



**The Wadden Sea,
Germany and Netherlands (N1314) –
Extension Denmark and Germany**

– Volume One –



Colophon

Compilation and Layout
Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany

Cover photos
S. Tourgaard - The Danish Wadden Sea
R. Czeck - Harbour porpoise in Niedersachsen

Binding
Besemann, Wittmund

Wilhelmshaven, December 2012

Common Wadden Sea Secretariat (CWSS)
Virchowstr. 1, D-26382 Wilhelmshaven
phone +49 (0)4421 9108-0
fax +49 (0)4421 9108-30
info@waddensea-secretariat.org
www.waddensea-secretariat.org



Foreword

We are pleased to submit the nomination to extend the Wadden Sea World Heritage to include the Danish Wadden Sea and an area offshore of the German Wadden Sea in Niedersachsen.

We are delighted to put forward this extension for inscription into the World Heritage List, because it is consistent with the decision of the World Heritage Committee when the Dutch-German Wadden Sea was inscribed on the World List in June 2009 to *"encourage the State Party of Denmark to submit a nomination of the Danish part of the Wadden Sea as soon as feasible to extend and complement the existing property"*. However, more importantly we are delighted to offer a nomination that will, if approved, complete a process to encompass the entire Wadden Sea, thus, addressing ecological integrity; one of the central criteria of the Convention. It will constitute a uniquely tri-national inscribed natural World Heritage property. It will strengthen, reinforce and enhance our generation long efforts to protect, conserve and manage the Wadden Sea as the

World's largest tidal barrier island system and a property shared between us for the benefit of present and future generations.

The inscription of the Dutch-German Wadden Sea on the World Heritage List has engendered enormous pride and received amazing support. It has been embraced by virtually all stakeholders in the Wadden Sea region. It has released an incredible amount of additional activity which has reinforced the management of the property, raised the profile of the area, created synergies and new partnerships, and brought new benefits and opportunities to the region in accordance with the aims of the World Heritage Convention. We are convinced that the extension with the Danish part will help reinforce what we have already embarked upon and will significantly contribute to the implementation of the Convention nationally and internationally. We are determined to meet our responsibilities to manage this precious heritage on behalf of the World community.



Marianne Jelved, Minister of Culture, Denmark



Ida Auken, Minister for the Environment, Denmark



Peter Altmaier, Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Germany



Sharon Dijksma, Minister for Agriculture, The Netherlands



David McAllister, Prime Minister of Niedersachsen, Germany



Torsten Albig, Prime Minister of Schleswig-Holstein, Germany



Olaf Scholz, First Mayor of the Free and Hanseatic City of Hamburg, Germany

EXECUTIVE SUMMARY	7
1. IDENTIFICATION OF THE PROPERTY	13
1.a Country	13
1.b State, province or region	13
1.c Name of property	13
1.d Geographical coordinates to the nearest second	13
1.e Maps and plans, showing the boundaries of the nominated property	14
1.f Area of nominated property	19
2. DESCRIPTION OF THE PROPERTY	21
2.a Description of the property	21
2.b History and development: A Wadden Sea of change	77
3. JUSTIFICATION FOR INSCRIPTION	87
3.1.a Brief synthesis	87
3.1.b Criteria under which inscription is proposed	87
3.1.c Statement of Integrity	94
3.1.d Protection and Management Requirements	96
3.2 Comparative analysis	97
3.3 Proposed statement of outstanding universal value	99
4. STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY	103
4.a Present state of conservation	103
4.b Factors affecting the property	118
(i) Development pressures	118
(ii) Environmental pressures (e.g., pollution, climate change, desertification)	121
(iii) Natural disasters and risk preparedness (earthquakes, floods, fires, etc.)	123
(iv) Visitor/tourism pressures	124
(v) Number of inhabitants within the property	126
5. PROTECTION AND MANAGEMENT OF THE PROPERTY	127
5.a Ownership	127
5.b Protective designation	127
5.c Means of implementing protective measures	136
5.d Existing plans related to municipality and region in which the proposed property is located (e.g., regional or local plan, conservation plan, tourism development plan)	140
5.e Property management plan or other management system	143
5.f Sources and levels of finance	147
5.g Sources of expertise and training in conservation and management techniques	148
5.h Visitor facilities and statistics	149
5.i Policies and programmes related to the presentation and promotion of the property	152
5.j Staffing levels (professional, technical, maintenance)	152
6. MONITORING	155
6.a Key indicators for measuring state of conservation	155
6.b Administrative arrangements for monitoring of the property	158
6.c Results of previous reporting exercises	158
7. DOCUMENTATION	161
7.a Photographs, slides, image inventory and authorization table and other audiovisual materials	161
7.b Texts relating to protective designation, copies of property management plans or document management systems and extracts of other plans relevant to the property	161
7.c Form and date of most recent records or inventory of property	161
7.d Address where inventory, records and archives are held	162
7.e Bibliography	162

8. CONTACT INFORMATION	167
8.a Preparer	167
8.b Official local institution/agency	167
8.c Other local institutions	168
8.d Official Web addresses	169
9. SIGNATURES	171

ANNEXES

- 1 List of Wadden Sea fish species.
- 2 List of Wadden Sea bird species.
- 3 List of endemic salt marsh species.
- 4 The Wadden Sea Quality Status Report 2009. Marencic, H. and de Vlas, J. (Eds.), 2009. Wadden Sea Ecosystem No. 25. (only on DVD)
- 5 The Wadden Sea Quality Status Report – Synthesis Report 2010. Wolff, W.J, Bakker, J.P., Laursen, K. and Reise, K., 2010. Wadden Sea Ecosystem No. 29.
- 6 Sylt Declaration and 2010 Joint Declaration. 11th Trilateral Governmental Conference on the Protection of the Wadden Sea, Westerland/Sylt, 18 March 2010.
- 7 Administrative Agreement 2010 on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea.
- 8 Agreement on the Conservation of Seals in the Wadden Sea according to Article 4 of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention), 1990.
- 9 Trilateral Wadden Sea Plan 2010.
- 10 German Federal Nature Conservation Act, § 30 Legally Protected Biotopes, February 2012.
- 11 Act on the National Park "Niedersächsisches Wattenmeer", amended February 2010.
- 12 Danish Nature Protection Act, LBK nr 933 of 24/09/2009.
- 13 Danish Statutory Order on Nature Conservation and a Nature Reserve in the Wadden Sea, Statutory Order BEK nr 867 of 21/06/2007.
- 14 Danish Act on National Parks, LOV nr 533 of 06/06/2007.
- 15 Danish Statutory Order on National Park Wadden Sea, BEK nr 1159 of 30/09/.
- 16 Danish National Park Plan Wadden Sea 2013 – 2018. (only on DVD)
- 17 Designation of the Wadden Sea as Particularly Sensitive Sea Area (PSSA) by the International Maritime Organization, 2002.
- 18 Regional declarations supporting the nomination.
- 19 Image inventory list.
- 20 40 topographical maps of the property, scale 1:50,000.
- 21 DVD with photographs, GIS data, topographical maps and all documents.

Executive Summary

State parties

Denmark and Germany.

State, province or region

Denmark: The municipalities of Tønder, Esbjerg, Fanø and Varde.

Germany: Federal state of Niedersachsen .

Name of property

"THE WADDEN SEA"

Geographical coordinates to the nearest second

The geographical coordinates to the nearest second are in Table S1.

Textual description of the boundaries of the nominated property

The nominated property encompasses basically the Danish Wadden Sea Conservation Area and an offshore extension of the Niedersachsen Wadden Sea National Park. The nominated Danish Wadden Sea World Heritage property covers an area of 1,238.7 km² and the Niedersachsen extension an area of 406.3 km².

The nomination of the Danish Wadden Sea for inscription in the World Heritage List is an extension of the Dutch–German Wadden Sea World Heritage property inscribed in the List in 2009 and in response to the decision of the World Heritage Committee on the inscription of the property to

"encourage the State Party of Denmark to submit a nomination of the Danish part of the Wadden Sea as soon as feasible to extend and complement the existing property". Furthermore, on the occasion of the minor boundary modification of the property to include the Hamburg Wadden Sea National Park, the World Heritage Committee "encourages the State Parties to continue to strengthen their transboundary collaboration in managing the property, and with the State Party of Denmark, and to consider the potential for nomination of an extension of the property to include the Danish Wadden Sea, taking account of the Committee's recommendations at the time of inscription of the property on the World Heritage List."

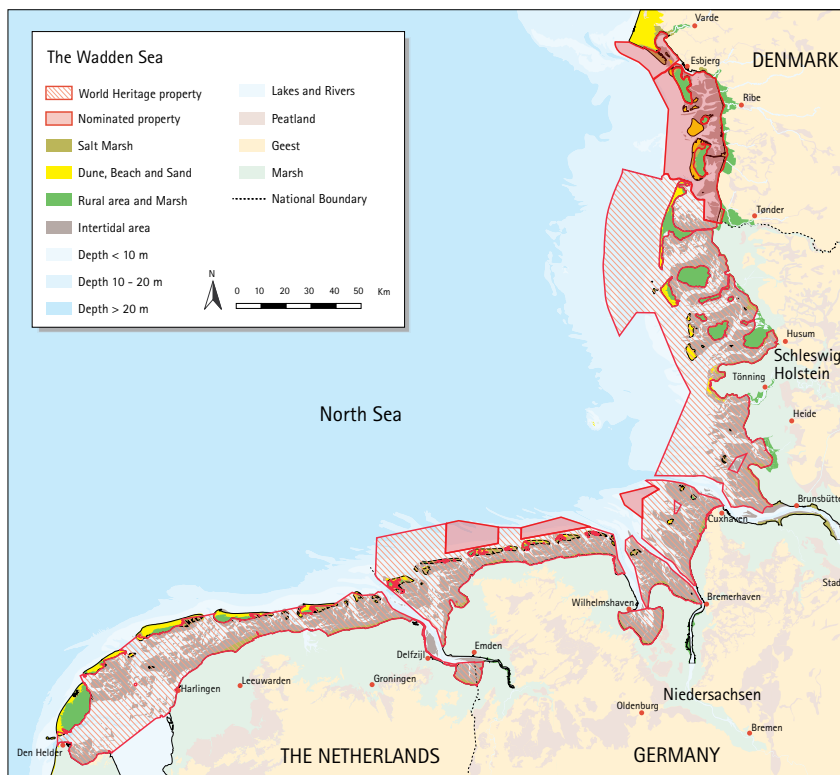
On the inscription of the Danish part of the Wadden Sea and the German (Niedersachsen) extension the property will cover an area of 11,456.1 km².

The Danish Wadden Sea Conservation Area as designated by Statutory Order on the Nature and Wildlife Reserve Wadden Sea, 1982 and later amendments, which is part of the overall trilateral Conservation Area, is delimited landwards and on the three inhabited islands Rømø, Mandø and Fanø by the sea walls, or where the sea walls are absent the highest daily water level including high sands and state owned parts of the islands, and the land reclamations. Offshore the nominated property is delimited by the 3 nautical sea mile boundary. The state boundary between Denmark and Germany constitutes the southern boundary of the nominated property. In the north, the nominated

Component Part	Name	Country	Coordinates of Centre Points	Size in hectares	Map No. 1:50,000
001	Key Planning Decision (PKB) Wadden Sea, part I	Netherlands	53° 23' 27" N 05° 39' 57" E	247,386	NL3/18 - NL18/18
002	Key Planning Decision (PKB) Wadden Sea, part II	Netherlands	53° 22' 00" N 06° 53' 47" E	790	NL1/18 - NL3/18
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	Netherlands / Germany	53° 16' 31" N 07° 09' 49" E	8,931	NL1/18 D17/19
004	National Park Wadden Sea Niedersachsen, part II	Germany	53° 41' 44" N 07° 19' 57" E	199,026	D15/19 - D19/19
005	National Park Wadden Sea Niedersachsen, part III	Germany	53° 37' 40" N 08° 15' 50" E	49,134	D13/19 - D14/19
006	National Park Wadden Sea Niedersachsen, part IV / National Park Wadden Sea Hamburg	Germany	53° 53' 03" N 08° 22' 06" E	80,663	D11/19 - D13/19
007	National Park Wadden Sea Schleswig-Holstein / Danish Wadden Sea Nature and Wildlife Reserve, part I	Germany / Denmark	54° 36' 31" N 08° 27' 59" E	539,742	D1/19 -D10/19
008	Danish Wadden Sea Nature and Wildlife Reserve, part II	Denmark	55° 29' 56" N 08° 11' 14" N	19,937	DK1/3 - DK3/3
	Total Property			1,145,609	

Table S1: Coordinates of the centre points of the component parts of the inscribed and nominated property. Component parts with the offshore extension of the Niedersachsen Wadden Sea and the nominated property in the Danish Wadden Sea are shaded in red.

Figure S1:
Map of the World
Heritage property and the
nominated property



property includes the peninsula of Skallingen and the Ho Bay. Some of the state owned parts of the islands such as the beaches of Rømø are included in the nominated property including the Margrethe Kog in the southern part, which was reclaimed in 1982.

The nominated property does not include the shipping lane to Esbjerg, which is not designated as a Natura 2000 area, the military exercise area the island of Rømø in conformity with the exclusion of similar exercise areas of the existing property, a very small area around the Rømø harbour for which a planning license has been granted in conjunction with an environmental assessment according to Art. 6 of the Habitats Directive and a small area in Margrethe Kog north.

The nominated property includes all habitats which belong to the Wadden Sea – salt marshes, tidal areas including the tidal inlets, channels and gullies, beaches and offshore areas and the Nature and Wildlife Reserve protects and conserves the ecological processes and its flora and fauna. Within the protection regime, the nominated property is comprised of different protection zones. The zones providing the strictest protection are e.g. the main haul-out sites for harbour seals and high water roosts and breeding sites for birds. These areas are closed for access the whole or part of the year. Outside these strictly protected areas, admission and use of the area

is allowed, basically on the condition that such activities do not adversely affect the area and its ecological and landscape values. In addition, several activities are regulated in time and space. The nominated property is consistent with the 2009 inscribed Wadden Sea World Heritage which also covers the area of the trilateral Wadden Sea Conservation Area.

The German (Niedersachsen) extension of the property covers the offshore area off the East Frisian Islands and the Elbe-Weser triangle. The proposed extension modifies the boundaries of the German (Niedersachsen) part to basically align with the extension of the Niedersachsen National Park in 2010 to include offshore areas important for the protection of the sea birds and marine mammals in particular harbour porpoise. The main shipping lane of the Jade-Weser approach, the Traffic Separation Scheme (TSS) and an area of commercial sand extraction on the northern edge of the Elbe-Weser triangle have been excluded from the nominated property.

The Wadden Sea Plan 2010, as outlined in chapter 5.e, is valid for the Trilateral Wadden Sea Cooperation Area, in short the Wadden Sea Area. The Wadden Sea Plan fully applies to the nominated property.

The purpose of a buffer zone according to paragraph 104 of the Operational Guidelines is to provide an extra layer of protection to the

property. The size of the nominated property, the scope and span of the regulations in place and international agreements and regulations, both in space and scope, ensure the integrity of the nominated property and fully meet the intent of paragraph 104 of the Operational Guidelines. The EC Habitats Directive stipulates e.g. that any plan or project, either within or outside of the nominated property, likely to have a significant effect on it shall be subject to appropriate assessment of its implications for the site. Therefore, a buffer zone to the nominated property has not and will not be designated. This approach is fully consistent with the approach for the Wadden Sea World Heritage property as inscribed on the List.

Justification. Statement of Outstanding Universal Value

The Wadden Sea forms the largest unbroken system of tidal sand and mud flats worldwide with natural dynamic processes proceeding in a widely unimpaired natural state. It is one of a kind on earth. The Wadden Sea ecosystem represents one of the most important international wetland habitats that provide the basis for exceptional high biological production, species diversity and a high degree of ecological specialization and potential for adaptation.

It is an outstanding example of the ongoing Holocene development of a sandy coast under conditions of rising sea level and is unique in that it is the largest extensive tidal flat and barrier island depositional system in the World. Its geological and geomorphological features are closely entwined with biophysical processes and provide an invaluable record of the ongoing dynamic adaptation of coastal environments to global change. The biogeomorphological interactions are notably strong and unique at all scales.

The high primary and secondary production in the Wadden Sea sustains species of birds, fish and crustaceans and seals well beyond its borders. The rich and diverse habitats are of outstanding international importance as an essential habitat for migratory water birds using the East Atlantic Flyway and other migration routes between South Africa, Northeast Canada, and northern Siberia.

It is considered one of the most important areas for migratory birds in the world, and is connected to a network of other key sites for migratory birds. Its importance is not only in the context of the East Atlantic Flyway but also in the critical role it plays in the conservation of African-Eurasian migratory waterbirds. In the Wadden Sea up to 6.1 million birds can be present at the same time, and an average of 10-12 million pass through it

each year.

The mosaic of natural phenomena, including the complex geomorphological features and biologically diverse and rich habitats, the unparalleled vastness and expanse in terms of the spatial dimension and the millions of migratory birds passing through in spring and autumn, combine to form an exceptional and beautiful land and seascape.

The nominated property encompasses all the biophysical and ecosystem processes that characterise a natural and sustainable Wadden Sea. The standards of protection, management, including coastal protection measures, and monitoring ensure that the natural Wadden ecosystem, with all its component parts, will continue to evolve naturally and to sustain human uses. Man's use of the natural resources in a sustainable way, including small-scale traditional uses, is a key to help guarantee its integrity for generations to come.

Criteria under which the property is nominated

By decision 33 COM 8B.4 "The Wadden Sea, Germany and Netherlands" was inscribed on the World Heritage List under natural criteria (viii), (ix) and (x). The nominated property is an extension of the already inscribed property and the natural criteria under which the latter was inscribed unreservedly apply to the nominated property:

Criterion viii: "be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features"

The Wadden Sea has evolved over the last 8,000 years being a very young ecosystem in geomorphological and evolutionary terms. It represents an outstanding example of the Holocene development of a temperate-climate sandy barrier coast under conditions of rising sea level. The Wadden Sea is unique in that it consists entirely of a sandy-muddy tidal system with only minor river influences on morphodynamics. The Wadden Sea ecosystem is characterised as tidal flats and barrier island system with extensive salt marshes. The Wadden Sea differs from other systems of this type in that it is the only tidal flat and barrier island depositional system of this scale and diversity in the World. There are no systems in the World that compare to the Wadden Sea.

The Wadden Sea contains very fine examples of post-glacial coastal geomorphology and the dynamic interaction of physical and biological processes on a scale that is not found within one unified system anywhere else in the world. Despite

man-made interventions the continuing presence of these dynamic natural processes ensures the development and rejuvenation of landforms including the whole range of habitats, and secures the maintenance of ecosystem functions. The Wadden Sea ecosystem will thus continue to serve as an important bio-physical reference for the study of the effect of sea level rise and it will be important to consider this function as a legitimate part of the World Heritage concept.

Criterion ix: "be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals"

The Wadden Sea is a unique coastal ecosystem with enormously productive marine biota and with linkages far beyond its narrow geographical boundaries. It is one of the last remaining natural large-scale inter-tidal ecosystems in Europe where natural processes continue to function in an undisturbed manner. Excellent and broad scale examples of biogeomorphological processes can be found in the coastal dunes, the salt marshes, and on the tidal flats on mussel beds and sea grass meadows. This transitional environment between land and sea is characterized by the constant change of flood and ebb tides, fluctuations in salinity, high temperatures during summer and occasional ice cover in winter. These circumstances have created numerous ecological niches, colonized by species that are adapted to the extreme environmental conditions.

The Wadden Sea is an ecological transition zone between land and ocean. With its estuaries, marshes and particularly its wide intertidal zone intersected by deep gullies, the Wadden Sea functions as a gigantic coastal filter system. Freshwater and marine waters are mixed and flushed to and fro with the tides, transporting huge amounts of sediments, organic matter and nutrients. These riverine and marine imports of materials form the basis of the trophic system. Imported organic material is mineralized in the marshes, tidal flats sediment and shallow waters. The release of nutrients from this spacious purification plant, together with those nutrients supplied from the catchment area and the Atlantic waters, fuels outstanding primary production. Due to the active biota, this filter never clogs but is continuously renewed.

Criterion x: "contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation"

The tidal flats in the Wadden Sea form the largest unbroken stretch of sand and mudflats worldwide, accounting for 60% of all tidal areas in Europe and North Africa. As such it is 'the only one of its kind' and many textbooks refer to the Wadden Sea when describing intertidal habitats and the rich and diverse flora and fauna they sustain. The tidal flats and the salt marshes form the largest coherent habitat of this type in Europe and constitute an essential element of the Wadden Sea ecosystem.

The Wadden ecosystem represents one of the internationally most important wetlands. It is internationally recognised as a biologically highly productive ecosystem of great natural, scientific, economic and social importance.

The Wadden Sea is extremely rich in environmental gradients and transitional zones, yielding many different (micro) habitats that form the basis for ecological specialization under extreme conditions. The salt marshes host about 2,300 species of flora and fauna. The marine and brackish areas support a further 2,700 species. In total it is estimated that the Wadden Sea Area provides habitats for up to 10,000 species of unicellular organisms, plants, fungi and animals.

The large size of the Wadden Sea allows the diverse species to survive by spreading over several habitats, or by adopting a series of niches over the course of time. This constantly opens up territory for use by other individuals or species, and accounts for a high capacity to accommodate migratory species.

The rich and diverse habitats are of outstanding international importance for birds as staging, moulting and wintering areas. According to the 1% criterion of the Ramsar-Convention, which is an internationally recognized measure to identify wetlands of international importance, the Wadden Sea is of outstanding international importance as a staging, moulting and wintering area for at least 52 populations of 41 migratory waterbird species that use the East Atlantic flyway and originate from breeding populations as far away as northern Siberia or Northeast Canada. Numbers of 44 populations of 34 species are so high, that the Wadden Sea is indispensable and often main stepping stone during migration, or as their primary wintering or moulting habitat. Therefore the Wadden Sea is essential for the existence of these bird species. A severe deterioration of the Wadden Sea implies a biodiversity loss on a worldwide scale.

Names and contact information of official local institution/agency

Denmark

Bent Rasmussen
Nature Agency
Skovridervej 3
DK - 6510 Gram
T +45 73 51 44 66
F +45 73 51 44 66
brasm@nst.dk

Jens Enemark
Common Wadden Sea Secretariat
Virchowstr. 1
D 26382 Wilhelmshaven
T +49(0)4421 91080
F +49(0)4421 910830
enemark@waddensea-secretariat.org

Germany

Dr. Christiane Paulus
Federal Ministry for the Environment, Nature
Conservation and Nuclear Safety
Head of Division N I 2
Habitat Protection, Natura 2000, Marine Nature
Conservation
Robert-Schuman-Platz 3
D 53175 Bonn
T +49(0)228 99 3052620
F +49(0)228 99 3052694
christiane.paulus@bmu.bund.de

Niedersachsen

Hubertus Hebbelmann
Ministry for Environment, Energy and Climate
Protection Niedersachsen
Archivstraße 2
D 30169 Hannover
T +49(0)511 1203382
F +49(0)511 120993382
hubertus.hebbelmann@mu.niedersachsen.de

Peter Südbeck
Wadden Sea National Park Authority of Lower
Saxony
Virchowstr.1
D 26382 Wilhelmshaven
T +49(0)4421 911270
F +49(0)4421 911280
peter.suedbeck@nlpv-wattenmeer.niedersachsen.de

1. Identification of the Property

1. IDENTIFICATION OF THE PROPERTY

1.a Country

Denmark and Germany.

1.b State, province or region

Denmark: The municipalities of Tønder, Esbjerg, Fanø and Varde.

Germany: Federal state of Niedersachsen.

1.c Name of property

"THE WADDEN SEA"

1.d Geographical coordinates to the nearest second

The geographical coordinates to the nearest second are in Table 1.1.

Component Part	Name	Country	Coordinates of Centre Points	Size in hectares	Map No. 1:50,000
001	Key Planning Decision (PKB) Wadden Sea, part I	Netherlands	53° 23' 27" N 05° 39' 57" E	247,386	NL3/18 - NL18/18
002	Key Planning Decision (PKB) Wadden Sea, part II	Netherlands	53° 22' 00" N 06° 53' 47" E	790	NL1/18 - NL3/18
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	Netherlands / Germany	53° 16' 31" N 07° 09' 49" E	8,931	NL1/18 D17/19
004	National Park Wadden Sea Niedersachsen, part II	Germany	53° 41' 44" N 07° 19' 57" E	199,026	D15/19 - D19/19
005	National Park Wadden Sea Niedersachsen, part III	Germany	53° 37' 40" N 08° 15' 50" E	49,134	D13/19 - D14/19
006	National Park Wadden Sea Niedersachsen, part IV / National Park Wadden Sea Hamburg	Germany	53° 53' 03" N 08° 22' 06" E	80,663	D11/19 - D13/19
007	National Park Wadden Sea Schleswig-Holstein / Danish Wadden Sea Nature and Wildlife Reserve, part I	Germany / Denmark	54° 36' 31" N 08° 27' 59" E	539,742	D1/19 - D10/19
008	Danish Wadden Sea Nature and Wildlife Reserve, part II	Denmark	55° 29' 56" N 08° 11' 14" N	19,937	DK1/3 - DK3/3
	Total Property			1,145,609	

Table 1.1: Coordinates of the centre points of the component parts of the inscribed and nominated property. Component parts with the offshore extension of the Niedersachsen Wadden Sea and the nominated property in the Danish Wadden Sea are shaded in red.

1.e Maps and plans, showing the boundaries of the nominated property

Figure 1.1 (left):
The North Sea region with
the Wadden Sea.



Figure 1.2 (right):
The Wadden Sea (A3 map
on the following page).

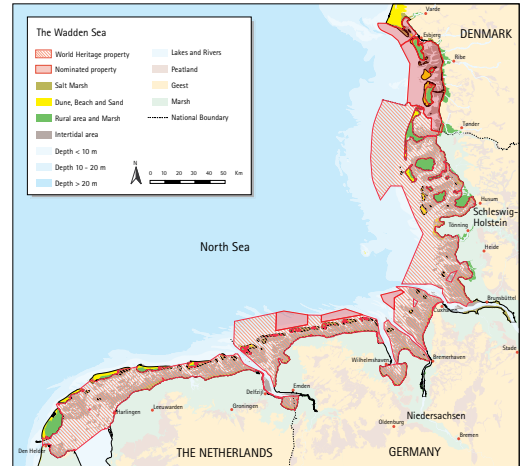
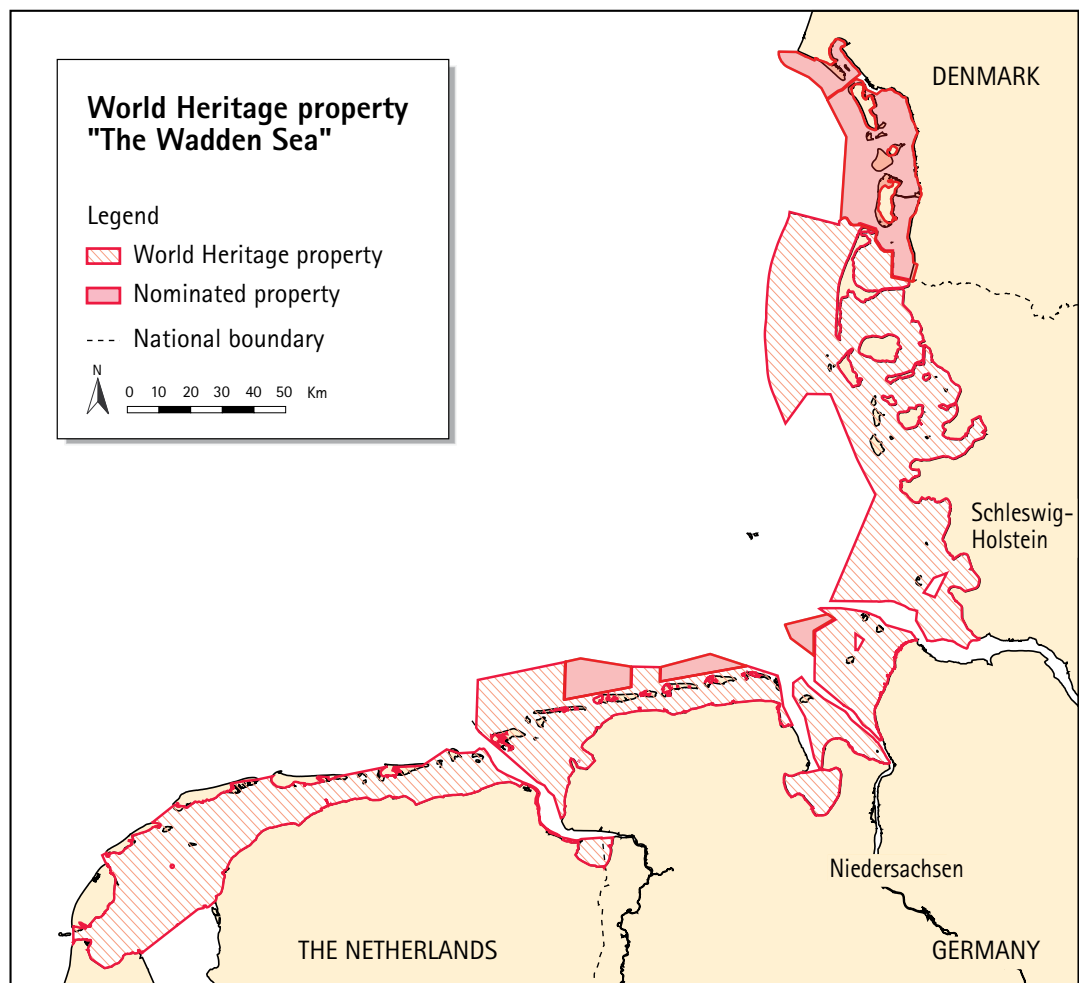


Figure 1.3:
The Wadden Sea World
Heritage and the nomi-
nated property



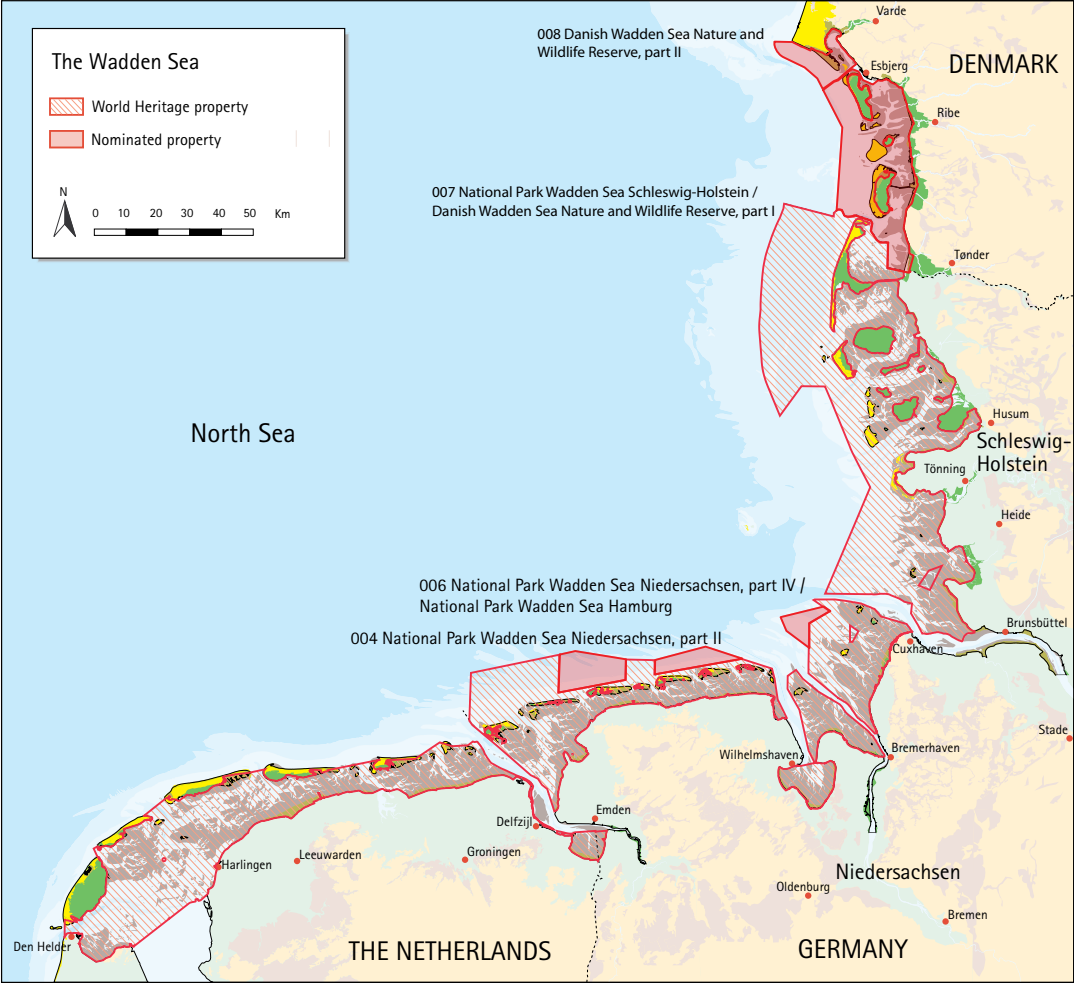
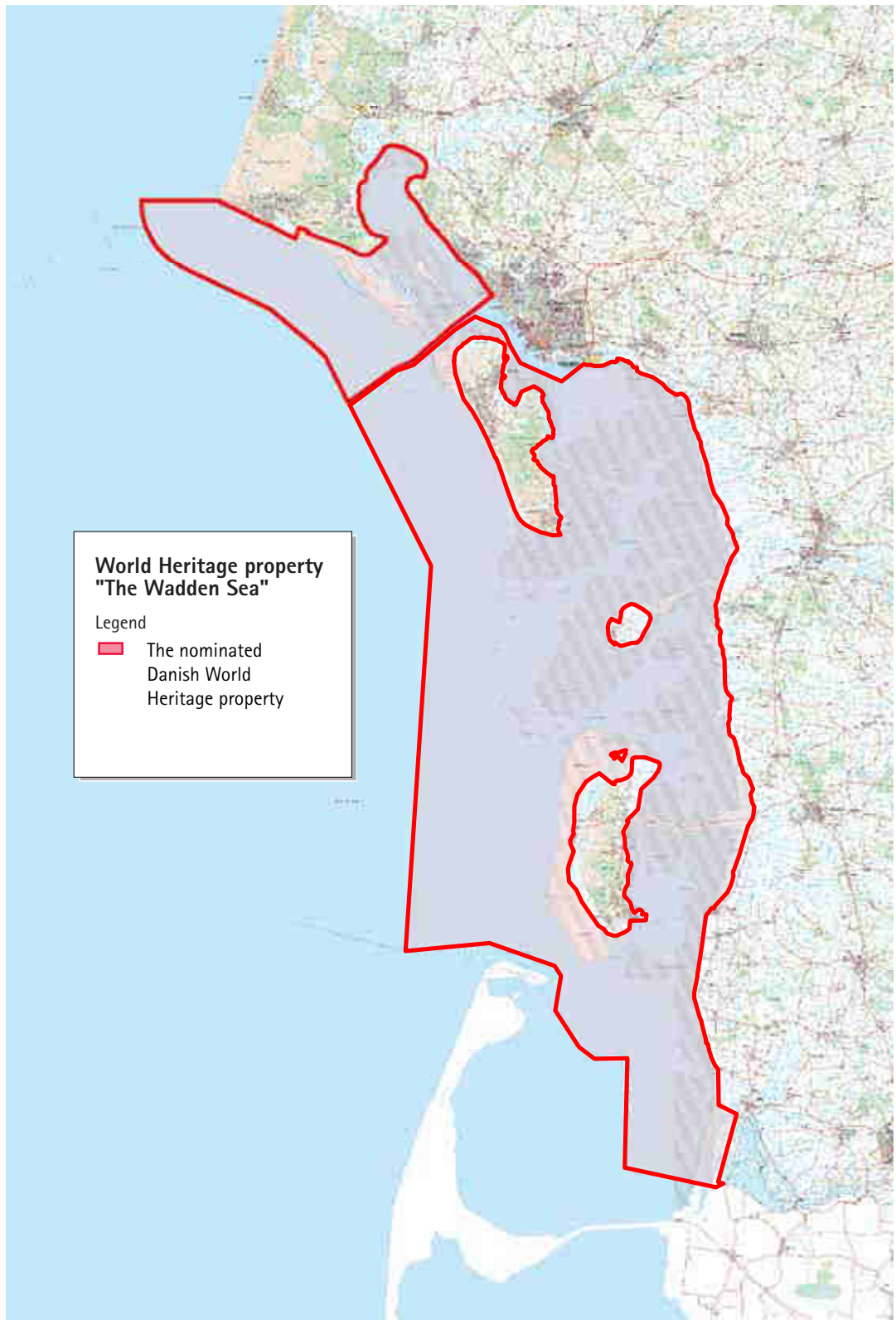


Figure 1.4: The Wadden Sea World Heritage and the nominated property.

Figure 1.5:
The nominated Danish
World Heritage property.



Component Part	Name	Prominent Points (see A3 map)	Latitude N	Longitude E
001	Key Planning Decision (PKB) Wadden Sea, part I	1.1	53° 33' 33"	06° 36' 03"
		1.2	53° 25' 47"	05° 25' 26"
		1.3	52° 57' 13"	04° 43' 15"
		1.4	53° 19' 16"	05° 45' 16"
		1.5	53° 27' 48"	06° 49' 58"
		Centre point	53° 23' 27"	05° 39' 57"
002	Key Planning Decision (PKB) Wadden Sea, part II	2.1	53° 27' 41"	06° 50' 32"
		2.2	53° 19' 03"	06° 59' 48"
		Centre point	53° 22' 00"	06° 53' 47"
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	3.1	53° 19' 05"	07° 14' 53"
		3.2	53° 18' 49"	07° 00' 46"
		3.3	53° 15' 58"	07° 04' 18"
		3.4	53° 13' 58"	07° 12' 32"
		Centre point	53° 16' 31"	07° 09' 49"
004	National Park Wadden Sea Niedersachsen, part II	4.1	53° 45' 11"	06° 34' 51"
		4.2	53° 37' 03"	06° 34' 51"
		4.3	53° 22' 08"	06° 59' 50"
		4.4	53° 34' 17"	07° 05' 14"
		4.5	53° 41' 02"	07° 28' 40"
		4.6	53° 38' 47"	08° 05' 29"
		4.7	53° 47' 08"	08° 01' 04"
		4.8	53° 50' 40"	07° 41' 45"
		4.9	53° 48' 13"	07° 27' 23"
		4.10	53° 49' 23"	07° 04' 29"
		Centre point	53° 41' 44"	07° 19' 57"
005	National Park Wadden Sea Niedersachsen, part III	5.1	53° 46' 58"	08° 07' 57"
		5.2	53° 30' 27"	08° 03' 34"
		5.3	53° 23' 26"	08° 12' 33"
		5.4	53° 31' 14"	08° 13' 53"
		5.5	53° 36' 35"	08° 19' 13"
		5.6	53° 32' 31"	08° 33' 30"
		Centre point	53° 37' 40"	08° 15' 50"
006	National Park Wadden Sea Niedersachsen, part IV / National Park Wadden Sea Hamburg	6.1	53° 57' 00"	08° 32' 10"
		6.2	53° 58' 49"	08° 12' 45"
		6.3	53° 55' 52"	08° 03' 09"
		6.4	53° 46' 25"	08° 11' 32"
		6.5	53° 36' 23"	08° 31' 19"
		6.6	53° 53' 19"	08° 41' 07"
		Centre point	53° 53' 03"	08° 22' 06"
007	National Park Wadden Sea Schleswig-Holstein / Danish Wadden Sea Nature and Wildlife Reserve, part I	7.1	55° 25' 24"	08° 13' 46"
		7.2	55° 19' 06"	08° 19' 06"
		7.3	55° 06' 04"	08° 02' 42"
		7.4	54° 30' 04"	08° 02' 20"
		7.5	54° 18' 06"	08° 28' 51"
		7.6	53° 59' 58"	08° 16' 03"
		7.7	53° 53' 29"	08° 59' 07"
		7.8	54° 31' 31"	08° 59' 08"
		7.9	54° 54' 02"	08° 38' 16"
		7.10	55° 09' 37"	08° 42' 05"
		7.11	55° 28' 58"	08° 22' 27"
Centre point	54° 36' 31"	08° 27' 59"		
008	Danish Wadden Sea Nature and Wild- life Reserve, part II	8.1	55° 33' 29"	07° 59' 00"
		8.2	55° 25' 34"	08° 13' 37"
		8.3	55° 29' 51"	08° 23' 37"
		8.4	55° 35' 46"	08° 16' 36"
		Centre point	55° 29' 56"	08° 11' 14"

Table 1.2:
Coordinates of prominent
points of the 8 compo-
nent parts of the inscribed
and nominated property.
Figure 1.4 shows the loca-
tion of the component
parts and the promi-
nent and centre points.
Component parts with the
offshore extension of the
Niedersachsen Wadden Sea
and the nominated prop-
erty in the Danish Wadden
Sea are shaded in red.
An A3 overview map in-
dicates the distribution of
the 40 detailed topograph-
ical maps 1:50,000 which
are in Annex 20.

The nominated property encompasses basically the Danish Wadden Sea Conservation Area and an offshore extension of the Niedersachsen Wadden Sea National Park. The nominated Danish Wadden Sea World Heritage property covers an area of 1,238.7 km² and the Niedersachsen extension an area of 406.3 km².

The nomination of the Danish Wadden Sea for inscription in the World Heritage List is an extension of the Dutch-German Wadden Sea World Heritage property inscribed in the List in 2009 and in response to the decision of the World Heritage Committee on the inscription of the property to "encourage the State Party of Denmark to submit a nomination of the Danish part of the Wadden Sea as soon as feasible to extend and complement the existing property". Furthermore, on the occasion of the minor boundary modification of the property to include the Hamburg Wadden Sea National Park, the World Heritage Committee "encourages the State Parties to continue to strengthen their transboundary collaboration in managing the property, and with the State Party of Denmark, and to consider the potential for nomination of an extension of the property to include the Danish Wadden Sea, taking account of the Committee's recommendations at the time of inscription of the property on the World Heritage List."

On the inscription of the Danish part of the Wadden Sea and the German (Niedersachsen) extension the property will cover an area of 11,456.1 km².

The Danish Wadden Sea Conservation Area as designated by Statutory Order on the Nature and Wildlife Reserve Wadden Sea, 1982 and later amendments, which is part of the overall trilateral Conservation Area, is delimited landwards and on the three inhabited islands Rømø, Mandø and Fanø by the sea walls, or where the sea walls are absent the highest daily water level including high sands and state owned parts of the islands, and the land reclamations. Offshore the nominated property is delimited by the 3 nautical sea mile boundary. The state boundary between Denmark and Germany constitutes the southern boundary of the nominated property. In the north, the nominated property includes the peninsula of Skallingen and the Ho Bay. Some of the state owned parts of the islands such as the beaches of Rømø are included in the nominated property including the Margrethe Kog in the southern part, which was reclaimed in 1982.

The nominated property does not include the shipping lane to Esbjerg, which is not designated as a Natura 2000 area, the military exercise area the island of Rømø in conformity with the exclu-

sion of similar exercise areas of the existing property, a very small area around the Rømø harbour for which a planning license has been granted in conjunction with an environmental assessment according to Art. 6 of the Habitats Directive and a small area in Margrethe Kog north.

The nominated property includes all habitats which belong to the Wadden Sea – salt marshes, tidal areas including the tidal inlets, channels and gullies, beaches and offshore areas and the Nature and Wildlife Reserve protects and conserves the ecological processes and its flora and fauna. Within the protection regime, the nominated property is comprised of different protection zones. The zones providing the strictest protection are e.g. the main haul-out sites for harbour seals and high water roosts and breeding sites for birds. These areas are closed for access the whole or part of the year. Outside these strictly protected areas, admission and use of the area is allowed, basically on the condition that such activities do not adversely affect the area and its ecological and landscape values. In addition, several activities are regulated in time and space. The nominated property is consistent with the 2009 inscribed Wadden Sea World Heritage which also covers the area of the trilateral Wadden Sea Conservation Area.

The German (Niedersachsen) extension of the property covers the offshore area off the East Frisian islands and the Elbe-Weser triangle. The proposed extension modifies the boundaries of the German (Niedersachsen) part to basically align with the extension of the Niedersachsen National Park in 2010 to include offshore areas important for the protection of the sea birds and marine mammals in particular harbour porpoise. The main shipping lane of the Jade-Weser approach, the Traffic Separation Scheme (TSS) and an area of commercial sand extraction on the northern edge of the Elbe-Weser triangle have been excluded from the nominated property.

The Wadden Sea Plan 2010, as outlined in chapter 5.e, is valid for the Trilateral Wadden Sea Cooperation Area, in short the Wadden Sea Area. The Wadden Sea Plan fully applies to the nominated property.

The purpose of a buffer zone according to paragraph 104 of the Operational Guidelines is to provide an extra layer of protection to the property. The size of the nominated property, the scope and span of the regulations in place and international agreements and regulations, both in space and scope, ensure the integrity of the nominated property and fully meet the intent of paragraph 104 of the Operational Guidelines. The

EC Habitats Directive stipulates e.g. that any plan or project, either within or outside of the nominated property, likely to have a significant effect on it shall be subject to appropriate assessment of its implications for the site. Therefore, a buffer zone to the nominated property has not and will not be designated. This approach is fully consistent with the approach for the Wadden Sea World Heritage property as inscribed on the List.

1.f Area of nominated property

The nominated property encompasses basically the Danish Wadden Sea Conservation Area and an offshore extension of the Niedersachsen Wadden Sea National Park and extends and complements the existing Wadden Sea World Heritage property, which basically encompasses the Dutch Wadden Sea Key Planning Decision Area, the German Wadden Sea National Parks of Niedersachsen, Hamburg and Schleswig-Holstein.

Component Part	Name	Size in hectares	Size in km ²
001	Key Planning Decision (PKB) Wadden Sea, part I	247,386	2,473.9
002	Key Planning Decision (PKB) Wadden Sea, part II	779	7.9
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	8,931	89.3
004	National Park Wadden Sea Niedersachsen, part II	199,026	1990.3
005	National Park Wadden Sea Niedersachsen, part III	49,134	491.3
006	National Park Wadden Sea Niedersachsen, part IV / National Park Wadden Sea Hamburg	80,663	806.6
007	National Park Wadden Sea Schleswig-Holstein / Danish Wadden Sea Nature and Wildlife Reserve, part I	539,742	5397.4
008	Danish Wadden Sea Nature and Wildlife Reserve, part II	19,937	199.4
	Total Property	1,145,609	11456.1

Table 1.3: Size and distribution of the inscribed and nominated property. Component parts with the offshore extension of the Niedersachsen Wadden Sea and the nominated property in the Danish Wadden Sea are shaded in red.



Low tide near Hjerpsted (Photo: National Nature Agency Vadehavet).

2. Description of the Property



System of tidal gullies in the Wadden Sea
(Photo: Martin Stock).

2. DESCRIPTION OF THE PROPERTY

2.a Description of the property ¹

The Wadden Sea is a coastal wetland of exceptional size, great beauty and richness in unique natural assets. It is one of the largest coastal wetlands in the world. Coastal wetlands are products of a post-glacial sea level rise by more than one hundred meters. These transitional zones between sea and land have been continuously shifting in size, shape and position over the last 16,000 years and will continue to do so. Although, in structure and function these wetlands resemble those of ancient coasts, they are in fact rather recent and highly dynamic features of the earth system. For this reason, existing coastal wetlands are not cradles of endemic organisms nor refuges for relicts of the past. Instead, they share biological species over a wide range of latitudes. This is a consequence of Holocene range extensions and wide physiological tolerance limits needed to survive in dynamic coastal environments. As

¹ Chapter 2.a is an update of the 2008 nomination document to include recent information in particular from the 2009 Wadden Sea Quality Status Report; separate chapters on the Danish Wadden Sea and the Niedersachsen extension have been added at the end of the chapter to inform the nomination.

a corollary, coastal wetlands are susceptible to biological invasions when species are translocated across oceans by human carriers.

Biota of coastal wetlands have a long evolutionary history of adaptations to coastal dynamics, frequent natural cataclysms and to the environmental extremes of the coastal zone. The physical environment of coastal wetlands is a great challenge to life. Favoured are either versatile organisms or specialists with a potential of wide dispersal. The latter is necessary in order to balance between frequent disappearances and new emergences elsewhere of their specific coastal habitat type. The net result of this evolutionary history is a rather small set of the world's species that can thrive in coastal wetlands. However, those which can are of a very special kind.

On the other hand, the outstanding plentitude of resources in coastal wetlands has given rise to an extraordinary biotic production. Via migrating and drifting organisms there is even an outreach far beyond the confines of the wetlands proper. The Wadden Sea is an indispensable hub along the East Atlantic flyway of coastal birds between northern and southern hemispheres. Its shallow waters are a nursery for finfish and various invertebrates of the entire coastal sea and even beyond.

The richness and exceptional productivity of

Figure 2.1:
Satellite image of the
Northeast Atlantic with the
North Sea region.



the biota in coastal wetlands has attracted people from early on with the benefit of combining marine, riverine and terrestrial food sources. With advancing technology, more and more of these wetlands have been separated from the sea and transformed into dry land. Also, the Wadden Sea has been to some extent subject to attempts at coastal conversion. However, it still has maintained the largest coherent area in the world with marine tidal sediments. These appear to be drenched land when the tide is out and a shallow sea when the tide is in. The Wadden Sea is a coastal sea shallow enough to wade across, hence the name *wadden* for tidal flats. The unique character and the outstanding vastness of these tidal flats with fringing salt marshes, beaches, dune islands and shoals and the spectacular abundance of wildlife form the basis for the designation as World Heritage Site.

Three decades ago, scientists of the Netherlands, Germany and Denmark provided a comprehensive review of existing knowledge on natural processes and human impacts in the Wadden Sea². This has provided a firm basis for environmental policies and management. The state of knowledge has been updated about every three years in proceedings of scientific symposia on the Wadden Sea environment³. The ecological quality status has been regularly assessed in reports

2 Wolff WJ (ed) 1983. Ecology of the Wadden Sea. Balkema, Rotterdam, The Netherlands.

3 Wolff WJ 2003. Ten international scientific Wadden Sea symposia in 25 years: what did we achieve? In: Wolff WJ *et al* (eds) Challenges to the Wadden Sea. Univ. Groningen, NL: 27-30.

since 1991 based mainly on the results of the Trilateral Monitoring and Assessment Program (TMAP) referred to in chapter 6^{4,5}. Together with workshops on selected topics such as sustainable coastal protection, salt marshes or trends in bird populations, this strong scientific dedication to the Wadden Sea provides a broad and solid basis for the following description.

In this chapter, the "Wadden Sea" refers both to the inscribed and nominated property as well as to the ecosystem in the broadest sense. In a few cases, it is necessary in the description of the geomorphology, hydrodynamics and habitats to make digressions beyond the confines of the inscribed and nominated property, because natural processes and, in particular, migratory organisms do not respect administrative boundaries.

The Wadden Sea contains the largest coherent tidal flat area in the world. It is spread out along the southern edge of a stormy shelf sea. From the land side, large rivers enter, which drain a continental area of the cold and moist temperate climatic zone in the northern hemisphere. This coastal transition is extremely flat, with its deepest and highest parts all within 50 m below and above mean sea level. The Wadden Sea was formed after a rapid post-glacial transgression and

4 Essink K *et al.* (eds) 2005. Wadden Sea Quality Status Report 2004. Wadden Sea Ecosystem No.19. Common Wadden Sea Secretariat, Wilhelmshaven, Germany

5 Marencic H. & de Vlas, J. (eds) 2009. Wadden Sea Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Wilhelmshaven, Germany

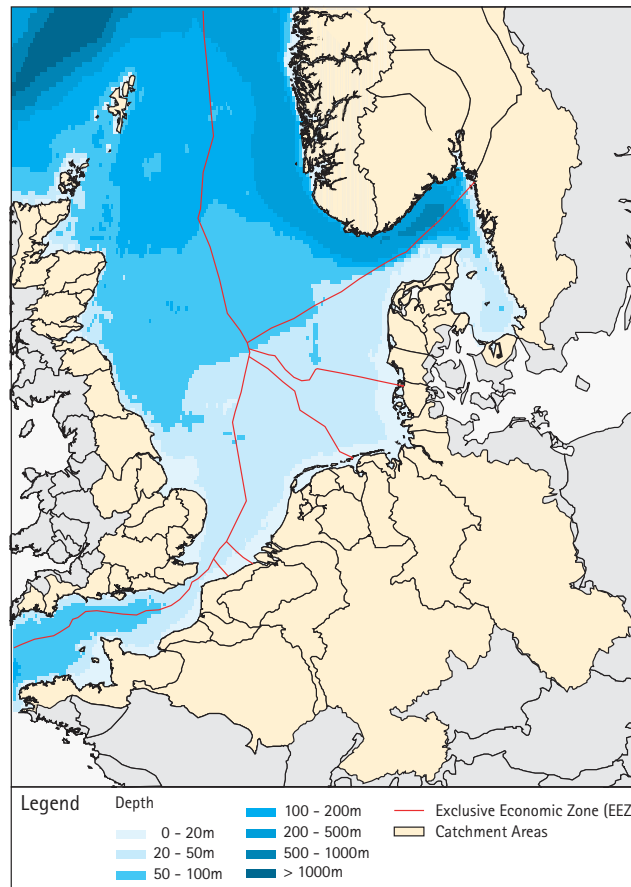


Figure 2.2:
Bottom topography and
catchment areas of the
Greater North Sea.
D = Dogger Bank
(Source: OSPAR, QSR
2004).

has remained highly dynamic in size and shape due to changes in sea level, tides, waves and strong winds. It consists of a dynamic mosaic of habitats with fringing brackish and marine marshes, estuarine and open coastal tidal flats, beaches, dunes, sand bars and barrier islands, tidal streams, inshore shallows and offshore waters. These together sustain a specific and diverse coastal flora and fauna.

The Wadden Sea is a gigantic coastal filter and an ecological hotline for biotic production and migrant animals. People have been living in the Wadden Sea area from the very beginning of this amphibious and dynamic landscape. Early settlers in the marshes built knolls (Terpen, Wierden, Wurten, Warften) to live upon. In a later phase, they claimed land by separating marshes from the sea with earthen walls (*dikes*). The coastal people affected flora and fauna by habitat transformations, the extraction of materials, and by hunting and fishing. However, the unique coastal landscape and seascape still resemble very much intact conditions, and the extraordinary flocks of coastal birds and the abundant seals are indicative of a thriving coastal ecosystem.

Physical environment

The inscribed and nominated property is an extremely shallow and elongated coastal margin, without a clear boundary between land and sea. Land lies in water and the sea moves over land. This land has been formed by the sea, and this sea is in perpetual tidal motion and at times stirred up by violent storms. The coastal climate is mainly determined by oceanic forces.

Geography

The northern oceans of the world are fringed by extensive shelf seas. On the Atlantic shelf of Western Europe, the North Sea is with 520,000 km² the largest shelf area (Fig. 2.1). To the west, it is connected with the Atlantic shelf through the English Channel and shielded from the North Atlantic basin by the British Isles. To the east, the Skagerrak connects it with the enclosed Baltic Sea. To the north, there is a wide transition to the deep Norwegian Sea. In the south, the North Sea meets the European continent, and here the shallow Wadden Sea comprises most of the coastline. It is linked to the ocean but located in the innermost part of one of its marginal seas.

The North Sea shelf area is an ancient continental drift depression, overlain by sedimentary deposits several kilometres thick. These originated from the surrounding land masses, and some of their strata contain large amounts of liquid and gaseous hydrocarbons, which are intensively exploited. The depth of the North Sea increases towards the Atlantic Ocean to about 200 m at the edge of the continental shelf. In the middle of the North Sea lies the shallow area of the Dogger Bank, where depths can be less than 20 m. This bank has a significant impact on the circulation in the southern North Sea and is an important fishing area.

The southern half of the North Sea is very shallow, mostly less than 50 m in depth, and here several large rivers debouch: Humber, Thames, Schelde, Maas, Rhine, Ems, Weser and Elbe (Fig. 2.2). These rivers cause oceanic salinity to be slightly depressed in the coastal waters and nutrient concentrations to be elevated. Many of these rivers developed inner deltas and outer estuarine funnels with extensive freshwater and brackish marshes which merge at the outer coast with salt marshes of marine origin.

The Wadden Sea is located right in the centre of the southeastern continental coastline of the North Sea, which stretches from Cape Cris Nez near Calais at the Strait of Dover over a length of 1,200 km to Skagen, the northern tip of Jutland at the Skagerrak. Within that sigmoid bended, sedimentary coast, the 500 km sector of the Wadden Sea is not an arbitrary unit but represents a natural entity. It is almost as self-contained as an island or a lake. This is primarily caused by a symmetric tidal regime. The Wadden Sea begins and ends at a tidal range just high enough for the formation of barrier islands sheltering tidal basins (mesotidal range). Adjacent coastlines at both ends exhibit a continuous sandy barrier without tidal basins but enclosed lagoons or land (microtidal range). The natural boundaries of the Wadden Sea are the Den Helder peninsula in the South and Skallingen peninsula with Blåvandshuk in the North. Tidal

range increases from both ends towards the centre. There the tidal range achieves macrotidal height and the chains of barrier islands and high sands fade. This hydromorphological symmetry gives the Wadden Sea the character of a natural coastal entity with a unique set of hydrological, geomorphological and ecological characteristics.

The shallow southern North Sea meets an extremely flat marshland in the Wadden Sea, only occasionally intersected by moderate elevations of glacial origin or of Holocene dunes. These elevations remain below 50 m in height. In the tidal inlets with strong scouring currents the depth rarely exceeds 50 m. Thus, over a length of 500 km of coastline and an average width of 250 km, the profile remains within the narrow vertical confines of about 100 m.

As a seaward limit of the Wadden Sea the - 15 m depth contour has been suggested which is parallel to but usually somewhat beyond the administrative boundary of the Wadden Sea. Selecting this depth contour is somewhat arbitrary anyway, but refers roughly to the boundary of an assumed coastal sediment exchange system, and coincides also with the seaward occurrence of some important seasonally migrating aquatic organisms of the tidal area. Coastal birds extend their feeding ranges rarely further offshore. Also, the landward limit of the Wadden Sea depends somewhat on the aspects in mind. Geomorphologically all the flat marshlands are included up to a maximum of 5 m above mean sea level. This is roughly equivalent to the widest transgression of the sea in the distant past and subsequent deposition of marine and fluvial sediments.

The long shore extent of the present Wadden Sea reaches to the Skallingen peninsula in Denmark and the Den Helder peninsula in the Netherlands. The coastline distance between these is roughly 500 km. The geomorphological width between seaward and landward boundaries may be up to 150 km in the estuaries but the average is only half of that. The Wadden Sea Area with its offshore parts is about 14,900 km², which com-

Table 2.1: Geomorphological region of the Wadden Sea Area with major subdivisions of the land- and seascape transition (km²).

Geomorphological region	Area (km ²)
Salt marshes	400
Intertidal sand and mud flats	4,700
Subtidal flats and gullies	3,700
Islands and dry sandy shoals	1,000
Offshore area (to about -15 m depth-line seaward of the islands)	5,100
Total Wadden Sea Area	14,900

prises a maritime zone from flat land to shallow waters (Tab. 2.1).

The tidal area is smaller. The long shore limits are the same, but the seaward boundary is defined as the line connecting all barrier islands and sand bars, and the landward boundary is the dike line or, in a few cases, Pleistocene cliffs beyond which the sea does not extend. This area is about 8,400 km², and of this, intertidal sediment flats comprise nearly half of the area.

This area of the Wadden Sea may be divided into three sub-regions:

- The *Southern Wadden Sea* extends from the Marsdiep tidal inlet in the west to the Jade inlet in the east. Twelve main islands form a seaward sandy barrier some 5 to 15 km off the mainland coastline and provide shelter to the tidal area against waves generated by northwestern and northern winds. Sediment supply from the sea is not sufficient to compensate sea level rise and barrier islands slowly shift in the direction of the mainland. A large embayment, the former brackish Zuiderzee (3,600 km²), was once part of the Southern Wadden Sea but became separated by a causeway in 1932 and was turned into a freshwater lake and agricultural land. Another embayment, the Dollard in the Ems estuary, still exists.
- The *Central Wadden Sea* extends from the Jade inlet to the Eiderstedt peninsula, and has three major estuaries: Weser, Elbe and Eider. Across the latter a storm surge barrier has been built, and Weser and Elbe have been partly transformed into deep shipping canals. Salinity is lower and more variable in the central sub-region than in the others, while tidal range is higher. A seaward chain of barrier islands is absent. Sediment supply from the sea locally even over-compensates sea level rise. With the Jadebusen a large embayment extends deep into the marshland.
- The *Northern Wadden Sea* extends from the Eiderstedt peninsula in the south to the Skallingen peninsula in the north. Eight islands and high sand bars form a seaward barrier some 5 to 25 km off the mainland coastline, and provide shelter against waves generated by the prevailing westerly winds. Several marsh islands are scattered across the tidal area and are remnants of a coherent marshland which became drowned in medieval times. Sediment supply from the sea is insufficient to compensate sea level rise, similar to the situation in the Southern

Wadden Sea. However, the most northern part benefits from an external sediment supply entering the shore from the North. Large estuaries are absent, while only in this part of the Wadden Sea cliffed glacial deposits occur at the shore.

Hydrology

A key feature of the hydrology of the southern shores of the North Sea is a continuous long-shore current from southwest to northeast (Fig.2.3). It is supplied with Atlantic water passing southward along the British east coast and eastward through the English Channel. These water masses merge west of the Wadden Sea, then continue as continental coastal currents following the coastline just seaward of the tidal area and finally adding

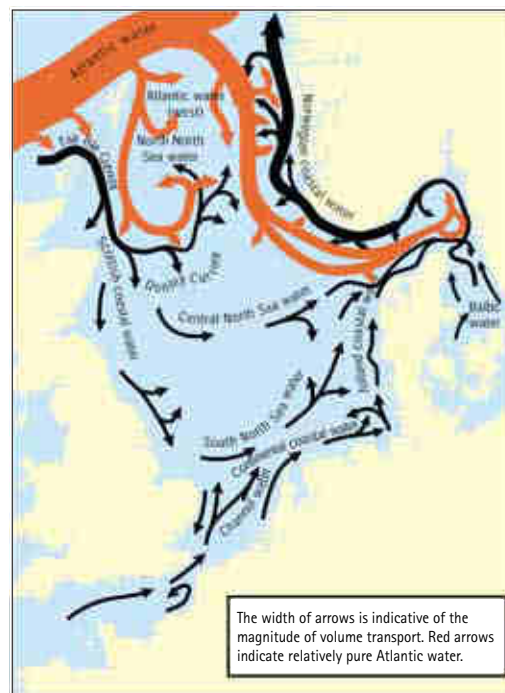
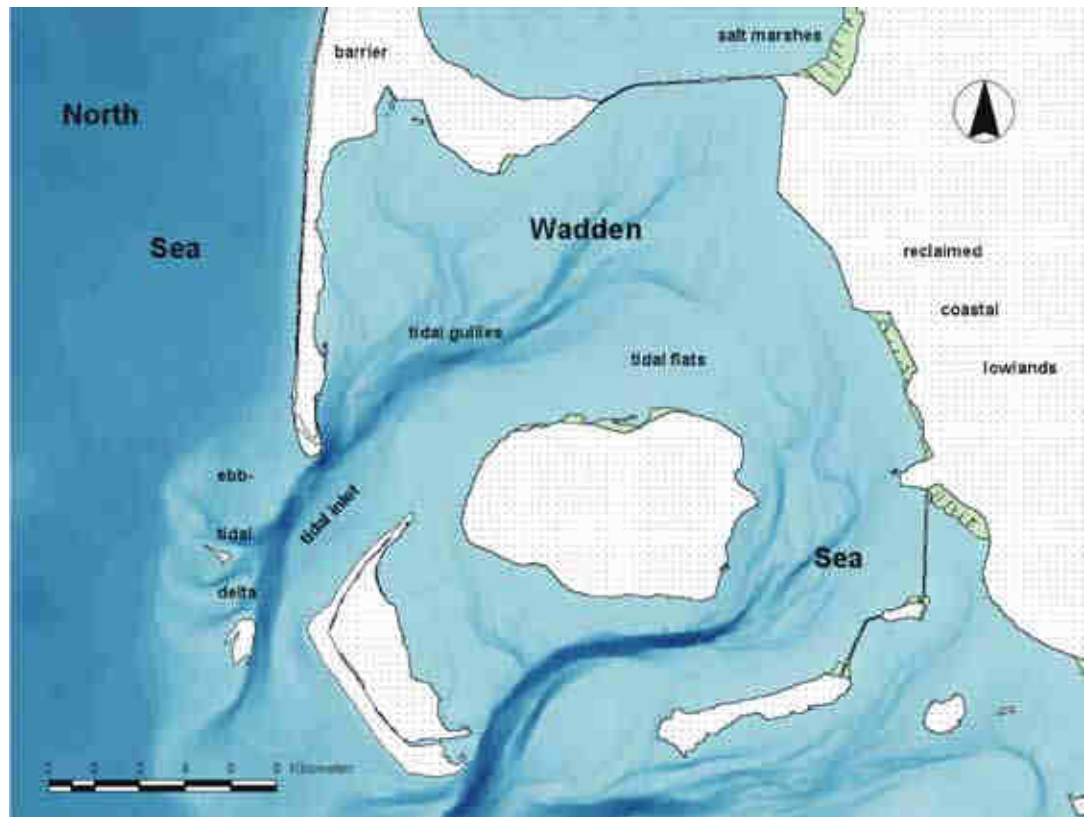


Figure 2.3:
Schematic diagram of
general circulation in the
North Sea (Source: OSPAR
Commission).

to the Norwegian Trench outflow back into the Atlantic. This coastal long-shore current takes up the river runoff of the Rhine and Elbe together with several smaller rivers. It is this mixed water body, which supplies the tidal area of the Wadden Sea and which is hydrologically a coherent part of the coastal long-shore current.

All rivers discharging directly into the waters of the Wadden Sea come from a catchment area of 230,000 km² with an annual discharge volume of 60 km³. Together with the Rhine and a few other rivers debouching adjacent to the Wadden Sea and affecting its waters, catchment area

Figure 2.4:
Geomorphological elements
of the Wadden Sea coast
(J. Hofstede; source: Wad-
den Sea Ecosystem No. 21).



and freshwater discharge approximately double. These rivers cause fluctuations in salinity. Usually, slightly lower average values occur in winter and spring and higher values in summer. This reflects the precipitation pattern of northwestern Europe. However, the riverine influence is not strong enough to categorize the entire Wadden Sea as an enlarged estuary. It is not an open oceanic coast either. The Wadden Sea holds a hydrologically unique intermediate position with three major hydrological characteristics:

- Salinity remains mostly between 20 to 30 psu, which is lower than oceanic waters (34) but higher and less variable than in most estuaries (0-20);
- Wave exposure is mitigated by a barrier of sandy islands, sand bars and shoals, while tides and frequent storms keep the waters in perpetual motion;
- Meso- to macrotidal (1.4 to 4.0 m mean tidal range) conditions in combination with an extremely gentle slope from land to sea expose the bottom of the sea over an average width of 15 km (range 5 to 25) and an area of 4,700 km².

A further distinctive hydrological feature of the Wadden Sea is the continuous series of tidal basins which are analogues to riverine catchment areas. However, they differ from these by

having alternating flow directions with the tides (Fig. 2.4). The existence of tidal basins is inter-related with the existence of barrier islands or high sands. Between adjacent islands, the tidal flow is compressed, forming tidal inlets up to 50 m in depth, scoured by strong currents. Behind the barrier islands most inlets furcate into major gullies (channels) and these branch into smaller and smaller tidal creeks or runnels in a recurrent fractal pattern. In the back-barrier area, flood waters of adjacent tidal inlets meet at tidal divides (watersheds). Seaward of tidal inlets, ebb deltas form with highly turbulent waters. Here ebb currents interfere with waves and the long-shore current. As a result, transported sand accumulates in the form of highly dynamic bars and shoals.

Altogether, a series of 35 such tidal inlets with their back-barrier basins and ebb deltas have been identified as recurrent features of the hydrography of the Wadden Sea. They are connected by some overflow across tidal divides in the back-barrier area and by the tidal flow and long-shore current seaward of the islands. Because of their lateral connections across watersheds, these tidal basins are different from coastal lagoons, which are a common feature of many other shores in the world. The regular pattern of tidal basins is interrupted by four major estuaries: Ems, Weser, Elbe and Eider. Their riverine runoffs add up with



Figure 2.5:
Mosaic of satellite images
of the period 2000-2002
(Source: Eurimage,
Common Wadden Sea
Secretariat & Brockmann
Consult).

the ebb flow. The resulting strong currents tend to displace ebb deltas by wide open funnels. These estuaries provide habitats of highly fluctuating and low salinities, in rare cases even freshwater tidal areas.

Tides are semi-diurnal (two ebb and two flood phases per day). Mean vertical ranges increase from 1.4 m in the southwest to almost 4 m in the Central Wadden Sea and decrease from there again to 1.5 m in the north. Twice a day tides move an average volume of 15 km³ of sea water into the tidal back-barrier area, where roughly the same volume remains in the subtidal zone, thus swelling up to some 30 km³ at high tide. This high exchange rate of tidal water masses secures the dominance of marine conditions in the back-barrier area. Tidal waves progress counter-clockwise within six hours through the Wadden Sea: when the tide is high in the southwest, then it is low in the northeast. Consequently, a single aerial image cannot show the full extent of tidal exposure. To show this, several images need to be combined (Fig. 2.5).

The effects of full and new moon phases on tidal range is only about 20% in the Wadden Sea.

Instead, strong onshore winds may increase high tides up to 4 m above normal high tide levels. Strong offshore winds may push low tides down to 1.5 m below normal low tide level. Corresponding to this asymmetry in modifying tidal heights, also the frequency of strong onshore winds is much higher than of strong offshore winds. Thus, tidal flats may often remain submerged over several days due to prevailing strong westerly winds, while continuous emergence over several tidal cycles caused by southern or eastern winds is rare. This further contributes to the dominance of marine conditions in the tidal zone.

Climate

With a latitude of 53° to 55° N, the Wadden Sea climate would resemble that of Hudson Bay, the Bering Sea or the Sea of Okhotsk in Siberia, if it were not for the warm water masses of the Gulf Stream that pass northwestern Europe and also penetrate into the North Sea. Climatically, the Wadden Sea region is more akin to the Gulf of Maine, Vancouver Island, the Sea of Japan or the

Yellow Sea, all between 40° and 50° N. Climatic conditions in the Wadden Sea are characterized by the interaction of humid maritime air masses coming from westerly directions, and dry continental air masses coming from the east. The eastward moving depressions originating in the North Atlantic dominate with their westerly winds. This explains rather mild winters and cool summers. The mean annual air temperature is around 8.5°C. The mean annual water temperature is about 9°C, with a summer average of 15°C and a winter average of 4°C. Extreme water temperatures of the last six decades were +23°C and -2.3°C in the tidal area.

In the tidal area, at least some ice cover was observed on an average of 19 days per year in the past. The tides prevent the development of a coherent ice sheet. They break it up and ice floes become piled upon each other, drifting to and fro, and being dragged across tidal flats, leaving trails and pits behind. Sediments in the high tidal zone may become frozen to a depth of a few centimetres. Occurrence of ice is very irregular between years and is more frequent in the Northern than in the Southern Wadden Sea.

In summer, the regular tidal exchange of water masses rarely allows water temperature to exceed 20°C, although in residual waters on the tidal flats up to 32°C have been measured on sunny days. During spring, shallow Wadden Sea water heats up faster than deeper North Sea water, while in winter North Sea water cools down slower than the shallow Wadden Sea water (Fig 2.6). Some fish and invertebrates respond to this seasonal reversal in temperature difference with inshore-offshore migrations to seek optimal conditions and avoid lethal extremes. Particularly in spring,

the early warming up of the shallow tidal waters facilitates reproduction and growth of tidal zone organisms. Conversely, cold spells in early winter initiate migrations from inshore to offshore.

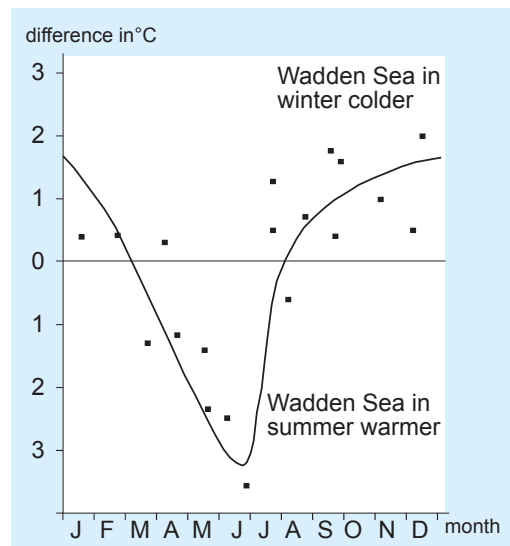
In spite of humid air from the sea, precipitation in the Wadden Sea region is moderate, with some 700 to 800 mm per year or roughly 2 mm per day. Clouds often pass the Wadden Sea, and rain comes down further inland where the terrain reaches higher elevations. Rainwater has little direct effects on the salinity in the tidal area. Indirect effects by river runoff are stronger.

In spring, a density driven circulation perpendicular to the shoreline starts with diluted and warmer water flowing near the surface in offshore direction, while near the bottom more marine and cooler water is flowing inshore. The latter transports significant amounts of suspended organic matter produced by planktonic microalgal blooms into the Wadden Sea. There it feeds the benthic fauna. When autumn cooling starts this transport ceases.

Of great importance for climate variation in the Wadden Sea are the North Atlantic oscillations between low air pressure in the north (Iceland) and high pressure in the south (Azores). This gradient in air pressure tends to be pronounced and is associated with strong westerly winds, cool summers and mild winters at the North Sea coast. However, this pressure gradient has shown an approximately decadal periodicity in the past. Periods with a steep pressure gradient and thus frequent storm surges, wet and mild winters alternate with periods of a weak gradient and thus continental climate with easterly winds and severe winters. These periodicities have been shown to affect abundances of marine organisms and migrations of birds.

The overall effect is a rather variable temperate climate. Moderate maritime conditions prevail and continental extremes are rare. Climate change scenarios predict the maritime dominance in winter to become even stronger, while summers may be subject to more continental influence. Thus, storminess and rain in winter may increase while freezing conditions may become exceedingly rare. Warming in spring may commence earlier and waters will attain higher temperatures in summer which then last longer in autumn. Sea level rise is expected to lag behind global atmospheric warming but will eventually have more serious consequences for the shallow and flat Wadden Sea. With more than half a meter of sea level rise by the end of this century, the size of the tidal flats could decrease by 15%.

Figure 2.6:
Seasonal development of water temperature in the Wadden Sea and North Sea (modified from: Het beheer van de Wadden 1985).





Megaripples on tidal flats
(Photo: Martin Stock).

Geology

The Wadden Sea is a sedimentary region. Tectonic activities do not threaten this coast. Neither volcanic eruptions nor serious earthquakes are expected. Since the Tertiary, the region has been part of a descending basin, gradually filling up with sediment of 1000 m thickness or even more. This pattern is only sporadically interrupted by uplifting domes of Permian salt. This phenomenon has given rise to a Triassic outcrop adjacent to the Wadden Sea, the rocky island of Helgoland. Similarly, on Sylt, one of the northern islands in the Wadden Sea, Tertiary layers have been lifted upwards.

Otherwise, the entire region of the Wadden Sea is composed of residues of the Quarternary glacial periods. Scandinavian glaciers have modulated and transported a variety of materials with origins spanning almost the entire history of the earth and deposited these mixed sands and stones in the Wadden Sea. Glaciers have passed over several times, carved valleys and left moraines as hills in the landscape, sometimes with large boulders grinded by ice. Also, riverine sediments from Scandinavia have become deposited in the area.

The current landscape and submarine seascape is almost a complete product of the last three glaciation periods and their interglacial phases, including the present one. Presumably, the past interglacials have given rise to coastal environments similar to the present Wadden Sea. At

least fossils indicate a marine fauna similar to the present one, and ancient cliffs and marine sediments show how far past interglacial seas have transgressed into the land.

The glacial front of the last glaciation, with its maximum 18,000 years ago, stopped just eastward of the present region of the Wadden Sea, which presumably was covered by tundra vegetation throughout that time. Sea level was down to 120 m below what it is now. With the onset of warming, sea level has risen rather fast and reached the present region of the Wadden Sea about 8,000 years ago. Then sea level rise slowed down from about one meter to 10 to 20 cm per century and the geomorphology of the Wadden Sea started to evolve.

Morphodynamics

The characteristic geomorphology of the Wadden Sea with mainland marshes, extensive tidal flats and a long chain of barrier islands developed gradually over the last 8,000 years and is still in motion. Its unique geomorphology is the product of a combination of five major past and ongoing processes: (1) Glaciations left a smooth relief of gentle valleys and hills where rivers found their course and which determined the general shape with a bend in the coastline at the mouth of the Elbe river from west-east to south-north in direction. (2) Post-glacial sea level rise entailed a progressively growing tidal range and gradually

enlarged the tidal area. (3) The southern North Sea basin supplied sediments to the region of the Wadden Sea, transported by long-shore currents, tides and waves. (4) Strong onshore winds have caused episodic floods of up to 4 m above normal high tides. These floods left conspicuous and lasting effects on the landscape. Strong onshore winds have also given rise to massive dunes on the barrier islands. (5) Large rivers which debouch near to or directly into the Wadden Sea have added fine sediments to the coast.

Together, these processes have created a dynamic and amphibious coastal land- and sea-scape with an extent of tidal flats which is nowhere else to be found in the world. In the last millennium the episodically flooded higher part of this coastal landscape became more and more transformed by human activities, while the tidal area remained very much the product of a natural interplay between a shallow sea and a flat land.

The valleys and trenches formed by the glaciers affected the course of the rivers IJssel, Ems, Weser, Elbe and Eider and the positions of the conspicuous estuaries. Glacial moraines form the core of the islands Texel, Föhr, Amrum and Sylt. Presumably there were some glacial relict islands seaward of the present Wadden Sea. Their erosion in the course of sea level rise probably served as an important source of sediment. Landward of the marshes, gentle moraines dominate the landscape. As remnants of past transgressions, some show former cliffs which provide magnificent platforms to view the marshes, the tidal area and islands. Some active cliffs occur in the Northern Wadden Sea, mainly on the island of Sylt and at the Danish mainland.

Changes in sea level have been most influential and will continue to be so. It is assumed that when post-glacial sea level rise slowed down 8,000 years ago, a seaward barrier of sand bars and long spits developed. Between this barrier and the glacial moraines, a back-barrier area of lagoons and marshes came into existence. At the feet of moraines, raised bogs developed. Alongside rivers, gallery forests grew up, while otherwise the landscape remained without trees because of episodic flooding by the sea.

With increasing tidal range, the outer sandy barrier broke up into a chain of barrier islands. Concomitantly, the tidal area grew larger at the expense of marshes. Sequences of preserved sediment layers indicate that the balance between marshes and tidal flats shifted back and forth as a result of variable sea level and sediment supply. The overall trend, however, was a rise in sea level. The chain of barrier islands gradually moved

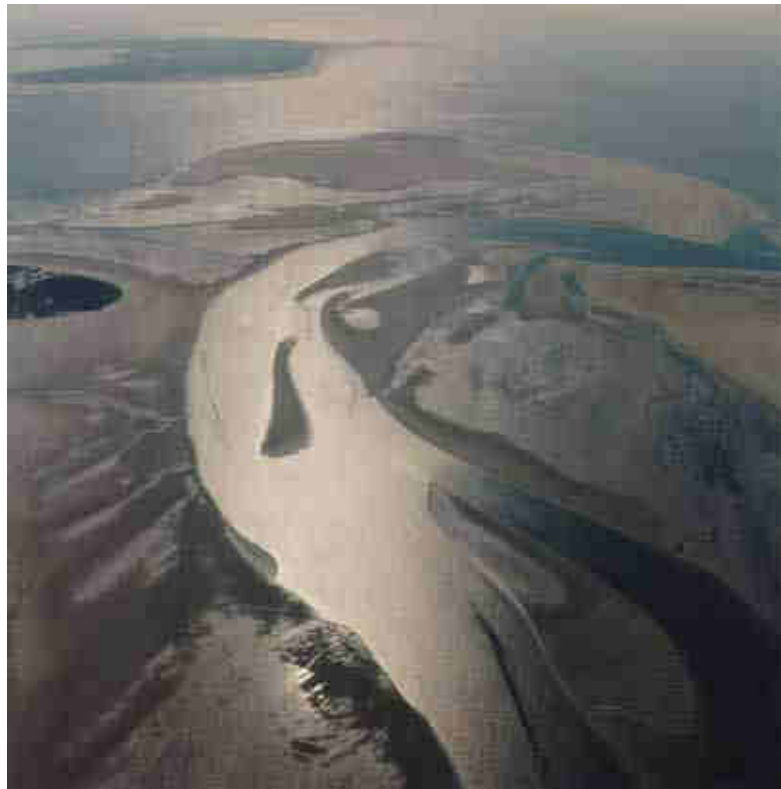
landwards and tidal inlets adjusted their cross sections to changing volumes of tidal waters. These dynamics are still ongoing and are expected to accelerate with more rapid sea level rise in the wake of global warming.

Long barrier spits are common at depositional coasts. They occur where average tidal ranges are less than 1.5 m. This is the case adjacent to the Wadden Sea along the Dutch coast and in northern Jutland. The peculiar chains of barrier islands in the southern and northern Wadden Sea are the consequence of tidal ranges between 1.5 to 3 m. Above 3 m no barrier systems persist. Maximum tidal current velocities in tidal inlets reach about 1.5 ms^{-1} at spring tides. These currents are sufficient to keep channels open in spite of sediment supply. In the Central Wadden Sea, major rivers debouch and tidal ranges tend to be higher than 3 m. Therefore the central part lacks barrier islands. Only small ephemeral islands do occur around mean sea level, surrounded by extensive tidal flats.

As remnants of formerly more extensive marshes, some marshy islands are interspersed in the tidal back-barrier area in the Northern Wadden Sea. Altogether there are at present some fifty islands and high sand bars, some of which are episodically flooded during storm surges. Marshy islands flooded during storm surges are called *Halligen*. Their vegetation consists of salt marshes and they grow upwards layer by layer when new deposits are added during flooding. Often the surrounding tidal flats do not grow up at the same pace. Then edge instabilities arise and the *Halligen* become eroded or have been protected by brushwood groins or stonewalls in response. Houses on *Halligen* have been built on mounds, as it was common practice in the entire marsh area of the Wadden Sea before dike building commenced. Such dwelling mounds are the only parts of the *Halligen* which remain above water during storm tides. These *Halligen* find no parallel elsewhere in the world.

Through the tidal inlets, sediments are moved from the outer coast into the tidal area and back again. The balance of this sand-sharing system varies with shape and size of tidal basins. Large back-barrier tidal basins have extensive ebbtidal deltas and deep tidal inlets. Usually less than half of the basin area is occupied by tidal flats. Small basins have small ebb deltas, shallow inlets and the share of intertidal flats is more than half of the area.

These hydrological and geomorphological relations are highly sensitive to sea level and variations in storminess. Accordingly, the geomorphology remains very dynamic. Small islands



Tidal flats and channels
(Photo: Hubert Farke).

emerge and others disappear in the course of the centuries. Islands populated until a few centuries ago and which have disappeared are Bosch and Buise in the Southern and Jordsand in the Northern Wadden Sea. New dunes on formerly bare high sands are recently developing on Kachelotplate in the Southern and Norderoogsand in the Northern Wadden Sea. There is little local stability but a high resilience of the general coastal configuration, which has persisted through the last millennia. However, there never was and still is no morphological equilibrium. Permanent change is the consequence of trends in sea level, tidal range and climate.

A shallow sea and a flat land also meet at other coasts of the world; however, the Wadden Sea has developed a unique geomorphology with its specific combination of physical factors and their interactions with the regional biota. This will be further detailed in the following paragraph and in the chapter on habitats.

Soils and Sediments

Natural rock formations do not occur in the Wadden Sea. Sediments prevail throughout the region; only some pebbles and a few boulders are scattered locally. The sand is of fluvial and glacial origin, redistributed by currents and waves in the southern North Sea. The fine clay fraction in the

sediments is thought to be primarily derived from recent riverine sources.

Sediments display a progressively shoreward-fining grain-size gradient. This gradient commences with shoals and sand flats in seaward sections, followed by mixed flats and, finally, mud flats fringing the mainland shore and sometimes occurring along tidal divides. Sandy tidal flats comprise 75%, mixed flats 18% and mud flats 7% of the back-barrier intertidal area. Almost all subtidal sediments are sandy. This dominance of sand is explained by the fact that the Wadden Sea is primarily created by relatively strong forces of the sea and a weak contribution by rivers.

Most of the supratidal marshes are composed of clay and peat of mainly terrestrial origin. The finer the sediments, the higher the biogenic share in their formation. In the salt marshes the retention capacity of the vegetation for fine particles is high. On mud flats, a bio-film of microalgae retains fine deposits. Also seagrass beds retain fine sediments, at least seasonally. Biogenic reefs of suspension-feeding molluscs locally enhance the mud content of sediments with their bio-deposits. Conversely, the abundant lugworms on the tidal flats of the Wadden Sea bioturbate the sediment and prevent fine-particulate accretion. These marine worms also contribute to the dominance of sandy tidal flats. Similarly, as Darwin described

the role of earthworms in the shaping of the landscape in England, lugworms shape the appearance of the tidal flats and the spatial relation between mud and sand flats in the Wadden Sea (see also under *tidal flats*).

Extensive molluscan shell beds which occur alongside tidal channels are a further biogenic contribution. These shells are a token of the high benthic filter-feeder production in the Wadden Sea. Together with a few stones and boulders, these shell beds provide the only natural hard substrate in an otherwise soft sediment environment.

Soil formation on sandy barrier islands is a slow process, because in the dry dunes the vegetation is scarce and often dominated by very slow-growing dry grassland or heather. Developing soils often become soon buried under sand blown in by the wind. In dune slacks, highly acidic soils occur with beginning peat formation. However, this remains insignificant because of the ephemeral nature of most dune slacks.

Salt marshes, on the other hand, may form clay soils of considerable magnitude and duration. Marsh soils grow upwards layer by layer with each inundation during spring-tides or tides amplified by strong onshore winds. The topography of salt marshes often shows a bewildering pattern of meandering creeks, irregularly shaped ponds and puddles, and the marsh surface is further diversified by a mosaic of vegetation types.

Deposits are supplied with waves from the sea. The seaward edges of salt marshes tend to grow faster and higher than the landward parts, because coarse-grained sediments deposit faster than alluvial mud particles. This process often generates inverted wedge-shaped salt marsh profiles. In salt marsh depressions soils become anoxic under water-logged conditions and vegetation may die back. Salt marsh puddles and ponds arise. These may become connected by creeks, which gradually become deeper and wider towards the tidal flats. Where adjacent tidal flats do not keep up with sea level rise as the salt marshes do with their sediment accretion, waves may attack salt marsh edges and cause erosion. This leads to salt marsh retreat and a possible advance of the tidal flats. Under sheltered conditions, the reverse process is initiated by pioneer plants growing into the upper tidal zone and trapping sediments where vegetation is getting dense.

In estuaries and landwards, salt marshes grade into brackish and freshwater reed marshes. The latter may also develop mangrove-like stands of willows, but this usually takes place outside the Wadden Sea upstream in the inner delta of estuaries. At such sites peat formation commences.

The most common peat is formed by the reed, *Phragmites australis*. It also dominates in clods of peat underlying tidal sediments or recent salt marshes. These have developed during a time of lower sea level, then became inundated, soaked with seawater and subsequently buried underneath marine deposits.

These fossil peat layers were excavated during medieval times on a large scale. The peat was dried, then burned and the salty ash was commercially exported. This provided a major income but also lowered the level of the terrain significantly. During storm tides much of these peat mining areas became inundated and then covered again with marine deposits. Particularly around the *Haligen*, traces of former peat mining are still visible and are now to be found in the tidal zone.

In the long term, much of the accumulated clay and peat became recycled. This is caused by the dynamic interplay between the advance of salt marshes into tidal flats by progressive salt marsh pioneer plants and by salt marsh retreat as an effect of wave erosion. The balance is sensitive to sea level, height of waves and the sediment supply. Hence, a shifting of shorelines back and forth in the course of centuries has been an inherent property of sheltered shores in the Wadden Sea. At the more exposed shores, shifts in shorelines are driven entirely by physical forces. This is the case at the seaward beaches of the barrier islands. Here, however, the salt marsh clay that had developed on the sheltered leeward side of the islands and then became overtopped by migrant dunes is finally showing up again at eroding seaward beaches as circumstantial evidence of a roll-over process in Wadden Sea dynamics.

Habitats

Habitats in the transition zone between the land and the sea are the product of intricate interactions between physical properties and biological activities. The spectacular dunes on the barrier islands give evidence to the ongoing contest between aeolian mobilization of sand and biotic stabilization. Salt marshes grow out of the sea by a dense vegetation trapping deposits during inundation, while at the same time waves erode the edges. Mussels attach to each other, accumulate sediments over the years and successively provide habitat to more and more species until in a severe storm or a winter with floes of ice scours it all away. Less obvious are the habitat maintaining activities of lugworms, which by their continuous recycling of surface sediments keep a sand flat sandy and prevent it from becoming

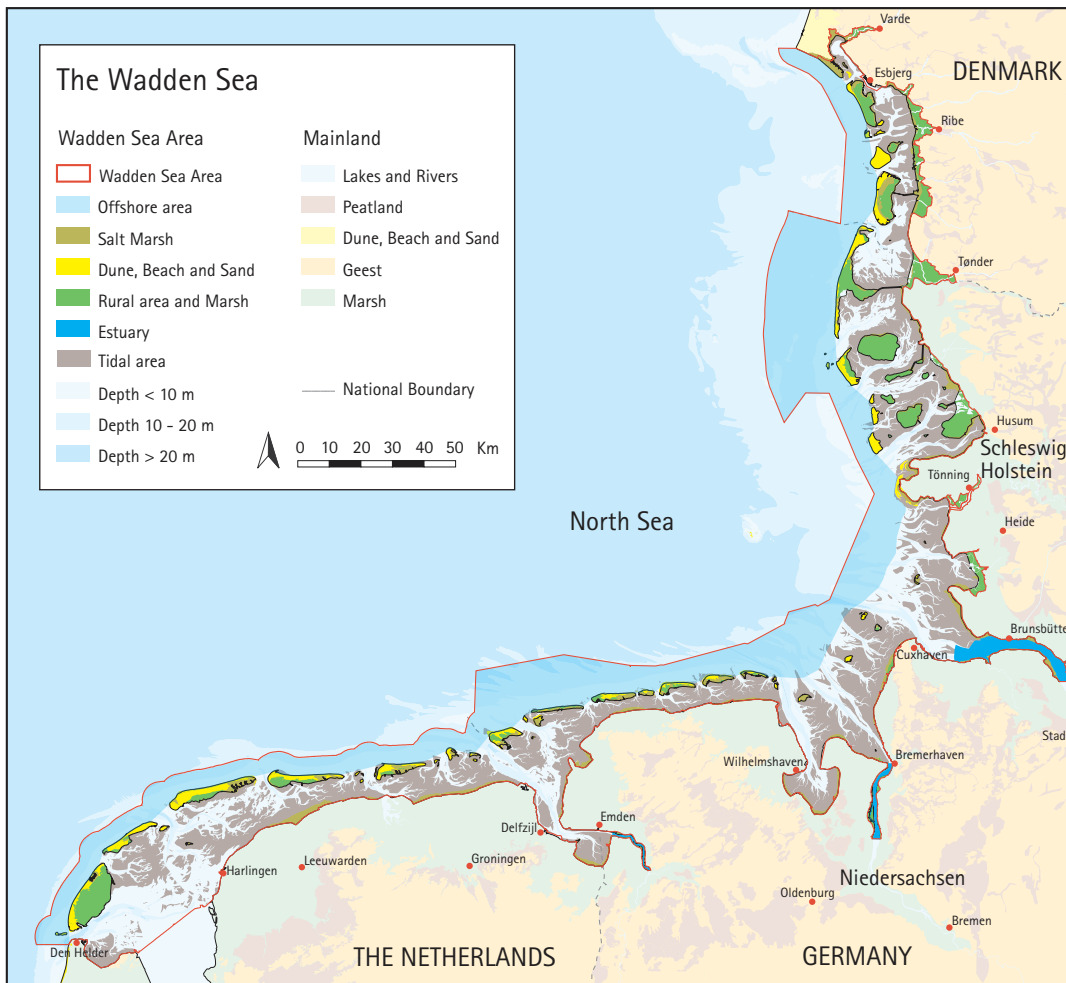


Figure 2.7:
Major habitats in the
Wadden Sea Area.

a mud flat. Without this secret work of worms, about 3,000 km² of rippled sand would be smooth and slimy.

The habitats of the Wadden Sea show in a fascinating way how in the biosphere an interplay between physical forces and biological activities generates conditions for life in a fragile balance. People can only grasp this in such a natural landscape, where the physical forces are strong, biological activities high, and the basic materials are soft sediments which readily change their configuration. This is strikingly exemplified in the Wadden Sea along an offshore-inshore gradient and from deep water up to the highest dunes (Fig. 2.7). The Wadden Sea provides a multitude of transitional habitats with tidal channels, sandy shoals, seagrass meadows, mussel beds, sandbars, mudflats, salt marshes, estuaries, beaches and dunes. In this chapter on habitats, the structure of the Wadden Sea Plan (see chapter 5) is adopted. According to that the 'offshore area' is not a habitat as such. However, there are characteristics which justify consideration as such in this chapter.

Offshore belt

The transition between the Wadden Sea and the North Sea may vary with regard to the aspect considered. In fact, there is a continuum between the characteristics of inshore and offshore areas, and the offshore part of the Wadden Sea is operationally defined here as the zone seaward of a line connecting the barrier islands and high sand bars, and extending into the North Sea down to the -15 m depth contour. This belt has no tidal flats and drops off rather smoothly towards the open North Sea but does not fully comply with it in terms of the biota present.

This *offshore* belt roughly comprises 6,000 km² and average water depth is around 10 m. Along the Southern Wadden Sea this zone varies between 10 and 25 km in width. In the Central and Northern Wadden Sea the offshore belt is wider and varies between 20 and 50 km. This transitional zone is only partially included in the inscribed and nominated property, which particularly extends seaward off the Ems estuary and off the islands of Sylt and Amrum. This offshore belt has to be taken

into account regardless of boundaries because physical processes and migrations of organisms reach across. The offshore zone is to a major extent within the Wadden Sea Area and hence also subject to protection and management in the context of the trilateral Wadden Sea Cooperation. Furthermore, the larger part of the offshore zone is subject to protection under the EU Habitats and Birds Directives and other international conventions such as the Ramsar Convention.

Hydrologically the offshore belt is part of the coastal long-shore current and cannot be considered to constitute a distinct water body. Due to the tides it exchanges an average volume of 15 km³ of water twice daily with the tidal area. This exchange is presumably several times more intense than the exchange with the open North Sea and adjacent coastal areas to the west and north. In terms of sediment, the offshore belt is part of a sand-sharing system with the barrier islands and tidal area. It is assumed that almost no sand is transported across the 15 to 20 m depth contour. However, this may happen during exceptionally heavy storms with waves affecting the bottom of the sea as far down as 50 m. Traces of such disturbances have been observed in the benthic fauna at such a depth. The regular sand-sharing system between the offshore belt and the islands, the outer sand bars and the tidal area is a vital condition for the resilience of the coastal system when responding to changes in tidal area and sea level and to disturbances caused by heavy storm tides.

The ecology of the tidal area and the open North Sea is intimately linked with the offshore belt. Phytoplankton blooms often commence in this zone. Here, turbidity is low enough for sufficient light availability in the water column and nutrient concentrations sufficiently high for rapid uptake. Both together provide an optimum for the development of microalgae suspended in the upper layer of the water. As described above, residual currents show a circulation pattern perpendicular to the shore. This is most pronounced in spring and summer when lighter surface water leaves the tidal basins while heavier bottom water flows in opposite direction. This phenomenon is vital to high benthic biomass production in the Wadden Sea. Suspended particles, mainly microalgal cells, flocculate and sink to the bottom in the offshore belt and are transported via the bottom current into the Wadden Sea. There it constitutes a major source of food to suspension and deposit feeders. Thus, primary production in the surface water of the offshore belt supports secondary production at the inshore tidal flats over a distance up to 50

km or even more. High remineralisation rates in the intertidal zone supply seaward flowing surface water with nutrients in return.

The benthos of the offshore belt differs from that of the open North Sea by being particularly adapted to the instability of the substratum and the occasional disturbances when waves hit the ground. Macroalgae are absent except where boulders provide isolated firm substratum. Most invertebrate animals are highly mobile to cope with shifting sands. Nevertheless, also tube-building worms such as the sand mason (*Lanice conchilega*) take the chance of intermittent stability, settle in dense assemblages and then manage to stabilize the sand. This provides habitat for other benthos and diverse assemblages arise until scouring waves destroy this worm-based habitat after a year or more.

Particularly the ebbtidal deltas in front of the tidal inlets provide a habitat with continuously shifting sands. Few organisms are adapted to live there but those who can are highly specialized such as stout little worms (genus *Ophelia*) which coil up once disturbed. Sand grains stick to their skin and make them heavy enough to soon return to the bottom in turbulent waters. Tiny amphipods (Haustoriidae) have evolved shovel-like legs to dig through the sand but also swim quickly in the water by paddling with their broad legs.

Ecologically the most important function of the offshore belt for the tidal area may be its role as a spawning site for organisms the larvae of which become transported into the tidal area and grow up there under highly nutritious and warmer conditions in spring and summer. This applies in particular to brown shrimp (*Crangon crangon*). It is nowhere as abundant as in the Wadden Sea and functions as a key predator on small benthic invertebrates (see also section on population of sentinel species). The shrimp fishery focuses on the offshore belt, because this is where the large adults stay while the smaller shrimp populate the tidal area. In former times, the rough surf in the offshore belt confined shrimp fishery to beam-trawling in the more sheltered back-barrier area but this limitation has been overcome by larger and better motorized vessels.

What has been exemplified with the brown shrimp also applies to several species of flatfish, with the plaice (*Pleuronectes platessa*) being the most abundant and the sole (*Solea solea*) (see also section on population of sentinel species). With the exception of the flounder (*Platycthtys flesus*), adult flatfish stay mostly offshore while their larvae drift inshore, metamorphose and then start feeding on benthic prey on muddy tidal flats. Be-



Tidal flat near Jordsand,
Denmark
(Photo: John Frikke).

fore winter commences the young return offshore.

For many other fish and invertebrates, the offshore belt serves as a refuge during winter, when temperatures in the tidal area become too cold. Particularly during exceptionally severe winters, this refuge function becomes vital for populations to survive. Partly, survival is achieved by satellite populations in the offshore belt while the larger part of the population occurs in the tidal area. This is the case with the cockle (*Cerastoderma edule*) which is highly susceptible to freezing conditions. Following a severe winter, offshore satellite populations may supply the larvae for recolonizing the tidal area. More mobile organisms, including worms which usually stay in the bottom, have been observed to escape from freezing conditions in the tidal area with the ebb current and then resettle in the offshore belt from where they may return in the next spring.

Terns in summer and Eiders and common scoter in winter often feed in the offshore belt. For individual harbour seals (*Phoca vitulina*) tagged with transmitters it has recently been shown that most feeding trips of these seals occur in the offshore belt and even beyond. The same probably applies to the larger grey seals (*Halichoerus grypus*). Both species aggregate for resting on emerging sand bars in the ebbtidal delta. Most sightings of the native whale species in the Wadden Sea, the harbour porpoise (*Phocoena phocoena*), are made in the offshore belt, and these also bring up

their young in this zone. A hot spot for harbour porpoise recruitment is off the islands of Sylt and Amrum, and therefore this offshore region has been included into the National Park of the Schleswig-Holstein Wadden Sea (see also section on population of sentinel species).

In conclusion, although geographically not obvious, the adjacent to the tidal area is an essential habitat for the Wadden Sea ecosystem. Phytoplankton blooms are transported from the into the tidal area. Also larvae of benthic fauna and fish take the same route. Shrimp, fish, diving birds and marine mammals readily commute between inshore and offshore parts depending on developmental stage or season. In severe winters the offshore belt provides an important refuge for the survival of populations otherwise confined to the tidal area. The offshore belt is also an important part of the coastal sand-sharing system.

Tidal Area

The occurrence of tidal areas is confined to oceanic coasts with notable astronomical tides. Similar habitats arise where in extremely shallow waters on- and offshore winds cause windflats and marshes to be irregularly emerged and submerged. The general appearance of tidal areas greatly differs between climate zones, substrate types and bio-geographic regions. The distinction made here between an offshore belt, tidal area, estuaries and salt marshes cannot be applied to

other coastal regions where barrier islands are absent, where riverine influence is a key factor or where salt marshes or even mangroves in tropical and subtropical zones occupy to a large extent the tidal zone. The singularity and exceptional spatial extent of the Wadden Sea may justify habitat distinctions appropriate specifically for this coastal region.

The tidal area of the Wadden Sea comprises the tidal flats, subtidal shoals and gullies. The boundary at the North Sea side is determined by an artificial line between the tips of barrier islands and outer sand bars. The inner boundaries at the estuaries are determined by salinity, the average 10 psu isohaline at high water in the winter situation.

The tidal area includes the most characteristic habitats of the Wadden Sea. Above all, the tidal flats up to the horizon are a phenomenon that cannot be found anywhere else on such a large scale. The tidal flats of the Wadden Sea form the largest unbroken stretch of mud and sand flats in the world. At low tide, the tidal flats are exposed over about half of the tidal area. The other half is subtidal shoals and deep gullies which branch into ever smaller creeks and runnels intersecting the tidal flats. Embedded in this topographic and sedimentary matrix are biogenic habitats such as seagrass meadows and mussel beds which will be given special attention.

Tidal flats

Twice a day a spectacle happens. Land slowly rises from the sea and then is irresistibly engulfed again by the flooding waters. The bottom of the sea meets the horizon and invites the visitor to take a long walk. However, the walker has to be cautious. Numerous runnels, some creeks and, finally, deep gullies may block the way and require swimming. Pushed by onshore winds the flood may return sooner than expected from the astronomical tide tables published for the various localities within the Wadden Sea Area. Therefore, guided tours are offered to the visitors, explaining not only the tides and the various bedforms but also revealing the secrets of hidden life in the marine sediments under our feet.

The sediment surface is almost completely covered by microscopic algae, and often their photosynthetic activity can be seen by bubbles of oxygen in puddles of water. Small snails, in particular, graze on these algae. Snails can be so numerous that what first appears to be coarse grained sediment is actually one snail shell next to the other of the common mud snail (*Hydrobia*

ulvae), reaching densities of up to 120,000 snails per m². These are at most a few millimetres long. With their rasping tongue they feed on diatom algae and bacteria films attached to sand grains or to the houses of their fellow snails. The snails in turn are hosts to a specific community of parasites, are prey to crabs, shrimp and fish, and some birds such as shelduck (*Tadorna tadorna*) at times prefer to forage on this abundant food.

These little snails prefer the upper tidal zone where most of the diatom algae occur on muddy flats. Young snails, however, drift downshore to feed on diatoms attached to individual sand grains, which are hardly smaller than the young snails. Therefore predators find it difficult to separate snails from grains of sand. This helps the young snails to survive. In late summer, when grown up, snails drift back to the upper tidal zone where their parents have remained.

Most of the marine organisms in the tidal sediments are rather small. Up to one hundred nematodes can be found per cm³ of surface sediment. However, the tidal flats of the Wadden Sea also harbour large sediment fauna. Most notable is the lugworm (*Arenicola marina*, Polychaeta) which may be up to 20 cm long and as thick as a pen. This worm stays well below the sediment surface at the base of its U-shaped burrow, out of reach to most predators. Its food slides down a funnel from the sediment surface. The worm ingests sand, digests adhering microalgae and bacteria, and then egests a fecal string of clean sand back to the surface, coiled up like cooked spaghetti. The faecal mounds lie scattered all over the sediment surface, giving the tidal flats of the Wadden Sea a highly characteristic surface topography (see also under *soils and sediments*).

Lugworms irrigate their burrows with water from above to supply their gills with oxygen and thus build up an oxic environment in an otherwise anoxic sediment with toxic sulphides. This creates a number of microoxic niches alongside burrows which are utilized by minute worms, copepods and amphipods. Some of these worms have never been found away from lugworms burrows (i.e., *Typhlopolycystis rubra*, *Scolioopharyngia arenicola*, *Coelogyropora faenofurca*) and constitute a highly specialized faunal component.

The almost ubiquitous lugworms displace other fauna by destabilizing the sediment surface layer which is recycled 10-20 times per year through the guts of these worms. Even their own juveniles are relegated to marginal zones until big enough to join the adults. Another victim of the bioturbation activity of lugworms is the small mud shrimp (*Corophium volutator*, Amphipoda). It dwells in



Lugworm marks on tidal flat
(Photo: John Frikke).

much smaller U-shaped burrows. The young ones are suspension feeders and the older ones collect sediment particles which are individually taken in between the mouth appendices to scrape off palatable bacteria and microalgae.

This amphipod is restricted to a belt in the upper tidal zone because here predation by fish and the brown shrimp (*Crangon crangon*) is confined to very short periods of inundation. However, during low tide exposure there is a specialized predator in the form of the nemertine worm (*Tetragramma melanocephalum*). This sneaks into burrows and captures the amphipods with a poisonous proboscis. This predator is only successful during low tide when the amphipods cannot escape by swimming. Also at low tide, the common redshank (*Tringa totanus*) prefers to forage on *Corophium*. This is convenient to the wading bird because it breeds in adjacent salt marsh vegetation, just high enough to hide its nests and young from gulls and raptorial birds.

Almost all organisms living in the tidal sediments are of marine evolutionary origin. Those of terrestrial or limnic origin are an almost negligible minority on the tidal flats of the Wadden Sea. However, their adaptations to the hostile marine environment are striking. The small roof beetle (*Bledius spectabilis*) feeds in the upper tidal margin on biofilms composed of blue-green bacterial colonies (Cyanobacteria) and lives in vertical burrows which can be sealed during inundation.

The beetle survives in a chamber filled with air. When inundations become too frequent during autumn and winter, beetles leave the tidal zone to hibernate in the upper salt marsh.

Waders and gulls also follow the ebbing tide down to the lowest level to forage for prey left behind in shallow puddles and prey hiding underneath the surface of the sediment. Evidently these tidal flats are so rich in resources that birds fly in from far away. However, birds do not forage evenly throughout the tidal zone. Their preferred prey may occur in distinct belts or patches, differs in sizes and abundance between mud and sand or is not everywhere easily accessible at all times. This is where the large coherent tidal area pays for the foraging birds. They are able to optimize their foraging strategy by selecting the most favourable sites at a given time.

A most graceful wading bird in black and white is the avocet (*Recurvirostra avosetta*). It breeds with about 10,000 pairs in the Wadden Sea Area and 46,000 birds visit during autumn migration and then leave for wintering in West Africa by the end of October. The main feeding grounds are the mud flats along the mainland coast of the Wadden Sea. There they prey on worms and, in particular, on the mud shrimp (*Corophium volutator*) (see above).

Time is short for birds which rely on low tide exposure to catch sufficient prey. This is particularly the case when the Wadden Sea is visited for

a stopover on the long flyway between southern wintering and northern breeding grounds. Refueling has to be accomplished in a short time. The Wadden Sea is ideal for that purpose. The vast extent of tidal flats and the hunting prohibition keep human disturbances at a minimum. Guided tours for visitors usually follow a fixed path, and birds are able to become accustomed to such predictable events.

The density and diversity of the tidal flat fauna in the Wadden Sea are higher than in most other coastal environments. The average biomass is about 50 g dry organic weight per m² and this is 10-20 times higher than in the offshore area. Of further importance is the fact that much of this biomass is rather easy to access for fish when the tide is in and birds when the tide is out. For example, preying on earthworms on dry grassland is much more difficult for a bird than feeding on ragworms, cockles or mud shrimp on a tidal flat.

The benthic biomass production on tidal flats is so high because there are two sources of food. One is the microbial and microalgal production on the sediment surface and the other is a phytoplankton import with the tides from the offshore belt. Further, these benthic and pelagic unicellular microalgae are much easier for invertebrate fauna to consume than larger plants. Thus, food webs in the tidal area are highly efficient.

In contrast to many other habitats, all these interactions between organisms from microbes to birds, as well as between organisms and their habitat by adaptations and modulating effects are

highly conspicuous and often directly observable on the tidal flats. A guided walk across tidal flats may take the place of many formal lectures and textbook chapters on basic and applied ecology. The tidal flat habitat reveals natural processes that are easily extended beyond the horizon to understand the earth system. Also, the consequences of climate change with the entailed sea level rise are readily apparent.

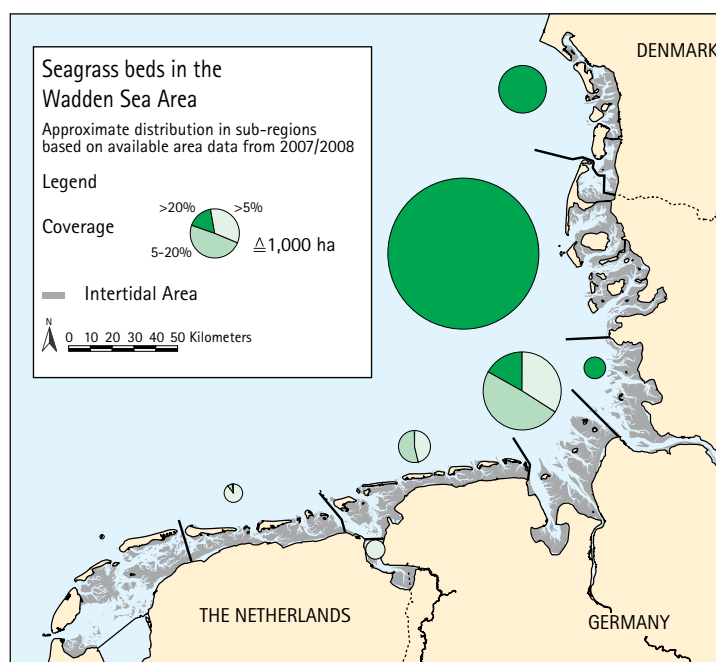
There are various specific types of tidal flats such as macroalgal mats, shell beds, soft mud, fine and coarse grained sand flats, seagrass meadows and mussel beds. The latter two are singled out for closer description.

Seagrass meadows

Seagrasses are submersed flowering plants which have their evolutionary origin in freshwater and from there have colonized shallow coastal waters with about 60 species world-wide. Typically for the harsh environment of the Wadden Sea, only two of these seagrass species have managed to become established in the area. However, due to its changeable environmental history, the Wadden Sea populations of both species have accumulated a much higher genetic diversity than other populations along the European Atlantic coast. This is an example where versatility of individual species has been favoured in the course of evolution over high species diversity.

The two species, *Zostera noltii* and *Z. marina*, often called dwarf seagrass and common seagrass, respectively, tend to occur in mixed stands on the

Figure 2.8:
Distribution of intertidal seagrass beds (with various densities) in the Wadden Sea (in ha) in different sub-regions in 2007/2008 (Source: QSR 2009).





Seagrass (*Zostera*)
(Photo: Gerald Millat).

tidal flats. The dwarf seagrass grows in very dense patches which trap sediment particles transported by tides and waves. Consequently, this accretion of sediment causes dwarf seagrass to grow on slightly elevated hummocks, while the interspaces between hummocks are the preferred habitat of the common seagrass. This species grows more scattered as individual plants and this pattern does not facilitate sediment accretion but favours erosion. Physiological measurements have shown that the dwarf seagrass is more tolerant to low tide desiccation than the common seagrass. This is a striking example of how coexistence between potential competitors is mediated by their habitat modifications.

Zostera beds provide a substrate for fouling algae which, in turn, are grazed by snails and other invertebrates. Snails, in fact, are essential for keeping seagrass blades sufficiently clean from fouling algae. Otherwise, seagrass photosynthesis would be inhibited by shading the chloroplasts. The canopy and rhizomes offer protection for small animals such as juvenile bivalves, crustaceans and fishes, which utilize the beds as a nursery. It is peculiar to find marine invertebrates specializing on the inflorescence of seagrass as a microhabitat which remains filled with water throughout the tidal cycle. The polychaete worm, *Polydora cornuta*, has been encountered regularly in the

inflorescences raising its larvae there.

In autumn, *Zostera* beds constitute a preferred food for brent geese (*Branta bernicla*) and widgeon (*Anas penelope*). Although these birds thin out blades and rhizomes, dwarf seagrass has been observed to grow more vigorously at sites where grazing took place in the preceding year as opposed to sites where grazing was inhibited. Grazing by these birds is apparently beneficial.

In the Wadden Sea, most beds are to be found in the mid to upper tidal zone along the leeside of islands and high sand bars, as well as along sheltered parts of the mainland coast. In addition to the protection offered by islands against waves created by the prevailing westerly gales, clay and peat of marsh soils submerged long ago provide a firm substrate for the roots. There, seagrass is safe from getting uprooted by wave erosion.

This is an example of how the remains of terrestrial habitats, long gone in the wake of sea level rise and storm tide devastations, influence the spatial pattern of a marine habitat centuries later. It may also explain why most seagrass meadows are found in that part of the Wadden Sea where in medieval times floods drowned an extensive marsh (Fig. 2.8). Probably, the prevailing high sediment dynamics in the Wadden Sea are a major limiting factor for seagrass occurrence, leaving most of the tidal flats bare of rooted plants.

Mussel beds

Mussel beds are generally known from rocky shores. However, in the Wadden Sea mussels have managed to develop persistent beds on sediments. Blue mussels (*Mytilus edulis*) occur in a belt from slightly above to a few meters below low tide line. Mussels have the ability to attach to each other by byssal threads. This has the advantage that aggregates of interconnected mussels resist translocation by waves and currents. It allows them to live upon the sediment surface without digging into the sediment as other bivalves do.

On sedimentary flats mussels usually aggregate into coherent mats which completely cover the sediment. Some 1,000 to 4,000 mussels per m² may occur. They mostly form elongated beds perpendicular to the main flow of tidal waters. This pattern minimizes intraspecific competition for the suspended food which they filter out of the tidal waters. It is the balance between the benefits of living tossed together and the disadvantage of competing for food that generates the rather specific fractal spatial pattern of mussel beds in the Wadden Sea.

Mussels cause the deposition of a large amount of suspended matter by their faeces and pseudo-faeces as well as by creating a rough surface with sheltered interspaces. This causes mussel beds to rise above the ambient sediment surface up to half a meter or more. Sedimentation may be further enhanced by macroalgae which grow attached to the mussels. Sediment is partly deposited within the bed, partly in its surroundings or even, after storms, in land reclamation fields and on salt marshes. Mussel beds are important for the budget

of fine-grained, organic-rich sediments (mud) in the Wadden Sea.

Mussel beds are very active in the breakdown of organic matter. While mussels contribute to a very rapid remineralisation and release significant amounts of ammonia and silicate, the main decomposition of organic matter is carried out by bacteria in the faecal material. One can conclude that mussel beds increase the turnover rate of organic matter through filtration, deposition and breakdown of organic matter and that they supply dissolved nutrients for primary production.

Mussel beds provide a natural hard substratum of considerable extent and this hosts a number of associated algae and invertebrates which otherwise would be absent from the Wadden Sea. A good example is the bladder wrack (*Fucus vesiculosus*). Thalli of this macroalgae are fixed by mussels with their byssal threads. In this association the bladder wrack merely grows vegetatively and lacks the characteristic bladders. Presumably, bladders would cause uplifting together with the mussels underneath and thus would be detrimental. A small periwinkle (*Littorina mariae*) grazes specifically on this wrack and is never found outside such mussel beds. These snails have been shown to be genetically distinct from populations which dwell on rocky shores.

More than one hundred allied species are to be found in mussel beds. Barnacles grow on the shells and create a rough surface with numerous small niches. Although barnacles lower the rate of growth and survival of the mussels they have overgrown, they also provide ideal settlement conditions for the recruits of the mussels. This is an

Mussel and oyster bank,
Juvre Dyb
(Photo: John Frikke).



interesting case of interactions between species, where disadvantages and benefits may alternate. In the short term and on the scale of an individual mussel, the negative effects of fouling prevail, while, in terms of the persistence of mussel beds and the mussel population as a whole, the positive effect of facilitating recruitment outweighs the negative one. Especially deposit feeding worms profit from the organic matter that accumulate underneath the layer of mussels, which also shields from predators above. Juvenile shore crabs (*Carcinus maenas*) prey on small mussels and find shelter underneath the big ones to keep away from their own predators.

Mussels in the Wadden Sea tend to be heavily infested by the shell-boring polychaete worm, *Polydora ciliata*. While the worms find a safe home in the shell, this weakens shell strength and facilitates predation by shell-crushing predators like crabs and Eider ducks. The biomass of mussel beds is 25 times higher than in adjacent bare sediment flats. This attracts wading birds and gulls to intertidal mussel beds and diving Eiders to subtidal beds. More than 200 birds per ha of mussel bed have been counted. This amounts to 25% of the wading birds in the Wadden Sea feeding on mussel beds that cover only 1% of the tidal area. The most important predators consuming mussels are Eider ducks (*Somateria mollissima*) and oystercatchers (*Ostralegus haematopus*). These birds can shift their diet between mussels and cockles depending on availability. Herring-gulls (*Larus argentatus*) feed preferentially on young mussel beds.

Recently, introduced Pacific oysters (*Crassostrea gigas*) began to invade mussel beds. Oyster spat attach directly to individual mussels, grow larger and suffocate the mussels underneath. However, once oysters attain their large size, they provide shelter to young mussels remaining thus undetected by their predators. This advantage is partly reversed because the mussels grow slower and remain small for the oysters take most of their suspended food. Although mussel beds may partly be transformed into oyster reefs, mussels still manage to persist albeit as subtenant instead of its former role as house-owner. The species formerly associated with mussel beds continue to exist in the new association.

Subtidal shoals and gullies

The diversity of epibenthic organisms which live upon the sediment surface is higher in the subtidal zone than in the intertidal and also than in the wave-swapped offshore belt seaward of the barrier islands and sand bars. In the back-barrier subtidal zone, species which cannot endure low

tide exposure but take advantage of the richness of food and the shelter from strong waves join species which have their main occurrence in the intertidal zone. Sponges, tunicates and colonial hydrozoan polyps which attach to shell beds are mostly confined to subtidal shoals. The most beautiful colonies are formed by polyps of the species *Sertularia cupressina*. In the past, these were dredged, dried and then stained in bright colours to use for decorative purposes, until substitutes made out of plastic replaced them on the market.

Reefs have been created by generations of worms which build their tubes out of sand grains and attach tubes to each other. The species *Sabellaria spinulosa* is capable of building massive solid reefs up to 50 cm high. Reefs have been reported in the past in the German part of the Wadden Sea only. Bottom trawling and changes in water current conditions are considered to be the main reason for the decline of *Sabellaria* reefs. Since trawling has been shifted mostly to the offshore belt, one may expect these *Sabellaria* reefs to recover. Similarly, beds of the European oyster which disappeared, partly due to overexploitation already at the beginning of the twentieth century, may eventually come back. The subtidal bottom provides habitat to the starfish, *Asterias rubens*. These seem to be excluded from the intertidal zone because gulls at low tide are particularly fond of this prey. Increased occurrence of starfish, in turn, may wipe out entire mussel beds in the subtidal zone.

The subtidal shoals and deep gullies are also important for the intertidal fauna as a refuge when seasonal conditions become too harsh in the intertidal zone. Particularly the young crabs, shrimp and fish which exploit the tidal flats soon begin to migrate with the ebbing tide into the subtidal zone and then return with the next flood. Some, like the shore crab (*Carcinus maenas*), hibernate in the subtidal but from spring onwards begin to commute with the tides between subtidal and intertidal zones. Crabs are very important predators, often decimating bivalve recruitment entirely.

Estuaries

Estuaries can be defined as tidally influenced transition zones between marine and riverine environments. World-wide, estuaries and deltas constitute the main coastal wetlands. The Wadden Sea is different in this regard. Although estuarine habitats are present, they are not a dominant feature and are small in size relative to the marine parts of the Wadden Sea. Nevertheless, they are of high relevance for the Wadden Sea ecosystem

for various reasons: (1) they supply riverine inputs such as nutrients and toxic substances, (2) they are pathways for fish such as flounder (*Platichthys flesus*), smelt (*Osmerus eperlanus*) and eel (*Anguilla anguilla*) which migrate between fresh and marine waters, and (3) they form a specific habitat characterized by a strong variability of salinity, tidal range and turbidity. From an ecological point of view, they are important for the migration of a number of species and, additionally, they are inhabited by various obligate brackish-water species and thus are of special importance for conservation purposes. However, compared to the Wadden Sea, the estuaries have been strongly altered by human activities and only some parts are protected as nature reserves. Only the Ems estuary is partly located in the inscribed property. This estuary is a mesotidal coastal plain estuary with extensive muddy tidal flats.

There are also many sluices which discharge freshwater into the Wadden Sea. Some are small with only some m³ per second, but in the Western Dutch Wadden Sea a sluice in the Afsluitdijk of Lake IJssel discharges around 500 m³ per second in average. Since discharge is limited to low tide periods, more than 2,000 m³ per second are discharged during such intervals, which is three times larger than that of the Elbe. This kind of drainage creates estuarine conditions – although not completely natural – in this part of the Wadden Sea. However, the main difference between the Wadden Sea and other coastal wetlands is, besides its outstanding size, the prevalence of marine (euhaline and polyhaline) conditions in the tidal area.

Salt Marshes

Salt marshes and mangroves are composed of upright vegetation. These plants are of terrestrial evolutionary origin but tolerate marine waters. Elsewhere in the world, they often manage to occupy the tidal zone down to about mid tide level and exhibit a vegetation height of more than one meter. This is not the case in the Wadden Sea. Mangroves are absent, because of low temperatures, and salt marshes are mostly confined to the supratidal zone not regularly flooded at each high tide. Only a few pioneer plants extend their range into the tidal zone down to about neap tide level, which is equivalent to three hours of submersion per tidal cycle on average (Fig. 2.9). Furthermore, Wadden Sea salt marshes rarely exhibit vegetation heights above one meter. Grasses and herbs or low shrubs of less than half a meter dominate. Trees do not occur in these salt marshes.

Vegetation and topography

Wadden Sea salt marshes are naturally open grasslands with habitat specific plants of great beauty and diversity. Salt marshes show a great variety of appearances. They can be rich in flowers, they can exhibit a rather diverse mixed assemblage of specialized plants and generalists adapted to disturbed regimes or they can be completely dominated by one or two grass species forming monotypic stands of vegetation. In general, diversity increases from the pioneer zone to the rarely submerged upper salt marsh belt. Highest diversity is found in sandy salt marshes and in the transition zone to dunes. Ranges of salt marsh plant populations are generally limited in the seaward direction by their ability to withstand marine inundations. In the landward direction they tend to be limited by competition, particularly shading by other plants.

Accordingly, the most specialized salt marsh plants are to be found in the lower zone, while the upper salt marsh also includes generalist plants of wide tolerance which may be common outside salt marshes as well. Plants in a salt marsh either adjust to salinity or regulate the salt content in their cells. Some of the salt marsh halophytes are succulents, compensating a high salt content by extending the vacuoles in their cells (i.e. *Salicornia* spp., *Suaeda maritima*). Others are capable of excreting salt through special glands (i.e. *Limonium vulgare*, *Spartina anglica*) or salt bladder cells which fill with salt, then die or burst, releasing salt from the plant (i.e., *Atriplex* spp.). Still others simply seem to accumulate salt in their leaves until they die at the end of the season (i.e. *Juncus gerardii*).

Under conditions of sea level rise, salt marshes will persist as a habitat by accretion. As the vegetation grows older, a gradual landward shift of the zonation may occur. Accretion is accomplished by inorganic sediments imported during inundations from the seaward tidal flats and by organic matter which is supplied by the marsh vegetation itself. Vertical accretion rates tend to decrease with increasing marsh elevation and with increasing distance from tidal flats or creeks meandering and branching across salt marshes (see also under *soil and sediments*). Vegetation height and density also facilitate accretion rate. These variations generate a rather irregular topography and a complex mosaic-like vegetation pattern. Further, water-logged pans arise which are bare or with scarce vegetation. Instead of accretion, these pans may erode into salt marsh ponds, and these may eventually merge into a creek. It is basically the vegetation which generates this highly

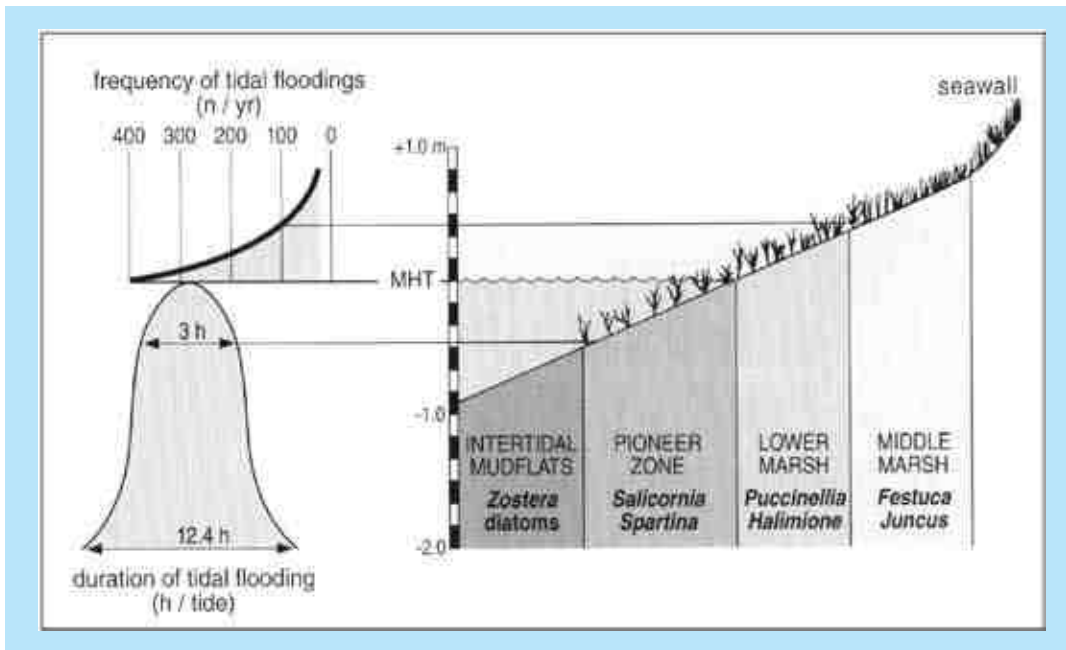


Figure 2.9: Zonation of salt marshes in relation to duration and frequency of tidal floodings and marsh elevations. (Source: Esselink, 2000).

complex and irregular dynamic habitat mosaic of salt marshes.

While salinity may be high in salt marsh pans during dry periods, salinity is low at the upper end of salt marshes where these are bordered by dunes. Here, freshwater seepage is common, creating brackish water habitats. In the absence of grazing, often the reed (*Phragmites australis*) takes over as it also does in the inner parts of estuaries. For example, in the Elbe estuary, outside the inscribed property, under macrotidal conditions the reed grows up to 4 m in height.

Depending on sediment supply and wave action, the seaward edge of salt marshes may show

a variable width of pioneer zone composed mainly of glasswort (*Salicornia* spp.) and the cordgrass (*Spartina anglica*). While the former are annuals and rather short, the latter grows in dense tussocks which extend laterally and, finally, may merge into continuous belts. At sites with low sediment supply at the seaward edge, salt marshes become cliffed and retreat, and no progressive pioneer zone develops into the tidal zone. On a larger scale, this edge instability may not be taken as a threat to the habitat, because the eroded material may accumulate elsewhere, allowing pioneer vegetation to colonize anew.



Salt marsh (Photo: Klaas Kreuijer).

Animals

While the organisms occurring on tidal flats are predominantly of marine origin, in salt marshes those of terrestrial origin by far outnumber marine algae and marine invertebrates. However, an abundant marine snail, very similar to the abundant mud snail (*Hydrobia ulvae*) on the tidal flats, is *Assiminea grayana*. It grazes on microalgae in the moist microenvironment underneath dense vegetation. Interestingly, although the adults are confined to the supratidal salt marshes, their larval development is still planktonic in the tidal waters. This guarantees wide dispersal. This prosobranch marine snail with gills often shares the same habitat and feeding mode with a pulmonate snail of terrestrial origin (*Ovatella myosotis*), and as such is equipped with a lung to breathe air.

Aquatic species of the microfauna are particularly adapted to highly variable moisture and salinity in salt marshes. A study on turbellarian worms revealed that many species are of the specialized brackish water fauna. They thrive in salt marshes, where salinity fluctuates between inundations during storm tides and periods of heavy rain. When it gets too dry or otherwise adverse, some of these species even encyst and then wait in this dormant stage for more benign conditions to come.

Most invertebrates in the salt marshes are terrestrial arthropods. Many of them show morphological adaptations to prevent saltwater from intruding into their bodies. Some have a dense fur, like a hair coat, which ensures that an air film is trapped between the hairs when the organism

is covered with water. Such films of air serve as physical gills. Tolerance to salinity, osmotic and ionic regulation as well as avoidance behaviour during periods of inundation are also quite common. On the other hand, it is curious to find spiders such as *Erigone arctica* (Micryphantidae) and *Leptorrhoptum robustum* (Linyphiidae) spinning nets under submerged conditions.

A common mode of life for terrestrial arthropods in order to become partially independent from the harshness of the physical environment is to adopt an endophagous or endoparasitic habit. A large proportion (ca. 60%) of coastal butterflies (mostly Microlepidoptera), as well as some beetle species, spend their larval stages inside roots, stems, shoots, leaves or flowers of saltmarsh plants. Endoparasitism by larval stages is found in more than 100 hymenopteran insect species encountered in the Wadden Sea salt marshes.

Salt marshes of the Wadden Sea make up about 20% of this habitat type along the European Atlantic and Baltic coasts. They represent an indispensable habitat for huge flocks of migratory waterfowl and breeding birds. Many just come for resting at high tide until the tidal flats become accessible for foraging again. However, salt marshes are also important breeding areas for various wading birds, terns and gulls, spoonbills and some passerines. The oystercatcher (*Haematopus ostralegus*) is one of the most abundant breeding birds in the Wadden Sea. Highest densities are found on island salt marshes. Pairs are territorial, with an average of one pair per ha. Breeding close to the salt marsh edge in the vicinity of the tidal

Salt marsh pioneer zone
(Photo: John Frikke).



feeding grounds is most advantageous. Pairs have to queue for several years before finding a chance to occupy one of these superior territories. Other pairs decide on a breeding territory further away from the edge, starting earlier in life with raising young, but their overall reproductive success may be lower because they have to "leapfrog" over the territories of others in order to forage and feed their chicks. As a result, these often die of starvation.

Brent goose (*Branta bernicla*) and barnacle goose (*Branta leucopsis*) use salt marshes during spring migration to replenish their body reserves. This is essential in order to reach their distant breeding grounds. A study on salt marshes of the island of Schiermonnikoog revealed that grazing by barnacle geese improved the quality of vegetation for the birds. A positive feedback between increased grazing intensity and foraging efficiency on short-grazed lush vegetation has been revealed. This was the case for low-productive vegetation, while high-productive sites developed a dense and high vegetation unsuitable for herbivore consumption.

Modified salt marshes

In the Wadden Sea, about one third of the salt marsh area shows the natural patterns of accretion, erosion and vegetative diversification described above. Entirely natural salt marshes prevail on the barrier islands and, in the Northern Wadden Sea, also behind sandy barriers of the mainland (Table 2.2). Along most of the mainland, however, salt marshes are man-made. At the seaward edge, accretion is facilitated by means of brushwood groins. These are set up in a rectangular pattern. Groins are often up to one meter in height, constructed with two parallel rows of wooden pilings and brushwood fixed in between. Such groins are permeable for water, mitigate wave action and enhance sedimentation.

In addition to groins, parallel ditches are dug to facilitate drainage and to enhance vegetation settlement and growth. Small ditches lead to larger ones which debouch drainage water into the tidal flats. Draining by numerous ditches prevents water-logging. The vegetation in such man-made salt marshes was grazed intensively

Salt marsh type	The Netherlands	Nieder-sachsen	Hamburg	Schleswig-Holstein	Denmark ¹⁾	Total
Yeas	2002-2006	2004	2004	2006/2007	2005	
1. Barrier islands						
Back-barrier (incl. foreland)	4,280	3,660	260	1,250	2,230	11,680
Green beaches	850	280	4	100	320	1,554
Summer polder	10	60	80	0	0	150
De-embanked (summer) polder	90 ²⁾	150	40	0	0	280
2. Mainland						
Back-barrier	0	0	0	720	1,620	2,340
Foreland-type	3,910	5,460	0	7,880	2,240	19,490
Summerpolder	960	1,400	0	0	10	2,370
De-embanked (summer) polder	320	240 ³⁾	0	0	0	560
3. Halligen						
	50	0	0	2,160	0	2,210
Total	10,470	11,250	384	12,110	6,420	40,634

by livestock to keep the vegetation short, often less than the length of a finger. Under these conditions, lower and upper marshes are dominated by the grasses *Puccinellia maritima* and *Festuca rubra*, respectively. To increase the natural value of those marshes, grazing and draining have been reduced or abandoned. Today, a large proportion of the man-made marshes are allowed to grow according to the geomorphological conditions of the habitat. The landward boundary of such groin-protected and drained salt marshes is almost always an earthen seawall (*dike*) to prevent flooding of the hinterland. The purpose of such

a foreland in front of a dike is to dissipate wave energy during storm tides.

In the Southern Wadden Sea, the upper foreland is often protected by a summer dike, which is high enough to keep out inundations during summer, while storm tides in winter may overtop such a seawall. The marshes between the summer dike and the main dike are so-called summer polders. Here, the vegetation is no longer dominated by halophytes. Summer polders mainly serve to improve livestock farming. Some of these have been de-embanked in order to restore more diverse salt marsh vegetation (Tab. 2.2). On the *Halligen*

Table 2.2: Area of salt marsh types (ha) in the Wadden Sea, including the pioneer zone, except for Denmark. The boundary between the pioneer zone and bare soil is chosen at 5% coverage (10% in Schleswig-Holstein) (Bakker et al. 2005). Barrier-connected salt marshes are mainly found on the sheltered parts of the islands. On the islands, de-embanked summerpolder may be added to the back-barrier marshes; on the mainland to the foreland-type salt marshes (Source: QSR 2009).
¹⁾ Habitat type 1330 only,
²⁾ Total de-embanked area, ³⁾ includes both de-embanked and opened summerpolder.

in the Northern Wadden Sea, a salt marsh type prevails which resembles the upper foreland along the mainland. Shores of these Halligen have been moored with stonewalls to stop cliff erosion at the salt marsh edge. The vegetation on the *Halligen* is dominated by *Festuca rubra* and *Juncus gerardii* vegetation.

Traditionally, salt marshes were used for livestock grazing, mostly cattle in the Southern Wadden Sea and sheep in the Northern Wadden Sea. On mainland salt marshes, the grazing intensity was kept high, because it was assumed that when vegetation remained short and dense, the resulting lawns were better than natural vegetation in preventing erosion on the foreland in front of seawalls. In the meantime, it has been demonstrated that higher vegetation can function likewise. Consequently, grazing intensity is now generally reduced to allow for higher plant diversity.

In conclusion, there is quite a diversity of distinctive salt marsh types in the Wadden Sea. Most consist of a species-rich dynamic mosaic of vegetation patches. A rather monotonous grassland prevails either as a result of intensive livestock grazing or of high nutrient supply in the absence of grazing. Barrier-connected salt marshes are often entirely natural while the others are mostly man-made and/or managed for coastal protection. The barrier-connected type constitutes a rare natural heritage, and the latter is a rather distinctive cultural heritage documenting the contest between man and the sea. Both types together represent an area of 400 km² in the Wadden Sea Area and about 350 km² in the inscribed and nominated Wadden Sea property.

Beaches and Dunes

Beaches and coastal dunes together constitute one morphogenetic habitat system. Sand blown by wind in the landward direction from the dry parts of beaches becomes trapped by various pioneer plants. In the Wadden Sea, the main dune generating species is the marram grass *Ammophila arenaria*. This is able to grow upwards with the accumulating sand. Marram grass does not, however, fix the sand entirely. Aeolian transport of sand continues, albeit at a lower rate. It may happen that one dune overtops another. In this way, dune heights of 20 m are exceeded. Above that height, wind forces become too strong for marram grass to slow down sand transport, and bare migrant dunes arise. These usually travel from west to east in response to the prevailing wind direction. Migrant dunes may reach the lee side of barrier

islands, supplying beaches and tidal flats there with new sand. Ecologically, beaches and dunes are linked to the other habitats, not only by sand transport but in particular by birds, which rely on beaches and dunes as important foraging, nesting and resting habitats.

Beaches and High Sands

In the Wadden Sea with altogether about 470 km of sandy beaches, 91% occur at the barrier islands and high sands, the rest at the mainland. While, in the past, these beaches were regarded as dreadful sites, mostly by sailors threatened with becoming beached in the surf, nowadays these beaches are regarded as the most attractive recreational sites and constitute a major basis for regional tourism. Sandy islands like Trischen, Memmert and Rottumerplaat and vast remote high sands, like the Northfrisian "Außensände", Blauort in Dithmarschen, Koresand in the Danish part and Richel in the Dutch part, form another important part of the sandy habitats in the property.

Sandy beaches are the most dynamic physical systems of the seashore. Wave energy associated with sediment particle size and tidal range are major structuring forces for beach morphology as well as for the composition of the biota dwelling in the sand (Fig. 2.10). The wave-shoaling zone of the beach system extends far into the North Sea, without a distinct seaward boundary. The surf zone begins with shore-parallel bars and is recognizable from the shore as the breakpoint belt of the approaching waves. Bars are followed by a wide trough until waves dissipate the rest of their energy in the swash zone. This is also called the beach face and is approximately equivalent to the intertidal zone. It often ends in a distinct berm or continues into an extended beach plain which only becomes part of the swash zone during heavy storms, when waves reach up to the foot of the dunes.

Three beach types are well represented in the Wadden Sea. *Dissipative beaches* represent the high energy end of the beach spectrum. They are a product of large waves moving over fine sand, resulting in a flat beach face and wide surf zone. Dissipative beaches tend to have relatively stable morphologies, and exhibit minimal shoreline change. They are the prevailing type in the Southern Wadden Sea. The low energy end of the spectrum is represented by *reflective beaches*. They develop under combinations of low waves and/or longer wave periods or coarse sand. Reflective beaches have a relatively narrow swash zone and a surf zone is absent. Waves move unbroken to

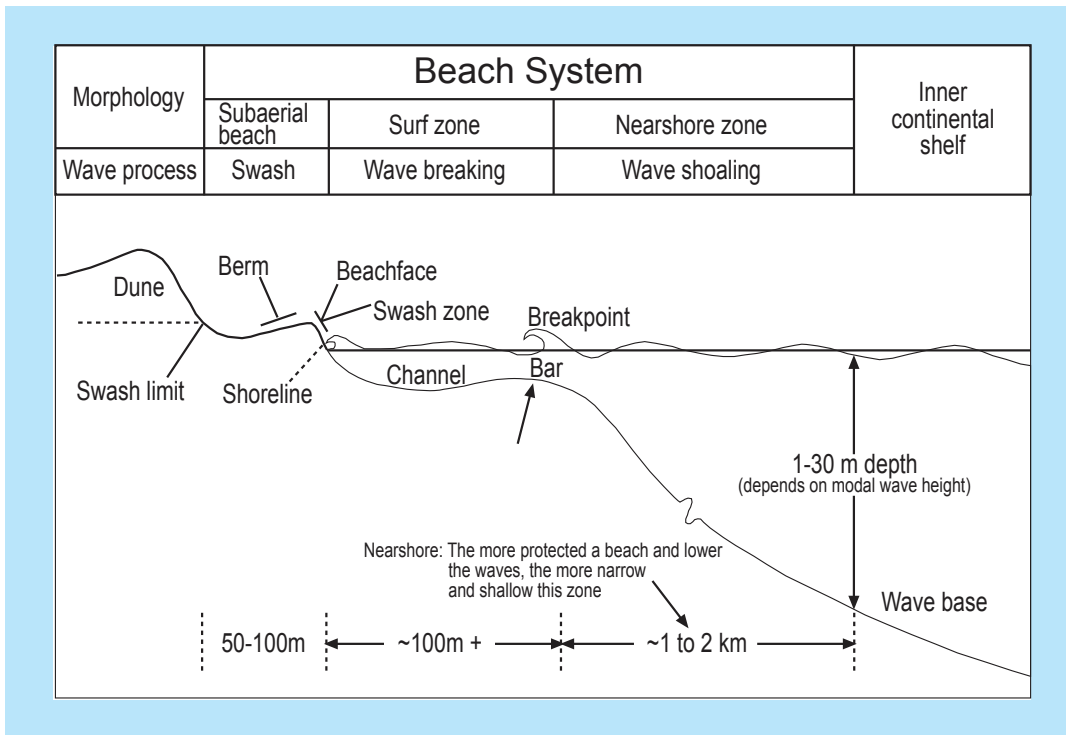


Figure 2.10:
The beach system (Source:
I. Menn, 2001).

the shore, where they collapse or surge up a steep beach face. Sand is transported shoreward under such conditions and often beach cusps arise. In the Wadden Sea, reflective beaches are not common and are found mostly at the bended tips of barrier islands.

Intermediate beaches represent a transition from high energy dissipative to low energy reflective beaches. They occur under a wide range of conditions, from moderate to high waves, fine to medium sand, and longer wave periods. There is a pronounced long-shore variability caused by alternating rip and bar topography. Intermediate beaches are the most mobile in terms of sediment exchange.

Beach organisms are almost all of marine evolutionary origin. Their distribution is largely physically controlled. Wave exposure has a strong adverse effect on the benthic macrofauna, which increases in abundance and diversity from reflective to dissipative shores. The smaller and highly diverse interstitial fauna of sandy beaches (micro- and meiofauna) thrives best at intermediate beaches. These organisms are somewhat buffered against the physical extremes of the beach environment by dwelling well below the surface during the entire tidal cycle.

The most common macrofaunal inhabitant of sandy beaches in the Wadden Sea is the polychaete worm, *Scolelepis squamata*. It looks greenish, gets up to 8 cm long and has two ten-

tacles to feed on suspended as well as deposited food particles. Together with some amphipods, this worm is the principal prey of sanderlings (*Calidris alba*) which patrol the beaches. This small wading bird runs with an amazing speed in front of splashing waves and is very common from late summer to spring. Its plumage is then black and white, while it is brownish when in its Arctic breeding grounds. Gulls often assemble in huge flocks on beaches, particularly after storm tides, when bottom animals became whirled up in the breaker zone and washed onto the beach face. When the sea is calm, terns often patrol the surf zone in search of small fish.

Interestingly, the numerous interstitial fauna of sandy beaches is barely linked to larger organisms in the food web. At the base of their small food web are organic imports pumped into the permeable sand by the waves and also some microalgae attached to sand grains. These are exploited by interstitial scavengers and herbivores which in turn are preyed by carnivores of similar small body size. Dominant among these is the turbellarian worm *Notocaryoplanella glandulosa* (Otoplanidae). It is a few millimetres long, transparent, and dashes through the interstices of sand. It is capable of adhering firmly to sand grains and also letting loose again very quickly. This helps it to stay within the turbulent zone at the lower beach face of exposed shores.

Several species of air-breathing sand hoppers

(talitrid amphipod crustaceans) dwell in the dry sand above the reach of splashing waves near the drift line. They are often superabundant and scavenge mainly at night on organic debris washed ashore. On some beach plains, a very peculiar assemblage of microbiota has developed. This has been termed *colored sand* and shows four distinct layers, of which the upper three measure only a few millimetres in thickness. The sediment surface layer is brownish and contains diatoms (microalgae of the Bacillariophyceae). Below this is a layer of bluegreen "algae" (Cyanobacteria) followed by a layer of purple bacteria. All three perform photosynthesis, and the latter splits hydrogen sulfide as electron acceptor instead of water. These layers are on top of a deep black zone where sulfur bacteria abound. Such *colored sands* have been described from the beach plains of the islands of Amrum and Mellum and from mainland beaches at St. Peter Ording.

Two red-list bird species prefer to nest on plains of dissipative beaches and among cusps of reflective beaches: Kentish plover (*Charadrius alexandrinus*) and little tern (*Sterna albifrons*). Their survival is threatened because they unfortunately prefer the same beaches as nesting sites that are most attractive for recreation. In winter, snow buntings (*Plectrophenax nivalis*) are common visitors of the upper washlines.

To conclude, there is a considerable extent and diversity of sandy beaches in the Wadden Sea area. The biota are distinctly different in composition from those of the offshore belt and the tidal area. Beaches considerably contribute to overall faunal diversity with rather 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 in contrast to seals and people who like to rest upon beaches, unaware of the high diversity of life in the interstices of the sand below them.

Dunes

Coastal dunes develop where sand is mobilized at dry beaches and blown landwards. The sand is trapped by plants, which give rise to a succes-

sion of dunes from embryonic to white, grey and brown dunes. This dry dune vegetation (xerosere) alternates with wet dune vegetation (hygrosere) in the dune valleys (slacks). With a few exceptions (e.g. Eiderstedt and Skallingen peninsulas) the dune habitat is confined to the Wadden Sea barrier islands. Dry dune vegetation dominates with 87.5 % over wet dune slack vegetation types (Tab. 2.3). The dunes included in the property predominantly occur on the Eastfrisian islands and in the proposed Danish extension on the island of Rømø and at Skallingen peninsula.

Dune succession commences with embryonic dunes and occasionally even starts from a drift line on dry sandy soils. The salt-tolerant *Agropyron junceum* growing slightly above the wet beach face is the most frequent pioneer plant initiating dune formation. Salinity decreases as more sediment becomes accumulated in the shelter of the grass. This is a cumulative effect of rain in the absence of further marine inundations.

Once salinity is low, the vigorously growing marram grass (*Ammophila arenaria*) takes over. It grows upwards with progressive sand accretion and an extensive root system remains in contact with groundwater. High evaporation causes groundwater level to move upwards underneath dunes. Thus, roots need not to reach all the way down to the dune basis. Dunes dominated by marram grass are termed white dunes, because bare sand is still visible and is kept in motion by the wind. Vigour of marram grass wanes when dunes mature and lose nutrients. Often, nematodes attack roots and further weaken the marram grass. This allows a diverse group of other grasses, herbs and shrubs to move in. Humus accumulates, and the white sand turns grey (*grey dunes*) and in later succession brownish, because ferrous hydroxides are released (*brown dunes*).

Dune grassland prevails in the Southern Wadden Sea, while dune heath is more dominant in the north. The dune grassland is facilitated by an atmospheric supply of reactive nitrogen and maintained by rabbits and other grazers. Dune heath is adapted to nutrient-poor conditions. The boreal crowberry *Empetrum nigrum* is considered to represent an end-successional stage, because windy and salty conditions strongly hamper woodland development. On barrier islands in the Northern Wadden Sea, crowberries are succeeded by common heather (*Calluna vulgaris*).

Scrubs often show up on the lee side of white dunes. In the Southern Wadden Sea, *Hippophae rhamnoides* dominates where the sandy soils still contain small quantities of lime. This lime dependence is the reason that this scrub can hardly be

Table 2.3:
Dune vegetation types in a total dune area of about 55.6 km² in the property and the proposed Danish extension area (Source: QSR 2009)
(Note: only dune areas which lie within the property or in the proposed extension area are listed)

Dune types	km ²	%
Dry dune vegetation	48.7	87.5
Embryonic dunes	5.6	10.1
White dunes	8.4	15.5
Dune grassland	21.6	38.8
Dune heath	2.9	5.2
Dune scrub	8.0	14.4
Dune woodland	2.2	3.9
Wet dune vegetation	6.9	12.4



Dune erosion, Skallingen
(Photo: National Nature
Agency Vadehavet).

found on the lime-poor northern islands of the Wadden Sea. Here, the sand willow (*Salix arenaria*) is common. The woodland in the dunes is almost always initiated by plantations, particularly of pine trees.

Between dune ridges, ground water may accumulate and cause moist soil in summer and prolonged inundations in winter. The vegetation in these dune slacks is highly diverse and ranges from pioneer plants, which include many extremely rare species, to fens dominated by grasses or reedbeds. Dune slack heath and willow shrubbery may also occur, as well as occasional dune slack woodlands with low-growing alder and birch.

Habitats in the dunes vary from extremely dry to permanent inundation, from alkaline to acidic, from pure sand to peaty soils, and, finally, from freshwater to rather saline conditions. Dunes dominate the landscape of the barrier islands and provide an impressive scenery. However, dunes are also part of the coastal defence system, and for that purpose they have been stabilized in the vicinity of settlements. Cliff erosion is often countered by trapping sand with brushwood fences and planting marram grass. In combination with eutrophication, these human interferences have modified habitat proportions with a dominance of dune grassland and scrubs at the expense of embryonic and white dunes.

Besides a rich arthropod fauna, with ants in particular, amphibians and lizards, small mammals and birds populate dunes. Characteristic for moist dune areas are natterjack toads (*Bufo calamita*), which have a yellow vertical stripe on their back. At night, the natterjacks even climb up into the dry dunes to forage on insects there. On islands without foxes, gulls (*Larus argentatus*, *L. fuscus* and *L. canutus*) maintain large breeding colonies in the dunes. Their import of nutrients from the sea has striking effects on the dune vegetation. Occasionally, Eider ducks (*Somateria molissima*) also breed in the dunes. Other breeding birds often encountered in the dune areas are hen harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*) and passerines such as wheatear (*Oenanthe oenanthe*) and red-backed shrike (*Lanius collurio*). In late summer whimbrel (*Numenius phaeops*), gulls and starlings forage on berries (crow-, blue- and cranberry). Hares are widespread, and on some islands rabbits have been introduced. Both modify the vegetation by grazing. Livestock grazing was once common in the dunes but has been phased out.

The lower plant production in dunes than in salt marshes entails less opportunities for animals, which are rather scarce in comparison. On the other hand, plant diversity exceeds that of salt marshes by a factor of ten, including a variety of

rare and endangered species. Therefore, almost all of the dune areas in the Wadden Sea are under nature protection. Management measures have been taken to restore successional processes as well as typical species-rich habitats where, in the past, anthropogenic dune stabilization had modified the vegetation.

Species and population size

Coastal wetlands with their salt marshes, tidal areas, dunes and beaches, belong to the most dynamic habitats on earth. They were tossed forth and back, squeezed and enlarged with the ups and downs of sea level in the past. Terrestrial and limnic organisms are challenged by seawater, while marine organisms are challenged by the vagaries of terrestrial climate. Accordingly, coastal wetlands are not sites where endemic and conservative species could survive and where relicts of the past would encounter a safe refuge.

A naturally high level of disturbances and frequent occurrences of extreme events may even lead to the expectation that biodiversity would be generally low. However, this is not the case in the Wadden Sea. The reason for a high number of species is the manifold opportunities to make a living, at least for some time within a cycle of life. This is because of (1) a high habitat diversity generated by the dynamic transitions between the land and the sea and (2) the rich spectrum of resources washed ashore from the production of the vast oceanic realm, discharged by the rivers from their large watersheds, and made available by the rapid biological turnover on site. In addition, the Wadden Sea is not isolated but in the midst

of migration routes and accessible to dispersal along the coast and rivers as well as across the sea.

The following chapter will deal with patterns of species diversity and with populations of sentinel species in the Wadden Sea. It will be shown that incredibly high species numbers have been revealed where this was not expected. The Wadden Sea is a treasure box of extremely specialized species alongside with species of an astounding versatility in their adaptations. The combination of great naturalness with a large areal size offers opportunities for many a species which are endangered elsewhere along the world's coasts (Tab. 2.5). Particularly when considering the huge flocks of migratory birds in the tidal area, the essential role of the Wadden Sea for global biodiversity becomes obvious. Further, the Wadden Sea is a showcase to demonstrate how important a population of an individual species of organism can be in shaping an entire coast-scape. The Wadden Sea also constitutes a good example for the reversal of negative trends in populations and habitats brought about by stringent conservation and restoration programs.

Patterns of species diversity

Numbers of species tend to increase with the intensity of an inventory. In the Wadden Sea, there is a long tradition of research on the composition of the regional flora and fauna. Nevertheless, not all groups of very small organisms have been assessed. The Wadden Sea represents a critical habitat for about 2,700 species of marine origin in the intertidal and subtidal zones and at least 5,100 semi-terrestrial and terrestrial species, mostly the

White dunes
(Photo: Norbert Hecker).



flora and fauna of salt marshes and dunes on the islands (Tab. 2.4). Considering various unicellular groups and small metazoans such as terrestrial nematodes not included in the surveys, we may estimate that the Wadden Sea Area is populated by up to 10,000 taxa of organisms living in the bottom and waters of the sea, in salt marshes, dunes and other habitats on the islands.

Phototrophic plants comprise about 2,300, macrofungi 1,300 and animals at least 4,200 species. With this species richness the Wadden Sea plays an important role in preserving biodiversity in temperate coastal zones in accordance with the requirements of the Convention on Biodiversity. The planktonic species and many of the fish and birds are not residents in the Wadden Sea. They either drift in and out or stay only for some phase of their life or for a particular season in the Wadden Sea. About 800 species belong to this temporary component of the biota. To these, one could add further species which have been observed as rare visitors, stragglers or stray migrants. Also, legions of rare fish and, particularly, birds have been observed. Altogether, these records comprise at least 300 more species not included in Table 2.4.

Complete surveys on species richness within habitats are extremely time consuming and require a wide spectrum of taxonomic expertise. Therefore, this has been rarely accomplished. However, one such an assessment has been performed at a sandy beach with a sand flat on the island of Sylt along a transect from high to low tide level, 115 m long. Altogether, about 50,000 sediment samples have been analysed and more than one million individuals have been examined and identified to species level. Most species belonged to the interstitial fauna, metazoans small enough to move through the interstices of sand without having to push sand grains out of their way. In total, 652 species were recorded, and for 148 of them that beach is the type locality, because these species were described here for the first time. To these, roughly 200 taxonomic groups not included in the survey have to be added. Also not considered are the plants, of which about 150 unicellular benthic algae may occur at the site. Thus, walking from high to low tide line on that particular beach one trespasses territories of almost 1,000 species. Macroinvertebrates tend to increase in diversity from high to low tide line and then further with depth of the sea bottom. This is not the case with the diverse interstitial fauna, which attained a maximum of species richness at a 10 m wide terrace just below the steep slope of the beach face. Here, an optimal balance occurs between the supply of organic materials, oxygen

Marine aquatic organisms	
Vascular plants (seagrass)	2
Macroalgae	80
Pelagic microalgae	380
Benthic microalgae	260
Zooplankton	260
Benthic microfauna	1,200
Benthic macrofauna	400
Fish	149
Marine mammals	3
Terrestrial, semi-terrestrial and freshwater organisms	
Macrofungi (islands)	1,300
Lichens (islands)	347
Mosses (islands)	338
Vascular plants	900
Molluscs	70
Arthropods	2,000
Birds ¹	106
Other vertebrates (mammals, reptiles, amphibians)	40

availability and water retention during low tide exposure. At this terrace, 350 species per meter interval were found along the transect. Contrary to most larger marine organisms, the hot spot of diversity of the interstitial fauna lies in the intertidal zone rather than at greater depths. The same applies to the benthic diatom algae.

In salt marshes there is an incredible richness of small arthropod species, mainly insects and spiders. The main primary producers, the vascular plants, comprise only 45 species. The microflora was not assessed. Directly feeding on these plants were 6 species of waterfowl and 400 insect species. Another 500 species have been found to feed on dead plant material, algae and fungi. Predaceous arthropods comprised 245 species and parasites 290. To this spectrum we may add about 100 species of birds feeding and resting in salt marshes. The sum of all these species is almost 1,600. Further, to these terrestrial or semi-terrestrial organisms some 500 species of aquatic, mostly marine, invertebrates of the meiofauna have to be added. Again, considering unicellular organisms not included in the surveys, the grand total is probably in the order of 2,300 taxa which dwell in the salt marshes of the Wadden Sea. This number compares well with the richness of species encountered in European temperate forests.

Populations of sentinel species

Birds

The Wadden Sea, with its diverse and often undisturbed habitats and vast tidal flats that serve as feeding grounds, is of an outstanding, international importance for birds breeding, staging,

Table 2.4:
Overview on species richness in the Wadden Sea. In some groups numbers have been estimated. Due to taxonomic uncertainties not all species complexes have been analysed, and in terrestrial environments surveys on small soil fauna are incomplete. Rare visitors are left out. (Lists of species encountered in the Wadden Sea Area are compiled in: Wolff W.J. (ed) 1983. Ecology of the Wadden Sea. Balkema, Rotterdam, The Netherlands)
¹ This number is listed by the trilateral experts groups Joint Monitoring of Migratory Birds (JMMB) and Joint Monitoring of Breeding Birds (JMBB) based on the EU Birds Directive. 176 species are listed in the framework of the trilateral cooperation, but in total there are many more.

Baranacle geese
(Photo: Bo Lassen
Christiansen).



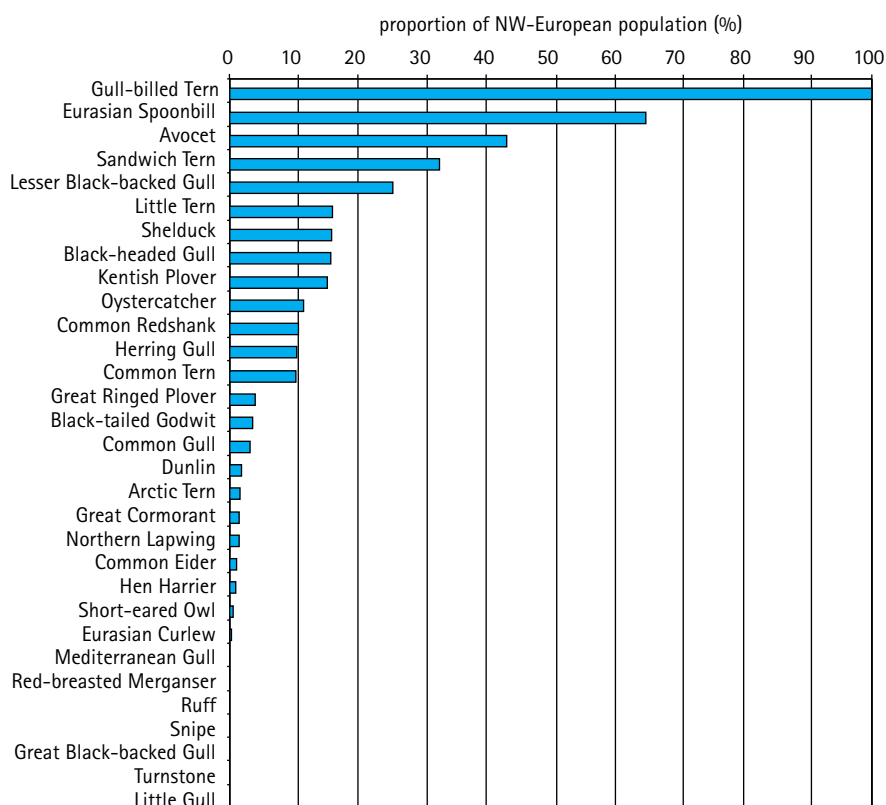
moulting and wintering in the area. A list of breeding, migratory and offshore birds is in Annex 2.

The availability of food and a low level of disturbance are essential factors. For 43 species, the Wadden Sea supports more than 1% of the flyway populations, which is the criterion of the Ramsar Convention as an internationally recognized measure for identifying wetlands of international importance. Of these, 4 are breeding birds, 24 are breeding as well as migratory species and 15 use the Wadden Sea only during their seasonal migrations. Of all migratory birds, 29 species occur with

more than 10% of their flyway population in the Wadden Sea.

A regular census is carried out on 31 breeding bird species that are considered characteristic for the Wadden Sea and which are indicative of favourable food availability and natural breeding success. In 2001 the survey recorded an overall number of 469,000 breeding pairs or territories. Nearly 70% of the breeding bird population is represented by gulls, with black-headed gull (*Larus ridibundus*), lesser black-backed gull (*Larus fuscus*) and herring gull (*Larus argentatus*) being the most

Figure 2.11:
Comparison of breeding
bird populations in the
Wadden Sea in 2001 with
NW-European population
sizes (from: Koffijberg et
al. 2006).



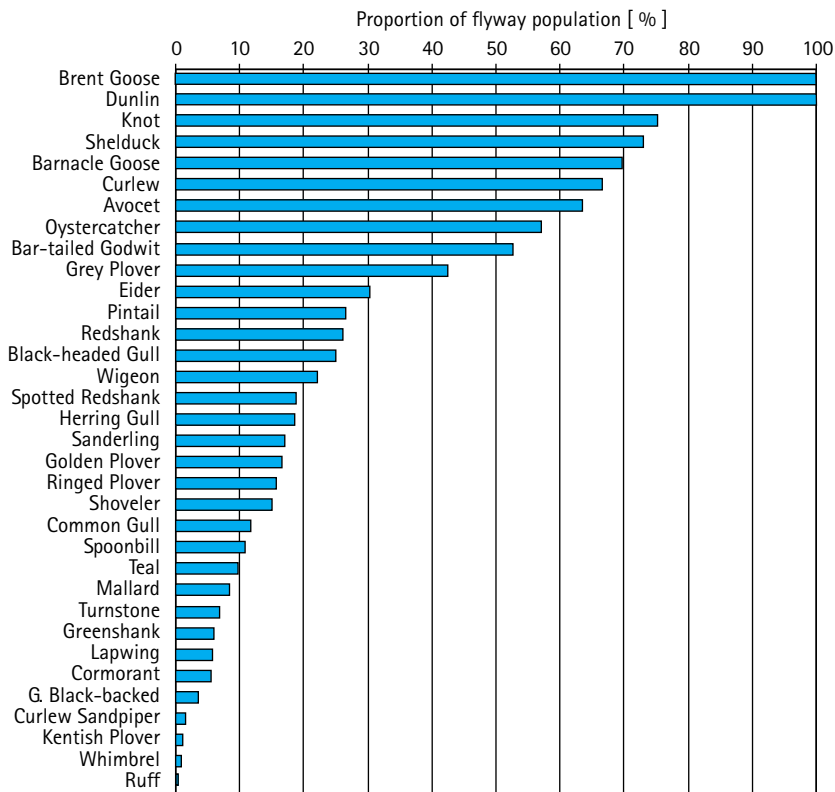


Figure 2.12:
Maximum estimated
numbers of migratory birds
between 1992–2000 given
as proportion of flyway
populations for the entire
Wadden Sea

abundant species. Another 18% of the total population are coastal waders, notably oystercatcher (*Haematopus ostralegus*), avocet (*Recurvirostra avosetta*), northern lapwing (*Venellus vanellus*) and common redshank (*Tringa totanus*). Among the rare breeding birds are dunlin (*Calidris alpina schinzii*) and ruff (*Philomachus pugnax*), which have been subject to long-term declines and currently balance at the verge of extinction in the Wadden Sea.

In five species, at least 25% of northwestern European populations breed in the Wadden Sea (Fig. 2.11). For 21 out of 31 species, the population in the Wadden Sea Area accounts for more than 1% of the NW-European population. In an international context, the Wadden Sea represents a core breeding area for Eurasian spoonbill (*Platylea leucorodia*), avocet, gull-billed tern (*Gelochelidon nilotica*) and sandwich tern (*Sterna sandvichensis*), each supporting between 33 to 100% of the NW-European population.

Breeding habitats are present in salt marshes, dunes, pastures and on beaches. Many species (21 out of 30) prefer islands as breeding sites. This especially applies to colonial breeders like great cormorant (*Phalacrocorax carbo*), Eurasian spoonbills, gulls and terns as well as hen harrier (*Circus cyaneus*) and short-eared owl (*Asio flammeus*). Occurrence of the latter two species is

mainly in the dune areas in the western Wadden Sea. Populations of avocet, great ringed plover (*Charadrius hiaticula*), Kentish plover (*Charadrius alexandrinus*), gull-billed tern, northern lapwing and black-tailed godwit (*Limosa limosa*) mainly concentrate along the mainland coast. The Wadden Sea also constitutes a refuge for those species that have largely lost their inland habitats, e.g. northern lapwing, redshank and black-headed gull.

Even more important than for breeding birds, is the role of the Wadden Sea as an outstanding internationally important staging, moulting and wintering area (Fig. 2.12). Following the 1% criterion of the Ramsar-Convention, the Wadden Sea accommodates at least 52 such populations of 41 migratory waterbird species that use the East Atlantic flyway and originate from breeding populations as far away as northern Siberia or Northeast Canada. Some species comprise two or more populations which occupy separate breeding regions and also differ in flyways and their timing of migrations. In about 20 populations more than half of the individuals utilize the Wadden Sea at some stage of their annual life cycle. For about 10 species almost the entire populations occur in the Wadden Sea. Numbers of 44 populations of 34 species are so high that the Wadden Sea can be considered as their indispensable and often main stepping stone during migration, or as their

Bird flock
(Photo: John Frikke).



primary wintering or moulting habitat. Therefore the Wadden Sea can be considered essential for the existence of these bird species. A severe deterioration of the Wadden Sea would cause a biodiversity loss on a worldwide scale.

Adding up the numbers from a survey in 2000, a maximum of some 6.1 million birds present in the Wadden Sea is obtained. Considering turnover, as many as 10-12 million birds pass through the Wadden Sea Area each year. This is at least ten times as many as there are coastal breeding birds in the area. Of all migratory birds, waders comprise 55%, ducks and geese 27% and gulls 16%. Most species reach their highest numbers during the autumn migration. Numbers of waders are almost as high during spring, whereas ducks and geese over-winter in high numbers. Only gulls reach considerable numbers in summer. Almost the entire population of the dark-bellied brent goose (*Branta b. bernicla*) and the entire West-European population of dunlin (*Calidris alpina*) use the Wadden Sea during periods of the annual cycle. Without the Wadden Sea, their populations would suffer heavily. An additional seven species are present with more than 50% and further 14 species with more than 10% of their flyway population.

The Wadden Sea serves as a refuelling region for birds either breeding in Arctic North America or in Arctic Asia. Two subspecies of knot (*Calidris canutus*) probably split about 10,000 years ago. One breeds in Greenland and Canada and winters in the Wadden Sea. The birds leave for breeding

by the beginning of May. Adults begin to return in July and are followed by their young in August and September. This population comprises about 450,000 knots. The other subspecies, probably comprising 340,000 knots, breeds in Siberia and winters in West Africa. These birds only make short stopovers in the Wadden Sea. In spring they arrive after the other subspecies has left, while in late summer and autumn both overlap in the Wadden Sea. All feed on small bivalves buried in the sediments of the tidal flats.

Wadden Sea areas, including the coastal zone of the adjacent North Sea, are used by high numbers of moulting shelduck (*Tadorna tadorna*) and moulting and wintering Eider (*Somateria mollissima*). In summer, nearly 80% of the NW European population of shelduck gather in the Dithmarschen Wadden Sea north of the mouth of the River Elbe for moulting. They lose their flight feathers, are completely flightless for some weeks and are thus highly dependent on the vast and undisturbed tidal flats.

Without the Wadden Sea, several European bird populations would be endangered or even lost. Although bird migration is a global natural phenomenon that cannot be associated with a single site, the Wadden Sea is a vital and irreplaceable stepping stone that is considered a critically important 'mega-site' for bird migration. It is not just one of several stopover sites on the East-Atlantic flyway, but it is the essential and indispensable stopover.



Spoonbills
(Photo: Gundolf Reichert).

Marine mammals

Marine mammals regarded as indigenous species in the Wadden Sea are the harbour seal (*Phoca vitulina*), grey seal (*Halichoerus grypus*), and harbour porpoise (*Phocoena phocoena*). After centuries of hunting, protection measures have fostered a striking comeback in the seal populations. At present, seals are so abundant in the Wadden Sea and flight distance has decreased so much since the ban of hunting in the 1970s that all visitors to the Wadden Sea have a fair chance observing these animals. Seal tours are announced at every harbour and constitute one of the prime attractions for tourists. Off the island of Sylt, also the harbour porpoise became so frequent that encounters on arranged boat tours and regular ferry tours are almost certain when the sea is calm.

The Wadden Sea now sustains approximately 20% of the world-population of harbour seals that belong to the Northeast-Atlantic subspecies *Phoca vitulina vitulina*. Simultaneous counts are performed from the air during low tide in August (moulting season), when approximately two thirds of the seals lie on the exposed sand bars. The population is spread fairly evenly throughout the Wadden Sea. In total, 26,220 were counted in 2012, compared to about 4,000 thirty years earlier. The increase since then was not an uninterrupted one. A virus disease strongly affected the entire population of the North Sea in 1988 and again in 2002 but recovery seems to have proceeded well. In the Wadden Sea, seals have adapted to the tidal conditions, which regularly submerge their resting and whelping sites. For whelping, females prefer



Grey seal
(Photo: Martin Stock).

Harbour seal
(Photo: Martin Stock).



sand flats in the sheltered inner part of the tidal area, while the main sites for resting are sand bars in the ebb tidal delta, from where seals may go hunting either way, into the tidal area or into the offshore belt and further out into the North Sea. Long-term field and pathological investigations indicate that there has been an improvement in their health condition over the last twenty years.

Archaeological findings suggest that grey seals were the dominant species in the Wadden Sea until medieval times. Whelping in this larger seal species occurs in winter when storm surges are most frequent. Therefore, females often have their pups on the upper beaches of the islands. This habit probably made them so vulnerable to hunting that grey seals remained absent from the Wadden Sea for several centuries. Three decades ago, however, grey seals started to re-establish in the Wadden Sea. Thriving colonies are now found in the western Dutch Wadden Sea (71%), at the tips of the western Eastfrisian Islands,

in the northern Wadden Sea off the islands of Amrum and Sylt, and just outside the Wadden Sea a colony became established at the island of Helgoland. Simultaneous aerial counts carried out in March-April 2011 during moulting came up with 3,312 grey seals in the Wadden Sea Area. Results from a few recently satellite-tagged animals indicate migration of grey seals from the Wadden Sea to British coasts and vice-versa. Therefore, the rookeries in the Wadden Sea seem to belong to a population which occupies the entire North Sea region.

This also applies to the harbour porpoise. The total population in the North Sea may comprise about 230,000 individuals. Particularly females with small offspring are observed off the northern Wadden Sea. There, aerial surveys in May-August have spotted a mean density of 1-2 harbour porpoises per km². A whale sanctuary was established off Sylt and Amrum in 1999 and is part of the inscribed property.

Harbour seals resting on a
sandbank
(Photo: John Frikke).



Fish

More than 140 species of fish have been recorded from the Wadden Sea. A list of fish species is in Annex 1. Most of them are North Sea or even oceanic species which visit the Wadden Sea but do not depend on this area. Whiting (*Merlangius merlangus*) and Cod (*Gadus morrhua*) have open sea nurseries but in late summer and autumn juveniles may invade the Wadden Sea in huge numbers. Their appearances are highly variable from year to year, and when they occur, they turn out to be very effective predators on Brown Shrimp (*Crangon crangon*), causing its population to crash intermittently. Almost all small fish are also victims of these occasional juvenile incursions.

Other species use the Wadden Sea only as a passage during their migration from the sea to the rivers. These are known as diadromous species. Of those which spawn upstream in the rivers, notable species are river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*), allis shad (*Alosa alosa*) and houting (*Coregonus oxyrinchus*). Formerly important were also sturgeon (*Acipenser sturio*) and salmon (*Salmo salar*). These have been over-fished and their riverine habitat degraded, but reintroduction and recovery seems possible if their riverine habitats continue to improve. Twaid shad (*Alosa fallax*), smelt (*Osmerus eperlanus*) and sea trout (*Salmo trutta*) spawn in the rivers, but juveniles and adults tend to live permanently in the Wadden Sea and not merely pass through.

Eel (*Anguilla anguilla*) is also a diadromous fish, albeit the other way round. Eels spawn in oceanic waters, and the pelagic larvae are transported to

the coast by Atlantic currents. The larvae metamorphose into transparent 'glass eels' and migrate into freshwater where they spend 6–20 years before the onset of maturation, at which they return to the sea as 'silver eels' and pass through the Wadden Sea in summer and autumn. Some juveniles do not migrate into freshwater but stay in the Wadden Sea until they mature.

For fish in the North Sea, the most important function of the tidal area of the Wadden Sea is that of a nursery. Some of these North Sea fish occur only as juveniles in the Wadden Sea, most notably the flatfish plaice (*Pleuronectes platessa*), sole (*Solea solea*), herring (*Clupea harengus*) and sprat (*Sprattus sprattus*). The two flatfish spawn in the North Sea and their pelagic eggs and larvae drift into the tidal area with the currents. After entering the Wadden Sea, the pelagic larvae undergo metamorphosis and settle on the mud flats. Here, they benefit from ample food and warm temperatures. They leave the Wadden Sea as juveniles before their first winter. A part of the juvenile population re-enters the Wadden Sea in its second year, while adults stay permanently in offshore waters. Herring and sprat are the most abundant pelagic fish species in the Wadden Sea. Juveniles of both species occur side by side, measure 5 to 10 cm in length, and form big shoals particularly at night.

Opposite to the above, flounder (*Pleuronectes flesus*), five-bearded rockling (*Mustela ciliata*) and sand goby (*Pomatoschistus minutus*) spawn in the North Sea and stay as adults in the Wadden Sea. About twenty species are residents in the Wad-



Plaice
(Photo: Imke Zwoch).

den Sea and may only leave the tidal area during exceptionally cold winters or, in the case of the lumpsucker (*Cyclopterus lumpus*), also leave in summer. Eelpout (*Zoarces viviparus*) and bull rout (*Myxocephalus scorpius*) both are common demersal fish in the Wadden Sea and stay there during their whole life. Eelpout give birth to fully developed young and males of bull rout guard their eggs deposited under shelter at the bottom. The pelagic garfish (*Belone belone*) attaches its eggs equipped with long sticky hairs to the blades of eelgrass.

Fish are sensitive indicators of a recent warming trend. Species once rare have become residents such as mullet (*Chelon labrosus*), anchovy (*Engraulis encrasicolus*), sand-smelt (*Atherina presbyter*) and red mullet (*Mullus surmuletus*). In general, the fish fauna of the present Wadden Sea is strongly dominated by small-sized fish.

Macrozoobenthos

The benthic macrofauna of the Wadden Sea comprises about 400 species, of which some 150 occur in the intertidal zone. Benthic macrofauna is less diverse than benthic meiofauna, which counts about 1,200 species. The average biomass of benthic macrofauna on the tidal flats ranges between 38 and 65 g dry organic matter per m², whereas in the inner estuaries and in the North Sea average macrobenthic biomass is much lower (1 - 13 g per m²). Within the tidal area, biomass is low on deep and exposed sandy bottoms and high in mixed and muddy sediments. However, the absolute hot spot is observed in the mussel beds,

where biomass ranges between 1,000 to 2,000 g per m². These biomass values are important, because benthic macrofauna is the main food source for most of the birds and fish in the Wadden Sea.

Dominant in biomass are usually the bivalves, cockles (*Cerastoderma edule*) and mussels (*Mytilus edulis*) in particular. Next in biomass are often the worms with the lugworm (*Arenicola marina*) contributing most. Extremely numerous but less important in terms of biomass are the mud snail (*Hydrobia ulvae*) and the mud shrimp (*Corophium volutator*).

The European cockle (*Cerastoderma edule*) ranges from Norway to Morocco, but its largest population is found in the Wadden Sea. The occurrence of cockles on the tidal flats is rather patchy. Dense patches develop only at times and sites where their main predators, shorecrabs (*Carcinus maenas*) and brown shrimp (*Crangon crangon*), have not encountered the spat in summer. In autumn, also flocks of knots (*Calidris canutus*) can eliminate patches of young cockles. Medium sizes of cockles are the preferred prey of oystercatchers (*Haematopus ostralegus*). Once reaching a large size, cockles may attain considerable longevity. Individuals up to 15 years of age have been found, and these old ones significantly contribute to the reproductive potential of the entire cockle population. A rare sister species, the lagoon cockle (*Cerastoderma glaucum*), occurs fairly isolated in salt marsh creeks of the Wadden Sea islands. Presumably, the young attach to birds for dispersal to creeks on other islands, which may explain their genetic homogeneity over wide distances.

Plumose anemone
(Photo: Martin Stock).



The most popular creature for visitors participating on guided walks across the tidal flats are the ubiquitous lugworms because of their highly characteristic coiled faecal strings. These mounds are scattered all over the flats with about 20 to 40 per m². In total, there are roughly one billion lugworms in the entire Wadden Sea consuming sand and digesting adhering bacteria and microalgae. Worms themselves are prey to flatfish and waders. Because lugworms dwell deep in their burrows, predators only get them when worms approach the sediment surface with their rear end to defecate. Tail ends are then sacrificed to the predators and the worms subsequently regenerate.

Lugworms spawn in late summer. Their larvae develop in the mother burrow and then drift into the subtidal zone, where juveniles hibernate among shell debris. In spring, the little worms drift back into the tidal zone and tend to settle at the margins of the adult population, usually as a nursery belt in the uppermost intertidal zone. From there, juveniles gradually migrate in autumn into the area of the adults. This complicated pattern has probably evolved because the sediment turnover caused by a dense population of adult worms inhibits juvenile development. The population size of these lugworms is remarkably stable over the years, perhaps because of this density-dependent response of juveniles to the dominating adults.

Juveniles of brown shrimp (*Crangon crangon*) often take refuge in the feeding funnels of lugworm burrows during low tide exposure. When the tide is in, the shrimp feed on small zoobenthos of any kind and exert particularly high predation pressure on bivalve spat. In effect, successful

recruitment in cockles is often confined to years with low shrimp abundance. For the Wadden Sea, it is even the rule that successful bivalve recruitment is limited to summers after a severe winter, because that retards the development of shrimp and crabs. Shrimp spawn in the offshore belt and their larvae are transported into the tidal area by the currents. Juveniles first stay on tidal flats but when their length exceeds one centimetre they begin migrating back and forth with the tides. Most adults stay in the subtidal zone and finally return to the offshore belt of the Wadden Sea.

Plants

Ecologically, the most important plants for the food web of the Wadden Sea are the unicellular algae on the sediment surface and in the tidal waters. More conspicuous, however, are the vascular or flowering plants. In the intertidal zone, two seagrass species, *Zostera noltii* and *Z. marina*, are the major habitat forming plants.

The most characteristic and peculiar plants of salt marsh pioneers in the upper intertidal and lower supratidal zones belong to the glasswort species complex (*Salicornia spp.*). This is a cosmopolitan genus in seashore environments. The succulent halophytes, with their segmented shoots, somewhat resemble a desert plant but are, in fact, growing where they become submerged by the tides twice daily. Seeds germinate at high salinities. In the Wadden Sea, the *Salicornia* species are annual herbs less than 20 cm tall. Most seaward on mud and sand flats grows the upright and slender *Salicornia stricta* (syn. *S. dolichostachya*). Seeds are not shed and remain on the decaying green



Sea holly
(Photo: Jan Huneman).

plant in autumn. A pioneer on flat sandy beaches is the mostly low-growing *Salicornia procumbens* (syn. *S. decumbens*), which turns from green to yellow and orange in autumn. More within the salt marshes in between other vegetation grows *Salicornia brachystachya* (syn. *S. ramosissima*). Its seeds even germinate at shaded sites, which is not the case in the other species. This strongly branched plant tends to have rather short shoot segments and turns from green to dark red in autumn. Taxonomists disagree about the proper subdivision of this complex of species. Speciation is still ongoing in the Wadden Sea and has not yet become genetically entrenched, and each species exhibits a high plasticity in its growth form. There is a strong tendency to inbreed and distinctive local populations may occupy contrasting habitats. The *Salicornia* species have attracted much research, because glassworts were seen as useful pioneers for the purpose of converting tidal flats into salt marshes, which then could be claimed and transformed into arable land. This interest is gone but glassworts are still highly regarded as a tasty vegetable.

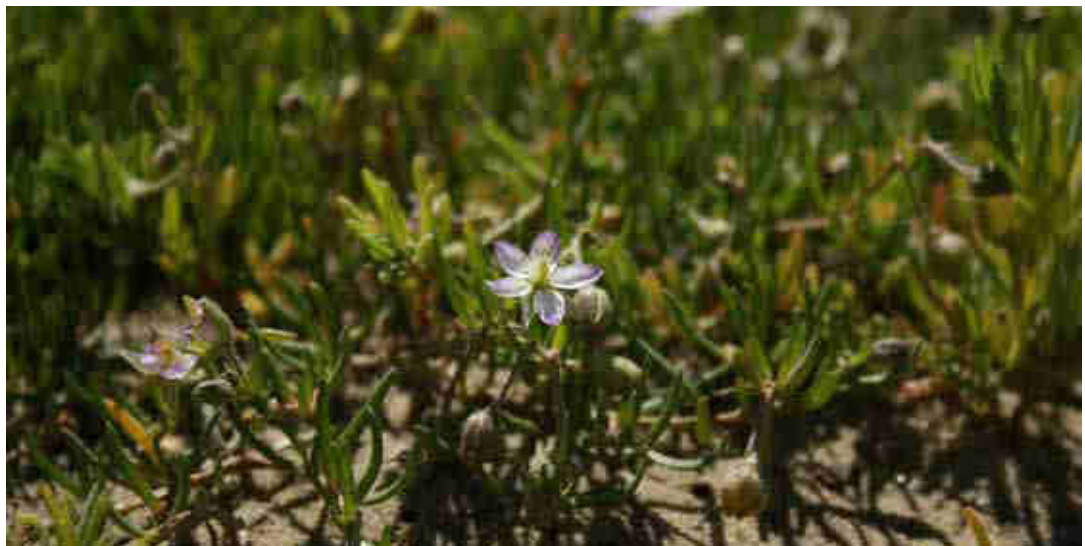
Glassworts were the only salt marsh pioneers on tidal flats in the Wadden Sea until eighty years ago. Then, cord grass was introduced to facilitate sediment accretion at the shore. It originated from a hybrid between the Afro-European *Spartina maritima* and the American *S. alterniflora*, accidentally introduced to southern England. The sterile hybrid converted by autogenic chromosome doubling into a fertile species, which has been named *Spartina anglica*. Coincidentally, that happened very close to the site and time of Darwin writing on the origin of species. This vigorous species now dominates in the pioneer

zone of salt marshes in the Wadden Sea. With glassworts and cord grass, the species diversity in the pioneer zone is rather low but rapidly increases in a dynamic mosaic-like fashion further up in the supratidal zone. Here, the Wadden Sea salt marshes in summer display a picturesque sea of flowers which is one of the main attractors for people visiting this coast.

The low marsh, inundated by more than one hundred floods per year, is characterized by a low-growing grass, *Puccinellia maritima*, often in combination with the purple-flowering *Limonium vulgare*. On clayish or brackish ungrazed marshes, *Aster tripolium* can be present. On well-drained creek levees and terraces *Halimione portulacoides* is the dominant species. On the middle marsh, with less than 100 floods per year, a dense lawn of *Festuca rubra* and *Juncus gerardii* is developed, sometimes associated with *Limonium vulgare* and *Artemisia maritima*. Sandy salt marsh pastures often have a pink appearance in early summer, because *Armeria maritima* achieves dominance. It is avoided by livestock. When grazing by domestic animals is reduced or ceases, and depending on geomorphological conditions, clay content and elevation, *Elymus athericus*, *Halimione portulacoides*, *Spartina anglica* or *Elymus repens* can represent the dominant species within the salt marshes. Under brackish conditions, *Phragmites australis* will prevail.

Without the marram grass (*Ammophila arenaria*), the barrier islands of the Wadden Sea would presumably look very different. This can be inferred from observations made at the coast of Oregon in Northwest America. After introduction there, the marram grass altered the dynamics of the dune system entirely. It quickly generated a

Salt sandspurry
(Photo: Norbert Hecker).



high and permanent fore-dune barrier behind the beach where none had been before. Sand formerly blown further inland was now trapped, and on the leeside of the new dune ridge a wet deflation plain emerged with unstable 'quicksand'.

In the Wadden Sea, where marram grass is native, it can cope with sand accretion rates of up to one meter per year by extending its shoots. Sand accumulates because the tussocks substantially slow down the wind speed above ground level. The grass extends horizontally with its rhizomes and its roots penetrate the emerging dune to depths of two meters or even more. Leaf rolling and a thick cuticle on the outer side restrict transpiration losses and reduce damage by sand blasting. Although marram grass only dominates the vegetation on the white dunes, without its dune-building capacity all the later successional phases with the many rare and endangered plant species could not develop. This is a striking example of how the attributes of one particular species of plant have created an entire coastal landscape, and it is hard to imagine what the evolution of the Wadden Sea barrier islands would have been like without marram grass.

Endemic and threatened species

As a coastal wetland, the Wadden Sea is neither sufficiently isolated for the evolution of endemic species nor has it remained climatically stable enough over the past millennia to preserve relict species. In addition, there is a long list of unicellular algae and small-sized invertebrates which have been first described for science from type-localities in the Wadden Sea, and up to now have not or only rarely been recorded elsewhere. However, for these taxa, a lack of records from outside the Wadden Sea is most likely caused by a lack of studies rather than real endemism. A list of endemic saltmarsh species is in Annex 3.

The Wadden Sea has remained a coast-scape which still provides ample space and resources to all these populations, and many of the large animals once threatened by man have started to recover during recent decades. Some species threatened in general find refuge in the Wadden Sea to some extent (Tab. 2.5). However, all of these are migratory and cannot be rescued by measures

confined to the Wadden Sea. Particularly, fish cannot take advantage of protection within the Wadden Sea as long as riverine habitats are not sufficient (e.g. for the sturgeon, *Acipenser sturio*) or fishery pressure continues further offshore (e.g. on thornback skate, *Raja clavata*).

The Wadden Sea as a gigantic coastal filter system

The Wadden Sea ecosystem represents one of the most important wetland habitats in the entire world. It provides a multitude of transitional zones between land, the sea and freshwater. All of its habitats together function as a gigantic coastal filter system. Water runoff from the land and water masses from the sea are mixed and flushed with the tides several times back and forth before being taken up by the long-shore current and eventually released to the Atlantic Ocean.

Riverine and marine imports of organic matter and dissolved compounds are retained. This clearance operation is mediated by the coastal biota. It begins with life in permeable sands in the offshore belt of the Wadden Sea and extends onto the sandy beaches and tidal flats. Waves push water into the interstices of the sand. These sand grains are highly bioactive, because they are overgrown by films of microorganisms. Some are photosynthetic and enrich the water with oxygen. Others utilize this oxygen to mineralize organic matter. In deeper layers of the sediment, this process proceeds more slowly in the absence of oxygen.

On the sandy tidal flats large burrowing infauna irrigates the sediments and enlarges the oxic remineralising zone by several orders of magnitude. Particularly the abundant lugworms pump down water into the underground, providing a unique habitat for microscopic organisms, with species which do not occur anywhere else. These large burrowers considerably facilitate the biogenic coastal filter function.

Cohesive mud is covered by a living slime full of microscopic algae and bacteria which trap particulate and dissolved matter. Their highly bioactive film further purifies incoming water which has already passed the permeable sands and lugworm flats further seaward. Even inside the salt

Species	Common name	IUCN Red list status	EU Directive status
<i>Phocoena phocoena</i>	Harbour porpoise	VU A1cd	HD Annex II, V
<i>Alosa alosa</i>	Allis shad	DD	HD Annex II, V
<i>Alosa fallax</i>	Twait shad	DD	HD Annex II, V
<i>Coregonus oxyrinchus</i>	Houting	DD	HD Annex II, IV (priority species)
<i>Lampetra fluviatilis</i>	River lamprey	LR/nt	HD Annex II, V
<i>Limosa limosa</i>	Black-tailed Godwit	NT	BD Annex II

Table 2.5: Threatened vertebrate animals on the IUCN Red List with survivors encountered in the Wadden Sea.

marshes, films of microbiota cover the sediment surface and contribute to the mineralization of the organic imports from the land and the sea as well as from the bio-production within the salt marsh.

The many suspension feeders in the tidal area are a third component of the coastal filter system. Bivalve molluscs are the prominent members, but filter feeders of many other zoological phyla are involved, such as tentaculated worms or worms which construct a filter out of slime, small crustaceans with feathered setae on their legs, colonies of polyps which grow on shells and algae and many more. Most of these live at the bottom, but some also drift in the tidal waters while filter feeding. It has been calculated that the bivalves alone filter the entire water volume of the Wadden Sea once every two weeks.

Suspension feeders tend to aggregate. Mussels beds are particularly characteristic for the Wadden Sea and significantly reduce suspended matter in the passing water. In return, they release nutrients like ammonia and silicate at a much faster rate than sediment bottoms, thereby facilitating the growth of phytoplankton. This may then drift to other mussel beds, serving there as a renewed food supply. In addition to phytoplankton, re-suspensions of bottom particles including benthic microalgae also may contribute considerably to the food of suspension feeders in the tidal area. Re-suspended matter may amount to almost half of the food supply.

A large part of the planktonic food for suspension feeders comes from the North Sea, where phytoplankton blooms arise in the coastal waters. There, transparency for unhampered photosynthesis is higher than in the shallow turbid waters laden with re-suspensions from the bottom. In the

Wadden Sea, a purification of North Sea waters takes place due to abundant suspension feeders, high retention rates of organic particles in permeable sand, on sticky mud surfaces and in salt marshes. This coastal filter never clogs, because it is permanently renewed by the consumers within the food web of the Wadden Sea.

Considering birds and fish, the rich populations of benthic suspension and deposit feeding invertebrates in the tidal area constitute a large fuelling station from which birds fly to distant lands and fish swim up the rivers or across oceans. In this respect, the Wadden Sea serves not only as a gigantic filter system but as an equally gigantic import and export system between land and sea as well.

The exceptionality of the Wadden Sea resides in the following qualities:

- Its vast size as an amphibious transition between land and sea,
- A unique diversity and combination of dynamic aquatic, semi-aquatic and terrestrial habitats,
- A diversity of resident organisms together with an extraordinary number of migrants,
- Breath-taking numbers of birds assembling in flocks dancing through the sky,
- Millions of aquatic nurrlings exploiting food in comfortable shallow waters,
- A bewildering diversity of tiny organisms specialized on changeable seashore conditions,
- The mastery of outstanding species of plants and animals over the dynamics of their physical environment by creating solid reefs, permeable sediments, sticky mud, accreting salt marshes and high dunes.

Mussel bed
(Photo: Gerald Millat).



Description of the Niedersachsen Offshore Belt

Geography

The nominated extension to the property „The Wadden Sea, Germany and Netherlands“ is part of the Lower-Saxon Coastal Waters and the Niedersachsen Wadden Sea National Park. It is located seaward of the chain of barrier islands resp. high sand bars as a broad strip parallel of the offshore belt parallel to the coastline between the Outer Ems Estuary in the west and the Outer Elbe Estuary in the east. The nominated property connects the open North Sea and the shallow tidal area. It completes the already inscribed block-shaped parts of the Lower-Saxon Offshore Belt and adds important geomorphological, hydrological and ecological elements and functions as well as secures the existing connectivity of habitats. The area is interrupted by the outer estuary of Jade and Weser. The eastern part is named „Roter Sand“, the western part „Küstenmeer vor den ostfriesischen Inseln.“ The property is 40,628 ha/406.3 km² large. Measured along the base line parallel to the coast, it stretches over a distance of about 65 km.

Geology und Hydrology

The hydrological dynamics are driven by large scale, temporally variable circulation patterns of oceanic currents of the North Sea and by the influx of riverine water from the Ems, Weser and Elbe. The prevailing coastal current is running eastward and interacts with semi diurnal tidal currents. Water temperature varies seasonally and the annual amplitude takes an intermediate

position between the open North Sea and the tidal area. Climatic warming has led to a continuous rise of the average water temperature over the last decades. Stable stratifications of the water column do not develop. Salinity and nutrient concentrations are determined by a mix of Atlantic water and the freshwater runoff from Ems, Weser and Elbe, most pronounced in the eastern area „Roter Sand“, characterized by an abrupt transition of concentrations, named “Convergence Zone of the German Bight”.

The submarine slopes of the extension area at the northern edge of the Wadden Sea are 5 to 20 m below sea level. The seabed consists of sediments deposited during the Pleistocene and the Holocene. Varying sedimentation conditions led to different sediment types and grain size distributions. Under the influence of oceanic currents, tides and storm surges, sand is transported predominantly eastward, parallel to the coastline. Large areas are characterized by a highly dynamic dislocation of sediments. The offshore belt is part of a closely linked sand-sharing system with barrier islands, estuaries and tidal areas. The lower shore face located at the outskirts of the barrier islands and the Elbe-Weser-Triangle below a depth of about 10-12m is structured by a series of NE-striking ridges and valleys, the so-called shore-face connecting ridges with interspaces of several kilometres and heights of up to 6 m. Sediments consists of fine to medium sand. Relicts of the last iceage left an imprint on the morphology and the sediments of the deeper parts of the extension area. Particularly in the western part, stretches of coarse sand and occasionally also gravel and stones occur, imbedded between large patches of medium and medium to coarse sand.



Flock of common eider
(Photo: Reno Lottmann).

Brown shrimp
(Photo: Imke Zwoch).



Habitats

Between biota and climatic, hydrological and geo-morphological processes, strong interactions unfold their intense influence within the extension area and are indicated by the occurrence of typical habitats and communities.

The characteristic benthic association colonizing the fine to medium sandy bottom above the 10m depth contour is the *Macoma balthica* -Community. Below this depth, the widespread *Tellina fabula*-Community has been recorded. The rare *Goniadella*-*Spisula*-Community occurs in coarse sand and gravel. Long-term warming has led to an increase in species numbers, abundance and biomass of the benthos.

The offshore belt and the tidal area together compose an ecological unit for numerous mobile animal species. The nominated German (Niedersachsen) extension to the property is an important spawning site for fish and invertebrate species, which is used as an essential part time habitat within the life cycle or during seasons. It links spatially and seasonally as reproduction -, retreat - and transfer zone the tidal area, the estuaries and the deeper North Sea, for example for the typical flatfish species sole (*Solea solea*) und plaice (*Pleuronectes platessa*) as well as brown shrimp (*Crangon crangon*): The most important habitats for adult brown shrimps are the gullies and channels of the tidal areas, the submarine slopes of the outer estuaries and in the offshore zone down to

the 20 m depth contour. They migrate seasonally between the areas perpendicular to the coastline. In spring, the juveniles abound in the shallow zones and in autumn migrate offshore. Fish species are of vital importance for fish consuming seabirds like terns, divers and cormorants as well as for marine mammals.

Marine mammals indicate as top predators within the coastal ecosystem, how closely the area of the nominated extension to the property is linked to the tidal area and the open North Sea. In terms of spatial distribution, surveys of harbour porpoises (*Phocoena phocoena*) covering the German parts of the North Sea show that habitat use is heterogeneous, with the animals showing clear preferences for certain areas. These may be important foraging grounds. Although the number of counted harbour porpoises throughout the North Sea have remained almost stable since the first counts in 1994 the overall numbers of sightings of harbour porpoises in the southern North Sea are rising which includes the area of the nominated extension to the property.

Harbour seals (*Phoca vitulina vitulina*) prefer to feed on ground fish and are foraging in the extension area all year round. They favour depths between 12 and 25 m. Especial during the birth and lactation period, female individuals, resting on sandbanks in the tidal area, depend on the adjacent offshore belt as their foraging ground. For several centuries, grey seals (*Halichoerus grypus*)

had been missing in this region. Since a few years back, however, the species has been returning to the Niedersachsen Wadden Sea. The centre of the newly found colony lies at Kachelotplate near the island Juist. Grey seals use the area of the nominated extension to the property for foraging.

High biological productivity in the nominated extension area attracts coastal birds preying by diving for fish, mussels, shrimps and crabs or taking small organisms from the water surface. Seabirds and coastal birds use the offshore belt not only for foraging but also for resting and moulting.

The distribution and behaviour of seabirds in the offshore belt are highly variable, depending on season, location of the hydrological convergence zone, wind speed and tidal cycle. Large and connected protection zones for these species are needed to meet their variable demand of habitats. The extension area adds important resting, migrating and overwintering areas of red-throated diver (*Gavia stellata*), common gull (*Larus canus*) and a passage area for little gull (*Hydrocoloeus minutus*, *Syn.Larus minutus*) to the existing property.

Breeding birds from the islands use the offshore belt adjacent to their colonies as foraging area, depending on their preference for certain prey,

preferring limited radii and water depths around their colonies. Thus, the extension area closes important gaps. In the Hamburg and Niedersachsen Wadden Sea, for example, several breeding colonies of sandwich tern (*Sterna sandvicensis*) occur. Sandwich terns forage almost exclusively within the offshore belt up to the 20m depth contour line. The extension areas contain essential parts of their basic food requirements. The offshore belt of the Niedersachsen Wadden Sea is also important for the food supply of breeding common tern (*Sterna hirundo*), arctic tern (*Sterna paradisaea*) and lesser black-backed gull (*Larus fuscus*).

Other, regularly detected bird species within the extension area are: Black-throated loon (*Gavia arctica*), northern fulmar (*Fulmarus glacialis*), northern gannet (*Morus bassanus*), great cormorant (*Phalacrocorax carbo*), common scoter (*Melanitta nigra*), common Eider (*Somateria mollissima*), velvet scoter (*Melanitta fusca*), common black-headed gull (*Chroicocephalus ridibundus*), herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), black-legged kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*) and razorbill (*Alca torda*).



Harbour porpoise
(Photo: Richard Czeck).

Description of the Danish Wadden Sea

The entire Wadden Sea with the Danish part at its northern end constitutes a natural geographic entity at the southeastern continental coast of the North Sea. This entity has an inherent symmetry of hydrological and geomorphological characteristics which vary with tidal range. The tidal range swings from below 1.5 m at the southern end up to 4 m in the central parts and then down again to the 1.5 m range at the northern end. This is a crucial property because at about 1.5 m coastal morphology switches from continuous sandy barriers without tidal flats to a chain of barrier islands with tidal flats between islands and mainland. Islands tend to become shorter and ephemeral with increasing tidal range in the central Wadden Sea while tidal flats become more extensive, whereas wave height tends to decrease from both ends towards the central part.

This is caused by a bend in the coastline giving the Wadden Sea the shape of a wide funnel. The tidal wave is compressed and gains in height towards its inner part while wind waves diminish. The Danish Wadden Sea near the northern rim of this funnel constitutes the symmetric counterpart to the western Dutch Wadden Sea in the south. Without the Danish subregion this natural symmetry of the Wadden Sea would be broken. In other words, the Danish Wadden Sea is – in both geographical and biological ways – an essential

part of the whole Wadden region and contributes significantly to protecting a natural integrity of this coastal landscape.

On a smaller scale, the German–Danish border and with this the boundary of the World Heritage Site since 2009 cuts diagonally through one of the largest tidal basins of the Wadden Sea. This border has reflected a compromise between national interests since 1920 but does not follow any natural features in the landscape. The intersected List tidal basin has an area of about 400 km² and is sheltered by the German island of Sylt in the south and the Danish island of Rømø in the north against the surf of the North Sea. Environmental research has bridged this border by joint German–Danish research projects and overlapping monitoring to overcome the obstacle of a national boundary cutting through a natural entity. Also coastal protection has been done in cross-boundary cooperation when the old dike in front of the Tønder Marsh required an adaptation to rising storm surge levels. A coherent new dike was built across the border in 1981. In the following description of natural values, the entire tidal basin is consequently taken into account without subdividing it arbitrarily.

The Danish Wadden Sea offers particular attributes which make this subregion a treasure box of natural values which considerably strengthen the value of the Wadden Sea World Heritage Site as a whole. (1) In the Danish Wadden Sea, the belt of marshlands is relatively small and at two sites

Moraine coast in the Ho Bugt
(Photo: John Frikke).





Island of Rømø
(Photo: John Frikke).

moraines of a former Ice Age approach the tidal area directly by forming active cliffs. (2) The Danish Wadden Sea receives more sand from the North Sea than most other parts. This may have given rise to a particularly high share of sand bars and plains remaining dry at normal high tide. (3) The Danish Wadden Sea is a very pristine part, fairly remote from industrial centers and the share of unmodified natural shorelines is particularly high. Most salt marsh areas have only been diked since last century, indicating a much shorter impact history than in other Wadden regions.

Although tidal range and the existence of barrier islands resemble very much the western Dutch Wadden Sea, there are more similarities with the adjacent German subregion from Sylt to Eiderstedt peninsula. Together with this part, the Danish Wadden Sea constitutes the Northern Wadden Sea region, one of the three major subdivisions based on physical attributes (Fig. 2.13). In the subsequent description of the Danish Wadden Sea, the particularities as well as the similarities with other parts of the Wadden Sea conservation area will be highlighted.

Geography

The Danish Wadden Sea Area covers an area of 1,545 km² of which the conservation area comprises 1,249 km². The coastal length is roughly 90 km or nearly one fifth of the entire outer Wadden Sea coastline. The width of the tidal area decreases from south to north and the average is about

13 km from the island beaches to the mainland shore. With the old town of Ribe there has been an important trading and cultural centre in the region since the 9th century. However, population density remained relatively low, and many aspects of coastal development emerged later than further south in the Wadden Sea. Embanking of the rather small belt of salt marshes with dikes commenced in the Tønder Marsh about 500 years later than in the Dutch Wadden Sea, and most other mainland marshes remained undiked until the early 20th century. The Varde Å entering the northernmost tidal basin forms the only estuary in the Wadden Sea not flanked by dikes nor intersected by barriers. The busy port of Esbjerg was founded in the 19th century for fishing and Danish commerce in the North Sea region. However, industrial development remained rather rudimentary near the Danish Wadden Sea. Environmental effects remained limited to the vicinity of Esbjerg. Tourism has developed over the last hundred years with a particular sprawl of summer houses on the islands of Rømø and Fanø since the 1960s.

Geology and hydrology

The Danish Wadden Sea came into existence at the same time as the southern parts, about 8,000 to 7,000 years ago. However, moraine elevations stemming from glaciation periods are more prominent than in any other part of the Wadden Sea due to the narrow salt marsh belt between the moraines and the tidal area. Over a total length

of 18 km these moraines have developed active cliffs towards the sea, and a shoreline rich in boulders and pebbles is found at these sites. As a natural phenomenon this is otherwise rare in the sedimentary Wadden Sea. Similar cliffs can only be found south of the border at the islands of Sylt and Föhr. The mainland marshes have developed on the gently sloping sandy outwash plains between and in front of the moraines and subsequently also on marine deposits as it is generally the case at the islands and Skallingen peninsula.

Where the Wadden Sea finds its end in the north, a submarine moraine extends almost 40 km seaward, perpendicular to the coast. Horns Rev (The devil's horn) with its shallows – up to 4 m below the level of the sea and a grave yard of many unfortunate ships in the past – is breaking waves during storms and deflects the prevailing northward coastal current. This, together with the projecting moraine of Sylt in the south, apparently provides a surplus of sand to the Danish Wadden Sea. The tidal area not only kept pace with sea level rise but sand bars grew seaward extending the Wadden region. The island of Rømø has one of the widest beaches in the world (1 to 1.5 km wide). At present a new dune ridge is developing at Havsand at the southern part of Rømø in front of the existing 3 to 4 old dune ridges. The high and large Koresand north of Rømø and also Blåvandshuk at the leeward side of the drowned moraine of Horns Rev are extending seaward. At the island of Fanø, the western beach is apparently stable, only with some dune erosion. The 12 km long Skallingen

peninsula exhibits an eroding beach lined by high dunes. Attempts to stabilize this shore with groins and a sand dike connecting the dunes have been more or less abandoned. At present, the peninsula is allowed to migrate naturally by wind and overwash during storm surges.

While Skallingen developed only 300 to 400 years ago, with dunes at most 200 years old, has now been eroding since the last decades, Rømø has been a high sand bar already since 8,000 years ago with dunes up to 1,000 years old, and this island is still growing seaward. There are some small remnant islands in the Danish Wadden Sea which suggest a chain of barrier islands about 3 to 4 km more landward from the present barrier, possibly existing during an earlier phase of development of the Danish Wadden Sea. One of these remnants, the island of Jordsand in the Lister Dyb tidal basin, extended over an area of about 600 ha with two farm sites in the 17th century but continuously eroded away to 2.3 ha in 1973 and since 1998 only a bare sand bar indicates where once this island had been. At exposed sites, wave erosion tends to prevail around high-tide level while sedimentation is often the dominating process on the tidal flats.

In the tidal area, marine deposits of 10 to 20 m have accumulated which more or less have compensated tectonic subsidence and sea level rise since the emergence of the Danish Wadden Sea. High deposition rates and sediment dynamics generally interfered with the access for ships to port locations and hampered the respective development in this part of the Wadden Sea. Only

Natural gullies in the salt marsh of Skallingen (Photo: John Frikke).





Island of Mandø
(Photo: John Frikke).

in the southern part of the Lister Dyb, tidal basin erosion prevails over deposition. At Ho Bugt in the north, alternating layers of brackish reed marshes and marine salt marshes have been deposited over the last 4,000 years indicating perpetual changes in relative sea level and sediment supply.

Dams have been built to connect islands with the mainland. A causeway for trains was built to Sylt in 1927, for a road to Rømø in 1948 and an ebb road of about 60 cm above mean tide level to Mandø in 1978. These run more or less along the tidal divides but prevent or reduce the overflow of tidal waters from one tidal basin to the other. At the mainland, considerable sediment accretion, mainly at the southern side of the dams, has led to the development of wide salt marshes. A storm surge around 1560 has divided the small Island of Mandø in two but both were connected again by a dike in 1872 and most of the island became embanked by 1937.

The tidal range decreases northward from 2 m in the Lister Dyb tidal basin to 1.5 m in the Ho Bugt basin. Altogether, a tidal prism of roughly 1 km³ (7% of the tidal prism of the entire Wadden Sea) is moved in and out of the Danish Wadden Sea in the course of a tidal cycle. More than half of this water volume flows into the List tidal basin where strong currents of up to 2 m per second have scoured the bottom of the tidal inlet to a maximum depth of 40 m. The other tidal inlets (Juvre Dyb, Knude Dyb and Grådyb) reach only a depth of 9 to 13 m. At the bed of these inlets, submarine dunes of 3 to 5 m in height migrate, often 40 to 60 m per year seaward.

Habitats

The offshore belt is gently sloping to the sea and shallower than in other parts of the Wadden Sea. This may explain the high abundance of common scoters (*Melanitta nigra*) in the area because of an easier access to the shellfish at the bottom which is their main prey. These ducks moult their feathers in the offshore belt and are highly sensitive to disturbance in this period, while breeding occurs in the Subarctic region to the northeast. The seaward barrier of the Danish Wadden Sea is characterized by very extensive dry sand bars and beaches. Presumably the wide shallow offshore belt mitigates the effects of strong surf on the exposed sands. The islands Rømø and Fanø together with Skallingen peninsula up to Blåvandshuk on the mainland coast are covered by dunes up to 20 m in height on their seaward sides while salt marshes occur on their Wadden side. Only a small share of the dunes is part of the conservation area and much of the salt marshes has been converted into pastures and arable land protected against flooding by dikes. In the vast tidal area, intertidal flats dominate over subtidal shoals and channels. The flats provide foraging grounds for huge flocks of migrating coastal birds on their way to and from the Arctic breeding sites. Four major tidal inlets connect this sheltered Wadden area with the offshore belt by a tidal exchange of coastal waters and with this plankton, shrimp, fish and seals commute to and from in high numbers. Along the mainland shore, moraine cliffs alternate with natural salt marsh habitats and artificially generated foreland. In the text below the habitats of the

tidal area and the salt marshes as the two main components of the conservation area are treated in more detail.

Tidal area

The tidal flats comprise an area of about 490 km² (including the German part of Lister Dyb tidal basin) which amounts to 62% of the tidal area. Muddy flats are only found as a narrow belt along sheltered parts of the mainland coast, at the lee sides of Rømø and Fanø, and at the innermost part of Ho Bugt. By far the majority of tidal flats are sandy. Intertidal seagrass beds occur at the leesides of Rømø and Fanø. Mussel beds at Lister Dyb and Grådyb have been extensive but have recently developed into mixed beds of mussels and oysters due to the spread of Pacific farm oysters introduced at a site near Sylt. It has been shown that high numbers of the common Eider (*Somateria molissima*) correlate with the stock size of mussels, and individuals feeding on mussels gain more weight than those feeding on cockles and other benthic prey. Eider ducks prefer small subtidal mussels which have a particularly thin shell, easy to crush in the duck's stomach. On the tidal flats the composition and abundance of the macrobenthic fauna resembles very much that of the entire Wadden Sea.

Outstanding in the Danish Wadden Sea are conspicuous high sand bars and plains with extensive areas above mean high tide level: Jordsand Flak in the Lister Dyb tidal basin, Havsand and

Juvre Sand at Rømø, Koresand west of Mandø, Keldsand and Peter Meyers Sand south of Fanø and north of Fanø the Søren Jessens Sand has merged with the island in the last decades. Together these high sands comprise almost 70 km², mostly bare dry sand and occasionally with some embryonic dunes. Submergence is limited to strong storm surges. This high proportion of high sandy areas is presumably related to an ample sand supply from the North Sea. These high sands are important roosting sites for migratory birds during high tide. The edges are preferred by Eider ducks, cormorants and seals. Of the latter, more than 3,000 have been counted during moulting season which may be about 13% of the entire harbour seal population in the Wadden Sea. In 1996 and 1997 entire schools of sperm whales stranded on these high sands and died – like ships in former times. The wide beaches with embryonic dunes are also very important breeding sites for little terns (*Sterna albifrons*) and Kentish plovers (*Charadrius alexandrinus*) which are rare and declining in the other parts of the Wadden Sea.

Salt marshes

The Danish Wadden Sea comprises a relatively high share of natural salt marsh developments, at the islands as well as along the mainland shores. Particularly along the shores of Ho Bugt (the most northern tidal basin of the Wadden Sea), salt marshes develop naturally on an area of about 10 km². At the lee side of Skallingen peninsula,

Jordsand
(Photo: John Frikke).





Salt marsh with natural gully system, Keldsand, South Fanø (Photo: John Frikke).

a large and natural salt marsh extends, which has been studied in detail. It developed on a high sand plain at the onset of the last century with the pioneering plants *Salicornia* and *Puccinellia*. Accretion rates were highest at the landward and seaward sides, leaving a central depression with enhanced salinities during evaporation in summer. Then gradually meandering creeks have developed and drained the central area. This subsequently allowed for vegetation development there as well. This marsh is partly grazed by domestic sheep. There, the grass *Puccinellia* dominates while the scrub *Halimione portulacoides* dominates where sheep had no access over the last decades. At the edge of this salt marsh a scarp indicates retreat while about 25% of the edges are prograding. Since 1963 the mean accretion rate at this salt marsh has been almost 2 mm per year which is slightly less than the relative sea level rise over the same period. To compensate the most recent rate of sea level rise with about 4 mm per year, accretion may lag behind in the future. On the adjacent tidal flats in the Ho Bugt, an accretion of 1.5 m has occurred over the last 2,000 years. This corresponds to an annual rate of less than 1 mm or less than half of the accretion rate observed on the salt marsh. This facilitates lateral erosion at salt marsh edges.

At the mainland shore near the town of Ribe, a different type of natural salt marsh development is ongoing. The Råhede Vade salt marsh is an interesting example for alternating effects of

erosion and deposition. The edge of this marsh is eroded by the prevailing waves. In front of the emerging scarp of about 0.5 m in height, a runnel parallel to this cliff is developing and creates a sandy ridge on its seaward side. Once this ridge has grown up and approaches high tide level, pioneer vegetation begins to accrete fine material. Then a new salt marsh is developing in front of the old one. In the course of time the new marsh merges with the old one. Finally waves create a scarp at the seaward side of the new marsh and the whole process is repeating and a regular pattern of ridges at distances of about hundred meters has emerged on a time scale of a few decades. High deposition rates allow the repetitive sequence of retreating and prograding salt marsh edges. In the Danish Wadden Sea, such recent and ongoing salt marsh developments can be observed along parts of the mainland coast because past land claim operations were less intensive than in the other regions of the Wadden Sea.

As a special feature of the northern Wadden Sea, the lagoon cockle *Cerastoderma glaucum* lives in salt marsh creeks and occasionally also in sheltered seagrass beds with some cover of water throughout low tide period. This sister species to the common cockle *C. edule* which is abundant on the tidal flats, occurs in semi-isolated patches scattered throughout the Danish and North Frisian Wadden Sea. Connection between these patches as well as to more distant populations elsewhere along European coasts is primarily maintained by

Estuary of Varde Å
(Photo: John Frikke).



migrant birds which unintentionally carry the adhesive eggs of this bivalve over long distances. The reason for a thriving meta-population of lagoon cockles is the relatively large extent of natural and semi-natural salt marshes in this region.

The curlew increased significantly in numbers and its melodious calls are now often heard again in the tidal zone and salt marshes. Migrant dunlins form huge flocks when flying from the flats to their roosting sites at the edge of salt marshes. Only in the Danish part of the Wadden Sea pairs of the subspecies *Calidris alpina schinzii* of the dunlin breed in the salt marshes. Its main breeding range is in the Baltic region but it was once also common throughout the entire Wadden Sea. That it is still found in the Danish Wadden Sea may be attributed to the relatively low level of disturbances and high share of natural salt marshes. This particularly applies to the Island of Mandø which also provides breeding sites for high numbers of lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*).

The Varde Å drains an inland area of more than 1,000 km² and discharges 12 m³ of water per second on average or about one million m³ per day. Contrary to other estuaries in the Wadden Sea the Varde Å remained without dikes and is meandering naturally through an old outwash plain towards the sea. At the mouth, the tidal range varies between 1.1 and 1.6 m and marine waters protrude 2 to 5 km upstream during high tides. Salt marsh deposits are found up to 10 km

upstream. The tidal area extended at least 3 km into the present marsh but over the last thousand years sediment supply from the sea allowed the estuarine marsh growing into the Ho Bugt tidal area in spite of sea level rise. The marsh on either side of Varde Å is under agricultural use, mainly used to harvest grass. Only a small margin at the mouth is composed of natural brackish and salt marsh vegetation. This almost natural estuary is a showcase of estuarine development. It represents a habitat variety which has been lost or strongly transformed elsewhere in the Wadden Sea as a whole.

Prior to 1900, no dikes were built north of Emmerlev Klev. Storm surges could penetrate far inland into the marshes of Brede Å, Ribe Å and Sneum Å. Only at Vidå estuary dikes had been built since 1556 under Frisian and Dutch influence. The first sluice at the Vidå was built in 1566, the next further seaward in 1861 and the most recent one in 1981 when the last embankment in this border region occurred. The main part of the latest enclosed polder (Margrethe Kog) is not used for agriculture, but has the status of a nature reserve which on the Danish side belongs to the conservation area of the Wadden Sea. In front of the new dike, salt marsh development has been initiated by artificial sediment supplementation and brushwood groins. In the marsh area of the Brede Å, the northernmost dwelling mounds in the Wadden Sea had occurred but were given up after

severe storm surges in 1634 and 1825. This marsh became embanked in 1918. The Ribe Å estuary has been converted into a shipping canal in 1856 and the marsh became embanked in 1913. Overall, still existing salt marshes in the Danish Wadden Sea comprise 72 km² of which about half is still developing more or less naturally.

History of Research

Geological, ecological and biological research in the Danish Wadden Sea had a very early start and has contributed essentially to the understanding of the Wadden Sea coastal system. Possibly the first research in the Danish Wadden Sea dates back to Krøyer (1837) who mapped and described the status of the oyster beds which were of high commercial value at that time. When the stocks declined, Möbius (1893) began to study the prospects of the oyster population in 1869, particularly in the Lister Dyb tidal basin. On this occasion, he developed the ecological community concept (biocoenosis; Möbius 1877) which is still thriving in modern ecology. The first studies devoted to the fauna and flora of the tidal zone in the

Wadden Sea commenced with Wesenberg-Lund (1904) at the Island of Fanø. The study of zonation patterns in the tidal flat fauna was pioneered by Thamdrup (1935), investigating tidal flats between Skallingen and Langli. His studies together with those of Smidt (1951) in the 1940s have been used by Jensen (1992) to demonstrate that besides pronounced fluctuations between years, the tidal flat fauna has remained essentially the same over the past decades. Similar comparisons have been made in Königshafen, a small tidal bay at the northern tip of the island of Sylt. Smidt (1951) was the first to study benthic secondary production with respect to the Danish Wadden Sea as a nursery ground for plaice and other North Sea fish. Grøntved (1962) was the first to estimate benthic primary production by the microalgal films on tidal flats, investigated on mud flats between Sylt and Rømø. A comprehensive German-Danish ecosystem study has been conducted in the Lister Dyb tidal basin on the importance of exchange processes between the North Sea and Wadden Sea and between tidal waters and tidal flats (Gätje and Reise 1998; Madsen et al. 2010).



Figure 2.13: The Danish Wadden Sea Area and Conservation Area. Danish Nature and Wildlife Reserve.

Seals and the breeding and migratory populations of birds have been monitored carefully, especially since the 1970s (Tougaard 1989; Salvig et al. 1994; Meltofte et al. 1994; Thorup and Laursen 2008). In addition a number of research projects have been carried out on the role of waterbirds in the Danish Wadden Sea ecosystem (Maagaard and Jensen 1994; Madsen 1988; Laursen and Frikke 2006; Laursen et al. 2009).

A Skallingen field laboratory was founded by Copenhagen University already in 1935 for geomorphological research (Nielsen 1935; Christiansen and Aagaard 2004) and is still used for field courses and research projects. Summaries of this research have been provided by Jacobsen (1993), Bartholdy and Pejrup (1994) and Christiansen et al. (2004). The Danish Wadden Sea is a well investigated area in the Wadden Sea with respect to natural morphodynamics, sedimentation rates and origin of deposited material. In particular, the development of Skallingen peninsula has been studied in great detail from geological and ecological perspectives. There may be no other dune and salt marsh area of which the morphogenesis is better known. Research in the Danish Wadden Sea has certainly contributed to the general understanding of the Wadden Sea nature area.

Exploitation of Natural Resources

The Niedersachsen Offshore Belt

Fishery is the only direct exploitation of natural resources which takes place within the boundary of the proposed extension area. All other uses of natural resources (i.e., extraction of sand, wind energy) are located outside the area although some are adjacent or quite close to the borders of the nominated extension to the property. See Chapter 4b.

Fishery

The extension area is of great importance for the inshore fishing sector in Niedersachsen. Traditionally, the fisheries in this area are for brown shrimps and flatfish using beam-trawling vessels which start from small harbour villages at the mainland coast. The fishery for brown shrimps takes place from the shoreline down to the 20m depth within the 3 nautical mile zone. Seawards up to the 6 mile border mixed fishery on brown shrimps and flatfish is practiced. Landings of flatfish from this part have become almost insignificant. Fishery for blue mussels does not play any role due to their rarity.

The fleet consists of small vessels (circa 120): small beam-trawling vessels with low draft and

a motor capacity of 221 kW. Most of the vessels are run as a family business. In 2011 the landings of brown shrimps in all Niedersachsen coastal waters reached 6750 t.

Gas and oil

The state party confirms its commitment not to explore and extract oil and gas at locations within the boundaries of the property in line with law in force.

The Danish Wadden Sea

Gas and oil

Exploration and exploitation of gas and oil including seismic investigations is prohibited in the nominated property according to the Statutory Order on the Nature and Wildlife Reserve Wadden Sea.

Extraction of raw materials

Extraction of raw materials, i.e. sand, sediment and shells, is not allowed within the nominated property. Exemptions are subject to the strictest regulation. Hence, permissions are rarely given and follow exclusively the needs for societal security and maintenance of the flood protection – mainly the sea dikes. For maintenance and reinforcement of dikes material will only be extracted from the area in case suitable materials do not exist outside the area i.e. the embanked polders behind the sea dikes.

Salt marshes – Land use and management

Coastal flooding defence and protection

Beaches, dunes, coastal island heaths and tidal salt marshes and meadows are habitats created and maintained through dynamic and unimpaired natural processes. Restoration of wetlands and watercourses in the mainland are planned and partly already carried out. Yet a part of the water courses in the hinterland are still regulated primarily securing sufficient freshwater run-off for the needs of agricultural purposes.

A new dike southwest of Højer (Det Fremskudte Dige), built from 1979 to 1981, was the last coastal protection project that had a land reclamation effect on tidal areas in the Danish Wadden Sea. The project created Margrethe Kog, which together with Ny Frederikskog, Gammel Frederikskog and Magisterkogen, comprises a core area of approx. 2,500 ha of the much larger Tønder March (6,500 ha). A part of Margrethe Kog (250 out of 1,200 ha) consist of an artificial saltwater lagoon where inflation of seawater helps to maintain a rich marine fauna feeding the bird populations.

All sea dikes along the mainland coast (from the Danish/German border to Esbjerg) and the dikes at Mandø and Rømø are maintained in order to meet the requirements for safety to the populations living behind these dikes. The maintenance follows regulations under the Coastal Protection Act and only after a careful Environmental Impact Assessment.

For safety reasons artificial sedimentation fields are in a few cases placed along areas where natural sedimentation processes and immigration of salt marsh vegetation do not take place, e.g. along Det Fremskudte Dige near Højer and the causeway to the island of Mandø. Most forelands and dikes are as a part of the maintenance programme grazed with cattle in particular sheep.

Grazing and drainage

Grazing by domestic animals can interfere with the natural development of salt marshes. Too intensive grazing by cattle or sheep may lead to destruction of the top soil layer and a decrease of the perennial vegetation due to feeding and trampling. It results in a decrease in sedimentation and in reduced soil conditions and soil stability, both of which are harmful for coastal protection and which may minimize the nature values. It may lead to a monotonous habitat structure and, in this way, to less attractive conditions for breeding birds. Low-rate grazing, on the other hand, can increase the diversity of plant and animal species on sites with a clay layer thicker than 15-20 cm, and improve conditions for most breeding bird species in salt marshes.

On the islands and in the peninsula of Skallingen, the majority of the vast salt marshes have developed naturally, and due to extensive or no grazing, they are left to natural succession and they show various transition stages. In addition the salt marshes in the Ho Bay area and in the northern parts of the islands Fanø and Rømø are of more or less natural ancestry.

In former times, many sites were intensively used for agricultural purposes. However, livestock grazing for agricultural purposes has generally decreased in the area over the past 20 years, but still approx. 75% of the salt marshes in the protected area are grazed extensively and/or are under appointment of environmental friendly management. The agricultural utilization of the meadows and forelands is a cultural heritage which combines agriculture, coastal protection and nature management.

In about 50% of the salt marshes there were no drainage measures taken, and in an addition drainage has been reduced over the past 10 years.

Fishery

Fishery for shrimp, blue mussel and cockle is the only commercial fishery in the Danish Wadden Sea. Fishery is strictly regulated by the statutory order of the Nature and Wildlife Reserve Wadden Sea.

Shrimp fishery

The shrimp fishery is furthermore regulated by the statutory order for shrimp by the West coast of Jutland (Bekendtgørelse om fiskeri efter hesterejer ved den jyske vestkyst). The Danish shrimp fishery fleet is located in the harbours of Havneby at Rømø and Esbjerg and to less extent in Hvide Sande and Thyborøn. There are currently 28 licenses for vessels from Havneby (5), Esbjerg (7) Hvide Sande, Thorsminde and Thyborøn. The annual landings are about 2-3,000 tonnes (2009).

The fishery takes place in the North Sea along the west coast of Jutland down to the Danish-German border and even further south in international waters. Shrimp fishery is not allowed east of the Wadden Sea islands, i.e. only west of the so-called "shrimp line", a zonation introduced in 1977, which separates the Wadden Sea from the North Sea. However, only trawls with sieve-nets or veil-nets are allowed in order to reduce by-catches of fish.

Blue mussel fishery

Fishery for blue mussel (*Mytilus edulis*) in the nominated property is only allowed on wild mussel banks. Mussel cultural banks are not allowed in Denmark. Currently blue mussel fishery is prohibited. This ban is effective until the effects of the fishery in relation to securing sufficient food availability for migratory and breeding birds, e.g. common Eider and oystercatcher, in the protected area are well documented. About half of the Danish Wadden Sea has been closed for mussel fisheries with the aim to set aside about 10,000 tons of mussels for mussel eating birds.

In the Danish Wadden Sea, fishery for blue mussel and bivalves is restricted by NATURA 2000-directives and no permits for fishery on blue mussel is given before the impact of the fisheries is assessed according to the Habitats and Birds Directives. Impact of fishery with a traditional mussel dredge is evaluated. The evaluation of the impact is conducted with respect to parameters included in the list of protected species and habitats for the area where the fishery is taking place. A practice for estimation of the biomass of blue mussel that annually can be fished in the Danish Wadden Sea has been developed. The biomass of blue mussels required for bird consumption is included in the estimate.

Due to a low standing biomass of blue mussel the fishery was halted in 2005 and onwards. The fishery was stopped in 2008 and the needs of the bird populations were estimated to 40,000 t of blue mussel. This biomass has to be reached before the fishery can be re-opened. Over the last ten years the total biomass of blue mussel has not reached a level that allowed the fishery to be re-opened.

Cockle fishery

There is one licence for limited mechanical cockle fishery in a small part of the outer Wadden Sea area connected to the channel to Esbjerg harbour (Grådyb). The license is currently not used.

Oyster fishery

Commercial, industrial uptake of Pacific oyster is at present not allowed in the Danish part of the Wadden Sea. In 2012 one licence for manual collection of Pacific oyster was issued by the food authorities to a local restaurant. The oysters are harvested manually from the sea bottom. There is currently no information on how much has been collected. The public is allowed to manually collect Pacific oysters and blue mussels for private use only. The impact of manual collection is not considered to have a harmful impact on the Wadden Sea ecosystem.

Other fisheries

The employment and number of business in fisheries and related industries with regard to the Danish Wadden Sea are not known in details but is, in 2010, estimated to 70 jobs and 10 registered fishing companies and 60 jobs in related 15 services and processing companies.

Netting and the use of fykes in the nominated property is regulated by a statutory order issued by the fisheries authority. The use of gill-nets is prohibited because of concerns to the protected Atlantic salmon and houting (a highly protected fish species only found in the Danish part of the Wadden Sea). Fykes must be issued with a grille preventing otters, salmon and houting from entering the fyke.

Fishery in the river systems and watercourses connected to the Danish Wadden Sea is restricted according to a special statutory order that primarily determines the closing seasons of the fishery on salmon and seatrout, setting sustainable quotas and the methods by which the fishery including recreational fishery is performed.

Hunting

Hunting has a long tradition in the Wadden Sea region. In former times, taking of seals

and trapping of waterbirds - mostly geese and ducks - were traditionally an integrated part of the livelihood of the inhabitants of the Wadden Sea area. Waterbirds were also hunted to be sold to provide an additional income, and the many duck decoys, of which some still exists along the coast, bear witness to this. Some of these have been restored and serve as museums. However, methods, equipment and also the purpose changed with time, as has legislation and public opinion on hunting. In Denmark, catching ducks in duck decoys was banned with a revision of the hunting legislation in 1931. Nowadays, hunting has changed into a mainly recreational activity, with the exception of hunting for rabbits for coastal protection reasons. Seals are no longer hunted in the Wadden Sea (closing of the hunting season in the Netherlands in 1962, in Niedersachsen in 1973, in Schleswig-Holstein in 1974 and in Denmark 1976). Exemptions for hunting for wildlife management and pest control are possible.

In the Danish Wadden Sea, hunting used to be intensive and widespread compared to hunting in the other parts of the international Wadden Sea. However in the context of the Nature and Wildlife Reserve Statutory Order hunting has been reduced significantly throughout recent decades. The most disturbing hunting activities, like hunting from active motorboats, has been phased out in the protected area, and today waterbird hunting along the coast lines is only allowed in some private salt marsh and marsh areas making up less than 5% of the reserve, and hunting in the sea territory from anchored boats or by wading is only allowed in the areas west of the islands. Hunting in autumn and winter at sea in the westernmost parts of the Danish Wadden Sea is to a high extent limited by weather conditions and is a leisure activity for very dedicated Eider duck hunters exclusively. The number of active hunters has gone down in recent decades and the general hunting pressure has decreased.

Hunting on coastal birds has been reduced in the Danish Wadden Sea. This has since then considerably reduced the flight distance of more species of geese and the curlew.

The revision of the executive order in 1998 resulted in the prohibition for hunting in large, state-owned areas, and hunting within the Wadden Sea reserve has since then been considered as sustainable in relation to management of the most vital parts of this very important refuge to a number of waterbird populations.

2.b History and development: A Wadden Sea of change⁶

Coastal wetlands all over the world changed considerably in position, size and shape in the wake of a postglacial sea level rise of more than one hundred meters over the last 16,000 years. Hunters and gatherers frequented these bountiful coasts from the beginning. Severe resource depletion commenced in Asian and Mediterranean regions 2,500 years ago. In the North Sea region, intensification of resource use began about a thousand years ago. Human impacts intensified with population growth and dominance of global markets but then slowed in some and reversed in a few coastal wetlands, including the Wadden Sea, by prudent environmental management. In this section, the geomorphological, human and ecological history of the North Sea region with the Wadden Sea at its centre is summarized, concluding with perspectives on future developments.

⁶ Chapter 2.b is a marginal update of the 2008 nomination document

Early geomorphological development

Since the end of the last glaciation, sea level has risen by 120 m in the North Sea region (Fig. 2.14). During a fast rise until 7000 BP, tundra and boreal forest in the Southern North Sea were inundated. When the shoreline approached the region of the present Wadden Sea, sea level rise decelerated. Since then sediment deposition more or less kept pace with relative sea level rise and tidal deposits of 10 to 15 m magnitude have accumulated since the beginning of the Wadden coastscape. Some phases of stasis or fall may have occurred intermittently.

When sea level rise slowed down, barrier spits with sand dunes developed. These were eventually breached and cut into barrier islands as sea level continued to rise and tidal range increased. In the southern part, this happened between 7500 and 6000 BP and constituted the birth of a coastal configuration which resembled the present Wadden Sea. The tidal area behind barrier islands gradually enlarged with sea level rise. When this stopped intermittently, the tidal area

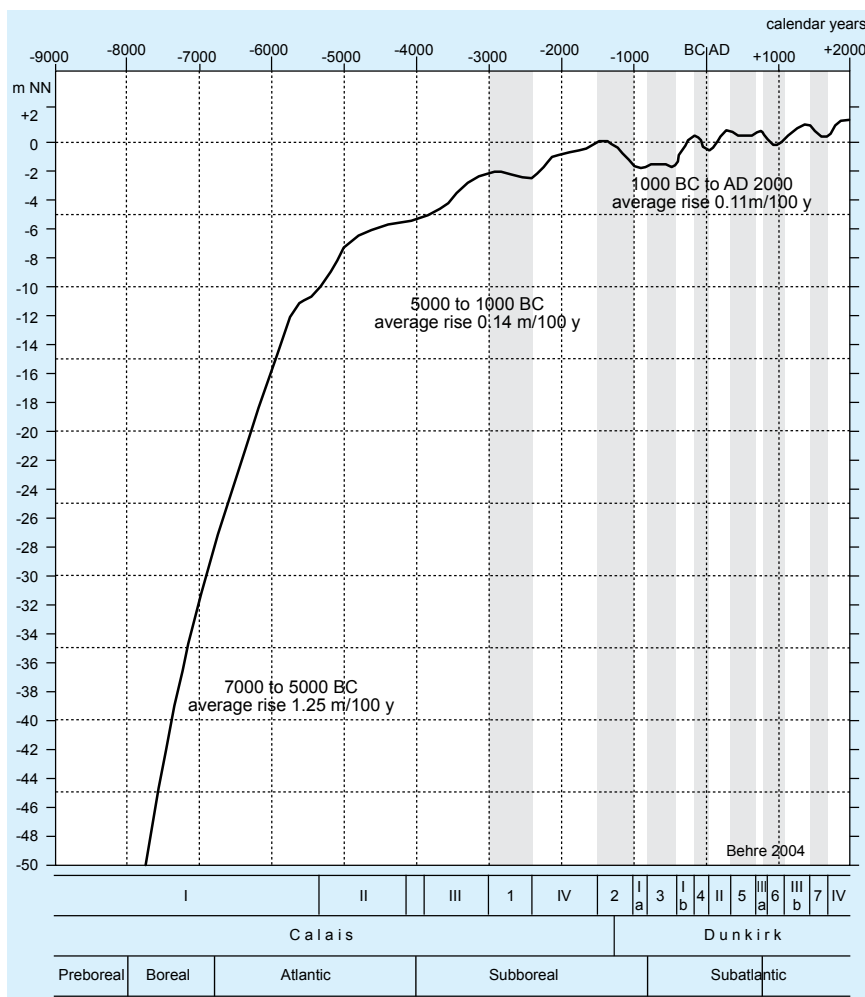


Figure 2.14:
Transgression curve
(Source: K.-E. Behre,
2004).

decreased, and then increased again when sea level rise continued. Landward of the tidal area, a marsh of a similar areal extent provided a wide episodically flooded plain, consisting of salt marsh vegetation and brackish to limnic reed marshes. Between these marshes and the Pleistocene elevations, extensive raised bogs developed. Along major rivers, gallery forests occurred at the levees. Otherwise, the marsh was a treeless plain kept open by episodic flooding.

Such a coastal landscape may be regarded as a pristine condition of the Wadden Sea, and it lasted until about a thousand years ago. The positions of shorelines at islands and between the tidal area and the salt marsh area were highly dynamic and shifted back and forth with sea level and sediment supply.

Human history

As far as we know, humans have always been present in the Wadden Sea region. Islands, tidal flats and marshes, with a diversity of fish, shellfish, fowl, mammals and wild plants must have offered ample opportunities for Neolithic and Mesolithic hunters and gatherers. The archaeological evidence is scarce, however, as traces have been destroyed by wave erosion or buried under massive layers of sediments. Permanent settlement was largely restricted to higher grounds. On the

moraine islands of Sylt, Föhr and Amrum, outside the inscribed property, as many as 77 megalithic graves and 1,000 Bronze Age barrows have been located, and the adjoining tidal flats and sand dunes provided dozens of flint daggers and sickles.

Wetland settlements are known from the western part of the Wadden Sea from 5500 BP onwards. Fishing and fowling was combined with agriculture. About 3350 BP, relatively large numbers of colonists settled at a former salt marsh estuary on the Noord-Holland peninsula and, later, on the banks of the rivers Weser, Elbe and Ems. Settlements were abandoned when extending bogs and recurrent sea-breaches submerged the farmland. Settlers on the seaward salt marshes were transhumant pastoralists who took their cattle to higher grounds during winter season. First salt marsh settlements were established on level terrain, but subsequently inhabitants began to raise their farmyards to keep them out of the water during storm tides. Collective raised mounds (*terpen*, *wierden*, *wurten* or *warften*) piled up with sods and dung were built for safe housing in an otherwise amphibious marsh.

From the ninth to tenth century AD a great transformation of the coastal landscape set in. Swamps and bogs were systematically drained and converted into cultural land. Salt marshes came to be protected by earthen sea walls (dikes)

Breaking waves
(Photo: Klaas Kreuijjer).





Rising tide
(Photo: Martin Stock).

repelling the floods and retaining fresh ground-water supplies. By the thirteenth century one to two meter high dikes surrounded most marshes. Valve sluices were used to discharge accumulating rainwater. The population increased and reached an unprecedented prosperity. Urban demands for cattle, cereals and dairy products boosted agriculture and commerce.

However, the dikes were feeble and major storm surges swept freely over their tops. The drainage of swamps and bogs had unforeseen repercussions. It caused topsoil erosion and subsidence. Embanked marshes could no longer rise by regular deposition of fertile clay during inundations. In stagnant brackish waters mosquitoes multiplied. Malaria became endemic, leading to widespread health problems. Salt making was an important economy. To obtain salt, tidal peat banks were dug off, the peat dried and then burned. The salt was extracted from the ashes. This activity started in Roman times, and at the end of the Middle Ages most bogs buried by marine sediments had disappeared and the terrain lowered by 1 to 2 m. This had aggravated the effects of storm surges. Apparently, human activities have contributed to the development of deep embayments such as Zuiderzee, Dollard and Jade Bay, and large parts of the Northfrisian area. Devastating floods caused the deaths of thousands of people and their livestock. Only part of the inundated land could be reclaimed in subsequent decades and centuries.

With the beginning of the Modern Age (1500

AD), dikes were reconstructed until they were strong enough to stand substantial storm surges. When the risk of flooding declined, a growing number of farmsteads were reallocated from knolls onto the flat ground. Extensive drainage guaranteed sufficient lowering of the water tables to intensify arable farming. Maritime trade also intensified, with islanders being particularly involved in shipping, trading and whaling.

From 1900 AD onwards, large-scale mechanisation of dike building, hydrological management, agriculture and fishing took place. The landscape was more and more redesigned to fulfil human needs. Many remaining bays were embanked, estuaries canalized and rivers dammed. On the islands, tourism developed into the major economic activity and entailed a sprawl of infrastructures. However, in the last third of the twentieth century a turning point was reached. The idea that a coastal landscape is something to be valued on its own right has gained ground. Species and habitat protection and restoration efforts have been initiated on a large scale.

For centuries, the deep tidal inlets in the Wadden Sea area have formed the main shipping routes from the 'Zuiderzee' harbours to the open sea. Of these harbours, Amsterdam became the most important and developed into a central staple market within Europe. During the 16th century the focus of trade was directed toward the Baltic area, with the emphasis on grain trade. But from the 17th century onwards the trade with

The wide horizon
(Photo: Klaas Kreuijer).



the East and West Indies in luxury commodities such as tea, coffee and tobacco rapidly gained importance. For this purpose, the Dutch East India Company (VOC) was founded in 1602. The large merchantmen used for the long distance trade were unable to pass the shallow waters of the 'Zuiderzee' to enter the Amsterdam harbour. Therefore, these ships were loaded and unloaded on the Texel roads in the western Wadden Sea. Protected from the northwestern winds by the Island of Texel, it was a relatively calm area. Relatively, because over the centuries, thousands of these ships have been wrecked by storms. A notorious example is the Storm of Christmas Eve 1593, when more than 40 ships are said to have sunk in a single night. Until now, approximately 80 shipwrecks with archaeological significance have been located in this area.

The Wadden Sea is a highly dynamic tidal area. Gullies cut deeply into the Pleistocene subsoil and are shifting constantly. Sediment is continuously eroded and redeposited. Ships that sank into such gullies deflected existing currents and, consequently, the course of these gullies. In a short period of time, these ships were covered and protected by a layer of sediment, which caused these wrecks and their (organic) content to stay extremely well preserved. This archaeological maritime heritage is of great importance on a national level. These shipwrecks reflect a period in the national history in which the Netherlands became an important maritime nation. But the significance of this heritage goes far beyond national meaning. The shipwrecks, which are of

many different nationalities, form the physical testimony of the maritime exploration and trade of the 16th to 18th century that brought contact with distant parts of the world, sometimes for the first time. The number of wrecks and the extremely favourable preservation circumstances make the western Wadden Sea one of the richest archaeological resources of our common maritime heritage. That is why the western Wadden Sea is on the tentative list of the Netherlands as a cultural site (26/09/1995). However, the shipwrecks are not included in this nomination of the Wadden Sea. The reason for this is that at the moment, there is not a complete archaeological characterization of all the shipwrecks concerned. In addition, there is only little information on the number, the locations and the characterization of possible shipwrecks in the German and Danish part of the Wadden Sea. Therefore, much work still has to be done to establish a full inventory of the underwater cultural heritage of universal value for the Wadden Sea.

As the gullies keep shifting, the sedimentation-erosion process repeats itself. This situation can cause covered wrecks to be exposed again or it may lead to the discovery of a new wreck and sometimes even several wrecks at the same time. Exposition from the protective sediment may be a threat to the long-term preservation of these shipwrecks by erosion, the woodboring shipworm (*Teredo navalis*) or by human activities such as looting. Therefore, the wrecksites and sedimentation-erosion patterns within the area are monitored on a regular basis. In the last two

decades techniques also have been developed to physically protect these wrecks by covering them with nets with fine meshes that catch the sand, resulting in artificial mounds or reefs.

The shipwrecks and their environment are subject to protection under the Monuments and Archaeological Sites Act 1988, the Nature Conservation Act 1998 and the PKB. The Malta Convention was ratified by the Netherlands in 1998 and implemented in the Monuments and Archaeological Sites Act 1988. According to the PKB, monitoring of the shipwrecks as well as investigation and recovery of shipwrecks that are exposed from the protective sediment as a consequence of natural physical processes is allowed under certain conditions. These activities may not adversely effect the natural values and features. Human activities in the Wadden Sea may not damage the archaeological values present in the bottom of the Wadden Sea.

When flying over the Wadden Sea area of North Frisia at low tide, traces of earlier land cultivation, farming and settlements can be seen on the eroded banks of tidal gullies lining the mudflats or in areas where the mudflat substratum has been worn away by the flow of water. The remains of ditches used for drainage and soil improvement are the most common traces which appear. However, it is also possible to find the remains of roads and dikes, mound bases, wells and cisterns constructed from dried bricks of peat or clay, pits and stakes used for various purposes as well as

areas used for the mining of peat for fuel and salt.

Walking out onto the mudflats, it is possible to date some of these structures, known locally as "Kulturspuren" (traces left by cultural development), with the help of archaeological evidence. In this way, it is possible to reconstruct the course of earlier land development and settlement and to outline the general contours of the development of land cultivation in space and time. Archaeological and geographical research has shed light on the complicated interplay between human manipulation of the environment, a rising sea level, and the increasing frequency and severity of tidal flooding. At the same time, interdisciplinary cooperation has shown that the morphological development of this coastal landscape cannot be fully understood without knowledge of the composition of the geological subsoil and, in particular, the consistency and strength of the Holocene sediments.

The present protection and management of the inscribed and nominated property will ensure that such features are also protected as part of the nomination and remain an integrated part of the heritage. Small-scale traditional uses are small-scale activities, mainly carried out by local inhabitants, in accordance with regional customs and traditions. They are part of local heritage and give islanders a sense both of belonging and of freedom. These feelings are intense and, as such, they play an important part in shaping the islanders' identity. These uses enhance the involvement of local communities. These activities are only



Sunset at the Ribe Å,
Denmark
(Photo: John Frikke).

allowed if they do not cause significant damage to nature. The local authorities are responsible for supervising these uses. Examples are catching shrimp for own consumption (dragnet shrimp fishing), digging up lugworms and ragworms by hand, collecting shellfish by hand for own consumption, walking and strolling along the countryside.

Experiencing the Scenic Values

The complex and dynamic mosaic of the superlative natural phenomena formed by the geomorphological features and biologically rich and diverse habitats that constitute the Wadden Sea ecosystem forms one of the most dramatic and beautifully integrated landscapes and seascapes world wide. This can be experienced when walking on the "bottom of the sea" during low tide and crossing this vast expanse of interrelated land and seascape from the mainland to one of the many barrier islands. On the way one passes all the habitats characteristic of this system, including the salt marshes with their intricate gully systems and the mudflats near the coast, hard sandbanks and deep gullies where the water constantly moves in and out. Experiencing the marine environment on foot, where just a few hours before it was covered by some meters of water, surrounded by an endless sky where the sea meets the horizon deeply impresses most people visiting the Wadden Sea.

As far back as Antiquity, the vast area of the Wadden Sea and the dynamic transition between sea and land created a lasting impression on human observers. The earliest and most famous testimony is recorded in the 'Historia Naturalis' by Plinius Secundus (23–79 AD). Pliny's amazement was caused by the 'indistinctness' of the coastal formation, of which one could not tell, "whether this region was part of the mainland or part of the sea." It is not surprising therefore, that Pliny found the intimate link between the people in this region and this dynamic natural environment quite incomprehensible.

A fundamental re-interpretation of the visible world during the 17th - 18th centuries introduced the 'aesthetics of the sublime', which made it possible to ascribe a particular aesthetic quality to the elements of coastal landscapes. As a result, a new perception of 'pleasure' was derived from the stimulus to the human senses provided by the natural features of the Wadden Sea.

The completely open horizon with the apparently limitless sky above and the indistinct transition between the tidal flats and the sea creates an expansive experience and intense stimulation of the senses that cannot be equalled by any

other comparable coastal formation. This creates a unique relationship between the high aesthetic qualities of the natural ensembles and of the extraordinary ecological features of the area. The extraordinary aesthetic importance of the Wadden Sea Region is represented through a special kind of tension which can only be experienced with such intensity in this location: the tension between the 'overwhelming natural phenomenon' of a coastline that offers a particularly powerful experience of the sublime on the one hand, and the characteristic sharpening of the capacity for sensual experiences through what at first glance would seem to be unprepossessing natural phenomena on the other.

An inherent feature of the system is the continuous change of the flats, the deeps and the gullies from the largest to the smallest fraction. These morphological variations are in the aesthetic perception compounded by the infinite tidal rhythm. Nowhere else can the dynamic interplay between the sea and land be experienced on such a scale and richness in form. Nowhere else is there such a variety of natural features in a coastal area: the hugeness of the area; barrier islands with large differences in land and seaside; tidal area with an enormous differentiation, uninterrupted over many hundreds of kilometres with a highly dynamic system of deeps and gullies constantly changing; estuaries and tributaries debouching into the area; and large areas of salt marsh area along the coast with islands and Halligen. These natural features dominate the land and seascape and are accentuated by humanity's constant struggle with the area for over a thousand years. It is this complexity of habitats and biotopes so intricately linked in an elaborate ecosystem that stimulates the observer with its superlative intricacy.

The serene beauty and peacefulness of the landscape and seascape are continually changing as a result of seasonal variations in climate and the rhythm of the tides. The onset of major winter storms can suddenly transform the placid waters into a wild and awesome setting of wild beauty that inspires great respect for the forces of nature. It is the intense tension between the human perception of the grandeur and beauty of the natural systems and their ability to instill awe that result in an exceptional attractiveness. The sheer scale and richness of the land and seascape in which anthropogenic features play an important role enhances the aesthetic value of the Wadden Sea. It has stimulated such famous novels as *The Dykemaster* by Theodor Storm and *The Riddle of the Sands* by Erskine Childers, as well as the world-



Mandø, Koresand
(Photo: John Frikke).

known expressionist paintings by Emil Nolde. Childers and Nolde capture the very beauty of the "sands", the extended tidal flats and the silence and the awe under storm.

History of ecological changes

Large terrestrial mammals (e.g. aurochs, elk, bear) and birds (pelican, flamingo) were hunted during the earliest human occupation in the Wadden Sea and elsewhere in Europe and finally disappeared. During medieval and modern times, a gradual decline of waterbirds (e.g. herons, cranes, spoonbills, cormorants, ducks and geese) and marine mammals (e.g. grey seals, large whales) is assumed to have been caused by hunting. Large diadromous fish (e.g. sturgeon, salmon), groundfish (e.g. haddock, cod, rays) and oysters declined because of intensive fishing. This trend culminated in the nineteenth and twentieth centuries. The commercialization and intensification of exploitation inside and outside the Wadden Sea Area was a major driver for declines. This became obvious with the onset of protection programs for birds and seals in the twentieth century, which have resulted in a striking increase of populations.

For species depending on wetlands, river or estuarine habitats, habitat loss, destruction and degradation also played a significant role in declines. At the end of the twentieth century, 144 species (~20% of total macrobiota) were listed on the Trilateral Red List of threatened species for the Wadden Sea Area. Of these, 21 species were

considered extinct in the twentieth century, while another four species had become extinct in earlier centuries. Habitat loss was considered to be the most important factor, particularly in extinctions of invertebrates and plants. Exploitation is assumed to be second in importance and has mostly affected vertebrates.

Dune areas on the barrier islands have been affected by stabilization for coastal defence purposes and by eutrophication. Some wet dune slacks became affected by groundwater extraction. More significant have been livestock grazing, pine plantations and the spread of introduced non-native species. Most notably are *Pinus spp.* and *Rosa rugosa* in grey and white dunes. The American cranberry *Oxycoccus macrocarpus* dominates in some dune slacks. In dry dunes with scarce vegetation a southern-hemisphere moss *Campylopus introflexus* is taking over. The cranberry and the moss seem to be competitively superior to native vegetation, while the Asian rose and various alien shrubs and trees took benefit from anthropogenic alterations in the dune environment. Also, the introduction of rabbits affected dune vegetation as has their recent population decline. Management attempts are underway to reverse some of these developments and to restore previous dynamics.

In the course of eutrophication, developments in phytoplankton, green macroalgae, and benthic macrofauna have been attributed to changes in nutrient and food supply to the coastal waters. A decline in intertidal seagrass beds may have been

Sunset in the Wadden Sea
(Photo: Martin Stock).



indirectly caused by reactive nitrogen enhancing epiphytic algae. In recent decades, riverine loads of nutrients have been declining but are still above pre-industrial levels. Respective changes have been observed in phytoplankton, but this may have been confounded by effects of climate change.

In the 1930s, seagrass became infected by an epidemic disease and the subtidal meadows never recovered. Up to now, 66 aquatic plants and invertebrates, brought from overseas with shipping and aquaculture, have become established in the Wadden Sea Area. This has not yet caused any extinction of native species. However, most notably the cordgrass (*Spartina anglica*), which was planted into the Wadden Sea Area in the 1920s, and the Pacific oyster (*Crassostrea gigas*), introduced in the 1980s, do replace native species and have generated novel habitat structures in the Wadden Sea. Other exotic species also have become highly abundant, sometimes only intermittently and in other cases facilitated by climate change, i.e. warmer summers and milder winters since 1996. Apparently, each is filling an open opportunity which was available to their mode of life, e.g. the japanese seaweed (*Sargassum muticum*), a bristle worm (*Marenzelleria viridis*), the american razor clam (*Ensis americanus*), the american slipper limpet (*Crepidula fornicata*) and the australasian barnacle (*Austrominius modestus*) among others. In contrast to oceanic islands, isolated mountain tops and lakes, coastal

environments along continental margins such as the Wadden Sea are inhabited by biota which have had a long history of contest with immigrants and thus are less likely to be strongly affected by introduced species.

The overall effect of ecological long-term change on ecosystem structure and functioning has led to a simplification and homogenization. Conservation efforts have reversed negative trends by enabling some birds and mammals to recover. Many salt marshes have been relieved of heavy livestock grazing, and drainage furrows are restricted to areas necessary for protection and against flooding and maintenance of dikes. This has significantly diversified the vegetation. Still, the present extent of salt marshes is only a shadow of its past. Also, many dunes and shorelines have been strongly modified, and the invasions of exotic species cannot be reversed.

Protecting and managing the ecosystem

Since the beginning of the last century, small nature reserves have been established in practically all parts of the Wadden Sea, primarily to protect breeding birds. Though the importance of the Wadden Sea for birds had been well known, it was only after the Second World War that scientists from the three Wadden Sea countries documented the significance of the Wadden Sea as one of the most important ecosystems world-wide. In the 1960s-70s, major projects and developments such

as large scale embankments, harbour and industrial developments as well substantial increases in tourism and pollution constituted significant impacts on the Wadden Sea ecosystem. Scientists and non-governmental organizations, such as the WWF, the German "Schutzstation Wattenmeer" and the Dutch Wadden Society, which had been established in 1965 in protest of a Dutch dam project, strongly advocated a comprehensive protection and conservation of the entire ecosystem which could effectively tackle the negative impacts both from inside and outside the Wadden Sea. The small scale nature reserves were too limited in their scope and inadequate instruments to protect an entire ecosystem, they contended.

The Wadden Sea environmental movement was the major force which resulted in the designation of comprehensive protection schemes by the responsible authorities in the countries and in the establishment of a trilateral Wadden Sea cooperation to protect the Wadden Sea as an ecological entity. It all started in the 1970s with designation of considerable parts of the Wadden Sea as nature reserves. Around 1980, major conservation schemes were introduced in all three countries, leading to a comprehensive protection of the Wadden Sea. The Dutch part was made subject to a planning decree in 1980, setting out the conservation objectives and regulating human activities. In 1985/86, the two German states Schleswig-Holstein and Niedersachsen declared their parts of the Wadden Sea national parks, followed by Hamburg in 1990. The Danish Wadden

Sea was declared a Nature and Wildlife Reserve in 1979/1982. In 2010, the Danish National Park Wadden Sea was instituted and comprises the Nature and Wildlife Reserve including the islands and parts of the mainland. The designations have since been amended and extended but the main traits of the conservation schemes introduced a generation ago have been maintained.

The Wadden Sea is further subject to a multitude of international designations. Most of the Wadden Sea Area has been designated Special Protection Areas under the Birds Directive and designated as habitat areas under the Habitats Directive, which forms the Natura 2000 for the Wadden Sea. Further, most of the area has been designated as wetlands of international importance under the Ramsar Convention and Particularly Sensitive Sea Area by the International Maritime Organization.

In parallel, the three governments started a cooperation, with the aim of ensuring a coordinated protection of the Wadden Sea. The first trilateral Danish-German-Dutch Governmental Conference on the Protection of the Wadden Sea was held in 1978 in The Hague. The 11th Ministerial Conference was held on the German island of Sylt on 18 March 2010.

The formal basis of the Cooperation is the "Joint Declaration on the Protection of the Wadden Sea" signed at the Third Wadden Sea Conference in Copenhagen in 1982. The Joint Declaration was amended at the 11th Ministerial Conference. It is a declaration of intent of the three Wadden Sea



Winter in the Wadden Sea
(Photo: Jan Hunemann).

countries to protect and conserve the Wadden Sea as an ecological entity in accordance with the Guiding Principle, i.e. "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". In 1987, the Common Wadden Sea Secretariat was established to facilitate and support the Cooperation. The ministerial conferences, which are held as a rule every 3-4 years, are the central decision making bodies for the cooperation.

Since 1997, the arrangements of the Wadden Sea Cooperation have been embedded in the framework of the Trilateral Wadden Sea Plan, which entails policies, measures, projects and actions agreed upon by the three countries. The Plan has been updated in 2010 and is a statement of how the three countries envisage the future coordination and integration of management of the Wadden Sea Area and of the projects and actions that must be carried out to achieve the commonly agreed Targets.

The Wadden Sea Plan is declared the coordinated management for the Wadden Sea World Heritage property which also applies to the nominated property.

Perspectives

The economy of the Wadden Sea Area is likely to shift further from agriculture and fisheries towards tourism and, perhaps, to alternative energy in the form of wind, water and photovoltaic power, as well as biomass. Pollution and eutrophication is expected to decrease strongly as a consequence of European policy. Stemming the tide of unintentionally introduced species in the wake of globalization will require cooperation at the scale of the entire northeast Atlantic coastal waters.

Like all other coastal wetlands in the world, the Wadden Sea will be increasingly affected by global warming with a slow but inevitable rise in sea level. New species from southern regions will immigrate, some resident species will retreat towards northern regions, and introduced species adapted to warmer conditions will proliferate. Nevertheless, the Wadden Sea ecosystem may be expected to retain most of its unique composition and functioning, because coastal species are adapted to a wide range of temperature variation. A more serious threat is the long-term prospect of a rise in sea level on the order of one to two meters. This will require innovative and flexible adaptations to protect both, the cultural land as well as the natural environment of the Wadden Sea region.

3. Justification for Inscription



Sediment ripples on the Wadden Sea mudflats (Photo: Jan van de Kam).

3. JUSTIFICATION FOR INSCRIPTION

3.1.a Brief synthesis⁷

The Wadden Sea is the largest unbroken system of intertidal sand and mud flats in the world, with natural processes undisturbed throughout most of the area. It encompasses a multitude of transitional zones between land, the sea and freshwater environment, and is rich in species specially adapted to the demanding environmental conditions. It is considered one of the most important areas for migratory birds in the world, and is connected to a network of other key sites for migratory birds. Its importance is not only in the context of the East Atlantic Flyway but also in the critical role it plays in the conservation of African-Eurasian migratory waterbirds. In the Wadden Sea up to 6.1 million birds can be present at the same time, and an average of 10-12 million pass through it each year.

3.1.b Criteria under which inscription is proposed

By decision 33 COM 8B.4 "The Wadden Sea, Germany and Netherlands" was inscribed on the World Heritage List under natural criteria (viii), (ix) and (x). The nominated property is an extension

⁷ This is from the Statement of Outstanding Universal Value, The Wadden Sea, Germany and Netherlands (Decision 33 COM 8B.4).

of the already inscribed property and the natural criteria under which the latter was inscribed unreservedly apply to the nominated property:

Criterion viii: "be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features"

The Wadden Sea has evolved over the last 8,000 years being a very young ecosystem in geomorphological and evolutionary terms. It represents an outstanding example of the Holocene development of a temperate-climate sandy barrier coast under conditions of rising sea level. The Wadden Sea is unique in that it consists entirely of a sandy-muddy tidal system with only minor river influences on morphodynamics. The Wadden Sea ecosystem is characterised as tidal flats and barrier island system with extensive salt marshes. The Wadden Sea differs from other systems of this type in that it is the only tidal flat and barrier island depositional system of this scale and diversity in the World. There are no systems in the World that compare to the Wadden Sea.

An inherent feature of the system is the continuous change of the flats, the deeps and the gullies from the largest to the smallest fraction. The tidal-channel systems can be regarded as 'statistical self-similar fractal', i.e. the whole has the same shape as one or more of the parts net-

works and the similarity of the channel systems points to a self-organising nature. On smaller scales, fractal patterns are also found in the muddy deposits. These morphological variations are in the aesthetic perception compounded by the infinite tidal rhythm. Nowhere else can the dynamic interplay between the sea and land be experienced on such a scale and richness in forms. Nowhere else is there such a variety of natural features in a coastal area: the hugeness of the area; barrier islands with large differences in land and seaside; tidal area with an enormous differentiation, uninterrupted over many hundreds of kilometres with a highly dynamic system of deeps and gullies constantly changing; estuaries and tributaries debouching into the area; and large areas of salt marsh area along the coast with islands and Halligen. These natural features dominate the land and seascape and are accentuated by humanity's constant struggle with the area for over a thousand year. It is this complexity of habitats and biotopes so intricately linked in an elaborate ecosystem that stimulates the observer with its superlative intricacy.

The Wadden Sea contains very fine examples of post-glacial coastal geomorphology and the dynamic interaction of physical and biological processes on a scale that is not found within one unified system anywhere else in the world. Despite man-made interventions the continuing presence of these dynamic natural processes ensures the development and rejuvenation of landforms including the whole range of habitats, and secures the maintenance of ecosystem functions. The Wadden Sea ecosystem will thus continue to serve as an important bio-physical reference for the study of the effect of sea level rise and it will be important to consider this function as a legitimate part of the World Heritage concept.

Although tides with lower mesotidal to macrotidal amplitudes dominate the morphological evolution of the Wadden Sea ecosystem, wind stresses and waves also play a major role in the morphology of the Wadden Sea ecosystem. The morphological succession of the wetland system commences with sand flats in the seaward sections, followed by mixed flats and finally mud flats along the mainland shore and in embayments. In contrast to other parts of the world, the tidal flats of similar systems are merely occupied by eelgrass meadows or *Spartina* here and there. The mobility of sediments has prevented basin-wide encroachments by upright growing vegetation in the case of the Wadden Sea. This has created the unique character of its seascape of mainly unvegetated shoals divided by an intricate fractal-channel

pattern. This unique feature of the Wadden Sea is mentioned in many international textbooks as the example, par excellence, of extensive post-glacial meso to macro-tidal flat development.

There are also sedimentary features, such as naturally open barrier coasts consisting of dunes intersected by small overwash areas that are unique to NW-Europe. Another example is the unique sawtooth-shaped and swale topography along the barrier island coastline that is thought to be the result of near-shore wave/current generated resonance phenomena that form incised rip-current channels. The lower shoreface of the offshore belt is structured into a series of typical ridges and troughs so-called shore-face connected ridges on a horizontal scale of several kilometres and heights of up to 6 m.

Excellent and broad scale examples of biogeomorphological processes can be found in the coastal dunes, the channels, the tidal flats and the salt marshes. Because the Wadden Sea contains many different types of islands, sheltered and exposed dunes and subsequent sheltered and exposed types of salt marsh and green beaches there also is a great variety in vegetation types and communities.

The significant ongoing geological and geomorphological processes driving the development of landforms are continuously renewing the geomorphic features of the landscape and seascape within the lifespan of man. The Wadden Sea's outstanding universal value is maintained through the strong hydraulic and aeolian dynamics that form the prominent morphological changes on a variety of spatial and temporal scales, from whole groups of inlet systems that influence each other over many centuries, down to the shifting of a sand ripple in the order of minutes. These morphodynamic adjustments are possible due to the fact that the Wadden Sea system can still react in a natural way to human influences, allowing it to evolve freely to a large degree.

The Wadden Sea attracted the interest of scientists from an early stage of scientific endeavour and is one of the earliest and best-studied depositional systems. As such it is an important international reference area for tidal flat system studies. Long-term depositional processes have led to the formation of a series of Holocene sedimentary deposits, which provide details of the development of the Wadden Sea and the regional climate in great detail. This has allowed geoscientists to establish comprehensive archives of documentary evidence of tidal processes, stratigraphy, sedimentary structures and sediment distribution patterns.

The biological systems and their interactions



Glasswort, typical at the edge of the salt marshes (Photo: Klaas Kreuijer).

with geological and geomorphological processes in the Wadden Sea have also been studied in great detail over a similar long time. The comprehensive archives of bio-geophysical data form an historical record of the response of the Wadden system to sea level rise. These archives illustrate the ongoing processes and have formed the basis for numerous publications, maps, drawings, and other materials of immense value to the natural sciences and the sustainable use of the Wadden Sea ecosystem, and form an international reference for comparative studies with other tidal wetland ecosystems and their response to global change.

The unique geomorphological character of the Wadden Sea also has direct links to other World Heritage themes such as "stratigraphic sites". The Holocene stratigraphic records of the Wadden Sea form part of the overall geological inventory accumulated in the archives of numerous coastal research institutions. These invaluable and unique materials documenting the genesis of the Wadden Sea are unparalleled and form a universally important archive of the Holocene history of sea-level rise, climate, and depositional response.

The Wadden Sea is subject to sea level rise as a result of climate change and tilting of the earth's surface. It has always been able to react in a natural way to relative rise of the sea level. Scientific opinion is that it will be able to respond to increased sea levels in the foreseeable future because the morphodynamic and biological processes that maintain the health and productivity of the ecosystem have the freedom to adapt.

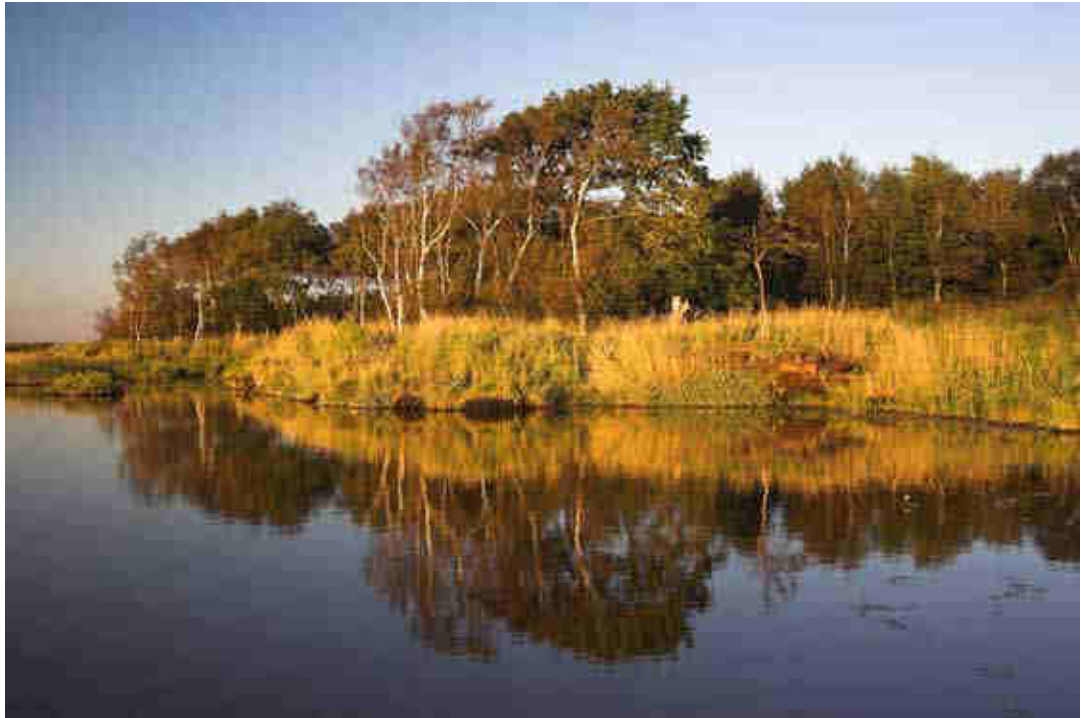
There are only very few areas worldwide where it is possible to experience the dynamic adaptation of bio-geomorphological processes within a generation.

Criterion ix: "be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals"

The Wadden Sea is a unique coastal ecosystem with enormously productive marine biota and with linkages far beyond its narrow geographical boundaries. It is one of the last remaining natural large-scale inter-tidal ecosystems in Europe where natural processes continue to function in an undisturbed manner. Excellent and broad scale examples of biogeomorphological processes can be found in the coastal dunes, the salt marshes, and on the tidal flats on mussel beds and sea grass meadows. This transitional environment between land and sea is characterized by the constant change of flood and ebb tides, fluctuations in salinity, high temperatures during summer and occasional ice cover in winter. These circumstances have created numerous ecological niches, colonized by species that are adapted to the extreme environmental conditions.

The Wadden Sea is an ecological transition zone between land and ocean. With its estuaries, marshes and particularly its wide intertidal zone intersected by deep gullies, the Wadden Sea functions as a gigantic coastal filter system. Freshwater and marine waters are mixed and flushed to and

Swimming bog at
Sehestedt, Jade Bay
(Photo: Martin Stock).



fro with the tides, transporting huge amounts of sediments, organic matter and nutrients. These riverine and marine imports of materials form the basis of the trophic system. Imported organic material is mineralized in the marshes, tidal flats sediment and shallow waters. The release of nutrients from this spacious purification plant, together with those nutrients supplied from the catchment area and the Atlantic waters, fuels outstanding primary production. Due to the active biota, this filter never clogs but is continuously renewed.

Natural processes such as tides, wind, currents, waves and a series of biological processes occurring in a large area have resulted in the richness of geomorphological and biogenic structures. Due to the undisturbed presence of these processes, structures are not only conserved, but there are also rejuvenation cycles, creating new structures and breaking down old structures representing all stages of succession. Examples are the dunes and salt marshes that can be found in various stages of succession, and structured mussel banks, which are formed by a combination of growth and food depletion from the overlying water.

From a physical point of view, the Wadden Sea combines two extremes. The stability and rather dampened fluctuations in the physical properties of oceanic waters with their high heat capacity meets in the Wadden Sea the strong and rapid physical fluctuations of the terrestrial environment. The mix of these two regimes gives rise to the unique ecological character of the Wadden

Sea when projected on the large expanses of the shallows and the flat land.

Due to the shallowness of the area and the transitional boundaries between land and sea, there is a strong interaction between biota and geomorphological processes, i.e. bio-geomorphology. The Wadden Sea morphology and geomorphological processes contain gradients between high and low, wet and dry, and sedimentation and erosion. These gradients and the processes that cause them, have a direct influence on gradients in grain size of the sediment, nutrient levels, organic matter levels and moisture. Plants and animals are tuned to specific conditions and will therefore be abundant in specific locations. The geomorphological influence on biota is most direct in respect to intertidal habitats and their flora and fauna. Conversely, the biological influence of biota on geomorphological processes creates, maintains, or transforms their own geomorphological surroundings. This is demonstrated by the influence of vegetation on the hydraulic resistance, erodibility and sedimentation, or by the influence of fauna on sediment characteristics through bioturbation and bio-stabilization.

The Wadden Sea forms an outstanding example in which biogeomorphological interactions are clearly demonstrated in the shallow, productive waters and various sedimentary environments. Important in this respect is that the Wadden Sea has many examples in which the timescale for geomorphological changes coincides with the

timescale for biological changes. This results in mutually interacting processes. Unlike other areas in the world, landscape processes are not dominated by geological timescales nor do biological processes dominate landscape features. This means that the constantly changing landscape requires adaptation of organisms and at the same time that organisms affect their environment as 'ecosystem engineers'. Excellent and broad scale examples of these biogeomorphological processes interactions can be found in the coastal dunes, the tidal flats and the saltmarshes. Of particular interest are for example the intertidal mussel beds. These form a biogenic structure that has considerable influence on the morphology of the tidal flats; they stabilize the sediment, preventing it from erosion and actively accrete silt. The numerous macrobenthic species can have an opposite effect. Their constant reworking of the sediment (bioturbation) makes the seabed more susceptible to erosion. Saltmarshes form another example in which the capturing of sediment increases the bed level, which leads to changes in vegetation composition and subsequent changes in sedimentation rates.

The Wadden Sea provides a multitude of transitional zones between land, the sea and freshwater environment, which is the basis for species richness. Among these organisms, there is a high degree of ecological specialization. On the tidal flats, the microbiota is highly diverse too, while only a few species of macroflora and macrofauna are adapted to the extreme environment. Of these, however, exceptionally high numbers and biomass can be found. The high productivity is most significantly demonstrated with respect to fish, shellfish, and birds.

The productivity of the Wadden Sea in terms of biomass is one of the highest in the world. A special feature of the Wadden Sea is that primary production is dominated by microscopic algae that cover the sediment surface of the tidal flats as microphytobenthos and drift in the shallow coastal waters as microphytoplankton. In spite of turbid waters, the periodic tidal exposure and shallowness guarantees sufficient light for photosynthesis. The gross primary production by microphytobenthos is the highest in the world for locations north of 42° latitude. The contribution of microphytobenthos to the primary production is about as high as the local primary production by planktonic algae.

The very fact that most photosynthetic production is generated in the form of unicellular algae allows for highly effective consumption. These miniature plants are more readily consumed by

invertebrate herbivores than larger plants. As a result of this high production of easily consumable benthic and planktonic food, the biomass of marine invertebrates on the tidal flats is on average 20 times higher than benthic systems in the open North Sea. This is what makes the Wadden Sea tidal zone so attractive to secondary consumers from outside, and explains the dense swarms of shrimp and small fish and the spectacular flocks of birds that congregate there.

The Wadden Sea is an integral part of the North Sea. The offshore belt of the Wadden Sea intermediates between the open and deeper North Sea and the tidal area. The Wadden Sea is one of the few shallow and relatively sheltered seas in the Northern Hemisphere and one of the most highly productive fish grounds world-wide. The Wadden Sea plays an important role in this high productivity. As a shallow sea, the benthic-pelagic coupling is notably strong, and the primary production and secondary production are high. This production forms a foundation to the intricate food web that ultimately results in an important nursery area for fish, a foraging and resting habitat for seals, and a foraging habitat for waders and other waterfowl, which are of international importance. For aquatic consumers, the shallow waters of the Wadden Sea serve as a vast nursery. Plenty of food, benign higher temperatures in the shallows than further offshore in spring, and the absence of large predaceous fish where the water level fluctuates with the tides, all of these contribute to a high turnover of nurslings. The Wadden Sea is an important nursery area for sole (*Solea solea*), plaice (*Pleuronectes platessa*) and dab (*Limanda limanda*). They grow up rapidly in spring and summer, and leave the Wadden Sea towards offshore waters when the cold seasons commence. For some fish that commute between inland waters and the open sea, traversing the offshore belt in the course of their life cycle, the rich food sources of the Wadden Sea constitute an important intermediate staging area. Good examples of diadromous fish species are flounder (*Platichthys flesus*), smelt (*Osmerus eperlanus*) and eel (*Anguilla anguilla*). Marine organisms manage to dominate the entire tidal zone. The plentiful supply of materials from land and ocean allows the marine food web to provide ample food for the waders, gulls and ducks. Migrants support or exploit distant ecosystems along the East-Atlantic flyway. In addition, there are birds that exploit the Wadden Sea in winter. Similar long-distance links apply to fish and some crustaceans.

The birds feed primarily on the extensive sediment flats during low tide exposure. Some species

also exploit the marshes and others dive in the gullies and the offshore belt for food. Although the availability of the food is crucial, it is more than just high benthic biomass that supports the enormous number of birds. Food availability may be highly variable at a particular site, depending on weather, disturbances and competitors, however the vast size of the continuous tidal area secures sufficient alternatives if one site fails. Another important factor that is sustaining the large populations of birds are abundant nearby resting and moulting areas, usually on sand bars and islets remote from any human disturbance. This aspect is also of primary importance for the seals, using the Wadden Sea as a nursery and resting area.

The present form of the Wadden Sea is mainly the result of natural forces. There may be other coastal areas with similar ecosystem functions, but none comes close to the Wadden in terms of such a large and coherent area of intertidal habitats of such high diversity.

Criterion x: "contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation"

The tidal flats in the Wadden Sea form the largest unbroken stretch of sand and mudflats worldwide, accounting for 60% of all tidal areas in Europe and North Africa. As such it is 'the only one of its kind' and many textbooks refer to the Wadden Sea when describing intertidal habitats and the rich and diverse flora and fauna they sustain. The tidal flats and the salt marshes form the largest coherent habitat of this type in Europe and constitute an essential element of the Wadden Sea ecosystem.

The Wadden ecosystem represents one of the internationally most important wetlands. It is internationally recognised as a biologically highly productive ecosystem of great natural, scientific, economic and social importance.

The Wadden Sea is extremely rich in environmental gradients and transitional zones, yielding many different (micro) habitats that form the basis for ecological specialization under extreme conditions. The salt marshes host about 2,300 species of flora and fauna. The marine and brackish areas support a further 2,700 species. In total it is estimated that the Wadden Sea Area provides habitats for up to 10,000 species of unicellular organisms, plants, fungi and animals.

The large size of the Wadden Sea allows the diverse species to survive by spreading over several habitats, or by adopting a series of niches over

the course of time. This constantly opens up territory for use by other individuals or species, and accounts for a high capacity to accommodate migratory species.

The marine deposits remain permanently flooded (subtidal) or are either periodically (intertidal) or episodically (supratidal) flooded by marine and brackish waters or in some cases even freshwater. Terrestrial soils range from very wet to extremely dry in the coastal dunes. High temperatures during summer and occasional ice cover in winter, and above all powerful storms with heavy rainfalls create these highly variable ecological niches for life. Under such circumstances, most species have adopted an extreme versatility. Others have evolved a high degree of specialization to survive the extreme environmental conditions. A high degree of endemism is not a characteristic of coastal wetlands. They are all relatively young and are interconnected by the flow of water which prevents the genetic isolation of populations. The outstanding feature of the Wadden Sea is the complex mixture of species from a wide array of regions and habitats as well as a mixture of residents, migrants and casual visitors, as well

Round-leaved wintergreen
(Photo: Jan Barkowski).





Flocks of birds
(Photo: Jan van de Kam).

as high abundance of individuals instead of high biodiversity at least in the tidal flats.

The rich and diverse habitats are of outstanding international importance for birds as staging, moulting and wintering areas. According to the 1% criterion of the Ramsar-Convention, which is an internationally recognized measure to identify wetlands of international importance, the Wadden Sea is of outstanding international importance as a staging, moulting and wintering area for at least 52 populations of 41 migratory waterbird species that use the East Atlantic flyway and originate from breeding populations as far away as northern Siberia or Northeast Canada. Numbers of 44 populations of 34 species are so high, that the Wadden Sea is indispensable and often main stepping stone during migration, or as their primary wintering or moulting habitat. Therefore the Wadden Sea is essential for the existence of these bird species. A severe deterioration of the Wadden Sea implies a biodiversity loss on a worldwide scale.

Adding up the numbers, results in a maximum of some 6.1 million birds present at the same time in the Wadden Sea. Each year on average 10 to 12 million birds migrate back and forth between their breeding grounds in Siberia, Scandinavia, Greenland and Northeast Canada and their wintering grounds in Europe, Africa and even further South. Most species reach highest numbers during autumn migration; numbers of waders are almost as high during spring, whereas ducks and geese over-winter in high numbers; only gulls reach

considerable numbers in summer. Almost the entire population of the dark-bellied brent goose (*Branta b. bernicla*) and the entire West-European population of dunlin (*Calidris alpina*) use the Wadden Sea during several periods of the annual cycle. Without the Wadden Sea their populations would suffer heavily. Additional seven species are present with more than 50% and further 14 species with more than 10% of their flyway population. Wadden Sea areas including the coastal zone of the adjacent North Sea are used by high numbers of moulting shelduck (*Tadorna tadorna*) and moulting and wintering Eider (*Somateria mollissima*).

Although bird migration is a global natural phenomenon that cannot be associated to a single site, the Wadden Sea is a vital and irreplaceable stepping stone that is considered a critically important 'mega-site' for bird migration. It is not just one of several stopover sites on the East-Atlantic flyway, but it is *the* essential stopover.

The millions of migratory birds, which pass through the area in spring and autumn and in huge flocks convey a scenic depth to the area which can be seen nowhere else on this scale, enhance the exceptional beauty and perceptive value of the area. This reinforces the unique relationship between the high aesthetic qualities of the land and seascapes and the extraordinary ecological features of the area.

The Wadden Sea is an important reproduction area for more than 30 species of breeding birds. For 5 species, at least 25% of northwestern Eu-

European populations breed in the Wadden Sea. The ecological support for resident and migratory birds is of outstanding universal scientific value because the study of migration can only be executed on this large scale in the Wadden Sea.

The Wadden Sea may be considered of lesser importance as a permanent home for rare or endangered species. However, when the large population and variety of different mammals, birds, fish, crustaceans, molluscs and other animals as well as plants that are sustained by the Wadden Sea's ecosystems are considered, the Wadden Sea plays a very important role as a habitat of great international significance.

The Wadden Sea also constitutes a refuge in the life cycle for those species that have lost their inland habitats e.g. northern lapwing, redshank and black-headed gull. Without the Wadden Sea, several European bird populations would be endangered or even lost. The Wadden Sea is also an essential staging area for fish migrating between rivers for spawning and the oceans for feeding or vice versa. These fish could not complete their life cycles without the nutritious habitats of the shallow Wadden Sea. This also applies to many fish and invertebrates that rely on the tidal zone as a nursery and spend their adult life further offshore.

A unique feature of the Wadden Sea harbour seals is that they rely on the Wadden Sea tidal sandflats for resting and whelping. Their resting habitat disappears during high tide and, therefore, their behaviour is completely adapted to these conditions. The Wadden Sea sustains approximately 20% of the world-population of harbour seals (estimated 35,500 individuals in 2011) that belong to a sub-species (*Phoca vitulina vitulina*), which is found mainly in UK, Icelandic, Norwegian and Wadden Sea waters. In recent years, grey seals started to re-establish themselves in the Wadden Sea, first a haul/out rookery off the German Island of Amrum, followed later by a few rookeries in the western part of the Dutch and the German (Niedersachsen) Wadden Sea. The most important calving and nursing site for the harbour porpoise (*Phocoena phocoena*) population of the central North Sea is off the coast of the Wadden islands Sylt and Amrum.

Overall, after centuries of extensive exploitation in the Wadden Sea, protection measures have triggered a striking comeback in many of the resident bird species and also of seals, which have shown a very good recovery within the last three decades, and also after the two virus epizootics in 1988 and 2002. Hunting of seals was stopped in the seventies and essential habitats are kept free from human disturbance.

3.1.c Statement of Integrity

The extension nomination of the existing Wadden Sea World Heritage property with the Danish part and the German (Niedersachsen) offshore extension will result in the inclusion of 77% of the Wadden Sea Area within the property and basically all critical ecological processes and key features and values that constitute the Wadden Sea will be comprised within the property meeting the criteria under which the nomination is proposed. The nomination therefore significantly contributes to enhance and strengthen its integrity in accordance with the decision of the World Heritage Committee on its inscription of the Dutch-German Wadden Sea on the World Heritage List at its 2009 session.

During the evaluation of the Dutch-German Wadden Sea nomination in 2008-09 the IUCN requested supplementary information on whether elements included in the nomination can be considered of Outstanding Universal Value without the Danish part. The comparison made between the Dutch-German Wadden Sea World Heritage property and the Danish part in response to the request confirmed that the Outstanding Universal Values that are found within the property are equally found within the Danish part of the Wadden Sea⁸.

The nominated extension of the property comprises all the habitat types, including all features and processes that belong to a natural and dynamic Wadden Sea. The offshore zone of the Danish part is delimited by the three nautical miles from the baseline which constitutes a coherent geomorphological system that is linked to the intertidal processes and systems. It includes the tidal inlets between the islands with their highly dynamic sediment transport and constantly migrating sandbars and high sands of Lammelæger, Koresand, Langjord, Peter Meyers Sand, Søren Jessens Sand and Langli Sand. The area is important for young fish and foraging and moulting seabirds, for seals and harbour porpoises.

The major parts of the beaches and salt marshes of the islands of the Danish Wadden Sea are included in the nominated property together with the peninsula of Skallingen with its dunes and the great natural salt marshes created on the eastern side of the peninsula. The salt marshes in the Ho Bay, on the uninhabited island of Langli, along the mainland coast from Esbjerg to Ballum, along the Rømø causeway and the extensive marshes in the Margrethe Kog are all located

⁸ Supplementary Information February 2009, Appendix 1

within the nominated property. The salt marshes form a unique habitat for vegetation, especially adapted invertebrates and breeding bird species. Basically the entire tidal area including the deep gullies, the subtidal area and the intertidal flats is within the nominated property. The tidal flats are inhabited by a very rich and productive flora and invertebrate fauna associated with mussel beds and seagrass. The salt marshes form the upper part of the intertidal zone and are home to high concentrations of unique plant and invertebrate species of which many are endemic. The salt marshes also form important roosting, breeding and feeding grounds for many bird species.

Apart from the construction of the Rømø Causeway in the 1940s and some smaller embankments of which the Margrethe Kog around 1980 constitutes the last one, the Danish Wadden Sea has not been subject to impacts on its geomorphological and sediment processes. In conjunction with the very low activity level and use of the natural resources, the relatively low input of nutrients and pollutants and the comprehensive protection, the Danish Wadden Sea area may be considered a very natural part of the entire Wadden Sea. The Danish Wadden Sea is an integral part of the northern sub-region of the Wadden Sea which is defined by the occurrence of a well developed outer barrier composed of islands and high sands, an extensive tidal area with some scattered marshy islets interspersed of which some become submerged during storm tides because they have remained undefended by high seawalls.

The German (Niedersachsen) part of the nomination includes an extension of the offshore belt of the property to complement, enhance and ensure the integrity and the spatial connectivity by including areas of importance for the ecological interchange between the tidal area and the open North Sea, geomorphological processes and for foraging and moulting seabirds and marine mammals. It covers a stretch of nearly 60km parallel to the three nautical miles line and represents a complete set of characteristic subtidal habitats towards the open North Sea down to the 20m depth contour. Some fisheries take place throughout the proposed extension area. If there are other uses of natural resources or development pressures in coastal waters (f. e. extraction of sand, wind energy), they take place outside the proposed offshore extension. Directly adjacent to the extension area, traffic-management route-systems, called Traffic Separation Scheme (TSSs Terschelling German Bight and German Bight Western Approach) exist to manage the traffic safely and efficiently.

Despite the considerable progress made in the improvement of shipping safety and the environmental protection measures intended to minimize maritime pollution, shipping will continue to be a potential source of risk for damaging the property and its adjacent coastline. The low activity level and use of the natural resources combined with a consistent and strict national protection regime effectively preserve the geological and natural values of the proposed offshore extension.



The tip of the peninsula Skallingen in Denmark (Photo: John Frikke).

3.1.d Protection and Management Requirements

The nominated property is subject to a comprehensive protection and management scheme. The German extension is part of the Niedersachsen Wadden Sea National Park and within zone 1, the core zone, the highest protection zone of the National Park. It has the legal purpose of preserving and protecting the Wadden Sea's unique natural assets and landscape, to ensure that the natural processes in these habitats remain in force and to conserve the natural diversity of the plant and animal species. It is entirely state owned property and the competent management authority is the Niedersachsen Wadden Sea National Park Authority.

The Danish Wadden Sea is subject to a comprehensive protection in the framework of the Statutory Order of the Nature and Wildlife Reserve Wadden Sea established in 1979/1982. The overall objective of the Nature and Wildlife Reserve Wadden Sea is to protect and conserve the area as a complete nature area of national and international importance including its natural dynamic processes and ensure a sustainable use taking account of the overall protection goal. The reserve is zoned into areas which are permanently closed for access and any use and areas where e.g. shellfish fishery is prohibited. Exploration and exploitation of gas and oil and bottom material is strictly forbidden.

As is the case for the German extension, the Danish Wadden Sea is fully embedded within the overall trilateral protection and management scheme in the context of the Joint Declaration on the Protection of the Wadden Sea (2010) and the Wadden Sea Plan (2010) including the Declarations of the various Wadden Sea Ministerial meetings since 1978. The Joint Declaration includes the Guiding Principle for the Wadden Sea Conservation Area, which is "[to] achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". The Wadden Sea Plan constitutes the common framework for the protection and sustainable management of the Wadden Sea as an ecological entity. The Wadden Sea Plan is declared the coordinated management for the Wadden Sea World Heritage property which also applies to the nominated property. In the context of the Wadden Sea Plan, the Trilateral Monitoring and Assessment Programme ensures an appropriate monitoring and assessment of the ecological status of the system.

Furthermore, the whole nominated property is

subject to protection under the European Union environment legislation, which has been transposed into national legislation. As a result of the designations under to the EC Birds and Habitats Directives, the property is part of the European Natura 2000 network of protected areas. Additionally the Water Framework Directive and the Marine Strategy Framework Directive of the European Union applies to the nominated property.

The whole nominated property is also subject to other international protection regimes such as the Particularly Sensitive Sea Area (PSSA), designated by the IMO, the African-Eurasian Waterbird Agreement (AEWA) and as a Wetland of International Importance under the Ramsar Convention. On regional level, it is part of the 'Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas' (ASCOBANS) and the 'Seal Agreement' on harbour seals and grey seals, which both are part of the Convention on the Conservation of Migratory Species (CMS) of Wild Animals (Bonn Convention).

The competent management authority for Danish part of the nominated property is the Nature Agency under the Danish Ministry of the Environment. It is adequately staffed and resourced to meet current and future challenges and the information and awareness on the reserve is provided by a dense net of information centres. The nominated property is part of the Danish Wadden Sea National Park which, in addition to the objectives of the reserve, aims to support the sustainable development of the region in cooperation with the local stakeholders through the National Park Board and its Advisory Committee.

All human activities within the nominated property which are assessed to cause adverse effects are well regulated in time and space or, as appropriate, prohibited. New activities, both within the nominated property or at its fringe, are only allowed following an assessment of their impact in accordance with Art. 6 of the Habitats Directive.

The legal protection and the management of the property also aim to maintain the landscape values of the property such as the wide-open horizon. Infrastructure projects within the property are therefore to a wide extent banned. In the case of wind turbines there is a complete ban on the construction of such installations in the nominated area.

Increased tourism following also a possible inscription of the nominated property on the List will be addressed in the context of a sustainable tourism strategy developed together with the industry and regional and local governments as

requested by the World Heritage Committee on the inscription of the Dutch–German Wadden Sea on the List in 2009. The strategy shall also cover the nominated property.

The safety of the inhabitants from flooding through appropriate coastal protection measures is and will be guaranteed in the future. Such measures have not and will not be compromised by the protection and management schemes. Other measures that are necessary for the safety of the area such as maritime traffic regulation infrastructure, the traffic within the area, drainage of the hinterland, public transport and the delivery of goods to the islands have and will be given high priority in relation to the protection and management of the nominated Site.

As for the existing property the state parties confirm their commitment, not to explore and extract oil and gas at locations within the boundaries of the nominated property in line with law in force.

3.2 Comparative analysis

The Wadden Sea is a mesotidal barrier island system that only has minor river influences fringing the flat and low-lying coastal plain. In accordance with the Operational Guidelines a comprehensive comparative analysis was made of similar properties in the 2008 nomination⁹. This comparison was acknowledged in the IUCN Technical Evaluation of the Wadden Sea 2009. The comparison also fully applies to the nominated extension and reinforces the comparison.

⁹ Nomination of the Dutch–German Wadden Sea as a World Heritage Site, 2008, Annex 3.

By comparing the Wadden Sea with the currently 31 listed World Heritage sites with significant marine components and the 24 World Heritage coastal island sites with no (or insignificant) marine areas it becomes apparent that there is only one listed property which the Wadden Sea compares with, and that is the Banc d'Arguin in Mauritania.

44 non-listed sites have been selected for the comparative analysis of a list of 350 intertidal mudflats world-wide. These 44 non-listed sites are mudflats larger than 300 km².

As outlined above the Wadden Sea is a mesotidal barrier island system that only has minor river influences fringing the flat and low-lying coastal plain. Most of the mudflat systems in the world are connected to estuaries and bays. Some are connected with barrier islands that are closely related to rivers and their deltas, such as the Mississippi delta. Only 5% of these deltaic barrier islands are found in North America and Europe, due to differing sea level rise history. A further criterion, therefore, is the presence of barrier islands that do not have a river delta origin. Of all mudflat sites larger than 300 km² this results in one comparable area: The Georgia Bight.

The primary features of the two comparable properties, Banc d'Arguin and the Georgia Bight according to the criteria under which the Wadden Sea is inscribed, are listed in Tab. 3.1. It should be acknowledged that the criteria and the associated features are to be considered integral features of the whole range of geomorphological and biophysical processes and interactions.



Hallig Habel
(Photo: Martin Stock).

Table 3.1:
Features of the Wadden
Sea, Banc d'Arguin and
Georgia Bight according to
the criteria viii, ix and x.

Features	Criteria	Wadden Sea	Banc d'Arguin	Georgia Bight
Designation WH		German Dutch part 2009 under criteria viii, ix and x	1989 under criteria ix and x	-
Country		Germany / Netherlands	Mauritania	USA
Climate zone		temperate	continental, arid subtropics, dry	temperate
Description setting		mixed energy to tide dominated mesotidal barrier coast (not deltaic)	back barrier islands and open mud flats, relic of former deltas	mixed energy to tide dominated mesotidal barrier coast (not deltaic)
Total area		11,456 km ²	12,000 km ² (50% marine)	8,000 km ²
Mudflat area		4,500 km ²	630 km ²	300 km ²
Tidal difference/ range	viii	1.5 – 3.5 m	2.1 m	0.8 – 2.5 m
Mean wave height/ range		1.0 – 2.0 m	1.4 m	0.6 – 1.0 m
Contiguous character		large and contiguous area of intertidal habitats	contiguous between Cap Timiris and Pointe Minou, isolated section at Cap Blanc	not a contiguous intertidal system
Major estuaries		5 estuaries	0 estuaries	13 estuaries
Habitats, biotopes	ix	complex mosaic of bare intertidal flats fringed by saltmarshes, tidal channels, seagrass meadows, mussel beds	sand dunes, coastal swamps, small islands, intertidal areas with 80% seagrass cover	tidal channels with narrow band of bare intertidal flat. Intertidal almost completely covered by <i>Spartina</i> and <i>Juncus</i> saltmarshes
Salt marshes		406 km ²	591 km ²	4,237 km ²
Mangroves km ²		none	31 km ² mangrove <i>Avicennia africana</i>	some mangrove <i>Avicennia germinans</i>
Productivity		primary production (gC/m ² /y): phytoplankton 100-200; microphytes 150; seagrass 500; macrophytes 500-1,000	primary production (gC/m ² /d): phytoplankton 2.1-8.9	primary production (gC/m ² /y): phytoplankton 200-400; microphytes 60; seagrass 150-700; macrophytes 800-2,000
Migrating birds	x	6.1 million present at the same time; on average 10 to 12 million each year; East Atlantic Flyway	2.1 million overwintering birds (106 species); East Atlantic Flyway	important stop-over for millions of migrating birds; West Atlantic Flyway
State of conservation		subject to a comprehensive international, trans-boundary and national protection and management system, RAMSAR site, PSSA by IMO, MAB by UNESCO, EU Natura 2000, EU WFD, contracting party of African-Eurasian Waterbird Agreement (AEWA)	RAMSAR site, National Park, has Fondation Internationale du Banc d'Arguin (FIBA) as management authority, not contracting party of AEWA	not contiguously protected. Two Western Hemisphere Shorebird Reserves, Carolinian-South Atlantic MAB, no RAMSAR sites, no PSSA.



Pioneer salt marsh
(Photo: John Frikke).

The Banc d'Arguin is a relic of former river deltas, which once flowed from the central Saharan basin to the Atlantic (indeed the Banc d'Arguin has been called "a warm Wadden Sea"). Bird numbers recorded at the Banc d'Arguin easily reach the millions. Both are large tidal areas and extraordinary productive ecosystems supporting a rich fish fauna with varied populations of piscivorous breeding birds. They both support huge populations of migratory waterfowl on the East Atlantic Flyway, thus being strongly linked to each other and constituting the key feeding and resting areas on this flyway.

There are also significant differences. The marine area included in the property is only half of the listed property (6,000 km²) and only a very small part of that area - about 10% (630 km²) - is intertidal area. The Banc d'Arguin does not have barrier islands. Furthermore, the area is located in another climatic zone, the tropics, making it very different from the Wadden Sea in terms of the governing processes.

The Georgia Bight (also named South Atlantic Bight) extends for a distance of 1,200 km between Cape Hatteras in North Carolina to Cape Canaveral in Florida. Both, the German Bight as well as the Georgia Bight are mesotidal barrier coasts that fall within the mixed energy / tide-dominated classification and both have a coastal development affected by Holocene sea level rise.

The major difference between the Georgia Bight system and the Wadden Sea is that the Wadden Sea has open intertidal flats fringed by

salt marshes, whereas the tidal basins along the Georgia Bight comprise tidal channels, narrow intertidal flats fringing the channels, and huge expanses of *Spartina* marsh which occupy what would otherwise have been open intertidal flats. The reason why *Spartina* has managed to encroach upon the former tidal flats is the large supply of mud (grain sizes <0.063 mm) to the coast by the local rivers. As a consequence, vertical accretion along the fringes of the marsh was so rapid that *Spartina* was able to occupy almost the entire intertidal area. The Georgia Bight tidal system thus looks very different from the Wadden Sea and also differs substantially in its ecology.

In conclusion, the Wadden Sea is to be regarded as of outstanding universal value compared to similar areas world-wide.

3.3 Proposed statement of outstanding universal value¹⁰

The Wadden Sea is the largest unbroken system of intertidal sand and mud flats in the world, with natural processes undisturbed throughout most of the area. It encompasses a multitude

¹⁰ The proposed statement of outstanding universal value is identical with the Statement of Outstanding Value for The Wadden Sea, Germany and Netherlands (Decision 33 COM 8B.4) to align with and reaffirm the existing statement as the nominated property is an extension of the already inscribed one.

of transitional zones between land, the sea and freshwater environment, and is rich in species specially adapted to the demanding environmental conditions. It is considered one of the most important areas for migratory birds in the world, and is connected to a network of other key sites for migratory birds. Its importance is not only in the context of the East Atlantic Flyway but also in the critical role it plays in the conservation of African–Eurasian migratory waterbirds. In the Wadden Sea up to 6.1 million birds can be present at the same time, and an average of 10–12 million pass through it each year.

Criterion (viii): The Wadden Sea is a depositional coastline of unparalleled scale and diversity. It is distinctive in being almost entirely a tidal flat and barrier system with only minor river influences, and an outstanding example of the large-scale development of an intricate and complex temperate climate sandy barrier coast under conditions of rising sea level. Highly dynamic natural processes are uninterrupted across the vast majority of the property, creating a variety of different barrier islands, channels, flats, gullies, saltmarshes and other coastal and sedimentary features. It is also one of the best-studied coastal areas on the planet, providing lessons of wider scientific importance for wetland and coastal management of international importance.

Criterion (ix): The Wadden Sea is one of the last remaining natural large-scale intertidal ecosystems, where natural processes continue to function largely undisturbed. Its geological and

geomorphologic features are closely entwined with biophysical processes and provide an invaluable record of the ongoing dynamic adaptation of coastal environments to global change. There are a multitude of transitional zones between land, sea and freshwater that are the basis for the species richness of the property. The productivity of biomass in the Wadden Sea is one of the highest in the world, most significantly demonstrated in the numbers of fish, shellfish and birds supported by the property. The property is a key site for migratory birds and its ecosystems sustain wildlife populations well beyond its borders.

Criterion (x): Coastal wetlands are not always the richest sites in relation to faunal diversity, however this is not the case for the Wadden Sea. The salt marshes host around 2,300 species of flora and fauna, and the marine and brackish areas a further 2,700 species, and 30 species of breeding birds. The clearest indicator of the importance of the property is the support it provides to migratory birds as a staging, moulting and wintering area. Up to 6.1 million birds can be present at the same time, and an average of 10–12 million each year pass through the property. The availability of food and a low level of disturbance are essential factors that contribute to the key role of the nominated property in supporting the survival of migratory species. The nominated property is the essential stopover that enables the functioning of the East Atlantic and African–Eurasian migratory flyways. Biodiversity on a worldwide scale is reliant on the Wadden Sea.

Shells on the beach
(Photo: Norbert Hecker).



Integrity

The boundaries of the nominated property include all of the habitat types, features and processes that exemplify a natural and dynamic Wadden Sea. Together with the existing property it encompasses 77%¹¹ of the entire Wadden Sea ecosystems and is sufficient to maintain the critical ecological processes and to protect the key features and values. The extension of the property with the Danish Wadden Sea and the German (Niedersachsen) offshore extension to now virtually comprising the entire Wadden Sea will provide a high level of integrity and a significant assurance that its values can be maintained and enhanced, where necessary, in the future.

The property is subject to a comprehensive protection, management and monitoring regime which is supported by adequate human and financial resources. Human use and influences are well regulated with clear and agreed targets. Activities that are incompatible with its conservation have either been banned, or are heavily regulated and monitored to ensure they do not impact adversely on the property. As the property is surrounded by a significant population and contains human uses, the continued priority for the protection and conservation of the Wadden Sea is an important feature of the planning and regulation of use, including within land/water-use plans, the provision and regulation of coastal defences, maritime traffic and drainage. Key threats requiring ongoing attention include fisheries activities, harbours, industrial facilities and maritime traffic, residential and tourism development and climate change.

¹¹ This percentage refers to the entire property.

Requirements for protection and management

Maintaining the hydrological and ecological processes of the contiguous tidal flat system of the Wadden Sea is an overarching requirement for the protection and integrity of this property. Therefore conservation of marine, coastal and freshwater ecosystems through the effective management of protected areas, including marine no-take zones, is essential. The effective management of the property also needs to ensure an ecosystem approach that integrates the management of the existing protected areas with other key activities occurring in the property, including fisheries, shipping and tourism.

Specific expectations for the long term conservation and management of the property include maintaining and enhancing the level of financial and human resources required for the effective management of the property. Research, monitoring and assessment of the protected areas that make up the property also require adequate resources to be provided. Maintenance of consultation and participatory approaches in planning and management of the property is needed to reinforce the support and commitment from local communities and NGOs to the conservation and management of the property. The State Parties should also maintain their commitment of not allowing oil and gas exploration and exploitation within the boundaries of the property. Any development projects, such as planned wind farms in the North Sea, should be subject of rigorous Environmental Impacts Assessments to avoid any impacts to the values and integrity of the property.

4. State of Conservation



Shelduck and oystercatcher on the island of Trischen (Photo: Martin Stock).

4. STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY

4.a Present state of conservation

Information on status and developments in the Wadden Sea is compiled and assessed in regular Quality Status Reports which have the aim of assessing the implementation of the Wadden Sea Plan and providing a scientific assessment of the entire ecosystem. The recent Quality Status Report (QSR 2009) was published in preparation for the Trilateral Governmental Conference in 2010. The information in this chapter is based on the QSR 2004 and 2009, supplemented with information that has become available since the QSR 2009 was issued.

The Wadden Sea Quality Status Report (QSR) 2009 and the synthesis report "The Wadden Sea 2010" are in Annexes 4 and 5.

Habitats and habitat developments

Offshore Area

The Wadden Sea Plan aims for an increased natural morphology and favourable conditions for birds and marine mammals in the offshore area. The offshore area in the inscribed and nominated

property is located off the Wadden islands of the German and Danish part and extends up to 12 nautical miles into the North Sea to a water depth of 10 to 20 m. The area is subject to nature conservation under national and EU legislation.

The offshore area is characterized by high natural dynamics and is interlinked with the Wadden Sea ecosystem (see Chapter 2). The sediments of the seabed of the offshore area and of the channels and tidal flats in the Wadden Sea form a coherent 'sand sharing' system, thus allowing natural sediment transport along the coast and into the Wadden Sea. There is no evidence of any negative impacts on the natural dynamics of the geomorphology in the offshore area.

Birds

In the Wadden Sea offshore area, nine coastal bird species occur in numbers which are of international importance (Tab 4.1). Many of these coastal birds use the offshore area as foraging areas, such as the sandwich tern (*Sterna sandvicensis*) which feeds on sand eel up to 15 km from the breeding colonies, and the lesser black-backed gull (*Larus fuscus*).

Off the North Frisian and Danish islands (at

Table 4.1:
Estimated numbers of the most numerous coastal bird species occurring in the offshore area up to the 20 m water depth line in specific months of the year.
* Number of international importance; 1% level (Source: QSR 2004 , p. 267).

Species	1% level of flyway	Period	Estimated number	Number in % of total population
Red/Black-throated diver	10,000	Dec-Mar	36,000*	4
Eider	10,300	Oct-Feb	63,000*	6
Common scoter	16,000	Dec-Feb	303,000*	19
Velvet scoter	10,000	Dec-Feb	7,000	< 1
Little gull	840	Mar-May	2,500*	3
Common gull	17,000	Dec-Feb	67,000*	4
Lesser black-backed gull	1,900	May-June	50,000*	26
Herring gull	13,000	Nov-Feb	48,000*	4
Sandwich tern	1,700	Apr-May	13,000*	8
Common tern	1,900	Apr-May	4,000*	2

water depths of 2 - 10 m), large concentrations of common scoter (*Melanitta nigra*) occur, most of which leave from there for their northern breeding grounds

Among the marine bird species, guillemot (*Uria aalga*) and razorbill (*Alca torda*) occur in areas with water depths larger 10 m all over the entire North Sea in numbers of 2,000 – 3,000 individuals, but also use the coastal zone. The most common diver, the red-throated diver (*Gavia stellata*), occurs with about 36,000 individuals in the offshore area between the 4-26 m depth line.

Marine Mammals

The offshore area is also an important area for marine mammals. Recent surveys indicated that harbour seals use the offshore area and the adjacent North Sea to a larger extent than known before. Harbour porpoises are distributed over the entire North Sea but show significantly high densities off the coast of Schleswig-Holstein and Denmark within and outside the inscribed and nominated property. The offshore area of the World Heritage property off the islands of Sylt and Amrum has specifically been designated as a whale protection area and extends up to 12 nautical miles.

Tidal Area

The tidal area between the mainland and the islands covers the intertidal flats and the subtidal areas and is characterized by a high degree of natural dynamics: the positions and structures of

tidal channels, shoals and emerging sand banks are changing continuously. The entire tidal area is subject to nature conservation by national and EU legislation. It is also covered by the trilateral Wadden Sea Plan, which aims for a natural dynamic situation and increased geomorphologically and biologically undisturbed areas in the tidal area. In addition, targets for blue mussel beds, seagrass beds and *Sabellaria* reefs have been formulated. The tidal area in the Netherlands, Germany and Denmark has a total size of about 8,400 km², of which about 4,700 km² consists of intertidal flats (mud and sand flats). The total area of the intertidal flats is almost the same as in the mid 1980s. Since then, no further embankments 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 historic times (since 1600) and sea level rise.

Seagrass

The two seagrass species (*Zostera marina* and *Z. noltii*) are the only submersed flowering plants in the Wadden Sea. They provide habitat for various animals and food for brent geese and widgeon. The trilateral Wadden Sea Plan aims for an increased area and a more natural distribution and development of seagrass fields.

Subtidal seagrass beds of *Zostera marina* disappeared in the 1930s because of a disease (an infestation with the pathogenic protist *Laby-*

Table 4.2:
Seagrass coverage in 2007/2008, as recorded in the TMAP database
* Area with coverage 5-20% has been calculated by total area minus area with coverage < 5% minus area with coverage >20%
** In Schleswig-Holstein only areas above 20% coverage are monitored.

	Total Area (ha)	Area (ha) with coverage < 5%	Area (ha) with coverage 5-20%	Area (ha) with coverage >20%
The Netherlands (2007)	303	285	14	4
Germany / Niedersachsen* (2008)	2,943	1,051	1,167	716
Germany / Schleswig-Holstein** (2008)	9621	-	-	9,621
Denmark (2008)	932	no specification of data		

zostera). A decline of intertidal seagrass (*Z. marina* and *Z. noltii*) was observed from the 1950s to the 1990s in the southern and central Wadden Sea. This decline seems to have come to a halt, and some slow recovery is evident and an increase of seagrass areas has been observed since the middle of the 1990s.

The highest occurrence with about 13,000 ha (77%) (all type of beds) were on the northern part (Schleswig-Holstein and Denmark), an increase of over 5,000 ha compared to the QSR 2004. The real figure may be even higher because beds with densities lower than 20% are not recorded in Schleswig-Holstein.

Today, intertidal seagrass beds (seagrass density > 20%) are unevenly distributed with a major occurrence (over 95%) in the northern Schleswig-Holstein and Danish Wadden Sea (about 10,000 ha), because the decline was more prominent in the western parts of the Wadden Sea. Both *Zostera* species also show considerable fluctuations between years in the size and shape of local beds.

Eutrophication and changing hydrodynamics seem to be the overall variables determining seagrass distribution in the Wadden Sea, while

positive effects of low salinity and negative effects of shellfish fishery and coastal protection works are of an important but more local relevance.

Mussel beds

Blue mussel beds are subject to particular protection because of their biodiversity and special ecological significance. Therefore, fishery is regulated by management plans in the entire Wadden Sea (see chapter: resources / management). The trilateral Wadden Sea Plan aims for an increased area and a more natural distribution and development of natural blue mussel beds.

Naturally occurring blue mussel beds have thus been able to develop in the intertidal (Fig. 4.1). However, lack of recruitment since 1999 has caused deterioration and overall loss of biomass.

Spatfall is a crucial process in the population dynamics of blue mussels. The determining factors for spatfall are still not well understood nor is the cause of regional differences in spatfall within the Wadden Sea. Besides recruitment success, the impact of storms and ice cover is of major importance for the long-term development of blue mussel beds.

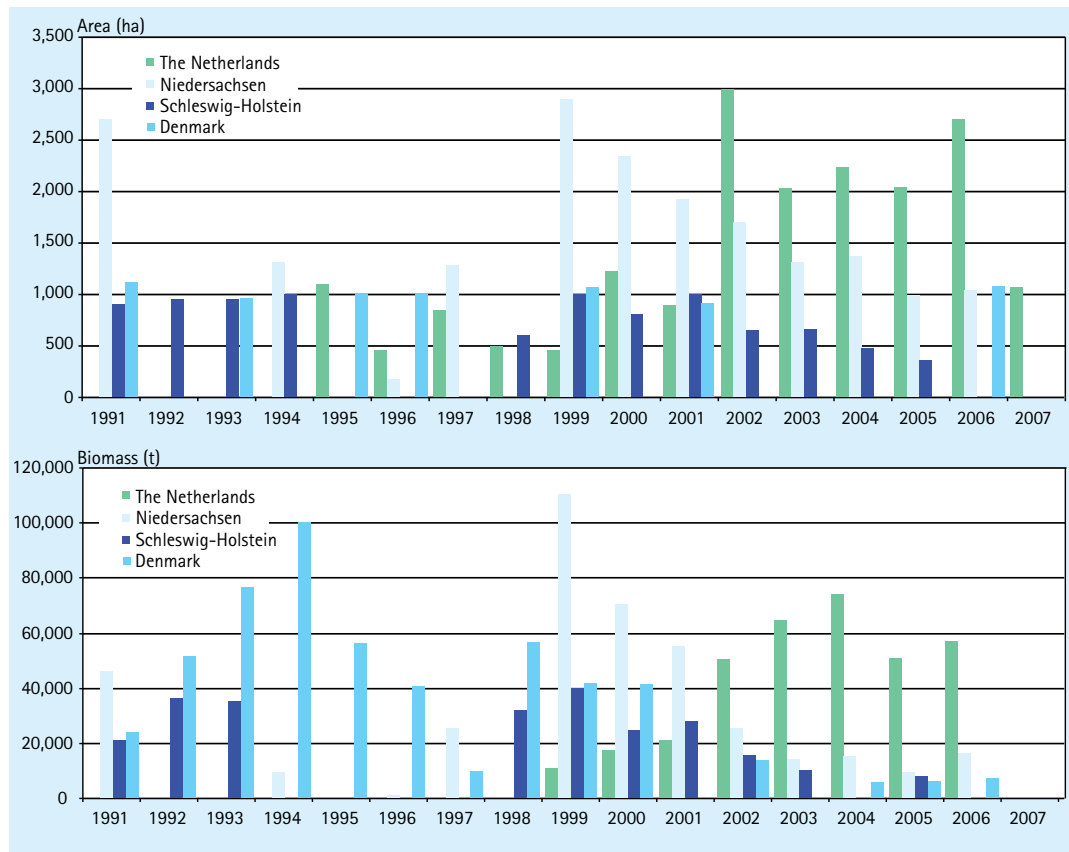


Figure 4.1: Area (ha) (top) and biomass (t) (bottom) of intertidal blue mussel beds in the Netherlands Germany (Niedersachsen, Schleswig-Holstein) and Denmark (no bars = no data).

Salt marsh, Råhede
(Photo: John Frikke).



Salt marshes

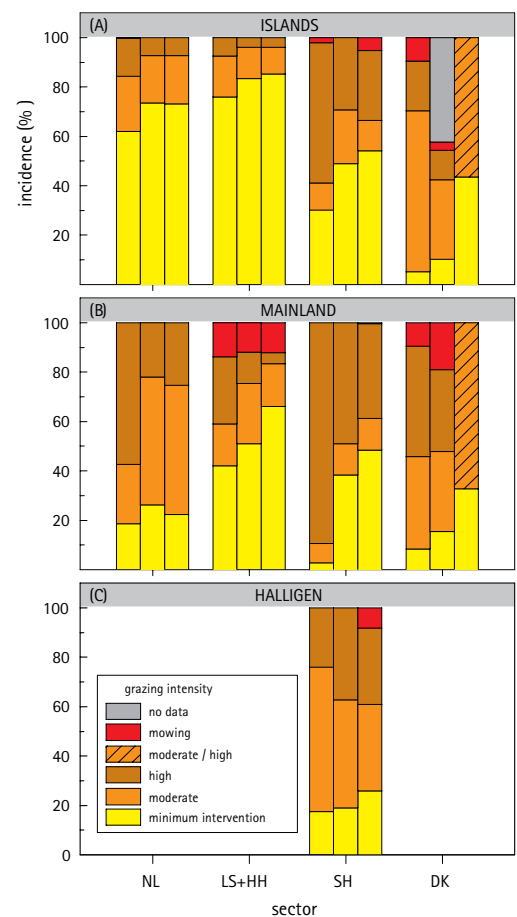
Salt marshes are the natural link between the land and the sea. They develop in close interaction between hydrodynamic processes and vegetation development. Salt marshes can be found on the barrier islands and Halligen, in the estuaries and along the mainland coast. During the last centuries, many salt marshes along the mainland coast were reclaimed, with subsequent creation of new salt marshes in front of the dikes, or were intensively grazed by cattle or sheep. Today, all Wadden Sea salt marshes are subject to nature conservation schemes by national and EU legislation, and they are also covered by the Wadden Sea Plan. The Wadden Sea Plan aims at an increased area of natural salt marshes, natural morphology and dynamics and an improved natural vegetation structure of man-made salt marshes.

The salt marsh area increased in most parts of the Wadden Sea during the past decades, mainly on the eastern parts of islands and in sheltered areas along the coast. The main increases were observed in Niedersachsen (about 2,700 ha, 1966 – 1997) and in Schleswig-Holstein (about 700 ha, 1988 – 2001). The recent comprehensive inventory of all salt marshes based on regular complete vegetation mapping resulted in a total area of about 40,000 ha in the Wadden Sea (QSR 2009) which is an increase of 5% of the salt marsh area compared to the QSR 2004.

In the Netherlands and Germany, roughly 56% of the salt marshes on the islands and roughly

7% of the salt marshes on the mainland have never been artificially drained and are not grazed by livestock and thus can be regarded as natu-

Figure 4.2:
Development of livestock grazing, mowing and minimum-intervention management in the Wadden Sea salt marshes from 1986/1987 (left bars) to 2002/2008 (right bars). The centre bars present the results of the 1997/2001 survey (QSR 2004, page 163). Data of the 1980s have been modified after Kempf et al. (1987) (Source: QSR 2009, Thematic Report No. 8 Salt Marshes).



ral. In the Hamburg Wadden Sea, for example, about 35% of the salt marshes have never been influenced by any land use or artificial drainage. In addition, about 690 ha of salt marshes (310 in Niedersachsen, 40 in Hamburg and 340 in the Netherlands) have been de-embanked, and the possible development of new salt marsh areas and vegetation development are being monitored.

Since the 1980s, livestock grazing and artificial drainage for coastal protection or agricultural utilization has generally been reduced. In some cases, moderate grazing is carried out for biodiversity purposes or to gain sod for coastal protection measures. Many natural and semi-natural salt marsh areas have developed during these last two decades. On the islands, the majority of the salt marshes can develop naturally and show various transition stages. Livestock grazing for agricultural purposes has generally decreased in all areas during the past 20 years. In about 60% of the salt marshes no drainage measures have been taken at all, and in an additional 31% no artificial drainage measures have been carried out during the past 10 years.

The salt marshes along the mainland coast are normally situated in front of the sea dike. In most cases their development has been actively supported by man, for example by drainage or reduction of wave energy. In former times, many of them were intensively used for agricultural purposes. Since the mid 1980s, a reduction of 50% of areas with intensive grazing could be observed on the mainland salt marshes in the Netherlands and Germany (Figure 4.2). In about 39% of the mainland salt marshes, no drainage measures have been taken during the past 10 years. This has enhanced natural sedimentation and erosion processes and the development of natural salt marsh vegetation.

In Denmark, about 43% of the salt marshes are classified as undrained, further 39% as moderately drained, and only 18% as intensively drained on average with only minor differences between the islands and the mainland (QSR 2009, Thematic Report No. 8 Salt Marshes).

The salt marsh vegetation development is monitored by using a trilaterally harmonized vegetation key, which allows a consistent and detailed analysis of the salt marsh vegetation with regard to the Wadden Sea Plan Targets. This also entails an assessment of vegetation changes as a result of changes in management, sea level rise, and spreading of single species such as *Spartina anglica*, *Atriplex prostrata*, *Elytrigia atherica*, *Elytrigia repens* and *Phragmites australis*.

Beaches and Dunes

Beaches and dunes are subject to constant changes as a result of natural forces such as the North Sea currents, waves, and wind. About 7,600 ha of dunes are located in the inscribed and nominated property, with 4,500 ha on the islands of Niedersachsen which represent the typical Wadden Sea barrier island, about 670 ha in Denmark (islands and mainland) and 100 ha in Schleswig-Holstein (mainland).

Almost all beaches and dunes areas are subject to nature conservation under national and EU legislation and covered by the Wadden Sea Plan, which aims for an increased natural dynamic and vegetation succession.

Natural dynamics of beaches and dunes can be observed mainly in the eastern, uninhabited parts of the barrier islands where no coastal protection measures have to be carried out. Large beach plains as well as embryonic and primary dunes have developed in these areas as result of natural sand transport. Since the mid 1960s, about 870 ha of new dune areas have developed; at the same time, an erosion of 115 ha of dunes occurred.

In the western, inhabited parts of the islands, however, practically all dunes are an integrated part of the coastal defence system. The white dunes are maintained and protected from erosion, e.g. by planting of marram grass. In these areas, natural dynamics of beaches are locally and periodically influenced by coastal protection measures, e.g. in the form of stony groins and sand nourishment of the beach or foreshore. Coastal protection measures may increase in connection with continued sea level rise. Additionally, the beaches adjacent to the island villages are also main areas of recreational activities.

The development of the dunes on the Niedersachsen back barrier islands over a period of 50 years was analysed by comparison of various vegetation maps from the 1940s with recent surveys:

- Embryonic dunes naturally develop on the beaches of the eastern parts of the islands, whereas they have decreased in areas with intensive recreational use,
- The area of white dunes has almost remained unchanged, also because of their importance for coastal defence,
- Grey dunes continue to represent the major dune type and a development in the direction of older successional stages such as heath or brushwood was observed,
- Species-rich dune slacks represent a rare but important dune type with a specific vegetation and biodiversity. On some islands, an

accelerated succession of dune slacks to drier communities is caused by enhanced groundwater extraction. Therefore, a management scheme was established on the islands of Langeoog and Norderney minimizing the impact of groundwater extraction on vegetation which has locally led to a regeneration of pioneer stages.

Similar developments were also observed in dune areas adjacent to the property, e.g. on the Dutch and Schleswig-Holstein islands, as well as on the Danish islands adjacent to the nominated Danish extension.

The Wadden Sea dunes are also hot spots of biodiversity with almost 8,000 animal species recorded from the East Frisian islands with about 100 arthropod species that either have their main distribution in the dunes or are highly endangered (QSR 2009, Thematic Report No. 15 Beaches and Dunes).

Species and population trends and developments

Birds

Breeding birds

Many bird species breed on the Wadden Sea salt marshes, dunes and beaches. During this time they are particularly vulnerable. All bird species are protected under national and EU legislation. The trilateral Wadden Sea Plan aims at favourable conditions for breeding birds through favourable food availability and natural breeding success.

Among the 31 bird species regularly monitored in the Trilateral Monitoring and Assessment Program (TMAP), there are six species which occur with more than 25% of the NW European populations breeding in the Wadden Sea. Some species are rare, as the Wadden Sea is situated on the edge of their European breeding range.

The quality of various habitats has improved in recent decades, leading for instance to an increase in numbers of coastal birds such as the common redshank breeding on salt marshes. Thanks to nearly 18 years of monitoring (since 1991), a reliable evaluation of trends has become possible, both for the entire period as well as for the last ten years. The latter can be used as an alert for recent changes (Tab. 4.3).

Over the period 1991-2008 and considering the entire Wadden Sea, seven species increased significantly. The highest rates of increase are observed for the great cormorant, lesser black-backed gull, Eurasian spoonbill and mediterranean gull (Tab 4.3). Nearly all of these species have expanded their geographical breeding range in the past decade and showed further increases in 2002-2008. The breeding population of most increasing species continued to grow during the entire period covered by the surveys (see Tab. 4.3).

Significant declines have occurred in thirteen species, among them the great ringed plover, Kentish plover, black-tailed godwit and northern lapwing. The most dramatic declines seem to have occurred in three species for which proper trend calculations in the past decade are difficult to assess due to low numbers and scattered breeding

Breeding Oystercatcher
(Photo: Martin Stock).



(dunlin, ruff, common snipe, turnstone, little gull). Recent counts (up to 2008) suggest that the rate of decline of the northern lapwing, black-tailed godwit and herring gull has levelled off, whereas a recovery has recently become apparent for the common tern. The great ringed plover and Kentish plover continued to decline until the last trend calculation for 2008.

The decline in numbers of some species has been caused by increased recreational pressure on beaches and other breeding habitats. Protective measures for beach-breeding birds have been successful for the colony-breeding little tern,

but Kentish plover and great ringed plover show an ongoing decline and need further protection effort. The decline in breeding populations of common eider (>75% in the Dutch Wadden Sea), oystercatchers and herring gull, mainly in the Dutch Wadden Sea, was considered as an effect of intense shellfish fisheries (cockle and blue mussels), which has now been reduced in the Netherlands. In some areas, shifts in breeding numbers from the mainland coast to the islands were observed, caused by increasing predation pressure by mammalian predators, e.g. the red fox. For species breeding in salt marshes (e.g., waders,

Table 4.3: Breeding birds in the Wadden Sea in 2001 and trends in 1991–2008 (JMBB, 2010.). Also given are international importance (expressed as percentage of the overall NW-European flyway population, after Rasmussen et al., 2000) and Red List status (Wadden Sea, SUS susceptible; VUL vulnerable; END Endangered; CRI critical; - no red list status, according to Rasmussen et al., 1996). 2001 refers to the breeding population in 2001. Trends are shown for the entire period 1991–2008: ++ = strong increase, + = increase, 0 = stable, - = moderate decrease, -- = strong decrease, ? = uncertain (significant at $P < 0.05$). For some species, no trend could be calculated due to the small or scattered breeding population ('no data'). Species included in Annex I of the EC Birds Directive are marked separately.

Species	Annex I EC Birds Directive	% population NW-Europe	Red List Status	2001	Trend 1996–2001
Great cormorant <i>Phalacrocorax carbo</i>	-	1-5	-	2,348	++
Eurasian spoonbill <i>Platalea leucorodia</i>	x	>25	SUS	831	++
Shelduck <i>Tadorna tadorna</i> *	-	5-25	-	6,480	0
Common eider <i>Somateria mollissima</i> *	-	1-5	-	10,500	-
Red-breasted merganser <i>Mergus serrator</i>	-	<1	VUL	44	+
Hen harrier <i>Circus cyaneus</i>	x	1-5	-	126	-
Oystercatcher <i>Haematopus ostralegus</i> *	-	5-25	-	39,928	0
Avocet <i>Recurvirostra avosetta</i> *	x	>25	-	10,170	-
Great ringed plover <i>Charadrius hiaticula</i> *	-	1-5	VUL	1,093	-
Kentish plover <i>Charadrius alexandrinus</i> *	x	>25	END	340	-
Northern lapwing <i>Vanellus vanellus</i> *	-	1-5	-	11,643	-
Dunlin <i>Calidris alpina schinzii</i> ¹	x	1-5	CRI	24	no data
Ruff <i>Philomachus pugnax</i> ¹	x	<1	CRI	33	no data
Common snipe <i>Gallinago gallinago</i> ¹	-	<1	-	188	no data
Black-tailed godwit <i>Limosa limosa</i>	-	1-5	VUL	2,824	-
Eurasian curlew <i>Numenius arquata</i>	-	<1	-	640	-
Common redshank <i>Tringa totanus</i> *	-	5-25	-	17,815	-
Turnstone <i>Arenaria interpres</i> ¹	-	<1	CRI	1	no data
Mediterranean gull <i>Larus melanocephalus</i>	x	1-5	-	9	++
Little gull <i>Larus minutus</i> ¹	x	<1	SUS	-	no data
Black-headed gull <i>Larus ridibundus</i> *	-	5-25	-	154,395	-
Common gull <i>Larus canus</i> *	-	1-5	-	13,827	+
Lesser black-backed gull <i>Larus fuscus</i> *	-	5-25	-	79,679	++
Herring gull <i>Larus argentatus</i> *	-	5-25	-	78,402	-
Great black-backed gull <i>Larus marinus</i>	-	<1	-	27	+
Gull-billed tern <i>Gelochelidon nilotica</i>	x	>25	CRI	56	?
Sandwich tern <i>Sterna sandvicensis</i> *	x	>25	END	17,172	0
Common tern <i>Sterna hirundo</i> *	x	5-25	-	13,594	-
Arctic tern <i>Sterna paradisaea</i> *	x	1-5	-	8,464	-
Little tern <i>Sterna albifrons</i>	x	>25	END	1,099	0
Short-eared owl <i>Asio flammeus</i>	x	<1	END	89	0

¹ trend calculation was not possible due to lack of data

passerines) various trends and fluctuations have been observed, however, without a clear relationship with changes in agricultural use or vegetation development of these areas.

Migratory birds

The outstanding importance of the Wadden Sea for migratory birds has been acknowledged in several international conventions and directives, such as the Ramsar Convention, the Bonn Convention on Migratory Species and the EC Birds and Habitats Directive. These all have been implemented in national legislation and the respective protection regimes. The Wadden Sea Plan aims at favourable conditions for migratory birds and sufficiently large undisturbed roosting and moulting areas.

The amount and quality of data on migratory waterbirds has increased considerably in recent decades. In addition to surveys focusing on wintering numbers and distribution in the framework of the International Waterbird Census of Wetlands International, further synchronous and complete counts and bi-monthly spring-tide counts at numerous sites are carried out in the TMAP. Therefore, for the first time, overall trends of the most important species have been calculated for the entire Wadden Sea, including all months of the year.

The analysis of trends of migratory waterbirds utilizing the Wadden Sea for the period 1987/88 – 2009/10 revealed alarming results: 16 out of 34 waterbird species experienced statistically

significant declines.

The sixteen species showing negative trends also for a longer period (1987/88 – 2009/10), include mallard, which flyway population decreases, as well as oystercatcher and herring gull, which are shellfish eaters. The overall negative trend of golden plover seems to be greatly determined by Schleswig-Holstein, Danish and Niedersachsen birds, while in the Netherlands the numbers are uncertain. In general, regional differences in distribution occur for a number of species, the reasons for which have to be further investigated.

The trend calculation over the recent ten year-period 1999/00 – 2009/2010 which highlights the actual developments in the Wadden Sea (JMBB 2011) showed that 2 waterbird species (common shelduck, ruddy turnstone) in the Wadden Sea seems to have improved compared to the long-term trend calculation (Tab. 4.4a). In general, less species showed a decline, however, negative trends for the mussel feeding species and regionally different trends for the most numerous species in the Wadden Sea need to be further assessed.

Most of the declining species were dependent on feeding on benthos, including bivalves, for 'fast refuelling' during their migration to the breeding and wintering areas. This is an indication of non-favourable food availability, although other risk factors such as wintering in Africa and breeding in the (sub-) arctic may play a role. For the bird species within this group and specializing in molluscs (e.g. eider, oystercatcher, knot and herring

Wintering oystercatchers
near Esbjerg
(Photo: Bo Lassen
Christiansen).



gull), it has been proven for some parts of the Wadden Sea that food availability was impaired due to shellfish fishery. For herbivorous species (e.g., dark-bellied brent goose, Eurasian widgeon and barnacle goose) food availability seems not to be limited.

In Table 4.4a and 4.4b, a summary of the trend categories for the Wadden Sea Area has been compiled.

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.

For three species, important moulting areas exist in the Wadden Sea and offshore zone. Practically the entire northwest European common shelduck population moult in the southern part of the Schleswig-Holstein Wadden Sea. The National Park Agency responsible has been successful in entering voluntary agreements with different user groups aimed at avoidance of disturbance during the moulting season.

For common scoter, moulting areas are in the offshore zone, decreasing in importance from north to south. A realistic estimate of the numbers moulting in the Wadden Sea area does not, however, exist. Moulting areas are chosen according to the presence of their favoured food resource (e.g., bivalves such as *Spisula* spp.) and low disturbance level.

Marine Mammals

The numbers of harbour seals and grey seals have significantly increased during the last decades. Trends for population size of harbour porpoise are not yet known specifically for the Wadden Sea, but sightings have increased in recent years. The harbour porpoise belongs to a North Sea population.

All marine mammals are protected under national and EU legislation. Harbour seal and the harbour porpoise are subject to the ASCOBANS agreement which is a regional agreement of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). The Seal Agreement was concluded between the three Wadden Sea countries with the aim to cooperate

Species	WS	DK	SH	Nds/HH	NL
Great cormorant	-	-	+	0	-
Eurasian spoonbill	++	++	++	++	++
Barnacle goose	+	+	0	0	0
Brent goose	-	-	-	-	0
Common shelduck	0	?	-	-	+
Eurasian widgeon	0	0	-	-	-
Common teal	-	?	-	?	?
Mallard	-	0	0	-	-
Northern 1	+	+	+	+	?
Northern shoveler	+	?	+	?	0
Common Eider	-	-	?	?	-
Eurasian oystercatcher	-	-	-	-	-
Pied avocet	-	-	0	-	0
Great ringed plover	+	?	+	?	+
Kentish plover	--	--	-	--	-
European golden plover	-	-	?	-	-
Grey plover	0	0	0	-	0
Northern lapwing	0	0	0	0	0
Red knot	0	+	-	?	0
Sanderling	0	+	0	-	++
Curlew sandpiper	?	?	?	-	?
Dunlin	--	-	-	0	+
Ruff	--	--	--	?	-
Bar-tailed godwit	0	-	-	0	+
Whimbrel	-	-	0	-	?
Eurasian curlew	0	+	-	0	+
Spotted redshank	-	?	-	0	-
Common redshank	0	+	0	-	+
Common greenshank	0	?	-	0	0
Ruddy turnstone	+	--	+	+	+
Black-headed gull	-	-	-	-	0
Common gull	0	-	-	?	0
European herring gull	-	0	-	-	-
Great black-backed gull	-	--	-	-	-

Table 4.4a:
Trend categories for the recent 10 years 1999/2000 – 2009/2010 for the Wadden Sea (WS) and the regions (JMMB 2011).
Trend categories:
++ = strong increase,
+ = increase,
0 = stable,
- = moderate decrease,
-- = strong decrease,
?=uncertain

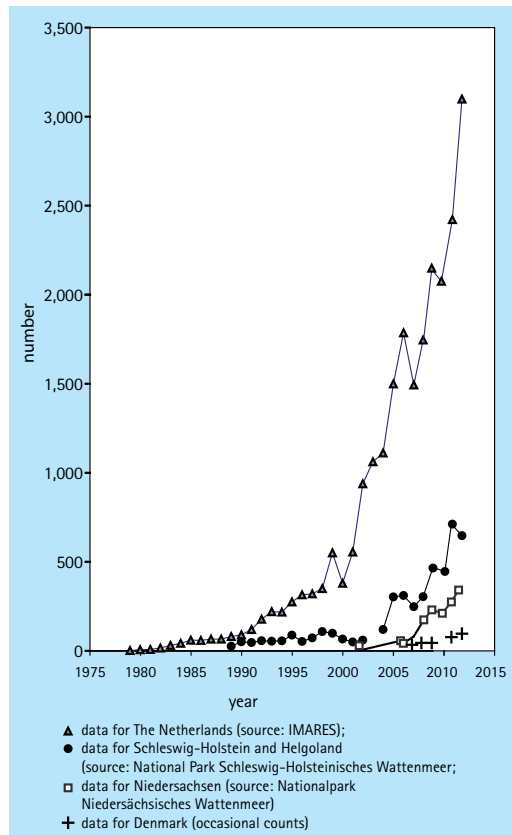
Trend category	WS	DK	SH	Nds/HH	NL
Strong decrease	2	4	1	1	0
Decrease	14	11	16	15	11
Stable	11	5	8	8	10
Increase	5	6	5	2	7
Strong increase	1	1	1	1	2
Fluctuating / uncertain	1	7	3	7	4

Table 4.4b
Counts of trend categories for the recent 10 years (1999/2000 – 2009/2010) in the Wadden Sea (WS) (JMMB 2010).

closely in achieving and maintaining a favourable conservation status for the harbour seal populations in the Wadden Sea.

The Wadden Sea Plan aims at viable stocks and a natural reproduction capacity of harbour seals, grey seals and harbour porpoises. The Seal Management Plan covers monitoring and protection of both seal species (harbour and grey seal).

Figure 4.3:
Counts of grey seals in the
Wadden Sea during the
moult (March/April) until
2010.
(Source: QSR 2009).



Grey seals

Grey seals had been extinct in the Wadden Sea area (south-eastern North Sea) for centuries probably because of hunting. Today, the number of grey seals in the Wadden Sea is growing. In the western Dutch Wadden Sea, the development of the grey seal population since its establishment in the early 1980s has been robust.

The maximum number of grey seals counted in the Wadden Sea during the moult in March/April 2012 amounted to 3,479 animals. Numbers were higher compared to the previous count in 2011 (+22%). In the Netherlands, 3,059 animals were counted (+28%), in Lower Saxony/Hamburg 348 (+46%) and in Schleswig-Holstein 72 which is a slight decrease compared to the previous year. Currently, an increased number of grey seals is also observed in the Danish Wadden Sea.

In the Wadden Sea grey seal pups are born in mid-winter. In November–January 2011/2012, the maximum numbers of new-born pups counted in the Wadden Sea of the Netherlands, Lower Saxony/Hamburg, Schleswig-Holstein, and Helgoland (which is linked to the Wadden Sea population) were 288, 59, 35, and 140 respectively, bringing an estimate of the total number of pups at 522.

Outside the reproductive colonies in the Dutch

Wadden Sea and in the Wadden Sea of Schleswig-Holstein, grey seal colonies have established themselves in the Wadden Sea of Niedersachsen. In the Danish Wadden Sea up to 76 grey seals were counted during the harbour seal pup counts in June 2012. Although this represents a 33% increase from the previous year, no grey seal births have been documented in the Danish Wadden Sea, and dedicated grey seal counts have therefore not yet been initiated.

The increase compared to the previous year was 22%. This high rate can be explained by bringing immigration from the UK into consideration.

Harbour seal

The harbour seal (*Phoca vitulina*) is the most numerous native marine mammal species in the Wadden Sea, and its population in the entire Wadden Sea can be considered as an entity. Exchange with populations in other areas such as the Wash (UK) and the Kattegat/Skagerrak (Sweden and Denmark) does occur, however, on a very small scale.

In the Wadden Sea, harbour seals haul out predominantly on intertidal sand banks along the tidal channels, which are emerged during low tide. The sandbanks have a function for social contact, giving birth and nursing the pups and moult.

After a disastrous Phocine Distemper Virus (PDV)-epizootic in 1988, the harbour seal population recovered nearly fivefold, from some 4,400 animals counted in 1989 to 20,975 in 2002 (Fig. 4.4). In 2002, a second PDV-epizootic struck the population, and in 2003, only 47% of the expected number of seals (if no epizootic had occurred) was counted, namely 9654 in the German-Dutch Wadden Sea. This number is comparable to the population count in 1996.

In 2012, the total number of seals counted during coordinated surveys in the moult period in the German–Dutch–Danish Wadden Sea in August was 26,220 (3,966 in Denmark, 9,268 in Schleswig-Holstein, 6,457 in Niedersachsen/Hamburg and 6,529 in the Netherlands). The maximum number of pups counted during the whelping season in June was 7,267 (570 in Denmark, 3,247 in Schleswig-Holstein, 1,977 in Niedersachsen/Hamburg and 1,473 in the Netherlands). According to recent satellite telemetry investigations, seals use the North Sea to a much larger extent, in terms of numbers as well as range, than known before.

Harbour porpoise

Harbour porpoises (*Phocoena phocoena*) are widely distributed throughout the North Sea and

adjacent waters. They used to be sighted frequently in the big river mouths and in the Wadden Sea.

According to the SCANS surveys in the North Sea and adjacent waters in 1994 and 2005, about 230,000 harbour porpoises were distributed over the entire area of the North Sea but a shift has been observed in the core area. In 1994 most harbour porpoises were counted in the northern part, whereas in 2005, most of the porpoises were seen in the southern part. It is assumed, that this effect depends on the presence of fish. In comparison to



Harbour seal
(Photo: Klaus Janke).

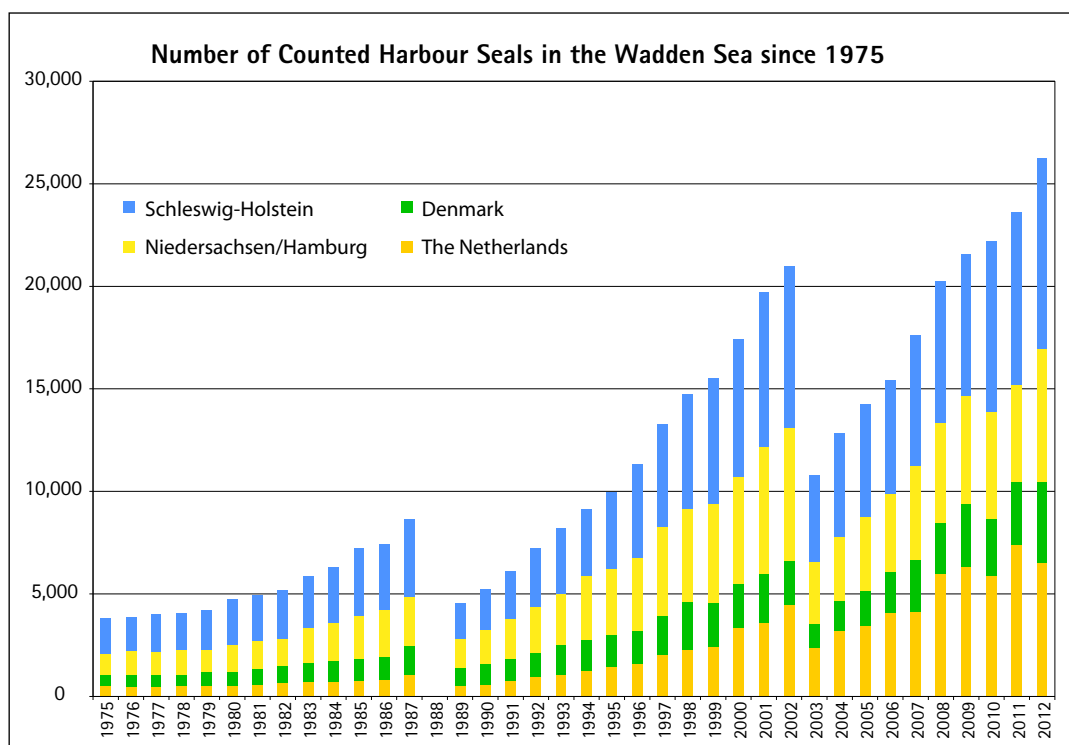


Figure 4.4:
Number of harbour seals
(*Phoca vitulina*) counted in
the different Wadden Sea
regions since 1975.

other parts of the North Sea, high densities of harbour porpoises and, especially, mother-calf groups were documented for the Schleswig Holstein part. The German area west of Sylt plays an important role as rearing area for harbour porpoises.

Along the Dutch mainland coast, fixed observation sites exist which supply more regular counts. This data demonstrates that since the mid-1990s harbour porpoises are becoming year-round visitors. Mother-calf groups have been observed with increasing regularity and the number of harbour porpoises sighted has increased considerably, by 41% per annum.

Aerial surveys of harbour porpoises in the German Bight carried out in the summers of 2002-2006 revealed that the overall mean abundance of harbour porpoises in the German EEZ of the North Sea amounted to around 50,000 animals.

Fish

Fish play an important role in the ecology of the Wadden Sea and the connected estuaries. Protection schemes in the Wadden Sea are established under the Water Framework Directive (transitional waters and rivers) and the Habitats Directive. Fishery management schemes are implemented on the EU level and by national legislation.

The houting is one of the most endangered species in Europe. A Danish restoration project with the aim of safeguard the houting was funded under EU's LIFE programmes. The restoration project comprises a variety of measures in the rivers connected to the Danish Wadden Sea (Varde, Sneum, Ribe and Vidaa rivers). The project started in 2005 and has removed fish farms, blockings for the migratory fish and restored wetlands as spawning grounds. The project has additional positive effects

for the ecosystem. Beside increased living conditions for the houting the project also had positive effects on habitats and species, e.g. salmon and other species on the EU list of endangered species.

Trends on the development of fish populations in the Wadden Sea can be drawn from long-time monitoring series of demersal fish in the Netherlands and Germany (back to the mid 1970s) and on pelagic fish in the Schleswig-Holstein Wadden Sea and some estuaries.

Overall, the number of fish species and the species composition in terms of ecological guilds has not shown any significant changes over the last 30 years. The number of estuarine resident species is remarkably stable, especially in the western and eastern Dutch Wadden Sea. Not much variation is observed in the number of marine juvenile species either. Most of the variation in species richness is

caused by the number of diadromous species or other (marine seasonal and marine adventitious) species (QSR 2009).

The 14 fish species analyzed showed large regional differences in abundance as well as in seasonal distribution. In addition, fluctuations in abundance on larger time scales such as decades occur, which makes it sometimes difficult to detect spatial and regional developments (Tab. 4.5).

Positive trends could be observed for herring, which is in agreement with the North Sea wide distribution pattern, and for anchovy, probably because of increased temperatures. High numbers and an increasing trend of twaite shad were recorded in Schleswig-Holstein (as also recorded in the German Bight), possibly from a stable spawning population in the Elbe estuary. Lower numbers were observed in the Ems estuary.

Table 4.5: Summary of trends in abundance of 14 fish species by Wadden Sea sub-area determined by TrendSpotter analysis of the DFS and DYFS (Bolle *et al.*, 2009). The period in which the trend was significant is indicated. Grey color means that there was no sampling. Green indicates a significant increasing trend, red a significant decreasing trend in fish abundance of a species. Explanation of the area codes: 1. Western Dutch Wadden Sea, 2. Eastern Dutch Wadden Sea, 3. Ems-Dollard, 4. East Frisia, 7. Elbe, 8. Dithmarschen, 9. North Frisia. * potential data errors (Source: QSR 2009).

Twaite shad	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									no significant trend
area 2									no trend
area 3									no trend
area 4									no significant trend
area 7									no significant trend
area 8									no significant trend
area 9									no significant trend

Smelt	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									increase>decrease *
area 2									no significant trend
area 3									increase>decrease *
area 4									no significant trend
area 7									increase>decrease
area 8									increase
area 9									increase

Flounder	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									no trend
area 2									no trend
area 3									increase
area 4									no significant trend
area 7									increase
area 8									increase
area 9									no significant trend

Eelpout	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									decrease
area 2									increase<decrease
area 3									increase<decrease
area 4									increase<decrease
area 7									no significant trend
area 8									increase<decrease
area 9									decrease

Sandeel	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									no trend
area 2									no trend
area 3									no trend
area 4									no significant trend
area 7									increase>decrease *
area 8									no trend
area 9									no trend

Plaice	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									increase<decrease
area 2									increase<decrease
area 3									increase<decrease
area 4									increase<decrease
area 7									no significant trend
area 8									no significant trend
area 9									no significant trend



Sole	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									decrease
area 2									decrease
area 3									no significant trend
area 4									increase<decrease
area 7									increase<decrease
area 8									increase<decrease
area 9									decrease

Dab	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									decrease
area 2									decrease
area 3									decrease
area 4									increase<decrease
area 7									decrease
area 8									decrease
area 9									decrease

Cod	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									no significant trend
area 2									increase<decrease
area 3									increase<decrease
area 4									increase=decrease
area 7									increase<decrease
area 8									decrease
area 9									decrease

Whiting	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									increase<decrease
area 2									increase<decrease
area 3									increase<decrease
area 4									increase=decrease
area 7									no significant trend
area 8									no significant trend
area 9									no trend

Herring	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									increase>decrease
area 2									increase>decrease
area 3									increase>decrease
area 4									increase=decrease
area 7									increase>decrease
area 8									no significant trend
area 9									no significant trend

Sprat	1970	1975	1980	1985	1990	1995	2000	2005	overall description
area 1									no significant trend
area 2									increase=decrease
area 3									no significant trend
area 4									increase=decrease
area 7									increase=decrease
area 8									no significant trend
area 9									no significant trend

* potential data errors, see text



Razor mussels
(Photo: John Frikke).

The numbers of juvenile flatfish using the Dutch Wadden Sea as a nursery area are declining, in particular the abundance of dab, sole and plaice. This is mainly caused by an offshore shift in the distribution of juvenile flatfish which is attributed primarily to increased summer temperatures, however; the causal factors for this shift are not yet fully understood (QSR 2009). Increasing water temperatures have a positive effect on the occurrence of more southern species such as the anchovy. Exotic or alien fish species introduced from outside the North East Atlantic seas are still rare in the Wadden Sea (QSR 2009).

Macrozoobenthos

The benthic macrofauna communities play a key role in the Wadden Sea food web. On the one hand they are important grazers of phytoplankton and microphytobenthos, on the other hand macrozoobenthos is the major food source of many predatory bird and fish species of the Wadden Sea.

Long-term data sets go back to the 1970s. Without such a long-term data set it would be impossible to distinguish real changes from incidental highs or lows. However consistent monitoring series at sites throughout the Wadden Sea are only available from 1988 onwards. In general it can be concluded that these long-time series show different signals in different sites. Also small scale, within-site, variations may play a role.

Average species composition at the monitoring stations in the mid intertidal range calculated over the 1988–2008 period show differences between the stations in the northeastern and the southwestern Wadden Sea. In general, these differences between the monitoring sites in the northeastern and southwestern Wadden Sea are consistent over the entire period between 1988 and 2008.

In the period between 1988 and 2008, at six monitoring areas in the mid tidal range in the Wadden Sea, Macrozoobenthos biomass showed considerable variability but no clear long-term trends (Fig. 4.5). In the two areas in the northeastern Wadden Sea Ho Bugt and Rømø and also at Norderney in the southwestern Wadden Sea, fluctuations in the *Cerastoderma edule* biomass

strongly influence the overall variability in macrozoobenthos biomass. *Mya arenaria* and *Arenicola marina* are relatively important and stable species in the southwestern Wadden Sea. Especially in the Balgzand area *M. arenaria* reaches high biomass values. It is also at the Balgzand area where around 2000 the invasive *Marenzelleria viridis* reached highest biomass values in the series presented here. However, the clear and significant increase of total biomass in Balgzand during winter/early spring can not be extrapolated to other areas. At monitoring sites in the Netherlands total summer biomass is declining while winter biomass continuous to increase or remains stable.

Also in the subtidal, *M. viridis* has become one of the most important species. *Ensis directus* is another invasive species which locally has a large impact on the macrozoobenthos biomass. This species is now strongly established in the subtidal and low exposed intertidal areas of the western Dutch Wadden Sea (Dekker and Beukema 2012). Despite that the invasive *M. viridis* and *E. americanus* can locally reach very high biomass values, there is no strong evidence that these species have a negative impact on the original benthic fauna.

It is still unclear in which way the newly spread Pacific oyster (*Crassostrea gigas*) will influence the ecology of the tidal flats, for example, by invading blue mussel bed habitats or influencing the food supply of mussel-eating birds. *Crassostrea gigas* develops reef like structures offering hard substrate and protection for other species, severely impacting species composition.

At present, there is no clear indication of any effects of climate change on most of the macrozoobenthos species. However, the number of species has increased with increasing winter temperatures and some cold tolerant species are declining most notable *Macoma balthica*. Global warming may have a negative impact on the recruitment success of the bivalves *Macoma balthica*, *Cerastoderma edulis*, *Mya arenaria* and *Mytilus edulis*.

There is no strong indication of effects of the reduction in eutrophication on macrozoobenthos – there may be some indications of summer biomass reduction in the western Wadden Sea.

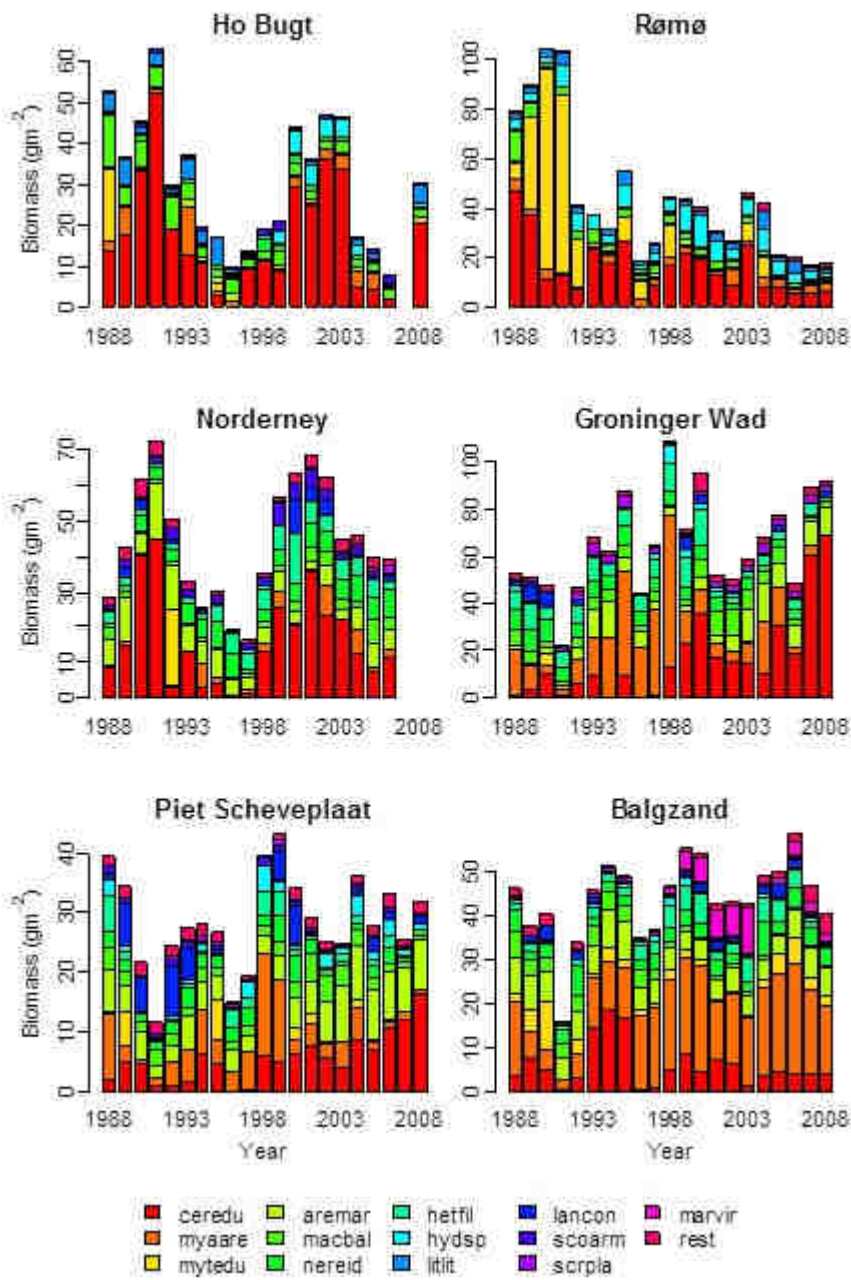


Figure 4.5: Time series of macrozoobenthos biomass at six monitoring areas in the Wadden Sea between 1988 and 2008. Areas are ordered from north east to south west. Bars are subdivided for the thirteen species with largest biomass and remainder of the community. Species are ordered according to the overall average biomass (cered = *Cerastoderma edule*, myaare = *Mya arenaria*, mytedu = *Mytilus edulis*, aremar = *Arenicola marina*, macbal = *Macoma balthica*, nereid = *Nereis diversicolor*, heftil = *Heteromastus filiformis*, hydsp = *Hydrobia ulvae*, litit = *Littorina littorea*, lancon = *Lanice conchilega*, scoarm = *Scoloplos armiger*, scrpia = *Scrobicularia plana*, marvir = *Marenzelleria viridis*, rest = others)

4.b Factors affecting the property

(i) Development pressures

All human activities within the inscribed and nominated property which are assessed to cause adverse effect are regulated in time and space or, as appropriate, prohibited. All activities that are allowed are subject to licensing following an assessment of their impact on the property in accordance with the stipulations of Art. 6 of the Habitats Directive. Art. 6 (3) of the Habitats Directive stipulates that "[A]ny plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. ...[t]he competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned ..." Henceforth, subsection 4 of the directive stipulates that "[I]f, in spite of a negative assessment of the implications for the site and 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, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected...". Thus within the framework of the approval procedures standardized preconditions have to be fulfilled obligatory. This includes relevant national nature protection regulations according to the German National park acts, the Federal and states Nature Conservation Acts, the Danish Nature Conservation Act as well as relevant EU Directives and other international regulations (e. g. PSSA, OSPAR, AEW, MARPOL, RAMSAR-Agreement and Bonn-Agreement), the Wadden Sea Plan and other trilateral agreements.

Furthermore, in addition to the Targets, the Wadden Sea Plan also encompasses a number of Shared Principles which are fundamental to decisions concerning the protection and management of the Wadden Sea. The result is that the inscribed and nominated property is not subject to significant development pressures.

There are, however, a number of activities, the most prominent ones taking place outside the inscribed and nominated property that potentially affect it but are essential for the regional economy and the living conditions of the people living in the

area or visiting it as tourists. These activities are shipping and the related (maintenance) dredging of the shipping routes and harbour developments, and coastal protection. Further, the issue of alien species is a potential pressure to address. Additionally, there are some activities such as civil air traffic, military activities, hunting and laying of cables that may potentially cause disturbance to the inscribed and nominated property.

In many of these activities the natural dynamic processes which change the Wadden Sea over time have to be taken into account; e.g. natural gullies used as shipping routes have moved substantially in the course of the centuries. Over the long run, the borders of the inscribed and nominated property should reflect this dynamic. Minor modifications to the boundaries of the property in case of morphodynamic shifts will be dealt with in accordance with the Operational Guidelines.

Germany (Niedersachsen)

As regards the German (Niedersachsen) extension of the property in the offshore area, there are very few human activities which affect the property. The main activity in the extension is shrimp fishery which, as outlined in the 2008 nomination document, does not negatively affect the nominated extension of the property.

Constructions of new wind turbines are not allowed within the nominated property, Cables have been and will be constructed through the area from windparks constructed further offshore in the framework of the German energy transition policy which aims at a significant extension of wind power. The construction of such cables is subject to assessment and permission under the Habitat Directive. Two corridors for laying power cables across the nomination area have been approved after passing the assessments and permission under the Habitats Directive. One corridor crosses from north to south via the island Norderney and a second one passes west off the Island Borkum.

Designated areas for the extraction of sand for building purposes lie entirely outside but partly adjacent to the nominated extension. Possible adverse side impacts on the property are subject to the Habitats Directive and the National Park Act.

Disturbance may ensue from civil air traffic crossing the offshore area including helicopter flights from airports on the mainland to offshore installations. Minimum flight altitudes and corridors have been introduced to minimize disturbance. Also, ultra-light aircraft and advertisement flights are prohibited or regulated. The German Wadden Sea National Parks are marked as sensitive areas in aerial flight maps and it is

recommended to steer clear of them.

Furthermore, it should be acknowledged that all dumping sites for dredged material are located outside the nominated extension.

Hunting is not allowed in the nominated extension area.

The state party confirms its commitment not to explore and extract oil and gas at locations within the property and the nominated extension area in line with law in force.

There are no coastal protection measures in the German extension of the property.

Danish Wadden Sea

Harbors, industrial facilities and dredging

There are three harbours (Esbjerg, Havneby, Nordby) located adjacent to the nominated property. The large majority of the smaller ports are located directly adjacent to the nominated property on the mainland or on the islands. They are vital infrastructure installations for the local and regional economy in terms of maritime installations, the traffic to and from the islands. An appropriate sustainable and flexible access to the harbours now and in the future is hence indispensable, as well as navigation, maintenance and development of the fairway. As in the entire Wadden Sea the hydro-morphological and geomorphological conditions are highly dynamic and additionally very sensitive to climate change with its sea level rise and variations in storminess. Access to the harbours also demands an integrated sediment management, both to maintain the shipping routes and to extend existing ones within the dynamic conditions of tidal coastal areas to allow for sustainable state-of-the-art shipping transport.

In the nominated property, new, not yet approved plans for new construction as well as for the extension or major modification of existing harbour and industrial facilities are not allowed unless such is necessary for imperative reasons of overriding public interest and if no alternatives can be found. In specific cases exemptions can be granted in accordance with the stipulations of Art. 6 of the Habitats Directive.

In the Danish part of the nominated property channels and harbours are regularly dredged for maintenance of water depth. There are two major and three minor deposit sites outside Esbjerg harbour and one deposit site outside Havneby harbour. The dredged material from the maintenance of Esbjerg harbour is mainly deposited at sites outside the nominated property. Deposit sites are for marine dumping of dredged material re-entering the natural sedimentation balance.

At these sites dumped material is comparable in quantity, type and structure to natural sedimentation dynamics in the area. Dumping is only allowed if no toxic substances are detected, and if dumping is considered to be without effect on the ecosystem. The material is regulated through dumping method, deposit site, quantify, frequency and season. The amounts of dredged material dumped into the entire Danish Wadden Sea varied between 9 – 26 million t/y (dry weight) over the period 1998 – 2003 (average 14.8 million t/y).

Yearly Esbjerg harbour authority is dredging 417,000 m³ sediment from the basins (average from 1993 – 2003) (DHI, 2005). In total the dry weight of marine dumped material is 117,000 tons, of which 20,000 tons are sand and 97,000 tons are fine-grained material (DHI, 2005). The main dumping sites are situated in areas of Grådyb with strong tidal currents. The result is that dumped material is not accumulated on the dumping sites, but kept in – or placed in – suspension by the tides. Thus the marine dumped material (re)enters into the gross sediment budget on 2.2 mill m³ per year.

The basins in the Esbjerg harbour act as a heavy sedimentation trap for the material transported by the tides in the Grådyb. The material will – on its way towards the inner parts of the tidal area – reach the harbour area, where a large percentage will deposit as sediment. It is important to regard the maintenance as an activity that neutralises the effect of the harbour on the environment if marine dumping of the material can take place without affecting the environment, and on the condition that the dredged material is not polluted. The dredged material belongs to the total natural sediment budget, so to speak, and is only temporarily impeded in the natural transportation by the harbour (Geografisk Institut, 1993).

Because dredging for maintenance is the main source of dumped material, the amounts depend mainly on natural variation of sedimentation and re-suspension processes. In general, no trend can be observed in the amounts of dredged material dumped.

Dredging may potentially lead to geomorphological changes or changes in the tidal regime. It is therefore subject to an environmental assessment of its impacts and subsequent licensing in case of extending existing channels or dredging new ones. Several environmental assessment studies have shown, however, that the impact of dredging is limited in time and space, because it follows the natural morphological developments. In general, dredged material is dumped into the system again, provided that the dredged material does not exceed certain pollution or so-called ac-

tion levels. For highly polluted dredged material, land based deposition is mandatory. In specific cases dredged material may be used for coastal protection purposes.

Coastal flood defense and protection

Coastal flood defense and protection, including the drainage of the hinterland, are inherent features of the Danish Wadden Sea coast. Basically the whole of the boundary coastline of the nominated property is delineated by seawalls or dune systems to protect the people living in the area and their economic assets. The current level of protection will not be compromised under any foreseeable circumstances. The current line and system of coastal flood defense and protection will be maintained and no further embankment will be undertaken or is planned in any parts of the nominated property in the foreseeable future. The aim is to keep the local impacts within a temporary timescale. The current and future flood defense standards demand, however, continuous reinforcement and adaptations of future coastal protection measures to a rising sea level. Reinforcement of the existing dikes in front of threatened areas will be carried out.

Other activities

Though the construction of new wind turbines is not allowed within the nominated property, it can be expected that cables from planned and anticipated wind farms in the North Sea will have to cross the nominated property in some cases. This will, however, mainly cause only a temporary impact on the Wadden Sea. The construction of such cables is also subject to assessment and permission under the Habitats Directive.

Fishery may affect the natural environment of the nominated property. As outlined in Chapter 2, the most important fisheries within the nominated property are for shrimp. Shrimp fishery is mainly performed in the area off the islands. These fisheries are subject to a coordinated management scheme which aims to ensure that the nominated property will not be negatively affected. Generally the fishery complies with the provisions of Natura 2000 stipulations and is managed in a sustainable way. Commercial fishery after bivalves – especially the blue mussel – is halted. Pacific oyster is only collected manually on a small scale basis.

Other fishery activities inside the nominated property including the use of fykes is restricted and limited in time due to concerns for migrating salmonoids including smolts and the highly threatened houting. The use of gill-nets is forbidden inside the islands. Fishery with gill-nets

is allowed on the west coast of the islands and is practiced especially on Rømø and the peninsular of Skallingen.

Disturbance may ensue from recreational civil air traffic over the nominated property, but also from route flights between airports and helicopter flights from airports on the mainland to offshore installations. Accordingly minimum flight altitudes and corridors have been introduced in some cases to minimize disturbance. Also, ultra-light aircraft and advertisement flights are prohibited or regulated. The minimum flight altitude over the Danish part of the nominated property is 1,000 feet (300 m) according to the Executive Order issued on 24 September 2012 by the Danish Transport Authority, but it is strongly recommended to use higher flight altitudes.

Hunting is almost phased out in the entire Wadden Sea, but in the Danish parts of the nominated property a regulated water bird hunting in a few salt marsh areas and hunting in the sea territory from anchored boats or by wading in the sea territory west of the islands takes place. Further exemptions for hunting for wildlife management and pest control are possible in the whole area.

There is one exercise area with air to ground missiles within the Danish Conservation Area on the island of Rømø. The extent of military activities has been significantly reduced over the last years. All activities are limited in time to take account of the breeding and moulting times for birds and seals. The military exercise area has been excluded from the nominated property in conformity with the exclusion of similar exercise areas of the existing property.

Alien species

At the North Sea coast, alien 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 some 52 known alien species, six have already had or are about to have effects on the composition of the existing biota in the Wadden Sea: cord-grass (*Spartina anglica*), japanese seaweed (*Sargassum muticum*), bristle worm (*Marenzelleria cf. wireni*), american razor clam (*Ensis americanus*), american slipper limpet (*Crepidula fornicata*), and Pacific oyster (*Crassostrea gigas*) (Fig. 4.6). These species differ in their effects, some of which may be of a dynamic character (i.e., sediment retention by *Spartina*, habitat provision by *Sargassum*, more food for birds by *Ensis*, displaced seagrass by *Spartina*, out-competing

mussels by *Crassostrea*). Global warming may benefit *Spartina*, *Crepidula* and *Crassostrea* in the coming years, resulting in further changes in dominance. Some introductions have become extremely numerous locally, such as the bristle worm *Marenzelleria*. 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.

The development with regard to introduced and immigrated species are followed and monitored carefully. No species can be intentionally introduced into the nominated property, e.g. for aquaculture, without an assessment according to the Habitats Directive.

As a follow-up of the decision of the World Heritage Committee on the inscription of the Wadden Sea World Heritage on the List in 2009,

(ii) Environmental pressures (e.g., pollution, climate change, desertification)

Pollution

Rivers are by far the largest carrier of polluting substances from the land to the Wadden Sea. The German rivers Elbe, Weser and Ems, together with the Dutch IJsselmeer, discharge on average 60 km³ of water into the Wadden Sea each year. Along the German and Danish coast, a number of small rivers also contribute to the discharge but cover only a minor part of the total catchment area. The rivers transport heavy metals, PCBs, pesticides like Lindane and large amounts of nutrients. The amount of polluting substances is to an important

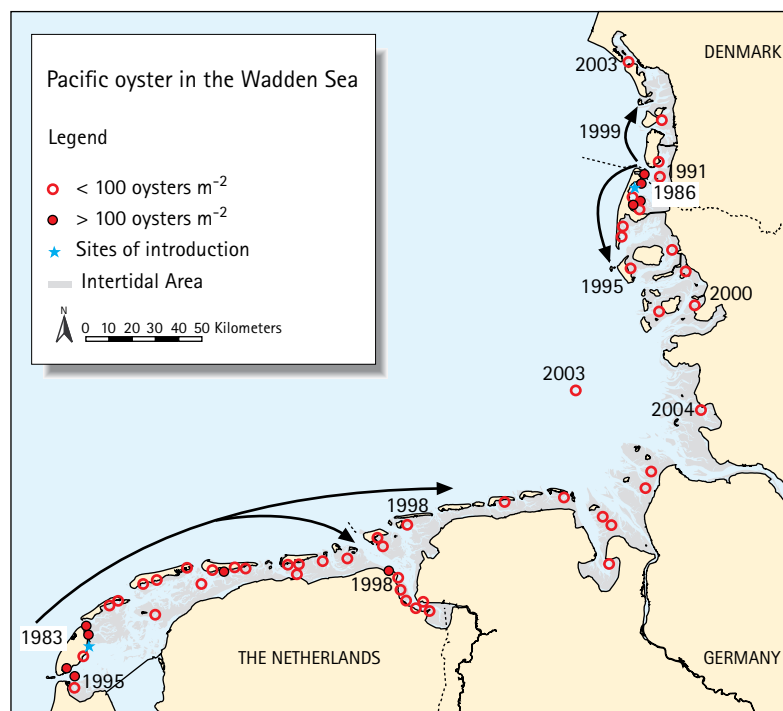
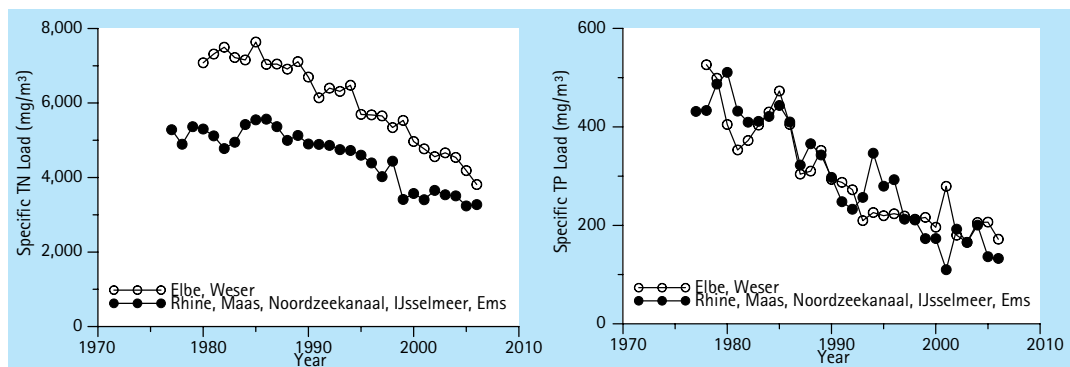


Figure 4.6: The Pacific oyster (*Crassostrea gigas*) in the Wadden Sea. Asterisks indicate sites and years (boxed) of introduction (Texel, Sylt). Other years indicate first records of settlement by larval dispersal for selected sites. Circles show mean abundance in 2003 (from QSR 2004).

acknowledging the research and control system provided by the States Parties of Germany and the Netherlands to mitigate the introduced species, encouraged the parties to implement a strict monitoring programme to control invasive species associated with ballast waters and aquaculture in the property, an aliens species strategy for dealing with alien species introductions in the Wadden Sea is currently being developed as decided at the 2010 Wadden Sea Ministerial Conference.

degree determined by the amount of water that is discharged by the rivers. This discharge shows large yearly fluctuations as a result of differences in rain and snowfall in the catchment areas. Major reductions in input of metals into the Wadden Sea mainly occurred in the late 1980s until the early 1990s, continuing moderately until 2002. In the Wadden Sea itself a general reduction in the concentration of pollutants can be observed.

Figure 4.7: Riverine input of nitrogen and phosphorus (normalized on the annual freshwater discharge), (QSR 2009).



Nutrients

The two most important nutrients are nitrate and phosphate. Of these, the concentrations of phosphate started to decrease in the water of the Wadden Sea in the second half of the 1980s, mainly as a result of the use of phosphate-free detergent and water purification (Fig. 4.7).

Though inputs of nutrients, especially of phosphate, have decreased, the present level of nutrients in the Wadden Sea is still about five times higher than before industrialization. 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 than in the northern Wadden Sea.

Hazardous substances

For some metals like mercury, lead, zinc etc., the Target of background concentrations in sediment and biota (blue mussels and bird eggs) has not yet been reached in all sub areas of the Wadden

Sea. In most parts of the Wadden Sea region, concentrations of many contaminants are falling in the sediment and in living creatures (Fig. 4.9). For a number of xenobiotic compounds, discharges to and concentrations in the Wadden Sea have decreased (Fig. 4.8). Some of these substances still pose a risk to the ecosystem. Many newly developed xenobiotics, including hormone disruptors, have a wide occurrence in the Wadden Sea ecosystem, and these may have deleterious effects on the ecosystem.

Oil pollution

The inscribed and nominated property is located adjacent to one of the world's busiest shipping routes off the coast of the southern North Sea. Furthermore, – from a climatic point of view – this region lies within the west wind zone, which is characterized by changeable weather with adverse weather situations, like heavy winds and restricted visibility. Despite all national and international activities and despite the progress made in the improvement of ships' safety, shipping safety and the protection against maritime pollution, shipping will continue to be a potential source of risk for substantial damage to the Wadden Sea and the adjacent coastline. In the case of an accident with an oil tanker the damage would affect the area severely.

The most frequent source of oil pollution at sea is not tanker incidents but illegal discharges of fuel oil residues due to operational processes on board, which has caused a constant threat to seabirds in spite of the designation of the North Sea as a Special Area according to Annex I and II of Marpol and the air surveillance of the whole area, which was introduced in 1986. A large proportion of seabirds washed onto beaches are contaminated with oil. Reported oil spills off the Wadden Sea coast declined in comparison to the 1990s. Since the mid 1980s, the incidents identified per air hour declined from 1.5 to 0.2. Oil rates

Figure 4.8: Riverine input of cadmium (QSR 2009).

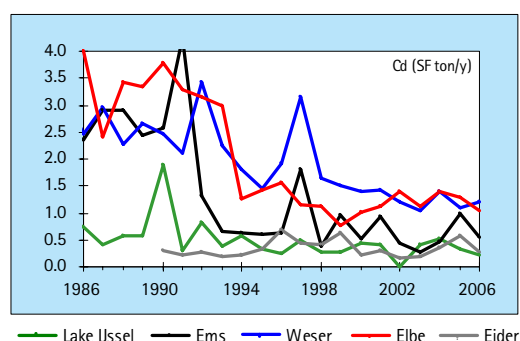
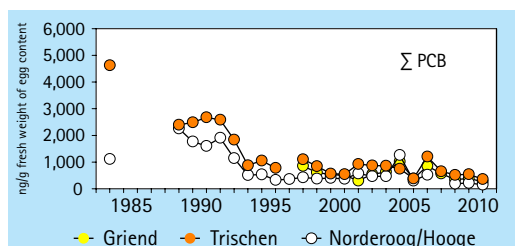


Figure 4.9: PCB concentration in Oystercatcher eggs, 1981–2008 (QSR 2009).



among beached birds of specific species of up to 90% in the 1980s have generally decreased, but are still high.

Climate change

Climate change and, in particular, its possible effects, have become a central issue in politics and science since the 1990s. To the layman the notion of climate change has almost become identical with anthropogenically-induced increases in the atmospheric concentrations of the so-called greenhouse gases, most notably carbon dioxide. As a result, increasing temperatures and, consequently, increasing water levels are predicted, caused by the thermal expansion of the ocean water and the melting of glaciers and polar ice caps. Also, changes in wind climate are expected or have, according to some publications, already occurred. Although climate has always changed, the new feature of the present situation is the expected speed of the change. This acceleration may induce significant changes in the Wadden Sea system.

Changes in any part of the system will cause sediment transport to or from other parts of the system, leading to a new dynamic equilibrium. Therefore, a moderate sea level rise in the Wadden Sea, resulting from both natural and man-induced processes, will be compensated by the import of sediment, which, in the long term, derives from the tidal channels, shore-face and the beaches and dunes of the barrier islands. In addition to these hydrodynamical and morphological processes, the importance of biotic processes for sedimentation and erosion has to be underlined. In this respect, the relevance of seagrass and mussel beds for biodeposition and reduction of erosion and the role of vegetation in the formation of dunes is emphasized.

It can be concluded that, generally, changes caused by sea level rise will not easily be distinguishable from changes resulting from the high natural variability, which is a specific feature of the Wadden Sea system. Moreover, there will be large differences in changes occurring in the different tidal basins. Because the Wadden Sea has a high resilience to changes, it is plausible that the system will be able to adapt to a sea level rise of up to some 25 cm per 50 years (the most realistic scenario) without substantial changes.

Beyond such levels, probably a breakpoint will occur, because the capacity of the system to balance the changes will become exhausted. When such a breakpoint, which will differ for different tidal basins, has been passed, substantial changes

in morphological and, consequently, biological parameters are expected. One of the major changes will be a reduction of the size of the intertidal area. It is estimated that, under the worst-case scenario (50 cm per 50 years), the size of the tidal flats could decrease by 15%, the tidal basins becoming more the character of tidal lagoons. An increase in storminess would further enhance this development.

The reduction of tidal flats will have important consequences for biological parameters, most notably bird species depending on the intertidal areas for foraging. A reduction in the populations of such species can be expected, not only because the potential feeding area will be less than today but also, and probably more important, because the feeding time will be less. For the worst-case scenario, changes in other morphological and biological parameters may also be expected. They concern, amongst others, an increase of erosion on the barrier islands, a significant erosion of the salt marsh cliffs, a decrease in benthic biomass, a decrease in seagrass and an increase in typical salt marsh vegetation.

The main socioeconomic consequence envisaged is an increase in costs for coastal defence. Under the most realistic scenario (25 cm per 50 years) an increase of costs for dike maintenance and strengthening of at least 5 to 15% is expected. Under the worst-case scenario, costs to maintain dike safety may increase up to 75% in Germany and Denmark and even more in the Netherlands. Also, the costs for other coastal defence measures, such as sand nourishment and salt marsh works, will increase considerably. Another important consequence of increased sea level is that possibilities for discharging freshwater from the mainland into the sea will become less and that additional sluicing, pumping and/or freshwater storage capacity will be needed.

(iii) Natural disasters and risk preparedness (earthquakes, floods, fires, etc.)

It is not expected that the Wadden Sea is subject to natural disasters as meant by the guidelines in the sense that they constitute a threat to the whole area and its integrity. The inscribed and nominated site is the result of a complex interaction of erosion and sedimentation at the shallow coastline of the North Sea. These still ongoing dynamics are the main feature of the site. The system has survived severe storm events in the past, which have altered the landscape and wiped out former settlement areas. Thousands of people and

cattle drowned during these storm floods. These experiences have led to today's coastal defence and protection plans with the highest possible safety standards for the inhabitants inside and outside the Wadden Sea.

The inscribed and nominated property is, however, subject to certain risks from shipping offshore its boundaries. As indicated above, access to the ports in connection with transit traffic to Scandinavia or to the Baltic Sea has turned the sea area off the Dutch and German coast into one of the regions with the highest traffic concentrations in the world.

The Danish part of the nominated property is also part the Particularly Sensitive Sea Area (PSSA) Wadden Sea. The PSSA designation is part of a comprehensive regime of protection measures for shipping safety and ships' safety set up by the International Maritime Organization (IMO), the European Union, or at the trilateral or the national level. This regime includes in particular Vessel Traffic Management System (VTMS), Traffic Separation Scheme (TSS), pilotage and mutual emergency management.

The TSS divides the sea traffic according to the main traffic directions into two one-way routes. Vessels carrying dangerous goods and deep draft vessels navigate the offshore routes far away from the coast and are thus separated from the other traffic according to the mandatory routing system adopted by the International Maritime Organization (IMO). With the exception of recreational traffic, which is usually limited to the summer months, the volume of shipping is spread evenly over all the months of the year. In view of the vessel traffic characteristics of the area, the Wadden Sea and adjacent North Sea still have an excellent record of only a few accidents and incidents. For example, during the period 1995–1999, a total of almost 800,000 ship movements in the German North Sea resulted in just over 100 incidents.

In the case of an emergency, a comprehensive set of contingency plans are in place to respond to oil pollution, for emergency towing of ships and mutual assistance in case of emergencies between the Wadden Sea countries in the framework of the DENGERNETH-Agreement concluded under the Bonn Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances. The best approach remains to prevent accidents from occurring and continued effort is therefore being made to maintain and, where necessary, increase shipping safety and the safety of the ships through an improved VTMS and international cooperation.

Risk-bearing companies and/or substances are

allowed, provided that in case of calamities no irreparable damage to the inscribed and nominated property is caused.

(iv) Visitor/tourism pressures

Tourism and recreational activity are a substantial part of the public experience of the Wadden Sea. They constitute a unique opportunity to experience the natural and scenic values of the area and one which also makes an important contribution to the regional and local economy, but also may potentially have a negative impact on the values of the Wadden Sea. The major part of the tourist activities, including the development of e.g. infrastructure, takes place outside the Wadden Sea, but all activities are so intimately linked to the inscribed and nominated property that it is essential to take the broader scope when describing and assessing tourism and visitor activities.

As requested by the World Heritage Committee in 2009, a project started in October 2011 to develop an overall Tourism Development Strategy for the property that fully considers the integrity and ecological requirements of the property and that provides a consistent approach to tourism operations in the property (www.prowad.org).

Apart from very limited recreational navigation there are no recreational activities taking place in the nominated German extension of the property.

The area around the Danish Wadden Sea covers a wide range of opportunities for recreational activities related to the natural and cultural history assets. The recreational infrastructure is highly developed. The experiences are of great variety, covering everything from windsurfing, mountain biking and horseback riding to swimming, boating and hiking in nature. 60–90 percent of the area's residents and tourists are active users of outdoor activities. The most visited areas are the south-eastern part of the island of Rømø, the coastline of the island of Mandø and the beaches of Hjerting and the western part of the island of Fanø.

Tourism in the Danish Wadden Sea area is organized and marketed mainly through the tourism organizations Destination South West Jutland, represented by the municipalities of Esbjerg, Fanø, Tønder and Varde. Destination South West Jutland is evolving and has launched several initiatives, e.g. travel packages, trails at sea and land, and thematic adventures such as gastronomy and art, and collaboration with local stakeholders about the dissemination of the activities.

Second homes represent the largest portion of the offered accommodation, followed by campsites, holiday apartments and centers, while the proportion of hotels is limited. Tourism is seasonal.



Tidal flat walking
(Photo: Martin Stock).

The number of overnight stays and day trippers in the Danish Wadden Sea was in 2010 estimated to around 9.7 million. The turnover of the tourist sector is estimated to app. EUR 500 million per year and the number of employees app. 5,305 full time equivalent (FTE). The number of visitors at the three largest visitor centers was 183,000 in 2007 and 30,000 visited the unstaffed exhibitions free of charge. The number of visitors at the beaches of Rømø and Fanø was in 2004 estimated to app. 2 million.

Tidal flat walking predominately takes place at guided tours offered by both public and private providers. Privately arranged tidal flat walking is not prohibited. The number of participants in guided tours was 105,000 in 2007. The number covers both tidal flat walking and other guided tours in the Danish Wadden Sea.

There are 11 recreational boat clubs in the Danish Wadden Sea which comprise around 1,300 members. Together with a number of rowing and kayak clubs they form much of the non-commercial recreational boating. The greatest activity is seen in Grådyb tidal area encompassing Esbjerg, Hjerting Varde and Nordby. Recreational boating from Varde goes via Varde river into the Ho bay. There is also a small - but growing activity - starting from Ribe/Kammerslusen, from Højer Sluice and Lægan in the Vidå River, and Havneby on Rømø. In Juvre Deep recreational boating is exceptionally rare.

Tourism and recreational activities are com-

prehensively regulated in the Danish Wadden Sea primarily in the context of the Statutory Order on the Nature and Wild Life Reserve. Access to certain areas is prohibited predominantly for the whole year. This concerns areas important for seals and roosting and breeding birds and other ecologically sensitive areas covering the island of Langli and areas around the island, the high sands of Jordsand, Koresand, Lammelæger, Trinden and Keldsand and the reclamation fields of Rømø causeway and the ebbe road to Mandø, and the southern part of the Lister Deep.

Any form of motorized transport and the use of any means of transport propelled by sail is prohibited in the reserve. Car traffic is however allowed in specific zones on the beaches of the islands of Rømø and Fanø and on the Mandø ebbe road.

Navigation east of the baseline at a speed exceeding 10 knots is only permitted within buoyed areas of the major shipping channels of the Grådyb, Knudedyb and Listerdyb. Any navigation by water scooters, jet skis, water skis catamarans and vessels propelled by air propels and windsurfing is in principle prohibited in the area. Windsurfing and navigation with catamarans is allowed in specifically designated areas along the west coast of Skallingen, Fanø and Rømø and in the the Grådyb in the summer half year. The activities at the beaches are regulated in dedicated zones where windsurfing is allowed, and on the islands of Rømø there are zones specifically dedicated for kite buggy and beach sailing.

For activities in the areas adjacent to the nominated property, a comprehensive planning system exists which aims to direct and regulate tourism. The building of tourist infrastructure, including e.g. marinas, is subject to assessment and planning and will only be allowed if there is no adverse impact on the nominated property. The planning system, including the spatial planning, also limits the use of space and natural resources. All things considered, the tourist and recreational activities are well controlled and the current planning, legal and management system is robust

enough to sustain an increase in the activities and prevent an adverse impact resulting from them on the nominated site.

**(v) Number of inhabitants with-
in the property**

The number of inhabitants within the nominated property is 2 (2012) which results in a total number of 45 within the inscribed and nominated property.

5. Protection and Management of the Property



Rømø, Havsand
(Photo: John Frikke).

5. PROTECTION AND MANAGEMENT OF THE PROPERTY

5.a Ownership

The extension of the German (Niedersachsen) part of the property of 40,628 ha / 406,3 km² is fully owned by the Federal Government being the competent authority for navigational waters.

As regards the Danish Wadden Sea the large majority of the reserve is state owned (almost 99%). The rest (some 1%) is owned by adjacent municipalities and private persons. This concerns predominately salt marsh areas and the northern part of the Margrethe Kog.

The landownership of the inscribed and nominated property the Wadden Sea is in table 5.1.

5.b Protective designation

As stated in Chapter 3 of the nomination, the Wadden Sea is subject to comprehensive protection, management and monitoring, both in the national as well as in the international context unprecedented in terms of its integrated and harmonized approach. The recognition that the Wadden Sea required a common protection and management approach in order to ensure that it would be protected and managed in respect of its shared character is more than a generation old.

The first formal International Wadden Sea Scientific Symposium was held in 1975. In 2012 the 13th Scientific Symposium has held. At the Symposia, scientists from the three Wadden Sea countries exchange relevant research findings and formulate recommendations to the political level. The Symposia also deal with management issues. The findings of the scientific symposia have been and are important for the development of trilateral and national policies in terms of protection, management, monitoring and research.

The first Governmental Conference on the Protection of the Wadden Sea was held in 1978 in The Hague, the Netherlands. In 1982, at the 3rd Conference in Copenhagen, the "Joint Declaration on the Protection of the Wadden Sea" was signed. Within the Wadden Sea Cooperation, conferences are held every 3-4 years. The 11th Wadden Sea Conference was held in 2010 at the island of Sylt.

Parallel to and within this framework, the national protection of the Wadden Sea developed in such a way that over the past generation the entire nominated property has been subject to the highest and most comprehensive legal protection under national legislation. It is very important to acknowledge the choice that was made a generation ago, i.e. to basically adopt "avant la lettre"

Table 5.1: Overview of land ownership of the inscribed and nominated property. Component parts with the offshore extension of the Niedersachsen Wadden Sea and the nominated property in the Danish Wadden Sea are shaded in red.

Area	ha	km ²	Ownership
Key Planning Decision Area (PKB) Wadden Sea	255,031	2,550.3	93.8 % state owned 1.7 % "Groninger Landschap" 0.05 % "Noord-Hollands Landschap" 4.2 % "Natuurmonumenten" 0.3 % "Wetterskip Fryslan"
Wadden Sea National Park Niedersachsen	324,160	3241.6	93.5% federally owned 5.2% state owned 0.9% owned by municipalities 0.4% private property
Wadden Sea National Park Hamburg	13,611	136.1	97.8% federally owned 2% owned by the City of Hamburg 0.2% private property
Wadden Sea National Park Schleswig-Holstein	436,698	4,367.0	98.3% federally owned 1.6% state owned 0.1% private property
Danish Nature and Wildlife Reserve	124,792	1247.9	99.0% state owned 0.1% owned by municipalities 0.9% private property
TOTAL PROPERTY	1,154,292	11,542.9	

* The total size of the land ownership is calculated on basis of national conservation areas and differs from the total size of the 8 component parts. Reasons are overlaps or gaps between the national conservation areas caused by inconsistency of geographical data based upon the unclear definition of the borders between the Netherlands, Niedersachsen, Schleswig-Holstein and Denmark. The inconsistencies in size are neutralized by joint component parts shared by states and countries.

an ecosystem and sustainable use approach to the long-term protection and management of the Wadden Sea, within which human activities will continue.

In addition, the nominated property is subject to protection under relevant European Union legislation and designations as well as under international agreements and conventions which contribute to enhancing and safeguarding its outstanding international importance.

Trilateral Wadden Sea Cooperation

1. The Joint Declaration on the Protection of the Wadden Sea, 1982/2010

The Joint Declaration on the Protection of the Wadden Sea was signed at the 3rd Trilateral Governmental Conference on the Protection of the Wadden Sea in Copenhagen in 1982. In this declaration, the governments recognize their responsibilities for the conservation of the ecosystem and declare their intention to coordinate their activities and measures to implement a number of international legal instruments in the field of natural environmental protection, amongst others the Ramsar Convention and the EC Bird Directive, for a comprehensive protection of the Wadden Sea region as a whole, including its flora and fauna.

At the 11th Trilateral Governmental Conference on the Protection of the Wadden Sea, 17-18 March 2010, a new Joint Declaration on the Protection of the Wadden Sea was adopted

(Annex 6). The 2010 Joint Declaration does not alter the spirit or legal status of the Cooperation. It encompasses the overall principles for the protection of the Wadden Sea and the objectives and areas of cooperation. The 2010 Joint Declaration also introduces new governance arrangements. The Trilateral Wadden Sea Governmental Council is the politically responsible body (Ministers) for the Cooperation. The Wadden Sea Board is the governing body of the Cooperation. The new Joint Declaration and Governance Arrangements will ensure that the Cooperation will be able to meet present and future needs.

2. Administrative Agreement on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea, 1987/2010

The Common Wadden Sea Secretariat was established in 1987 following a decision at the 4th Wadden Sea Conference in The Hague in 1985. The basis for the secretariat is the Administrative Agreement concluded in 1987 between the competent ministries of the three countries. In conjunction with the 2010 Joint Declaration also a new legally binding Administrative Agreement for the Common Wadden Sea Secretariat was signed to provide the secretariat with a legal status (Annex 7). The Administrative Agreement stipulates the legal status, tasks and the financing of the secretariat and its staff. The secretariat has been located in Wilhelmshaven since its establishment in 1987.



Kachelotplate
(Photo: Norbert Hecker).

3. Agreement on the Conservation of Seals in the Wadden Sea, 1990

The Seal Agreement (Annex 8) 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 (CMS, Bonn Convention). The Seal Agreement was concluded between the Wadden Sea countries with the aim of cooperating closely in achieving and maintaining a favourable conservation status for the common seal population of the Wadden Sea.

4. Declarations of the Trilateral Conferences on the Protection of the Wadden Sea, 1978 – 2010

The declarations issued on the occasions of the Wadden Sea Conferences are political declarations, in which agreements are made between the governments, which are relevant for all areas of the cooperation such as management, monitoring, international cooperation, etc. The declarations are therefore an integrated part of the total protection and management of the nominated property to which the governments have committed themselves. The Guiding Principle of the Trilateral Wadden Sea policy, as agreed upon at the 6th Conference in Esbjerg, 1991, is "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". The Guiding Principle is now codified in the 2010 Joint Declaration. The Wadden Sea Plan, the policy and management plan for the nominated property, which includes the central objectives

and principles of the Wadden Sea Cooperation, is also an agreement made at the 8th Conference in Stade, 1997. The Trilateral Monitoring and Assessment Program (TMAP), associated with the implementation of the Wadden Sea Plan, was launched on the same occasion.

5. Wadden Sea Forum

At the 2001 Wadden Sea Conference the Wadden Sea Forum (WSF) was established. The WSF is a stakeholder forum of representatives of regional and local governments and main sectors in the Wadden Sea region. The task of the WSF was to develop a sustainable development strategy for the Wadden Sea Region respecting the current level of protection of the Wadden Sea. The WSF sustainable development strategy "Breaking the Ice" was submitted to the 2005 Wadden Sea Conference at which the Governments indicated that they subscribed to the strategy as a start of the process to implement this strategy through the WSF action plan. Since 2011, the WSF is a formal stakeholder association under German law.

National Protection of the Wadden Sea

Germany

In Germany the federal states are responsible for the implementation of the Federal Nature Conservation Act (BNatSchG). Main habitats of the German Wadden Sea are, amongst others, legally protected by § 30 of the Federal Nature

Conservation Act (Annex 10). Actions that could lead to the destruction or other significant adverse effects are prohibited.

Schleswig-Holstein, Niedersachsen and Hamburg established national parks for the property in 1985, 1986 and 1990, respectively. The objectives of the national parks are to protect the Wadden Sea and to allow natural process to take place with a minimum degree of disturbance and other detrimental effects of human activities. The national parks have been divided into two or three zones of which the zone I includes the ecologically most valuable areas. Therefore, strict regulations apply to the zone I, including extensive restrictions to public admittance. In zone II, utilization and activities are allowed under such conditions that the overall protection objectives are not impaired. Each national park is managed by an administrative authority, the national park authority, which is responsible for the implementation of the provisions of the national park instruments.

1. Act on the Niedersachsen Wadden Sea National Park, 2010

The Niedersachsen Wadden Sea National Park was designated in 1986 by state statutory order, which was given the status of state act in 1999. The act was amended in 2001 to include a major extension of the area seaward and in the Ems estuary, and a rezoning of the park. The inhabited islands, except for the villages, are part of the National Park. A second major amendment in 2010 extended the National Park to include large parts of the offshore belt. The full legal protection regime for the core zone (zone 1) applies to the extension area as well. General exceptions are made for the dumping of sand from maintenance dredging in accordance with national regulations which refer to OSPAR and London Convention requirements, recreational fishery and, as far as the protection goals are not contradictory hereto, the extraction of sand for coastal protection purposes and the construction of cables and pipelines (Annex 11).

2. Order on the Navigation on the Federal Waterways in the National Parks in the area of the North Sea, 1997

The marine area of the German part of the nominated property is federal waterways. Navigation is hence to be regulated by Order of the Federal Minister of Transport, Building and Urban Development. An order was issued in 1992 and amended in 1995 and 1997. The order establishes speed limits for navigation in the National Parks and closed areas comprising of seal haul out sites, and breeding and moulting areas for birds.

Denmark

1. Nature Protection Act

The purpose of this act is to contribute to safeguarding nature and environment in Denmark, thus ensuring sustainable social development in respect of human conditions of life as well as the protection of flora and fauna. The objective of the act is to protect nature with its stock of wild animal and plants and their habitats as well as its scenic, cultural historic, natural science and educational values. The act furthermore aims to improve and restore or create areas of significance for wild animals and plants and for landscape and historical interests and to provide access to nature and to improve opportunities for open-air recreation. The most recent amendment of the act was in 2008 (Annex 12).

2. Statutory Order on the Nature and Wildlife Reserve Wadden Sea

The Wadden Sea order specifically intends to promote the sustainable management of the Wadden Sea and preserve the area as a coherent natural area of national and international importance and as a habitat for seals and populations of waterfowl. The order seeks to protect the area's natural ecology and environment and cultural heritage values in balance with the area's use for commercial and recreational purposes, taking into account infrastructure and the local population's security, while not affecting the natural dynamics of landscape evolution unnecessarily. This order ensures the fulfilment of Denmark's international obligations under the Joint Declaration. The first Statutory Order on Wildlife Management in the Wadden Sea was introduced in 1979 followed by the Statutory Order on the Wadden Sea Nature Reserve in 1982. Both orders were merged into one Statutory Order on the Nature and Wildlife Reserve in 1992. The most recent amendment of the order was 2007 (Annex 13).

3. Act on National Parks

The Danish part of the Wadden Sea is covered by the National Park Wadden Sea. The National Park is designated in accordance with national legislation. The purpose of the Act on National Parks in Denmark is to create and secure coherent nature and landscape of national and international importance. As a part of the designation of the National Park a foundation has been established that prepares a plan for the National Park establishment and development. The act was adopted by parliament in 2007 (Annex 14).

4. Statutory order on special fishing regulations and conservation zones in the Wadden Sea and in some streams in southern Jutland

The order is based on the Danish fisheries act, which provides the overall, overarching framework for regulating fishing in saltwater and freshwater, creating a coherent set of rules for commercial fishing and recreational fishing. The order on fishing and conservation in the Wadden Sea specifically aims to ensure that migratory fish moving from rivers into the sea are allowed to do so without hindrances. Therefore conservation zones, where fishing is prohibited, are put in place where rivers and streams flow into the ocean in the Wadden Sea area. The most recent amendment of the order was in 2012.

5. The Spatial Planning Act

This act ensures that the overall planning synthesizes the interests of society with respect to land use and contributes to protecting the country's nature and environment, so that sustainable development of society with respect to people's living conditions and for the conservation of wildlife and vegetation is secured. The act explicitly states that the country's coastal areas are to be kept as free as possible of development and installations that do not need to be located near the coast. The most recent amendment of the act was in 2007.

6. Coastal Protection Act

The purpose of the coastal protection act is to protect people and property from flooding and degradation of the sea, fjords, or other parts of the territorial sea. This purpose is served by balancing several considerations such as: 1) The need for coastal protection, 2) economic considerations 3) the technical and environmental quality of coastal protection 4) the preservation and restoration of coastal landscapes, 5) natural dynamics of the coastline 6) recreational use of the coastal zone 7) the need to secure the existing access to the coastal zone. The most recent amendment of the act was in 2009.

International Protection of the Wadden Sea

The Wadden Sea countries are contractual parties to a number of international agreements, conventions and treaties, in particular, the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention); the Convention on Biological Diversity (CBD), the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention) also covering the Agreement on the Conservation

of Seals in the Wadden Sea (Seal Agreement), the Agreement on the Conservation of African- Eurasian Waterbirds (AEWA) and the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention). The nominated property has also been designated as Man and Biosphere (MAB) Reserves under the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Some of the most relevant international conventions and agreements for protecting the Wadden Sea will be mentioned here, being aware that there are more treaties and conventions valid for the property. Due to the strong interactions between the Wadden Sea and the adjacent North Sea, the trilateral policy and management regarding pollution is closely related in particular to the OSPAR Convention.

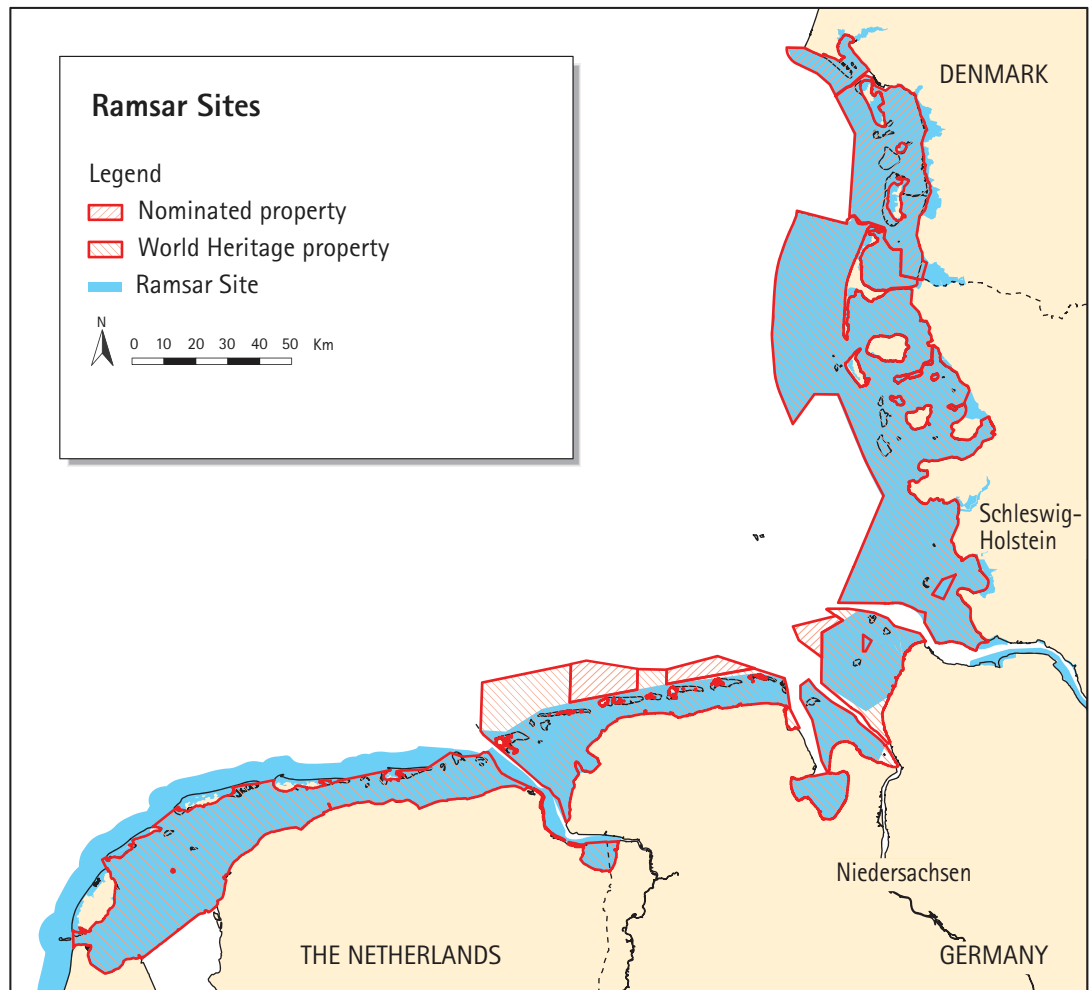
1. Ramsar Sites

The *Ramsar Convention* 1971 is a world-wide treaty for the conservation of wetlands: shallow open waters and any land regularly or intermittently covered or saturated by water. In the framework of the Convention, wetlands of international importance are designated by the contracting parties. Nearly all parts of the Wadden Sea have been designated as *Ramsar sites*.

2. Particularly Sensitive Sea Area Wadden Sea

In 2002, the Wadden Sea was designated as a Particularly Sensitive Sea Area (PSSA) (Annex 17) by the International Maritime Organization (IMO). The area designated as a PSSA is the marine area of the Wadden Sea. The PSSA covers an area of approximately 13,000 km²; the major shipping routes have been excluded from the designation. The PSSA does not limit shipping in the area nor the use of the Wadden Sea harbours. The designation of the PSSA Wadden Sea is seen as a recognition of the extensive regime of the national and international protective measures already in place in the Wadden Sea and adjacent the North Sea. Examples are the MARPOL Special Areas prohibiting discharges of oil and garbage, routing systems making certain routes compulsory for ships carrying hazardous goods and compulsory reporting for ships. An evaluation of the PSSA was done in preparation of the 2010 Wadden Sea Conference. As a result of the evaluation Governments agreed to develop a vision on maritime

Figure 5.1:
Map of Ramsar sites
within and adjacent to the
inscribed and nominated
property.



safety and pollution prevention for the Wadden Sea PSSA together with the main stakeholders including the shipping sector. This vision which will also encompass operational measures is currently under development.

3. Man and Biosphere Reserves

The nominated extension of the German part of the property is also part of the Man and Biosphere (MAB) Reserve under the UNESCO Man and Biosphere Program in line with the protected area status. In Niedersachsen, a development zone, which should contain 50% of the whole MAB reserve in accordance to the UNESCO criteria, is under development in the adjacent hinterland. Crucial is that planning, management and configuration find the acceptance of the local population.

4. The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) 1991

The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) was concluded in 1991 under the auspices of the Convention on Migratory Species (UNEP/CMS or Bonn Convention) and entered into force in 1994. The nominated property is within the agreement area. The aim of the agreement is to promote close cooperation amongst parties with a view to achieving and maintaining a favourable conservation status for small cetaceans. A Conservation and Management Plan forming part of the agreement obliges parties to engage in habitat conservation and management, surveys and research, pollution mitigation and public information.

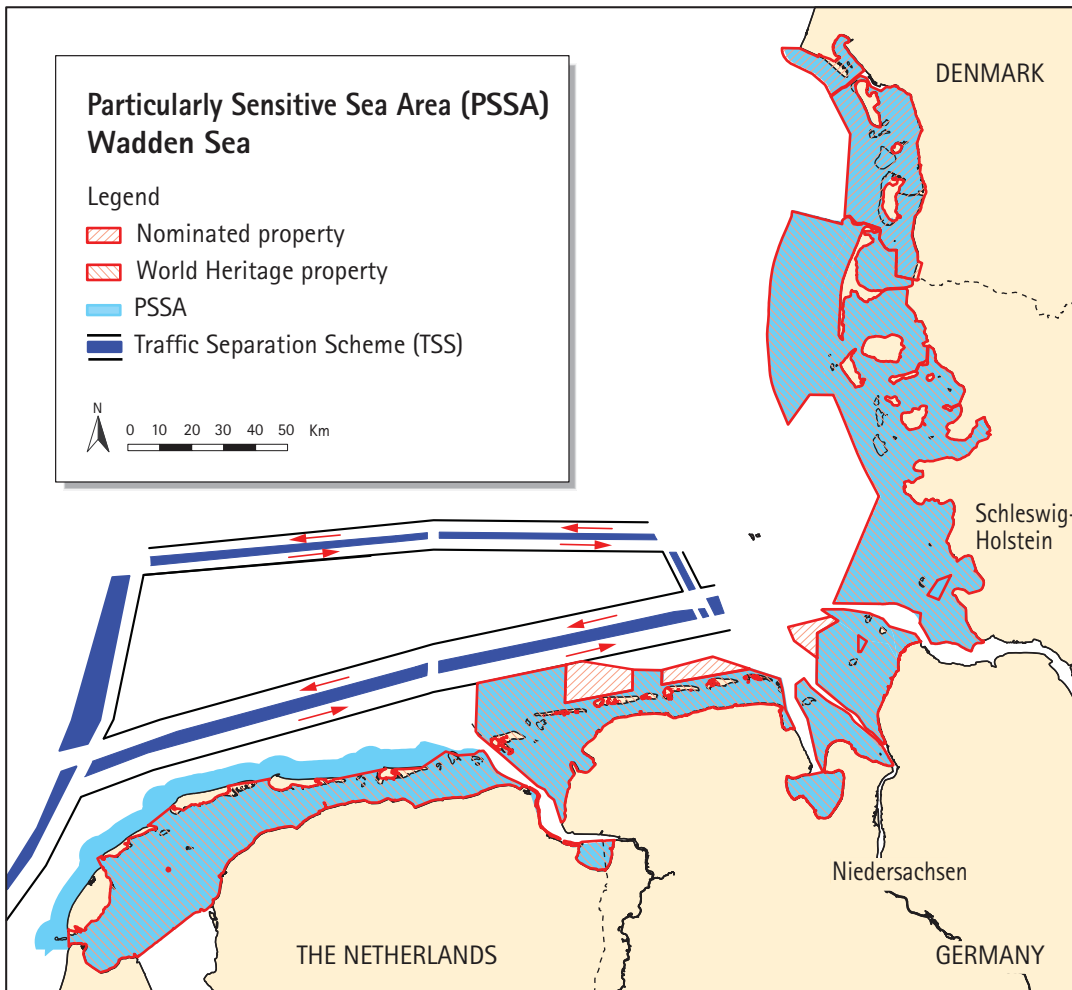


Figure 5.2:
Map of the Particularly Sensitive Sea Area (PSSA) Wadden Sea and the Traffic Separation Scheme (TSS).

5. The African–Eurasian Waterbird Agreement, 1995

The African–Eurasian Waterbird Agreement (AEWA) concluded under the Bonn Convention focuses on migratory waterbirds. It was concluded 1995 in The Hague, the Netherlands, and entered into force in 1999. The secretariat is located in Bonn, Germany. AEWA's flyway approach to waterbird conservation is unique. Being a regional agreement, AEWA focuses on 235 waterbird species ecologically dependent on wetlands for at least part of their annual cycle, including many species of pelicans, storks, flamingos, ducks, waders, terns, gulls and geese. The AEWA Agreement area covers 117 Range States in Africa, Europe, as well as parts of Canada, Central Asia and the Middle East. The geographic area stretches from the northern reaches of Canada and the Russian Federation to the southernmost tip of Africa. The AEWA is of particular importance for the Wadden Sea, being the key stepping stone for migratory birds within the agreement area. The two flyway projects initiated in the framework of the Wad-

den Sea World Heritage following the request of the World Heritage Committee on the inscription of the property in 2009, the Wadden Sea Flyway Initiative, is closely coordinated with AEWA.

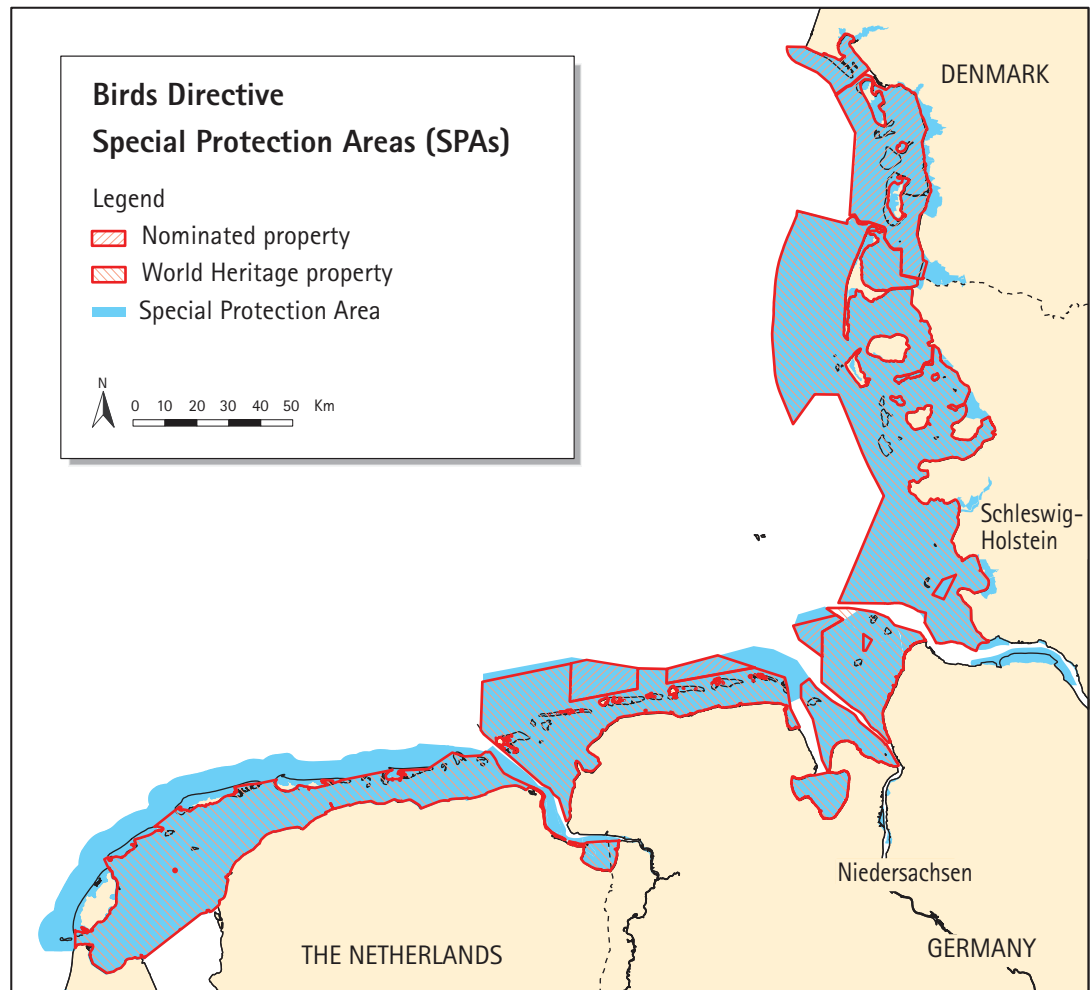
European Union

The European Union legislation in the field of environment is of specific significance for the Wadden Sea and has increased in importance during the past two decades. The European Union legislation is trans-boundary and, increasingly, covers all environmental policy areas. The legislation also has direct implications for Member States' legislation. Of the comprehensive list of environmental legislation, the Habitats, Birds and the Water Framework Directives are the most relevant pieces of legislation for the protection and sustainable use of the nominated property.

1. Birds and Habitats Directives

The Council Directive 2009/147/EC on the conservation of wild birds (Birds Directive) aims at the protection of all species of naturally occur-

Figure 5.3:
Map of the Special
Protection Areas (SPAs)
within and adjacent to the
inscribed and nominated
property.



ring birds in the territory of the member states. According to the Birds Directive, member states must classify the most suitable territories for the conservation of the species listed in Annex 1 of the directive, as 'Special Protection Areas' (SPAs). The greater part of the nominated property has been designated as SPA.

The Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), adopted in 1992, complements the Birds Directive. It has the aim of ensuring that biodiversity is maintained through conservation of important, rare or threatened habitats and the habitats of certain species. In the framework of the Habitats Directive a coherent ecological network, called NATURA 2000, is being established. NATURA 2000 will consist of Special Areas of Conservation (SACs) designated according to the Habitats Directive, and the SPAs of the Birds Directive. The nominated property has been or will be designated as SAC.

The Wadden Sea is part of NATURA 2000 and

subject to the provisions of the Habitats Directive, of which Article 6 is a crucial one. Article 6 stipulates that for special areas of conservation, member states shall establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans. Member states shall also take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this directive. A report on the ecological status of NATURA 2000 areas has to be delivered to the European Commission every six years.

A plan or a project likely to have a significant effect on the areas shall be subject to an appropriate assessment of its implications for the site. Only if it will not adversely affect the designated conservation area shall a competent authority

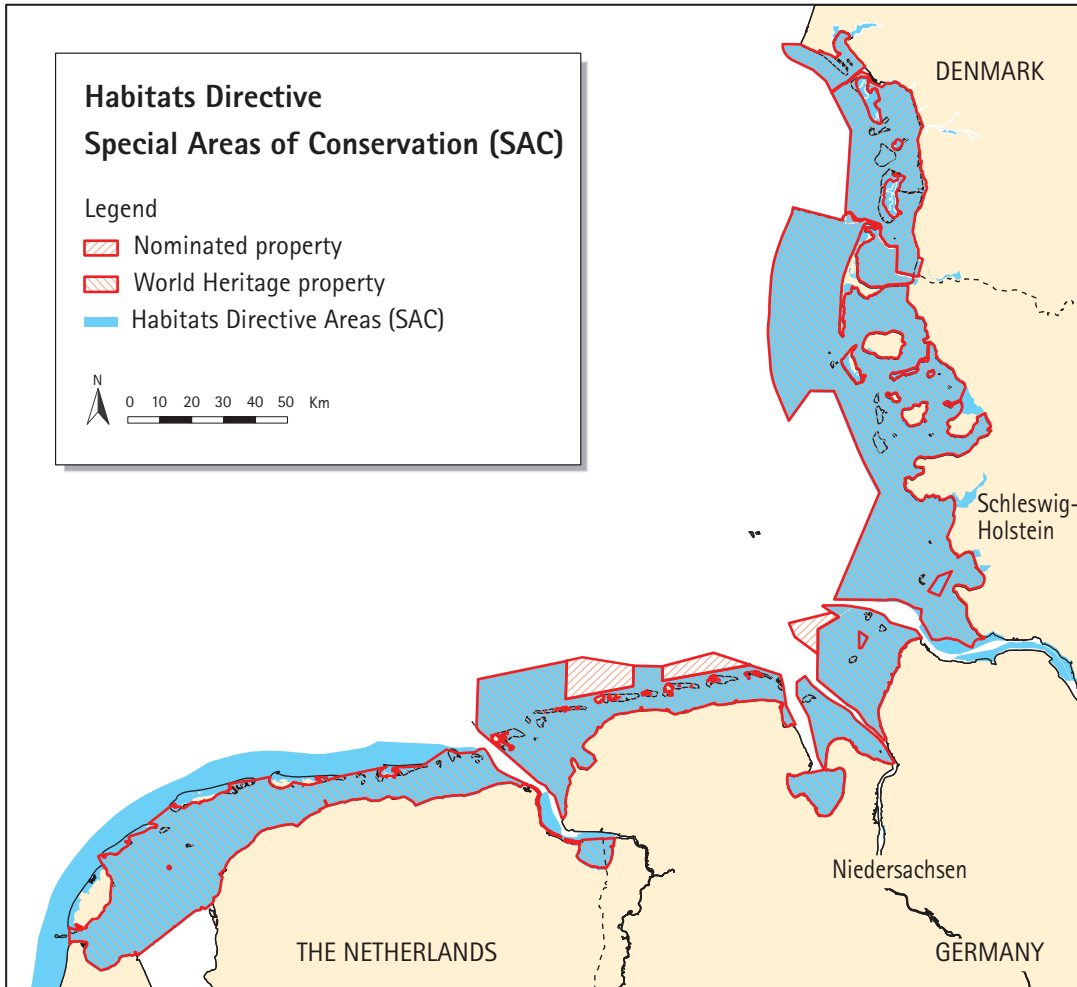


Figure 5.4:
Map of the Special Areas
of Conservation (SAC)
within and adjacent to the
inscribed and nominated
property.

agree to the plan or project. If a project or plan must nevertheless be carried out for imperative reasons of overriding public interest in the absence of alternatives it must be compensated to ensure the overall coherence of the NATURA 2000 network. These provisions are legally enforceable by the European Court of Justice.

2. Water Framework Directive

The Council Directive 2000/60/EC on establishing a framework for Community action in the field of water policy (Water Framework Directive, WFD) was enacted in 2000. It aims at a coordination of all water-related measures on the European level. The key elements of the WFD include the protection of all waters, surface and ground waters in a holistic way and the achievement of good quality ('good ecological status') by 2015. A first analysis of pressure and impacts was reported by the member states in 2005.

A River Basin Management Plan had to be prepared by 2009, based on the results of an op-

erational monitoring program (to be established by 2006). River management plans are to be reviewed every 6 years.

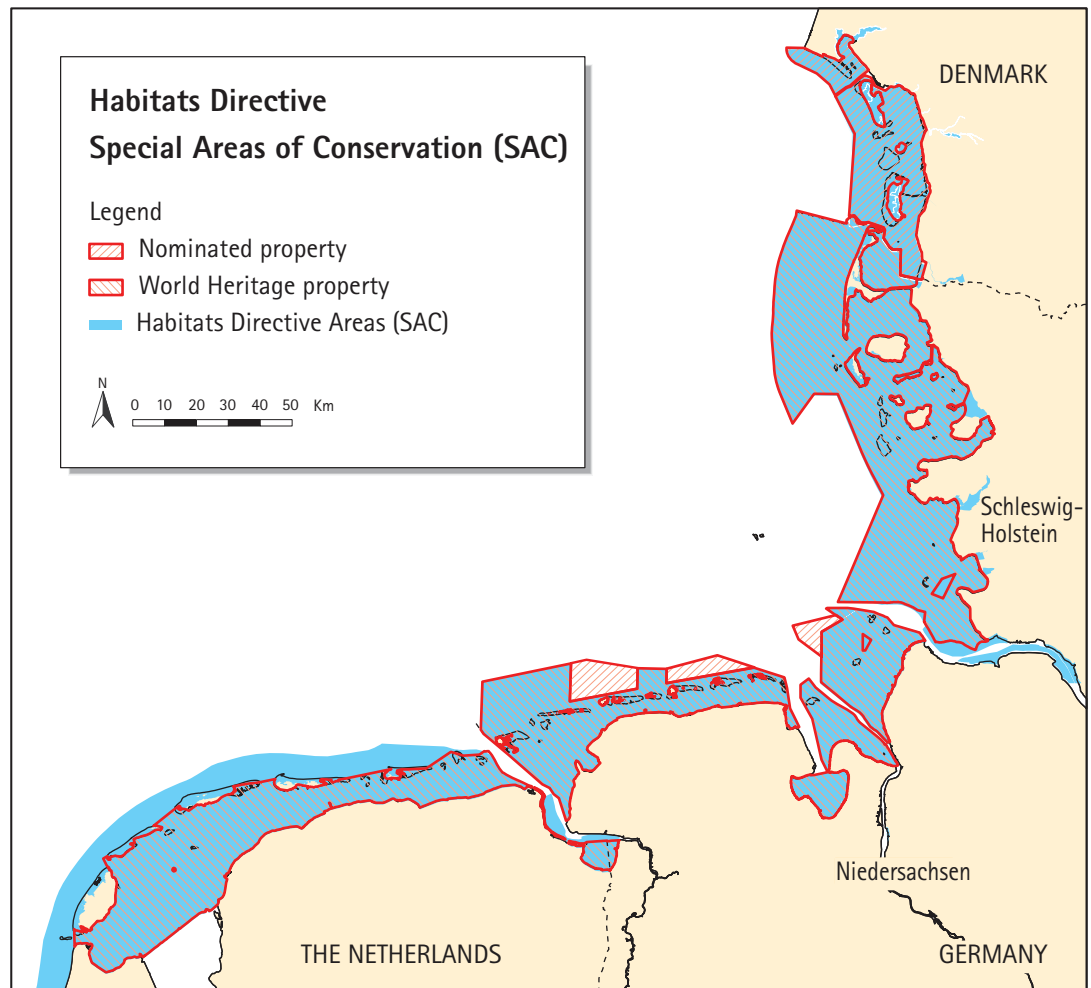
The Wadden Sea has been assigned to eight different River Basin Districts (RBDs), differentiated in coastal and transitional waters. These RBDs are the main management units of the WFD and cover all types of surface and ground waters. Coastal waters cover the areas up to 1 sm from the baseline and, with regard to the chemical status, also the territorial waters (up to 12 sm) (Figure 5.5).

Regarding the Habitats, Birds and Water Framework Directives, the Sylt Conference reaffirmed that a coordinated and consistent implementation will continue to be a central aim. The Wadden Sea Plan has been developed into a management plan in accordance with the stipulations of the mentioned directives.

3. Other European Union legislation

Other relevant European Union legislation includes the Marine Strategy Framework Directive, the

Figure 5.5:
Map of the Water Framework Directive Coastal and Transitional Waters within and adjacent to the inscribed and nominated property.



Environmental Impact Assessment Directive and the Strategic Environmental Assessment Directive, which are of central importance for the assessment of the environmental impacts of policies, plans and concrete projects. Also, the recommendation of the European Parliament and the Council on Integrated Coastal Zone Management is of particular importance for the Wadden Sea, it being a site located at the interface between land and sea and to be managed according to this specific characteristic.

5.c Means of implementing protective measures

An essential feature of the protection afforded to the nominated property is that the framework of the trilateral Wadden Sea Cooperation provides it with one comprehensive protection and management scheme, with additional layers of protection ensuing from international legal instruments within the same comprehensive scheme.

The trilateral Wadden Sea Cooperation forms the overall common framework for the protection of the nominated property within the Joint Declaration signed by the parties. At consecutive ministerial conferences and within the Wadden Sea Plan, common principles, objectives and policies have been agreed upon. The Guiding Principle, as agreed at the 1991 Wadden Sea Conference, is "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way" and incorporated in the Joint Declaration 2010. This overall guiding principle is supported by several management principles such as the "Principle of Careful Decision Making" and the "Precautionary Principle". Further, a comprehensive set of primarily ecological Targets was agreed upon by the cooperation at the 1994 Wadden Sea Conference in conjunction with the common delimitation of the Wadden Sea Cooperation Area as a basis for the common management of the Wadden Sea. As mentioned above, this has been followed by many other additional

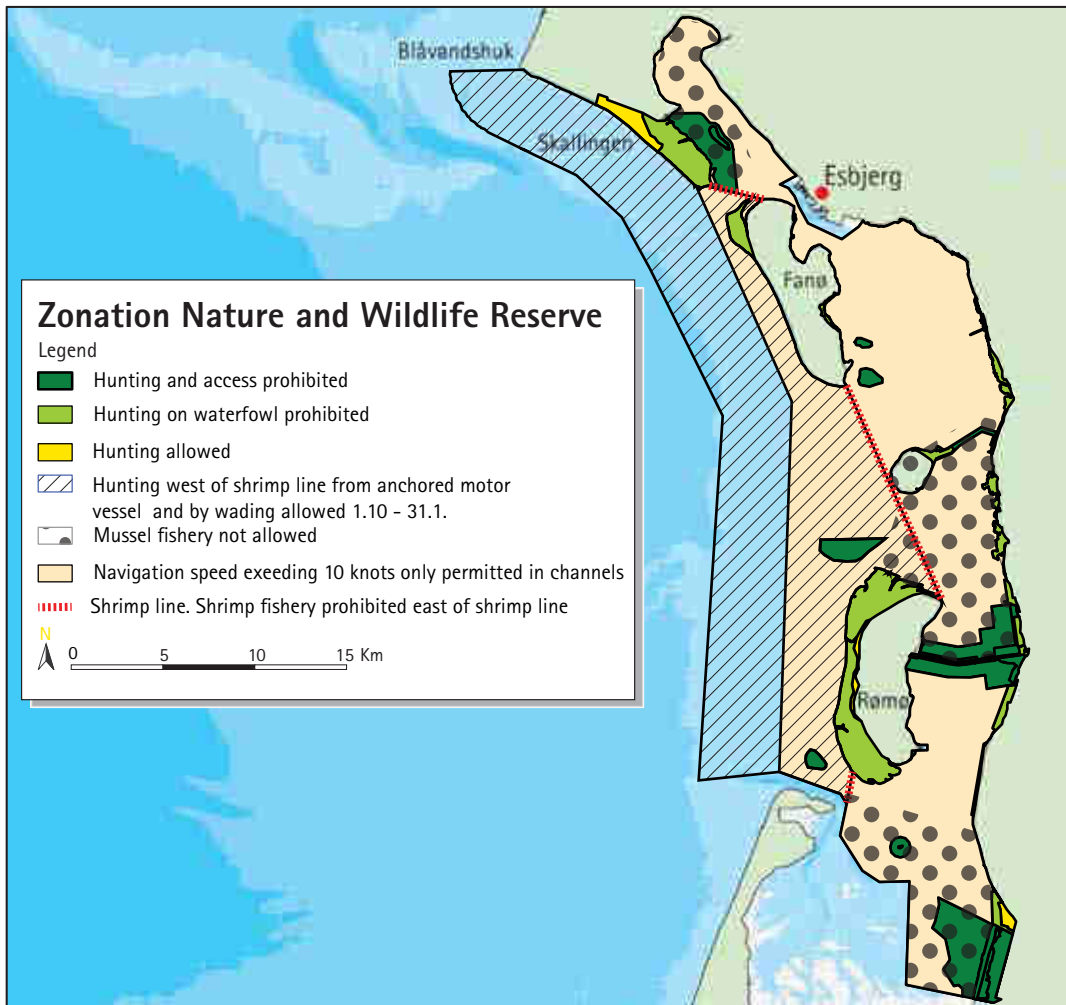


Figure 5.6:
Zonation Nature and Wildlife Reserve in the Danish Wadden Sea.

agreements of significance for the protection of the Wadden Sea.

Though these agreements are of a political nature and have no direct legal implications, they are commitments that are made on the highest level between governments in the understanding that the governments will apply, enforce or implement them using their national and international instruments and their full scale of other regulatory and management possibilities.

Though there are differences how the relevant national legal protection instruments are composed within the overall framework, which naturally follows from the apparent differences in legal schemes, they are basically similar in objectives, protection regulations and enforcement.

German Wadden Sea

The protection objectives of the German Wadden Sea National Parks covering the German part of the nominated property are to protect the Wadden Sea and its natural development. The natural processes should be allowed to proceed as undis-

turbed as possible. It is explicitly stated, however, that coastal defence measures and measures undertaken in conjunction herewith are not to be restricted. All issues of use and exploitation have to be impartially considered in the light of the overall protection aims of the national parks and individual cases. The conservation of nature by the national park should lead to an improvement of the living and working conditions of the human population living within the region through positive repercussions on tourism and the reputation of the region. This is currently a common Wadden Sea wide understanding of the added function of the protection and management schemes for the nominated property also embraced by the Wadden Sea Plan.

The national parks are divided into two respectively three protection and management zones with different levels of regulations. In the highest protection zone, resource use and access is in principle prohibited. In the other zones access and use of resources is conditionally allowed.

The Niedersachsen National Park, which includes the uninhabited part of the East Frisian Islands, is divided into three zones. Zone 1 – the core zone – covers 68.6% of the total area and includes the ecologically most valuable areas. All activities which destroy, damage or change the National Park or its components are prohibited. Public admittance is prohibited with the exception of assigned paths and routes. Some human activities (farming, hunting on parts of the islands and fishing) are still possible, but only under restricted conditions. The extension is fully part of the Niedersachsen Wadden Sea National Park and within the core zone (Zone I).

Zone 2 – the intermediate zone – covers 31 % of the total area. In general, the protection regime is similar to the core zone. In deviation of the core zone, exemptions for certain uses are made provided that the protections aims are not jeopardized. Admittance is allowed to this zone, with the exception of the salt marshes during the breeding season for birds, from 1 April until 31 July. Zone 3 – the recreational zone – covers about 0.5 % of the total area. Only recreational activities and health resort activities are allowed there. Paragraph 16 of the Niedersachsen National Park Act regulates possible exemptions and exclusions.

Resource use and activities that are not prohibited, coastal defence activities or those of a traditional nature according to the above mentioned national park acts are subject to licensing. Prior to issuing permits and exemptions the activity or project must be made subject to assessments in accordance with the Habitats Directive.

Danish Wadden Sea

The Danish Wadden Sea Nature and Wildlife Reserve is divided into a number of zones which regulate admission and use of the area. Access and hunting is strictly prohibited in some 10% of the reserve. This zone encompasses the ecologically most valuable areas such as breeding and resting areas for harbour seals and breeding and roosting areas for birds. Within the reserve motorized transport and use of any means of transport propelled by wind power is prohibited except for specifically defined areas. Furthermore, navigation with 10 knots or more east of the islands is only allowed in the shipping lanes and moreover windsurfing and similar navigation is only allowed in four defined areas. Jet scooters and similar equipment is prohibited.

Hunting on migratory birds is prohibited within the reserve except for certain salt marsh areas and hunting from anchored vessels and by wading west of the so-called shrimp line, basically west of the

barrier islands. Blue mussel fishery is prohibited some 30% of the reserve, i.e. in the Ho Bay, the Juvre tidal basin and the southern part of the Lister Deep basin. Currently the blue mussel fishery is prohibited in consequence of the assessment in accordance with the Habitat Directive. Cockle fishery is also defined to 3 smaller areas around the shipping lane to Esbjerg.

Stakeholder involvement

Advisory Boards have been established both in the existing as well as the nominated property. Though there are differences in the remits and composition of the boards they are very important in terms of consultation and advice on Wadden Sea matters and the involvement of local and regional stakeholders in matters of protection and management of the nominated property.

The Advisory Board of the Niedersachsen National Park is composed of representatives of the regional and local governments, regional stakeholders representing commercial, recreational and environmental interests and of scientific institutions. In regular meetings, the board is informed on all major activities in the National Park and gives advice to the National Park Authority.

In the Danish Wadden Sea context, there are two advisory boards. The Wadden Sea Advisory Board is the advisory committee in the context of the Nature and Wildlife Reserve. It is governed by the municipalities and the all relevant government and user stakeholders are members. The Advisory Board is consulted in all issues which relate to the use and governance of the reserve.

The National Park Advisory Board advises the National Park Board on major issues and issues of a principle character. The Advisory Board shall furthermore ensure that the national park develops with the support of the local community. The Advisory Board encompasses all relevant stakeholders including scientific institutes and museums.

Stakeholder involvement is ensured through other forums. The 'Green Council' is a voluntarily municipal forum consisting of representatives from local nature and recreational organisations, business and the municipality. The Green Council is a dialog forum for exchange of views on current topics and ideas for development on nature, environment and spatial planning.

The four Danish Wadden Sea municipalities are engaged in another stakeholder forum: The Local Authorities International Environmental Organisation – KIMO. KIMO was founded by local municipalities with a shared concern for the state of the environment. KIMO is designed to give municipalities a political voice at the international

level, to share best practice and to find solutions to marine political problems that affect coastal communities. Also Dutch and German municipalities are members of KIMO, an organization which might be helpful in a World Heritage context.

European Union Legislation

As outlined in the previous chapter the relevant European Union legislation becomes increasingly important also for the protection and management of the Wadden Sea. The Habitats Directive in conjunction with the Birds Directive are of particular significance for the nominated property. The objective of the NATURA 2000 network is to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the member states. Measures taken pursuant to the Habitats Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.

The nominated property has been designated as SACs. Furthermore, conservation status objectives have been elaborated as a basis for the legal protection and management of the site.

Further, as outlined in the previous chapter, Article 6 of the Habitats Directive introduces the assessment of projects and plans as an integrated part of the licensing of such projects and plans and, in a broader sense all activities in the nominated property. If the assessment provides evidence that the plan or project will have an adverse effect on the property it may not be permitted unless for overriding public interest and in the absence of alternatives. Such must be compensated.

It is important to acknowledge that the authority that issues a permit is the competent authority and this is in many cases not the authority competent for nature protection. The competent authority is obliged to take account of the protection framework.

Enforcement

The protection measures outlined above and overall legal, planning and management framework is directly enforceable. Much attention is given to the enforceability of the regulations through the establishment of management and enforcement units, coordination with all other government authorities operating in the nominated property and the introduction of state of the art techniques for surveillance of regulations and also by aerial surveillance.

In Germany, most of the enforcement meas-

ures lie within the responsibility of the federal states. The most important responsibility in the Wadden Sea directly assigned to the federal level is the competence for regulating and enforcing all measures connected to shipping because the marine area of the property is a federal waterway. Shipping regulations are therefore kept under the surveillance of the Federal Ministry of Transport, Building and Urban Development through its federal shipping agencies. At state level, generally regulations are legally implemented through the regular terrestrial and water based police forces of the State Ministries of the Interior. The State Ministries responsible for e.g. nature conservation, coastal defence and protection, water management, fisheries and economic affairs act directly or through their respective regional authorities. There is a close cooperation on all levels, e.g. national park and fishing regulations being kept under surveillance of the water based police. For implementing regulations of the national park acts, the National Park Authorities in Schleswig-Holstein, Hamburg and Niedersachsen have direct responsibilities. They are – differing from state to state – supported by wardens, volunteers and NGO's. The counties and municipalities also have their own share of responsibility for the enforcement of actual legislation being in force in the Wadden Sea.

In the Niedersachsen area, wardens employed at the coastal protection authorities and volunteers together with non-governmental organizations give advice to visitors and take care of the area. Also, the Water Police plays a significant role in terms of enforcement in the German part of the nominated property.

It must, however, be acknowledged that enforcement is an issue for various reasons. Enforcement is difficult in an area of the size of the nominated property with its natural features, i.e. marine tidal area with limited accessibility. Furthermore, legal enforcement does not contribute to enhanced acceptance and therefore during recent years voluntary agreements have increasingly played a role.

Also in Niedersachsen, voluntary agreements and certifications, e. g. guided tours and ship excursions have become more and more important, especially with the arrangements initiated in the frame of the ongoing process of the implementation of a Biosphere Reserve development zone in the Wadden Sea region of Niedersachsen, running also a partner programme. All three national parks in Germany work together on promoting the concept of voluntary agreements with potential national park partners.

Sandbank in the
Wadden Sea
(Photo: Martin Stock).



In the Danish Wadden Sea, the Nature Agency of the Ministry of the Environment is the competent authority for the implementation of the Statutory Order. All activities in the protected area require a permit or an exemption from the Agency. In cases where the Agency is not the legal competent authority e.g. with regard to fisheries or coastal protection measures the Agency must be consulted and approve of a permit or a measure. The recently issued Natura 2000 nature management plan for the area includes the overall management objectives and a comprehensive set of guidelines and efforts necessary to reach these objectives. The management plan is aligned with the river basin management plan under the Water Framework Directive, also issued recently.

The enforcement of the rules and regulations is done primarily by the staff of the responsible local state forest district which is also responsible for the management of state owned areas. The forest district also liaises with user groups and other interest organizations to ensure an effective management of the area.

The national park plan for the Wadden Sea National Park is anticipated to reinforce the management of the area and to ensure the necessary stakeholder support for and involvement in the management on the basis of the principles of cooperation and voluntary engagement.

5.d Existing plans related to municipality and region in which the proposed property is located (e.g., regional or local plan, conservation plan, tourism development plan)

It is important to acknowledge that the entire area of the nominated property is subject to a coherent protection and management system resulting from designations as a protected area and national parks and, hence, affording it the highest protection status nationally and internationally, including European legislation. As a rule, therefore, regional and local planning, including spatial planning, is to provide priority to the protection status of the nominated property in the sense of the criteria viii, ix and x. The planning system in place is therefore to be considered a supportive instrument to the current protection scheme.

As a result of the European Parliament and Council recommendation on the development of Integrated Coastal Zone Management (ICZM) for the European Union coastal zone (2002/413/EG), the Netherlands and Germany have reported to the European Commission the status of ICZM for their coastal zones including the nominated property and how they intend to follow up with

an ICZM strategy. ICZM attempts to direct and manage such developments and, from the point of view of the nominated property, to ensure that it maintains its integrity and that developments take a sustainable approach. The nominated property is therefore potentially the area that will profit most from the further development of the ICZM strategy and, at the same time, the area that will be a most determining element within the ICZM strategy for this part of the coast and the adjacent marine area. The Trilateral Cooperation with e.g. the Wadden Sea Plan, supplemented by regional organisational structures like the Wadden Sea Forum or "Euregio the Wadden" are existing elements of an ICZM.

The large part of the ICZM strategy is already present in the current national planning that has also been developed or is relevant for the nominated property.

Germany

With regard to ICZM, in particular, the federal government, the Länder (German federal states) and local authorities have advanced activities parallel to the further development of the set of legal instruments in order to generate know-how and experience, foster sustainability in coastal zones, improve cooperation between governmental, economic, social and research institutions and organizations as well as to improve the quality of the available knowledge within the framework of research and project support.

With respect to the existing set of tools and activities, the national strategy envisages four areas in which further steps should be pursued:

- (1) Further optimization of the set of legal instruments according to the basic ICZM principles;
- (2) Creation of the basis for continuation of the dialog process
- (3) Best practice projects and their evaluation;
- (4) Development and application of ICZM indicators.

Planning, including spatial planning, is a competency of the state, regional and local levels of government. The state spatial planning of Niedersachsen and Schleswig-Holstein includes the territorial waters including the German part of the nominated property. In the spatial planning programs of both states, the inscribed property as well as the nominated offshore extension is afforded the status of priority area for nature protection in the regional plans and, as such, also indicated on the state spatial planning maps. As a consequence, the spatial planning has to take full account of the status of the nominated property

and its stipulations and nothing can be planned or undertaken which opposes this status.

The State Spatial Planning Program Niedersachsen ("Landesraumordnungsprogramm Niedersachsen") further stipulates that the world heritage property as well as the nominated extension is to be protected, supported and developed in its uniqueness through appropriate developments in the surrounding area in addition to maintaining and developing the status of the whole property. It is further stipulated that the MAB area in the adjacent area to the nominated property is to be further developed through model projects in the sense of sustainable development.

The state planning system, as outlined above, has made a significant step towards implementing an ICZM approach within which the German part of the nominated property is firmly nested and is afforded an additional layer of protection.

Denmark

The Danish Wadden Sea is fully embedded within national and local planning. As indicated in 5.b the Spatial Planning stipulates that the country's coastal areas are to be kept as free as possible of development and installations that do not need to be located near the coast. The national park plan is a key plan for the integrated planning of the Wadden Sea area which has been approved by the National Park board after a public consultation. The Plan is aligned with the municipal planning of vice versa.

The municipality planning in the Wadden Sea is primarily obligated by the commitments and responsibilities determined in the national legislation on protection of the Wadden Sea and on spatial planning. This means that municipal plans are based on national legislation and that changing national regulation typically will be directly reflected and implemented in the municipal planning.

The Advisory Board of the Danish Wadden Sea (RuV)

After the municipality reform in 2007, the four Danish Wadden Sea municipalities formed a municipal Wadden Sea secretariat with responsibility for the Advisory Board for the Wadden Sea. Since 1998, the Advisory Board has not been statutory but since then acting as stakeholder forum. The bi/tri-annual meetings are public (advertised in the media) – the number of meetings depends on present topics and is scheduled to coordinate the Danish contribution to the Wadden Sea Forum. The Advisory Board of the Wadden Sea consists of representatives of national, regional and mu-

municipal authorities, including a political delegate from each of the four municipal councils, and also delegates from relevant stakeholders, institutions and organisations with affiliated with the Wadden Sea region. The foundation of the work of the advisory board is preservation and development of the Wadden Sea as an area of both natural and cultural importance. Economical and recreational use is based on sustainability – that is in a process balanced and integrated between the ecological, economic and social interests and with consideration for national and international responsibilities.

The Municipality Wadden Sea Secretariat

The Danish Municipality Wadden Sea Secretariat was established in 2007 as a joint municipal secretariat for Esbjerg, Fanø, Tønder and Varde municipalities in order to fulfil the four municipalities' interests in relation to the management of the Wadden Sea in a variety of topics and in collaboration with other agencies.

The main objectives of the secretariat comprise: Secretariat for the Advisory Board of the Wadden Sea; coordinate and initiate tasks related to engineering and environment as related to municipal responsibilities in the Wadden Sea; coordination of the municipal assignments in relation to the National Park Wadden Sea; participate in project development in the Wadden Sea; participate as municipal representative in the Trilateral Wadden Sea Cooperation; contribute to activities within the culture and cultural environment – including municipal cultural cooperation and projects under the Cultural Agreement.

Winter storm at the Halligen
(Photo: Martin Stock).



Wadden Sea Inter-municipal Planning Cooperation (VTP)

The primary purpose of the VTP is to create opportunity for collaboration on regional topics on spatial planning and integrate them into the municipality work. The VTP has also the aim of contributing to a mutual information and inspiration on the spatial planning and the process of this; and to establish an inter-municipal network of personal contacts; to incorporate cross-cutting elements in the affected municipality plans and to report on major project affecting adjacent municipalities.

Southwest Jutland Development Forum (SVUF)

The SVUF is a common municipal association with Esbjerg, Fanø, Tønder, Varde and Vejen municipalities as members. The SVUF has among others the responsibility of initiating and ensuring the implementation of initiatives that support growth and development as well as good conditions in the Southwest Jutland part of the South Denmark Region on areas of business, settlement, education and tourism. In addition member municipalities' tourism and business councils work closely together by regularly contributing concrete proposals.

Local Action Groups (LAG)

There are a total of seven LAG's within the four Wadden Sea Municipalities which are financed through the EU and the Ministry of Food, Agriculture and Fisheries of Denmark. The funds support local projects and the running of the LAG associations. The EU funding is given by both European Fisheries Fund and the European Agricultural Fund for Rural Development.

5.e Property management plan or other management system

Management

All partners concerned are aware of the outstanding universal value of the extension nomination and of the property "The Wadden Sea" and their responsibility to preserve this site for present and future generations. This is reflected as well in the Trilateral Governmental Conferences and Declarations (www.waddensea-secretariat.org) as in regional declarations and decisions supporting the nomination (see Annex 18, Regional declarations supporting the nomination).

Based on this thoroughly shared understanding of the property the conservation of the outstanding universal value and the integrity of the nominated property "The Wadden Sea" is already and will continue to be secured by an effective management system. It aims at safeguarding its geomorphological and biological processes, habitats and species and to maintain its biological diversity in line with the proposed criteria in chapter 3. This management system is a combination of the national management systems and the trilateral Wadden Sea Plan aiming at securing a coordinated management of the transboundary site and incorporating responsible authorities. An essential element of the management system of the nominated property is the Wadden Sea Plan (WSP), which is in Annex 9. The Wadden Sea Plan applies to the existing property "The Wadden Sea" as well as the nominated areas and the adjacent areas covered by the Wadden Sea cooperation. Following this ecosystem approach the World Heritage property will benefit from the fact that the management of the whole area coming under the trilateral Wadden Sea cooperation is based on the same comprehensive agreements set out in the Wadden Sea Plan.

The Trilateral Wadden Sea Plan was adopted at the 8th Wadden Sea Conference in Stade, Germany in 1997. The Wadden Sea Plan was updated in 2010 to be brought into line with the inscription of the Wadden Sea World Heritage property into the World Heritage List by including the criteria for which it was inscribed on the List and by aligning, as appropriate, policies and management. Also the requests encompassed in the decision of the World Heritage Committee on the inscription of the Wadden Sea in the World Heritage List have been included in the Wadden Sea Plan (WSP). The WSP constitutes the common

trans-boundary policy and management plan for the Wadden Sea Area. The Guiding Principle for "the Nature Conservation Area", as laid down in the "Joint Declaration", is "[t]o achieve as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". Such an ecosystem contains the full range of natural and dynamic habitat types each of which needing a certain quality (natural dynamics, presence of typical species, absence of disturbance, absence of pollution), which can be reached by proper conservation and management. The quality of the habitats shall be maintained or improved by working towards achieving Targets which have been agreed upon for the tidal area, the offshore area, estuaries, salt marshes, beaches and dunes, the rural area, water and sediment quality, fish, birds and marine mammals, as well as landscape and cultural aspects.

In addition to the Guiding Principle, seven Management Principles have been adopted which are fundamental to decisions concerning the protection and management within the Wadden Sea Area:

- The Principle of Careful Decision Making, i.e. to take decisions on the basis of the best available information;
- the Principle of Avoidance, i.e. activities which are potentially damaging to the Wadden Sea should be avoided;
- The Precautionary Principle, i.e. to take action to avoid activities which are assumed to have significant damaging impact on the environment, even where there is no sufficient scientific evidence to prove a causal link between activities and their impact;
- The Principle of Translocation, i.e. to translocate activities which are harmful to the Wadden Sea environment to areas where they will cause less environmental impact;
- The Principle of Compensation, i.e. that the harmful effect of activities which cannot be avoided, must be balanced by compensatory measures; in those parts of the Wadden Sea, where the Principle has not yet been implemented, compensatory measures will be aimed for;
- The Principle of Restoration, i.e. that, where possible, parts of the Wadden Sea should be restored if it can be demonstrated by reference studies that the actual situation is not optimal, and that the original state is likely to be re-established;
- The Principles of Best Available Techniques and Best Environmental Practice, as defined by the Paris Commission.

A very essential principle is that unreasonable impairments of the interests of the local population and its traditional uses in the Wadden Sea Area have to be avoided. Any user interests have to be weighed on a fair and equitable basis in the light of the purpose of protection in general, and the particular case concerned.

As emphasized above the trilateral conservation policy and management is directed towards achieving the full scale of habitat types which belong to a natural and dynamic Wadden Sea. Each of these habitats needs a certain level of quality, which can be reached by proper management of the area. This quality level can be described by certain characteristic structures, the presence of certain organisms, the absence of disturbance and toxic effects and by the chemical condition of the habitat.

For the common management six habitat types are distinguished:

- The offshore zone;
- The beaches and dunes;
- The tidal area;
- The salt marshes;
- The estuaries;
- The rural area.

For the first five of these habitats ecological targets have been adopted with the objective of maintaining and enhancing the area which is natural, dynamic and undisturbed, including targets for birds, marine mammals and fish. The approach as outlined is fully aligned with the criteria for the existing and the nominated property and compatible with the integrity requirements, namely includes all elements necessary to express its outstanding universal value, is of adequate size to ensure the complete representation of the features and processes which convey the property's significance, and does not suffer from adverse effects of development and neglect.

In addition, for the rural areas on the islands and the mainland supplementary targets aim to improve the conditions for birds. Also supplementary targets on marine mammals, birds, fish and mussel beds have been agreed upon, because these are important indicators of the biological quality of the ecosystem. Targets on the chemical quality of the Wadden Sea have been set as well. The essence of these targets: the concentrations of naturally occurring substances (for example nutrients and heavy metals) should be at natural levels and the discharges of non-natural substances, for example pesticides, should be zero.

The ecological targets are valid for the whole Wadden Sea Area. There are, however, differences as regards the extent to which the targets will

be implemented, in the interest of balancing out nature conservation concerns and human use. The Wadden Sea Plan is valid for the whole Wadden Sea Area and covers also topics which are not all part of national conservation areas like estuaries, dunes and the offshore area. Common agreements for a comprehensive protection of the Wadden Sea have been endorsed for almost all human activities. The Wadden Sea Plan also stresses that sustainable human activities in the area remain possible in the future.

The state of conservation of the nominated property is regularly reviewed and reported within the Trilateral Monitoring and Assessment Program (TMAP) and additional monitoring carried out within the property. The TMAP is an integrated common monitoring program of the Wadden Sea states the Netherlands, Germany and Denmark (§ 33, Ministerial Declaration, 6th Trilateral Governmental Conference, 1991). The WSP is linked to the Trilateral Monitoring and Assessment Program (TMAP) outlined in chapter 6. The TMAP monitors the Wadden Sea in a manner consistent with the WSP approach and enables a permanent assessment of the status of the Wadden Sea and the implementation of the WSP. Periodic Quality Status Reports are published encompassing a comprehensive assessment of the status of the Wadden Sea ecosystem based on the information gathered in the framework of the TMAP. So far, 5 Quality Status Reports have been published, including the 1991 "Development Report".

Since 1997, the implementation of the WSP has been assessed in terms of policy and management at each of the subsequent conferences in conjunction with the Quality Status Reports and the assessment laid down in public policy assessment reports. The WSP is therefore subject to periodic assessment of its implementation not only in a technical framework but also at the highest political level, ensuring that the WSP is implemented at the government level.

As a consequence of the "Agreement on the Conservation of Seals in the Wadden Sea" mentioned above, a Conservation and Management Plan was adopted in 1991 and been revised periodically. The latest revision was undertaken in 2011. The Seal Management Plan (SMP) outlines the management actions that are necessary to implement the stipulations of the Seals Agreement in conjunction with the Targets laid down in the WSP. The SMP also includes projects and actions to be implemented in the period jointly or by (one of) the contracting parties. The SMP is the only species-related common management plan within the Wadden Sea cooperation.

TARGETS

LANDSCAPE AND CULTURE

- 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.

WATER AND SEDIMENT

- 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.

SALT MARSHES

- To maintain the full range of variety of salt marshes typical for the Wadden Sea landscape
- An increased area of salt marsh 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.

TIDAL AREA

- 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.
- The Targets for birds, marine mammals and fish are relevant for the tidal area.

BEACHES AND DUNES

- 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.
- The Targets for birds are relevant for beaches and dunes.

ESTUARIES

- 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.

OFF-SHORE AREA

- An increased natural morphology, including the outer deltas between the islands.
- The Targets for water and sediment, birds, marine mammals and fish are relevant for the offshore area.

RURAL AREA

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

BIRDS

- 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.

MARINE MAMMALS

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

FISH

- 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 Wadden Sea Forum is a stakeholder forum of representatives of regional and local governments and main sectors in the Wadden Sea region. The WSF has developed proposals for a sustainable development strategy for the Wadden Sea Region respecting the current level of protection of the Wadden Sea.

Implementation

As outlined above the Wadden Sea Plan is the policy and management plan for the existing as well as the nominated property. Both the extension of the German (Niedersachsen) part of the property as well as the Danish nominated property is fully covered by WSP. The WSP is in combination with the national management systems and the relevant EU legislations key elements for the management of the Wadden Sea.

The involvement of stakeholders, allocation of resources and capacity, the cycle of implementation, monitoring, evaluation and feedback is secured. In addition, the enforcement programme assures the accurateness on a short-term base. In case of accidents the available calamity control system (5d) will be activated. The effectiveness is maintained by regular training-sessions. All these systems are subject to regular assessments and adaptations.

In Germany most of the implementation and enforcement measures of the national management system lie within the responsibility of the federal states. Schleswig-Holstein, Niedersachsen and Hamburg established national parks in 1985, 1986 and 1990 respectively. The agreements of the WSP are implemented through the national park acts in conjunction with the directives and the management structure established with the national park acts. The national authorities oversee the implementation of the policy and management agreements. Each national park is managed by an administrative authority, the national park authority, which is responsible for the implementation of the management regulations.

Advisory boards of trustees represent the local authorities and the most important stakeholder interests in Niedersachsen respectively. The stakeholder involvement aims at advising the national park authority on basic issues and long-term planning.

The regional management in Germany supporting the national park acts combines sectoral strategies on different levels, ranging from legal enforcements on the level of decrees e.g. the Order on the Navigation on the Federal Waterways in the National Parks in the Area of the North Sea, and

contractual regulations e.g. on municipality level to voluntary agreements between the national park authorities and various stakeholder groups. Regular common evaluations have proven successful in creating improvements for all partners involved. The regional management is regularly assessed on the basis of the results of the Trilateral Monitoring and Assessment Program, thus enabling a proper adjustment of the regional management. This is done in close consultation with the relevant stakeholders.

In the Danish part of the nominated property, the agreements of the WSP is implemented through the comprehensive provisions of the Statutory Order on the Wadden Sea Nature and Wildlife Reserve, the municipal planning and the administration of the international protection areas in the Wadden Sea region. The Statutory Order is administrated by the Danish Nature Agency of the Ministry of the Environment.

In 2010 the Danish National Park Wadden Sea was established and a board appointed to govern the National Park. The board is responsible for the implementation of the National Park Plan, the provisions of the law on national parks including the Statutory Order on the National Park Wadden Sea. The Board is supported by an Advisory Board in which important stakeholder interests are represented. Enforcement of national legislation is not within the tasks of the board.

By 1 January 2013, the final National Park Plan will come into force after being adopted by the board and a public consultation period in 2012. The plan will constitute the basis for the development of the national park for the coming six years. It contains guidelines for the National Park's nature, landscape and cultural heritage values – and sets up objectives for the development and strengthening of these values. The Plan also sets up objectives for recreational activities, interpretation, dissemination and business development in the National Park, however they act accordingly to national legislation for the environment, forest, raw material and spatial planning. The National Park Plan also describes how the objectives can be met. According to the Statutory Order of the National Park, the plan must be in alignment with the protective legislation of the area. The regional management of the national law pertaining to the Danish part of nominated property is mainly under the responsibility of the four municipalities. However, the coastal protection act is administrated by the Danish Coastal Authority.

The recently issued Natura 2000 plans for the Danish Wadden Sea area are the key management plans for the area. The plans are legally binding



Brown dunes on Spiekeroog
(Photo: Imke Zwoch).

plans and encompass the overall objectives for the area and the efforts to reach the objectives. As indicated previously, the plans are aligned with the relevant river basin management plans and in conjunction with the Wadden Sea Plan which is the coordinated management plan for the Wadden Sea Area including the nominated property, the Natura 2000 plans constitute a comprehensive management of the nominated property.

5.f Sources and levels of finance

The overview of the sources and level of funding is confined to the funding directly available for the protection and management of the property in terms of the protection objectives and the authorities and organizations directly responsible. Further sources of funding in addition to annual appropriations by governments and non-government institutions have been listed to the extent possible. The overview in Table 5.2 gives an indication of the level of funding available.

The appropriations are adopted annually by the national and state parliaments and may be subject to changes over time.

Of the amount of almost 3.8 million € for the National Park Authority in Niedersachsen, 1 mill € are allocated for the maintenance of 14 visitor centres.

In 1994 the "Niedersächsische Wattenmeerstiftung" was founded by the state of Niedersachsen together with "Statoil" and "Ruhrgas", with a basic deposit of approx. 25 million € and a yearly distribution rate of approx. 1 million €. The fund supports scientific projects and activities with the aim to enhance the conservation status of the Wadden Sea or projects dealing with alternative energy.

The amount of 2.5 million € in Denmark is public funding for the management of the nominated property also including public information services such as educational activities. Visitor facilities are run both by public funding and private donations, and the substantial but diverse funding for visitor centres is not included in the amount. NGOs are not included in the amount.

Governments	Source	Amount State
Germany (Niedersachsen): National Park Authority and Services (Information Centres, Wardens) and NGOs	State	3,800,000 EUR
Denmark: Nature Agency, Municipal Wadden Sea Secretariat, National Park, Coastal Authority, AgriFish Agency	State	2,500,000 EUR
Common Wadden Sea Secretariat	State	672,600 EUR

Table 5.2:
Sources and level of
funding in 2012.

The funding available to the nominated property is substantially more if other funding is included in the overview. The funding of the research institutes with research tasks in the area, for example, has not been included in the overview. Because the nominated property constitutes a very important nature area, if not the most important one for research and monitoring in the countries, the funding is extensive. It concerns both annual funds as part of normal government appropriations as well as project funds. The latter constitute the larger part of the funds.

Financial support is also available from other funding agencies such as the European Union, which supports, for example, the LIFE-project, specifically designed for Natura 2000 areas and the LEADER+ programme for rural development. These funds are, however, appropriated to specific projects. Projects that have received funding from the LIFE programme are e.g. the visitor information system in the Schleswig-Holstein part of the nominated property, the trilateral seals project following the seals epidemic in 1988, the DEMOWAD-Project for data handling within the TMAP or Water-logging and grassland extensification in Niedersachsen to improve habitats of the corncrake (*Crex crex*) and the black-tailed godwit (*Limosa limosa*) in the Niedersachsen part.

Also mostly not included in the overview are management costs to the area provided by other authorities than those responsible for nature protection.

5.g Sources of expertise and training in conservation and management techniques

The expertise and training available for the nominated property is very extensive. First of all, there is an extensive expertise available at the national park authorities and the conservation authorities. The staff involved in the conservation and management of the nominated property based at those authorities is academically trained and highly skilled. Also, those who are involved in daily management are based at authorities with decades of experience of working in the area. Furthermore, there is a long tradition of ecological research in the area from world-wide recognized institutes and organizations. A generation ago, this resulted in the publication of the "Ecology of the Wadden Sea", referred to earlier, which collected all the information available from researchers and experts on all relevant themes and issues with regard to the Wadden Sea. This publication was a crucial

element in the commencement of the ecosystem protection of the nominated property.

Since the publication of "The Ecology of the Wadden Sea" extensive research programs have continued and intensified. In the 1980s and 1990s, large ecosystem research programs were carried out both in the Dutch part as well as in the German part of the nominated property. The aim of the German project was to develop scientific foundations for protecting the Wadden Sea ecosystem, taking account of conflicts between uses and protection. Project efforts included analysing the region's natural dynamics, identifying and interpreting the processes that govern the spreading of plants and animals and developing mathematical models for describing the regional system.

Niedersachsen

Since the 1930s, the Wadden Sea in Niedersachsen has been the subject of intensive ecological and hydrological research, carried out by various institutions, including the "coast" research center of the Niedersachsen state office for water, coastal protection and nature protection ("Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küstenschutz und Naturschutz"), the "Senckenberg by the Sea" research station (Wilhelmshaven), the Ornithological Research Institute (Institut für Vogelforschung, Wilhelmshaven), the National Park Authority and the University of Oldenburg. Research results have been published in numerous scientific publications. Studies have been carried out in all subsystems of the Wadden Sea ecosystem (open mud flats, salt marshes, beaches and dunes, and the offshore belt). The research emphases have included hydrodynamics, morphodynamics, sedimentology, flora and vegetation and faunistic population inventories, especially in the macrozoobenthos and among wading and water birds.

In recent years, the National Park Authority has been focussing especially on enhancing remote-sensing procedures for terrestrial habitats (dunes, salt meadows). This work is currently being intensified, and it is being expanded to include surveys of sub-littoral habitats using hydro-acoustic procedures.

The national park authority provides regular training programmes to official and voluntary wardens.

Another supplementary project, "Visitor Guide to the National Park / Tidal Flats" ("Nationalpark-Watt-/ Gästeführer"), offers people the opportunity to earn certification as "visitor guides to the national park" or "visitor guides to the national park / tidal flats".



Excursion with a National Park Ranger (Photo: Martin Stock).

As regards the extension pioneering research has been done by the Senckenberg Institute on the geomorphology of the offshore area and importance of sediment movements for the system as well as regular monitoring has established the offshore area as being of crucial importance for sea birds and cetaceans.

Denmark

Denmark has a long tradition of research in the Danish Wadden Sea. Studies are conducted by a number of institutes with expertise on various aspects of coastal ecosystems and tidal areas, e.g. the Fisheries and Maritime Museum, Danish Centre of Environment and Energy (DCE, Aarhus University) and the Geological Survey of Denmark and Greenland (GEUS, Copenhagen University). In addition, resource management, sustainable tourism and local development are researched at the Centre for Tourism, Innovation and Culture (TIC), University of Southern Denmark.

Since the late 1970s, the Danish Wadden Sea is protected by the Statutory Order on the Nature and Wildlife Reserve and since 2010 the area has been declared a national park. This means that there is a long tradition of management of the protected natural area that includes cooperation and knowledge sharing between governmental and local authorities and also involvement of other relevant authorities and NGOs in the management. The cooperation is formalized through the Advisory Board for the Wadden Sea which provides advices for the municipalities. There are other cooperation forums as described previously

in this chapter (section 5d). A lot of experiences are available from NGOs who have supported the protection of the area and contributing with substantial practical and theoretical knowledge about the area, often collected over decades. Especially the Danish Ornithological Society contributes by taking part in monitoring birds.

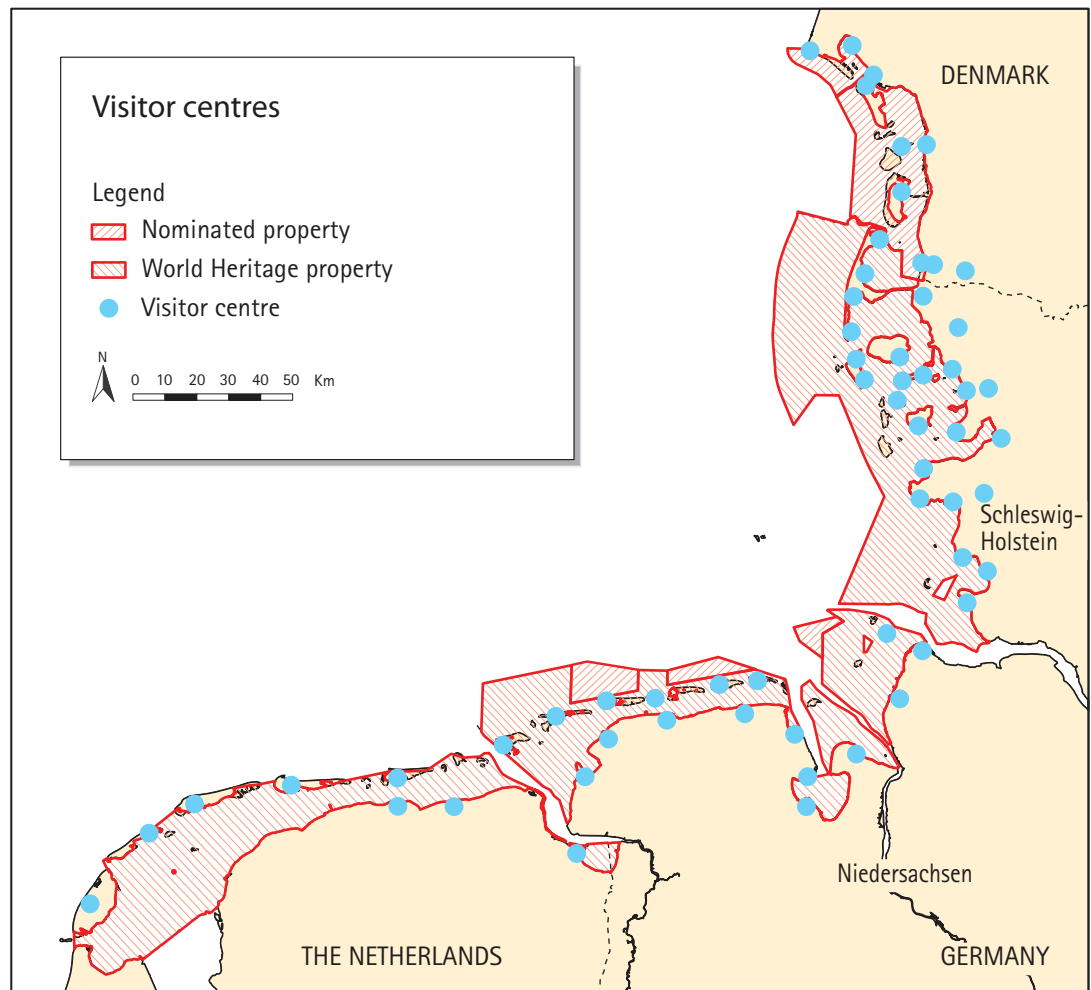
5.h Visitor facilities and statistics

Facilities

Through an extended net of information centres, visitor information systems, print and digital information and an increasing number of professional guides along the Wadden Sea, the quality of nature experience for visitors has improved significantly, benefiting both the visitors and nature. The information and interpretation centres adjacent to the nominated property are shown in Fig. 5.6. Furthermore, there is an extensive net of information tables and signs both at and within the nominated property on those locations where visitors are assumed to go and have a look at the site or follow the many trails specifically made to provide them with information and enjoyment while at the same time causing as little disturbance to the nominated property as possible.

Extensive information on the Wadden Sea, also for visitors to the inscribed and nominated property, is also available electronically via www.waddensea-worldheritage.org.

Figure 5.7:
Map of visitor centres
within and adjacent to the
inscribed and nominated
property.



Niedersachsen

The German (Niedersachsen) extension is fully integrated within the already existing visitor facilities of a total of 16 information facilities – 2 larger visitor centers in Wilhelmshaven and Cuxhaven as well as 14 information houses on the East Frisian Islands and on the mainland. The 2 larger centres have recently been extended and designated officially as UNESCO World Heritage Visitor Centres. The facilities, which are accountable to municipal authorities, are usually run jointly with a nature conservation association. 14 of the centres currently are subsidized by the state of Niedersachsen in terms of staff costs to a total amount of about Euro 0.9 million. The figure of 800,000 visitors to the facilities has been consistently large for years. Groups, in particular school classes but also people on study leave, make up about 15 per cent of these visitors.

All facilities also have a small shop where visitors can buy information leaflets and souvenirs. There are sanitary facilities available to the visitors in all information centers and houses. In addition to the 16 visitor centres mentioned above, there

are 13 regional and local education and awareness centers in the area.

All Information sites in the area of the National Park and Biosphere Reserve offer nature and environmental education on several levels. Different programs for all ages can be booked. Children and young people with special interests in nature can join the Junior Ranger Program. In a first step they learn about different tasks of nature conservationists, later they follow their own interests in small projects and courses. In the end they get the chance to guide other children and even adult guests, help in monitoring projects and become tutors for younger children. To ensure a common high grade of education, the advisors are connected with colleagues in networks not only in Niedersachsen but, under the umbrella of EURO-PARC all over Germany and by the International Wadden Sea School (IWSS) in a trilateral context.

Information signs have been put up in places with a high frequency of visitors, for instance in the large car parks for the visitors to the islands, on landing piers for ferries or any location where nature conservation requires that visitors be

looked after and directed more closely. The number of information signs currently totals about 250. Furthermore, there are nature experience trails dealing with specific subjects where the visitor can find out about environmental issues.

The administrative office of the protected area provides a large number of information brochures, which visitors can order by mail or obtain from information facilities and numerous local authorities.

Denmark

Visitor facilities in Denmark consist mainly of three different elements: visitor centers or exhibitions, nature guides, and open air facilities including hiking routes, bridle and cycle paths. Together the facilities aim at providing visitors high quality experiences and activities while at the same time increase their knowledge about the Wadden Sea's natural and cultural values. A vast network of 10 large and small information centers and exhibitions are situated along the coast and on the islands. Some centers are staffed with nature guides while others have affiliated nature guides, and finally, a number of centers are unmanned displays. A common goal of the centers is that they are using posters, articles or electronic media to tell the natural and cultural history of the area they are located in.

The Wadden Sea Interpreter Forum (VFF)

The VFF is a Danish Wadden Sea collaboration between the public and independent institutions in the Wadden Sea raising awareness of the Wadden Sea natural and cultural history. Since the start in 2006 the purpose of the collaboration has been to establish a platform for a coherent dissemination along the Wadden Sea coast where the interpretation of natural, cultural and recreational forms a whole.

The visitor centres are the basis for the VFF which offers, in cooperation with the "National Park Wadden Sea", a coordinated and effective communication through guided tours, activities and educational activities. Beside the VFF, a variety of local guides and storytellers offer guided tours.

The collaboration has developed towards a common understanding of standards and content of the interpretation of nature and history, e.g. through the digital platform www.vadehav.dk as well as active participant in the IWSS. In addition, it has developed an educational programme – My Wadden Sea – that is driven through the portal www.mitvadehav.dk. The establishment of VFF

has resulted in a comprehensive collaboration and exchange of ideas across intermediation institutions and the local/national/regional tourist- and educational actors. Thus VFF has a close cooperation with the National Park Wadden Sea's communication effort and in 2011 'My Wadden Sea' was adopted as the national park's official educational programme. The management of the VFF is done by a coordinating group responsible for the operations and development, including guidance of the employed interpretation coordinator.

In recent years, there has been a particular focus on educational activities for children, both nationally through the national park educational programme "Mit Vadehav" www.mitvadehav.dk and internationally through "The International Wadden Sea School" www.iwss.org where Danish nature guides are collaborating with German and Dutch nature guides. The educational programme 'Mit vadehav' is developed by the VFF and the Esbjerg Municipality school development programme. Finally the area has a well distributed infrastructure of information boards and facilities in the landscape like picnic areas, shelters, marked trails, nature playgrounds with special activities, etc. These facilities are important for providing free public events in a sustainable way for nature and for the local communities while at the same time raising awareness of the uniqueness of the landscape.

The Danish visitor centers and nature guides serve approx. 300,000 visitors a year. There is a great span of variation from 125,000 visitors at the Fisheries and Maritime Museum in Esbjerg to 6,000 guests at the local Nature Agency activities.

Visitor Statistics

It is particularly difficult to provide reasonable visitor statistics for the nominated property and the adjacent areas. It is difficult to discriminate between tourists and visitors to the area and statistically there is no genuinely dependable figure. Tourist statistics have been given in Chapter 4. If visitors to the nominated site and adjacent area are defined as day trippers, there are some indications as to the numbers. In Niedersachsen the number of day trippers has been estimated to amount to 16.5 million annually (2000). There is no dedicated statistics available for the Danish nominated property. However the number of overnight stays and day trippers can be estimated to approximately 9.7 million in 2010. More details on visitor statistics are given in chapter 4.

5.i Policies and programmes related to the presentation and promotion of the property

Extensive programs for promoting the Wadden Sea already exist within the framework of the current programs for promoting the national parks and the protected areas. The advertising of the nominated property will be an integral part of this promotion.

Within Germany, the property will be presented and promoted via the already existing mechanisms, amongst others the website www.unesco-welterbe.org. The regional presentation of the property will be done with official governmental presentations in various media, as well as on the level of ongoing activities presenting the national parks. The main communication channels are the information centres, the regional tourism organisations, the web sites of the three Wadden Sea National Parks and the presentation in local media. The National Park Authorities together with information centres and other educational institutions provide further education for regional disseminators (e.g. national park partners and tour-guides) on how to communicate the topic World Heritage competently. Niedersachsen designated two Wadden Sea UNESCO World Heritage Visitor Centres in Wilhelmshaven and Cuxhaven and produced new exhibitions integrated the new corporate design and the topic World Heritage into its print materials, information boards, the internet presentations, produced a World Heritage leaflet, postcards and a movie, realized several exhibitions, publications and presentations of the topic and created and produced a World Heritage information column in cooperation with Schleswig-Holstein and Hamburg. Along the main motorways leading to the property, World Heritage road signs are in place. The cooperation between nature conservation and tourism has been significantly improved since the inscription into the World Heritage List.

The presentation and promotion of the Danish Wadden Sea are communicated primarily through direct communication and indirect through exhibitions, information boards and websites such as www.naturstyrelsen.dk, www.danmarksnationalparker.dk/vadehavet, www.vadehav.dk, etc. Denmark also expects to contribute to targeted promotion of the Wadden Sea through participation in the trilateral Interreg project PROWAD.

Denmark considers education in nature and environment as a key factor in the presentation of the Wadden Sea, especially after the establishment of the Wadden Sea National Park. Educa-

tional activities are a part of building awareness and ownership of the protection of the Wadden Sea. The primary strategy for communication is a combination of educational activities offered to schools and daycare centers, public information in the form of excursions and outdoor activities, and exhibitions targeting specific localities. The education, presentation and promotion of the area are considered a shared obligation at the governmental, municipal and private level.

The Common Wadden Sea Secretariat undertakes various activities to promote the Wadden Sea, in particular in a trans-boundary context as well as internationally. The secretariat regularly publishes scientific and management reports in the "Ecosystem"-series and brochures and leaflets on various themes and topics such as World Heritage, the PSSA, coastal protection and sea level rise and cultural heritage of the area. The website for the property which is the central information and promotion site is www.waddensea-worldheritage.org.

5.j Staffing levels (professional, technical, maintenance)

The overview of staffing level is confined to the staffing of government organizations which are directly related to the protection and management of the nominated property for its nature protection values. The overview does not include the extensive staff of non-governmental organizations working in this field notwithstanding their crucial importance for the protection of the nominated property. It is however not possible to provide an overview of the exact staffing level in this sense, since their tasks are very diverse. Neither have those organizations been included which execute normal management tasks in the nominated property such as nature managers, maintenance of shipping channels and installations for shipping safety, police tasks and other tasks vital for the overall management of the property. The overview is predominantly confined to staff directly involved in policy making and information tasks.

The National Park Authority in Niedersachsen has a staff of 40 persons. The staff of the administration is supported by normal and water police forces, and by a network of wardens from coastal authorities (6), voluntary organisations/NGOs and counties (about 30). Information centres employ additional staff to do information and educational work.

The Danish staff level amounts to a total of 31. Most of the staff (25) is directly involved in the governmental management and protection of the nominated property. The National Park is still in an opening state and the permanent staff is currently 2 but expected to increase when the National Park comes into operation. Other public authorities employ staff who supports the protection and management. Visitor centres employ additional staff doing information and educational work.

In addition to the above-mentioned organisations, a broad citizenship commitment exists. Numerous volunteers from non-governmental organisations are active in the Wadden Sea in supporting state organisations.

Governments/Authorities	Staff
Germany: National Park Authority and Services (wardens, information centres) Niedersachsen	76
Denmark: Nature Agency, National Park, other Governmental agencies, Municipal Wadden Sea secretariat	31
Common Wadden Sea Secretariat	6

Table 5.3
Overview of staffing level



Boat trip on the
Wadden Sea
(Photo: Klaas Kreuijer).

6. Monitoring



Monitoring of salt marsh vegetation
(Photo: Martin Stock).

6. MONITORING

The state of conservation of the inscribed and nominated property is regularly reviewed and reported within the Trilateral Monitoring and Assessment Program (TMAP) and additional monitoring carried out within the area. The TMAP is an integrated common monitoring program of the Wadden Sea states the Netherlands, Germany and Denmark (§ 33, Ministerial Declaration, 6th Trilateral Governmental Conference, 1991).

The aims of the TMAP are:

- To provide a scientific assessment of the status and development of the Wadden Sea ecosystem;
- To assess the status of implementation of the trilateral Targets of the Wadden Sea Plan;
- To propose management measures as consequence of the scientific assessment.

The TMAP consists of a "Common Package" of monitoring parameters including an associated data handling system which was adopted at the 8th Trilateral Governmental Conference in 1997 (Table 6.1).

Based on trilateral decisions dating back to the 1991 Ministerial Conference, Germany as well as the Netherlands have designated reference areas in the Wadden Sea. The Schleswig-Holstein reference area is the zero-use zone of 12,500 ha (about 3% of the National Park), which is located south of the Hindenburg causeway. The area will also serve as a reference area with respect to

the coastal water bodies implementing the EU Water Framework Directive. Within the Hamburg national park, a reference area of about 10,400 ha has been designated (about 76% of the National Park). In Niedersachsen no official reference area has been established up to now, but large areas e.g. the islands of Mellum and Memmert and surrounding flats, and the Hohe Knechtsand area are without any human use.

In the Netherlands, a reference area in the eastern part of the Dutch Wadden Sea has been designated. It is an area of 7,400 ha (3% of the Dutch Wadden Sea), which is part of a larger area that had already been closed for shellfish fishery for a longer period. The reference area is closed for almost all human activities, including all fishery activities and all other resource exploitation.

6.a Key indicators for measuring state of conservation

TMAP Parameters

The TMAP Common Package covers the entire Wadden Sea and spans a broad range from physiological processes (e.g. the effects of eutrophication) over population development (e.g. of seals, breeding and migratory birds) to changes in landscape and morphology (e.g. tidal flats, salt marshes and dunes). Furthermore, the TMAP considers the

Table 6.1
Overview of the TMAP
Common Package parameters (adopted at the Trilateral Governmental Conference 1997 and revised in 2010). The data are exchanged via TMAP databases in each country for trilateral assessment such as the Quality Status Report.

Common Package of TMAP Parameters		
Chemical Parameters: Nutrients Metals in sediment Contaminants in blue mussels, flounders and birds eggs TBT in water and sediment Habitat Parameters: Blue Mussel beds Salt marshes Beaches and Dunes	Biological Parameters: Phytoplankton Macroalgae Eelgrass Macrozoobenthos Breeding birds Migratory birds Beached Birds Survey Common Seals Grey Seals	Human Use Parameters: Fishery Recreational activities Agriculture Coastal protection General Parameters: Geomorphology Flooding Land use Weather conditions Hydrology
Data Handling		
TMAP database The Netherlands	TMAP database Niedersachsen and Schleswig-Holstein/Hamburg	TMAP database Denmark
Assessment		
Thematic Reports, Quality Status Reports (QSR)		

relevant EU Directives (Birds and Habitats, and Water Framework), as well as obligations from other international conventions like the Ramsar Convention, the Bonn Convention, and the OSPAR Convention. The TMAP objectives and structure, the TMAP monitoring guidelines and the TMAP

data management are outlined and specified in the TMAP Manual.

The TMAP Manual was updated in 2009 to meet the requirements of the European Union Directives and other international obligations.

Indicator	Parameter Group	Parameters	Periodicity	Area	Location of records
Nutrients	Nutrients in Water	Nutrient inputs (riverine, atmospheric).	Existing stations.	1 – 6 stations per region	TMAP Database
		Dissoved inorganic nutrients in water, total N and P.	Monthly / weekly (depends on location)		
Contaminants in Water and Sediment	Metals in Sediment	As, Cr, Ni, Cd, Cu, Hg, Pb, Zn	Every 3 years (minimum)	3 sites per country (min.)	TMAP Database
	Organotin in Sediment	TBT substances (TBT, DBT, MBT, TPT)	Every 3-6 years (1/y at few stations)	1-6 stations per region	TMAP Database
	Organochlorines, PAHs and PCBs in sediment	DDTs, HCHs, HCB, PAH (CEMPT WFD-PS), PCB (28, 52, 101, 118,138, 153, 180)	Every 3-6 years (1/y at few estations)	1-6 stations per region	TMAP Database
Plankton	Phytoplankton	Species composition and abundance, chlorophyll , co-variables	1/week – 1/month	1 – 6 stations per region	TMAP Database
Benthos	Macroalgae	Location and, area, biomass, species composition	Yearly	1 – 6 stations per region	TMAP Database
	Eelgrass	Location, area, coverage,	Entire area every 6 years, selected sites 1/y	Entire area and representative areas	TMAP Database
	Macrozoobenthos communities	Species abundance, biomass, species composition	1/y to very 3 years	1-2 transects per region	TMAP Database
	Blue mussels beds	Size of beds, (GIS contours of beds), biomass, mussel coverage of beds, additional parameters for selected beds (field surveys)	Yearly	All intertidal flats	TMAP Database
	Contaminants in Blue mussels	Heavy metals, organochlorines, organotin, PAHs, PCBs	1/y to every 2 years	1-6 stations per region	TMAP Database
Fish	Distribution and abundance of fish species	Abundance and mean length of priority species, species composition, (all species), Transitional waters: abundance of pelagic species	Wadden Sea 1/y Transitional waters: 2/y	Existing locations 3-4 sites in transitional waters	TMAP Database
		Contaminants in Flounder	Heavy metals, organochlorines, organotin, PAHs, PCBs	1/y to every 2 years	1 – 6 sites per region
	Fishery parameters	Landings, vessels, size of culture lots, size of closed area	Yearly	Whole area	TMAP Database

Indicator	Parameter Group	Parameters	Periodicity	Area	Location of records
Birds	Breeding birds	Counts in a number of census areas,	Yearly	Census areas	TMAP Database
		Complete survey of selected species	Yearly	Whole area	TMAP Database
		Counts of a larger range of species	Every 6 years	Whole area	TMAP Database
	Breeding Success	Hatching success, reproductive success (selected species)	Annually	2-4 sites per region	TMAP Database
	Migratory birds	Complete survey	Yearly (mid-winter plus additional month)	Whole area	TMAP Database
		Synchronous counts (certain species)	Once per year (different time of the year per species)	Whole area	TMAP Database
Spring tide counts		Monthly	Selected areas	TMAP Database	
Contaminants in bird eggs	Heavy metals, organochlorines, PCBs	Yearly	Specific sites in each country.	TMAP Database	
Beached birds survey	Number of beached birds, oiled birds, co-variables	Yearly	Representative stretches (4-10 sub-regions per country)	TMAP Database	
Seals	Seal population	Seal numbers and distribution	Yearly (5 – 8 surveys)	Whole area	TMAP Database
Salt Marshes	Location and area of salt marshes	Size and location (ha), vegetation (HD types and/or vegetation types) Selected typical species	Every 6 years Annually	Whole area	TMAP Database
	Agricultural utilization of salt marshes	Grazing and drainage types (3 categories)	Yearly / every 6 years	Whole area	TMAP Database
Beaches and Dunes	Location and area of beaches and dunes	Size and location (ha)	6 – 10 years	Whole area	TMAP Database
	Location and area of beaches and dunes	Vegetation types (has)	Every 6 – 10 years	Whole area / selected sites	TMAP Database
	Selected typical species	Abundance	1/year	Selected sites	TMAP Database
	Vegetation (dunes)	Species composition	1/year		TMAP Database
Recreational Activities	Human activities	Numbers of boats at sea (all types) number of flat walker (guided tours)	Yearly	Whole area	TMAP Database
	Air traffic	Number of landings and take offs (all types)	Per month and year	Airports adjacent to the Wadden Sea (islands and mainland coast)	TMAP Database
General parameters	Geomorphology	Area tidal flats (size and location), sediment types (location and area)	Every 6 years	Whole area	Data record in the responsible institutions
	Hydrology / Flooding	Sea level, salt marsh flooding, wave climate	(Different frequencies)	Selected sites (at least one per country)	Data record in the responsible institutions
	Weather conditions	Water and air temperature, wind, ice coverage, NAO index	Daily or monthly averages	Selected sites (existing weather stations)	Data record in the responsible institutions
	Coastal protection measures	All relevant measures	Reporting every 6 years	Whole area	Data record in the responsible institutions
	Land use	Agricultural use (main types)	Every 6 years	Whole area	Data record in the responsible institutions

Data Handling

An elementary component of the TMAP is the common data handling, which makes monitoring data available for trilateral assessment. For this purpose, identical TMAP databases have been installed in each country. The monitoring data are available in a harmonized way and all the information which is necessary for the interpretation of

the data is part of the database. Beside storage and maintenance, the TMAP data handling system also has the aim to exchange monitoring data in a common format which can be used directly in the trilateral assessment work. An overview of the data can be found in the data catalogue, which can also be accessed via the website of the Common Wadden Sea Secretariat.

The TMAP, including the data handling system, serves the following tasks:

- Preparation of Quality Status Reports encompassing the most recent data and developments;
- Preparation of trilateral reports on specific topics (thematic reports, like breeding birds, migratory birds, seals, contaminants);
- Preparation of reports on unforeseeable events;
- Safeguarding long-term storage of relevant Wadden Sea data;
- Use of trilateral data for national and international programs.

The TMAP data handling system is also a valuable instrument for other reporting obligations (e.g. national status reports, EU reports concerning Natura 2000 and the Water Framework Directive, international reports concerning OSPAR, RAMSAR or other international conventions) by providing up-to-date and harmonized Wadden Sea data from different sources on the national and international level.

Additionally, the TMAP data handling system enhances the possibilities to present monitoring data to relevant authorities, interest groups and local citizens in accordance with the trilateral Wadden Sea Plan (Chapter 1, §15). In 2004, the TMAP data handling was evaluated by an external consultant (Orbis Institute, Canada). The Orbis Report concluded that the TMAP data handling is an effective tool in providing the required data at reasonable costs.

Additional Monitoring

There are several national and regional monitoring programs, which are formally not part of the TMAP Common Package but deliver important information for the overall assessment of the nominated property and are also included in the regular Quality Status Reports. These are e.g. the monitoring carried out in connection with the exploitation of natural gas in the Dutch part of the nominated property, in particular with regard to subsidence, the monitoring of tourism and recreational activities in a wider context as included in the Common Package, the monitoring of human use of coastal waters on birds, the monitoring of fish fauna and epifauna in the western part of the Wadden Sea, the monitoring of demersal fish, the monitoring of molluscs (littoral monitoring and beach monitoring), the monitoring of salt marshes (silt accretion, water levels, soil subsidence, vegetation), the biomass monitoring of blue mussel beds and of certain species.

6.b Administrative arrangements for monitoring of the property

The Trilateral Monitoring and Assessment Expert Group (TMAG) is in charge to secure the harmonized management and methodological soundness of the TMAP, i.e. that assessments are produced with equal methodology and quality control, and Quality Status Reports are regularly produced, annual progress reports on the implementation of the TMAP made, and issues defined that need decision by the Cooperation. The chairperson of the TMAG is simultaneously member of the Task Group Management.

Expert network groups, like the Trilateral Data Handling Group (TDG), the Coordinator Group on the Joint Monitoring Program for Breeding Birds (JMBB) and the Coordinator Group on the Joint Monitoring Program for Migratory Birds (JMMB) have been continued to exchange information, coordinate monitoring, assess the results, and provide advice on the scientific basis for management.

The Common Wadden Sea Secretariat (CWSS) is the secretariat for the trilateral Wadden Sea cooperation, including the TMAP. In the framework of the TMAP, the secretariat is responsible for the day-to-day management of the program and the preparation of the meetings of the TMAG and of the technical monitoring groups.

The TMAP is carried out by national and regional authorities in charge of monitoring.

6.c Results of previous reporting exercises

Assessment Reports

Related to the Trilateral Governmental Conferences (every 3 to 4 years), Quality Status Reports of the Wadden Sea are elaborated. They describe and evaluate the current ecological status of the Wadden Sea, identify issues of concern and indicate possible measures. In 2009, the latest Quality Status Report (QSR 2009) of the Wadden Sea was published. After 1991, 1995, 1999 and 2004, it was the fifth time that a comprehensive, integrated assessment of the Wadden Sea could be presented. Additionally, the results of the TMAP are published in workshop reports, thematic reports (the series "Wadden Sea Ecosystem") (see below) and in the "Wadden Sea Newsletter".

Country	Responsible Ministry	Responsible authority
Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Federal Agency for Nature Conservation
	Schleswig-Holstein State Ministry of Energy, Agriculture, the Environment and Rural Areas	LKN-National Park Authority, LLUR
	State Ministry of Urban Development and Environment	National Park Authority
	Niedersachsen State Ministry for Environment, Energy and Climate Protection	National Park Authority, NLWKN
The Netherlands	Ministry for Economic Affairs	Ministry for Economic Affairs Regional Affairs and Spatial Economic Policy Department
	Ministry for Infrastructure and Environment	Rijkswaterstaat Waterdienst (RWS)
Denmark	Ministry of the Environment	Nature Agency

All reports are available from the Common Wadden Sea Secretariat (QSR Synthesis 2010, QSR 2009 see Annex 4 and Annex 5):

<http://www.waddensea-secretariat.org/news/publications/publ.html>

TMAP Reports in the publication series "Wadden Sea Ecosystem"

Karsten Laursen, Jan Blew, Kai Eskildsen, Klaus Günther, Bernd Hälterlein, Romke Kleefstra, Gerold Lürßen, Petra Potel, Stefan Schrader, 2011. Migratory Waterbirds in the Wadden Sea 1987- 2008. Trend, Phenology, Distribution and Climate Aspects. Wadden Sea Ecosystem No. 30. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

Karsten Reise, Martin Baptist, Peter Burbridge, Norbert Dankers, Ludwig Fischer, Burghard Fleming, Albert P. Oost, Cor Smit, 2010. The Wadden Sea – A Universally Outstanding Tidal Wetland. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 7 – 24.

Wolff, Wim J., Jan P. Bakker, Karsten Laursen, Karsten Reise, 2010. The Wadden Sea Quality Status Report – Synthesis Report 2010. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 25 – 74

Ens, B. J., Blew, J., Roomen van, M.W.J., Turnhout van, C.A.M. 2009. Report of the Joint Monitoring Group of Migratory Birds in the Wadden Sea (JMGB) Wadden Sea Ecosystem No. 27. Exploring Contrasting Trends of Migratory Waterbirds in the Wadden Sea.

Marencic, H. & de Vlas, J. (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.

Koffijberg, K., Dijksen, L., Hälterlein, B., Laursen, K., Potel, P. & Südbek, P., 2006. Breeding Birds in the Wadden Sea in 2001. Results of the total survey in 2001 and trends in numbers between 1991 and 2001. Wadden Sea Ecosystem No. 22.

Blew, J. and Südbek, P. (Eds.), 2005. Migratory Waterbirds in the Wadden Sea 1980- 2000. Wadden Sea Ecosystem No. 20.

K. Essink, C. Dettmann, H. Farke, K. Laursen, G. Lürßen, H. Marencic, W. Wiersinga (Eds.), 2005. Wadden Sea Quality Status Report 2004. Wadden Sea Ecosystem No. 19.

Peter H. Becker & Jacqueline Muñoz Cifuentes, 2004. Contaminants in Bird Eggs in the Wadden Sea. Recent Spatial and Temporal Trends. Seabirds at Risk? Effects of Environmental Chemicals on Reproductive Success and Mass Growth at the Wadden Sea in the Mid 1990s. Wadden Sea Ecosystem No. 18.

CWSS (publisher), 2003. Management of North Sea Harbour and Grey Seal Populations. Proceedings of the International Symposium at EcoMare, Texel, November 29 - 30, 2003. Wadden Sea Ecosystem, No. 17.

Koffijberg, K., J. Blew, K. Eskildsen, K. Günther, B. Koks, K. Laursen, L.M. Rasmussen, P. Potel, P. Südbek, 2003. High Tide Roosts in the Wadden Sea. A Review of Bird Distribution, Protection Regimes and Potential Sources of Anthropogenic Disturbance. Wadden Sea Ecosystem No. 16.

Beusekom, J.E.E., van, H. Fock, F. de Jong, S. Diehl-Christiansen, B. Christiansen, 2001. Wadden Sea Specific Eutrophication Criteria. Wadden Sea Ecosystem No. 14.

Peter H. Becker, Jacqueline Muñoz Cifuentes, Brigitte Behrends, Klaus R. Schmieder, 2001. Contaminants in Bird Eggs in the Wadden Sea. Spatial and Temporal Trends 1991–2000. Wadden Sea Ecosystem No. 11.

Lars Maltha Rasmussen, David M. Fleet, Bernd Hälterlein, Ben J. Koks, Petra Potel, Peter Südbeck, 2000. Breeding Birds in the Wadden Sea in 1996. Results of a total survey in 1996 and of numbers of colony breeding species between 1991 and 1996. Wadden Sea Ecosystem No. 10.

Folkert de Jong, Joop Bakker, Kees van Berkel, Norbert Dankers, Karsten Dahl, Christiane Gätje, Harald Marencic, Petra Potel, 1999. Wadden Sea Quality Status Report 1999. Wadden Sea Ecosystem No. 9.

Stefan Thyen, Peter H. Becker, Klaus-Michael Exo, Bernd Hälterlein, Hermann Hötter & Peter Südbeck, 1998. Monitoring Breeding Success of Coastal Birds. Wadden Sea Ecosystem No.8.

Peter H. Becker, Stefan Thyen, Susanne Mickstein, Ute Sommer & Klaus R. Schneider, 1998. Monitoring Pollutants in Coastal Bird Eggs in the Wadden Sea. Wadden Sea Ecosystem No.8.

Joop Bakker, Norbert Dankers, Folkert de Jong, Christiane Gätje, Torben Pedersen, Petra Potel, Kees van Berkel, 1997. Assessment Report of the Wadden Sea Ecosystem. Wadden Sea Ecosystem No.7.

Marencic, H., J. Bakker, H. Farke, C. Gätje, A. Kellermann, F. de Jong, K. Laursen, T. Pedersen & J. de Vlas, 1996. TMAP Expert Workshops in 1995 / 1996. The Trilateral Monitoring and Assessment Program. Wadden Sea Ecosystem No.6.

Martin Poot, Lars Maltha Rasmussen, Marc van Roomen, Hans-Ulrich Rösner & Peter Südbeck, 1996. Migratory Waterbirds in the Wadden Sea 1993/1994. Wadden Sea Ecosystem No.5.

Johannes Melter, Peter Südbeck, David M. Fleet, Lars Maltha Rasmussen, Rob L. Vogel, 1997. Breeding Birds on Census Areas 1990 until 1994. Wadden Sea Ecosystem No.4.

Jochen Dierschke, 1997. Status of Shorelark, Twite and Snow Bunting in the Wadden Sea. Wadden Sea Ecosystem No.4.

Hälterlein, D., D.M. Fleet, H.R. Henneberg, Th. Mennebaeck, L. M. Rasmussen, P. Suedbeck, O. Thorup & R. L. Vogel, 1995. Guidelines for Monitoring of Breeding Birds in the Wadden Sea -Summary (in Dutch, German, Danish). Wadden Sea Ecosystem No.3.

Rösner, H.U., M. v. Roomen, P. Suedbeck & L. M. Rasmussen, 1994. Migratory Waterbirds in the Wadden Sea 1992/93. Wadden Sea Ecosystem No.2.

Fleet, D. M., J. Frikke, P. Suedbeck & R. L. Vogel, 1994. Breeding Birds in the Wadden Sea 1991. Wadden Sea Ecosystem No.1.

Monitoring of salt marsh vegetation
(Photo: Martin Stock).



7. DOCUMENTATION

7.a Photographs, slides, image inventory and authorization table and other audiovisual materials

An image inventory, including the photograph and audiovisual authorization form is given in Annex 19.

The photographs about the Wadden Sea are compiled on a DVD Annex 21.

7.b Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

Trilateral level

Joint Declaration on the Protection of the Wadden Sea (2010), Annex 6.

Ministerial Council Declaration, Sylt 2010, Annex 6.

Administrative Agreement (2010), Annex 7.

Agreement on the Conservation of Seals in the Wadden Sea according to Article 4 of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention, 1990), Annex 8.

Trilateral Wadden Sea Plan (2010), Annex 9.

Designation of the Wadden Sea as Particularly Sensitive Sea Area (PSSA) by the International Maritime Organization, 2002, Annex 17.

Further documents of the Trilateral Cooperation on the Protection of the Wadden Sea, including the ministerial declarations 1991, 1994, 1997, 2001 and 2005 are available from the website of the Common Wadden Sea Secretariat www.waddensea-secretariat.org.

Denmark

Nature Protection Act, LBK nr 933 of 24/09/2009 by the Ministry of the Environment, Annex 12.

Statutory Order on Nature Conservation and a Nature Reserve in the Wadden Sea, Statutory Order BEK nr 867 of 21/06/2007 by the Ministry of the Environment, Annex 13.

Act on National Parks, LOV nr 533 of 06/06/2007 by the Ministry of the Environment, Annex 14.

Statutory Order on National Park Wadden Sea, BEK nr 1159 of 30/09/2010 by the Ministry of the Environment, Annex 15.

Danish Wadden Sea National Park Plan, Annex 16.

Germany

The Federal Nature Conservation Act constitutes the framework legislation to be enacted by the federal government and the corresponding acts by the states. The actual versions of the acts can be obtained via www.bmu.de (English translation). Of special importance to the Wadden Sea are the National Park Acts.

Niedersachsen

Act for amendment of the Act on the National Park "Wadden Sea of Niedersachsen" of 19 February 2010. (Law Gazette of Niedersachsen (Nds. GVBl.) page 104), Annex 11.

7.c Form and date of most recent records or inventory of property

TMAP

All records and inventories of the nominated property according to TMAP are available, after registration, from the official web address of the TMAP:

<http://www.waddensea-secretariat.org/TMAP/Monitoring.html>.

Additional data on national or regional level can be obtained via the regional responsible authorities (see Chapter 8b)

Quality Status Reports

The three Wadden Sea countries regularly produce joint Quality Status Reports on the basis of findings from the TMAP. These reports describe, in detail, the condition of the area's most important biotic and abiotic factors; the extent and impacts of human activities, and protection and manage-

ment of the Wadden Sea region. All of these factors are evaluated in sum and, where necessary and possible, recommendations for further management in the framework of the Wadden Sea Plan are provided. The Quality Status Report covers the periodic reporting obligations of the proposed property according to the operational guidelines. The recent Quality Status Reports 2009 together with the Synthesis Report 2010 is at www.waddensea-secretariat.org.

7.d Address where inventory, records and archives are held

The inventory records according to TMAP are held at the
Common Wadden Sea Secretariat
Virchowstr. 1
D – 26382 Wilhelmshaven
Germany
www.waddensea-secretariat.org

Additional regional inventories and data are held at the nationally or regionally responsible authorities:

Denmark

Nature Agency
Skovridervej 3,
DK - 6510 Gram
nst@nst.dk
www.naturstyrelsen.dk

Germany

Niedersachsen
Nationalparkverwaltung Niedersächsisches Wattenmeer
Virchowstr. 1
D- 26382 Wilhelmshaven
www.nationalpark-wattenmeer.de

7.e Bibliography

A list of references for the Wadden Sea including an update since 2009 and a more specific one for the Danish part of the Wadden Sea is provided below. This is a small part of the large scientific literature which exists for the nominated property. A comprehensive bibliography for the property and the nominated extension containing over 700 references was provided in Annex 9 of the nomination dossier 2008.

Abrahamse, J., Bemelman, M., Hillenga, M., Frederiksen, J. and Hahn-Pedersen, M., 2005: Vadehavet – Portrætter af et kulturlandskab. Common Wadden Sea Secretariat, Wilhelmshaven, Fiskeri- og Søfartsmuseet i Esbjerg, Varde Museum, Esbjerg Museum, Tønder Museum. 250 pp.

Andersen-Harrild, P., 1987. Danish oil drilling activities in relation to the Wadden Sea. In: Proceed. of the 5th International Wadden Sea Symposium, Esbjerg 1986: 297-304. The National Forest and Nature Agency and The Museum of Fisheries and Shipping, Esbjerg.

Bartholdy, J. and Pejrup, M., 1994. Holocene evolution of the Danish Wadden Sea. *Senckenbergiana Maritima* 24:187-209.

Bazelmans, J., Meier, D., Nieuwhof, A., Spek, T. and Vos, P., 2012. Understanding the cultural historical value of the Wadden Sea region. The co-evolution of environment and society in the Wadden Sea area in the Holocene up until early modern times (11,700 BC-1800 AD): An outline. *Ocean & Coastal Management* 86: 114-126.

Beck, M. and Brumsack, H.-J., 2012. Biogeochemical cycles in sediment and water column of the Wadden Sea: The example Spiekeroog Island in a regional context. *Ocean & Coastal Management* 86: 102-113.

Beusekom, J.E.E van, Buschbaum, C. and Reise, K., 2012. Wadden Sea tidal basins and the mediating role of the North Sea in ecological processes: scaling up of management? *Ocean & Coastal Management* 86: 69-78.

Boere, G.C. and Piersma, T., 2012. Flyway protection and the predicament of our migrant birds: A critical look at international conservation policies and the Dutch Wadden Sea. *Ocean & Coastal Management* 86:157-168.

Brodde, M., 2010. På Kanten af Vadehavet – Danske kunstnere for Natur og Miljø besøger Esbjerg Kommune 2009. 98 pp. Esbjerg Kommune 2010.

Buschbaum, C., Lackschewitz, D. and Reise, K., 2012. Nonnative macrobenthos in the Wadden Sea ecosystem. *Ocean & Coastal Management* 86: 89-101.

Christiansen, C. and Aagaard, T., 2004. Wadden Sea research an introduction. *Danish J Geography* 104:1-3.

Christiansen, C., Aagaard, T., Bartholdy, J., Christiansen, M., Nielsen, J., Nielsen, N., Pedersen, J.B.T., and Vinther, N., 2004. Total sediment budget of a transgressive barrier-spit, Skallingen, SW Denmark: A review. *Danish J. Geography* 104:107-126.

CPSL 2010. CPSL Third Report – The role of spatial planning and sediment in coastal risk management. Report of the Trilateral Working Group on Coastal Protection and Sea Level Rise (CPSL), Wadden Sea Ecosystem No. 28. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, pp 53.

Dekker, R. & Beukema, J.J., 2012. Long-term dynamics and productivity of a successful invader: The first three decades of the bivalve *Ensis directus* in the western Wadden Sea. *Journal of Sea Research* 71: 31-40.

Dittmann, T.D., Becker, P.H., Bakker, J., Bignert, A., Nyberg, E., Pereira, M.G., Pijanowska, U., Shore, R., Stienen, E.W.M., Toft, G.O. and Marencic, H., 2011. The EcoQO on mercury and organohalogenes in coastal bird eggs: report on the pilot study 2008 – 2010. INBO.R.2011.43. Research Institute for Nature and Forest, Brussel.

- Ebbinge, B.S., 2009. Evaluatie opvangbeleid 2005-2008 overwinterende ganzen en smienten. Deelrapport 4. Invoel opvangbeleid op de internationale verspreiding van overwin-terende ganzen in NW-Europa. Wageningen, Alterra, Alterrapport 1842.
- Engelmoer, M., 2008. Breeding origins of wader population utilizing the Dutch Wadden Sea. Thesis from the Rijksuniversiteit Groningen. Fryske Akademy, Leeuwarden. 226 pp.
- Ens, B. J., Blew, J., Roomen van, M.W.J. and Turnhout van, C.A.M. 2009. Exploring Contrasting Trends of Migratory Waterbirds in the Wadden Sea. Report of the Joint Monitoring Group of Migratory Birds in the Wadden Sea (JMWB). Wadden Sea Ecosystem No. 27. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.
- Feige, N., van der Jeugd, H. P., van der Graaf, A. J., Larsson, K., Leite, A. and
- Stahl, J., 2008. Newly established breeding sites of Barnacle Goose *Branta leucopsis* in North-western Europe - an overview of breeding habitats and colony development. Vogelwelt, 129: 244-252.
- Fleet, D., Frikke, J., Südbeck, P. and Vogel, R.L., 1994. Breeding Birds in the Wadden Sea 1991. Wadden Sea Ecosystem No. 1. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.
- Frederiksen, J. and Christensen, T.H., 2012. Nationalparkplan Vadehavet 2013-18. Danmarks Internationale Nationalpark. Høringsforslag april 2012. Nationalpark Vadehavet.
- Frikke, J., 1991. Breeding Waders in Wet Grassland Habitats in Denmark. Wader Study Group Bulletin 61, 1991. Supplement: 42-49.
- Frikke, J., 2009. Fuglenes Vadehav. Sjøk'len 2008: 113-137. Fiskeri- og Søfartsmuseet, Saltvandsakvariet i Esbjerg.
- Gätje, C. and Reise, K. (Eds), 1998. Ökosystem Wattenmeer. Austausch-, Transport- und Stoffumwandlungsprozesse. Springer, 570 pp.
- Gram, I., Meltofte, H. and Rasmussen, L.M., 1990. Fuglene i Tøndermarsken 1978-1988. Miljøministeriet, Skov- og Naturstyrelsen, 1990.
- Grøntved, J., 1962. Preliminary report on the productivity of microbenthos and phytoplankton in the Danish Wadden Sea. Medd. Danmarks Fiskeri- og Havvundres. 3:347-378.
- Hahn-Pedersen, M., 2001. Fra Viking til borebisse - 50 generationer ved Vadehavet. Fiskeri- og Søfartsmuseets Forlag, Esbjerg 2001. 200 pp.
- Hald-Mortensen, P., 1987. Conservation measures in the Danish part of the Wadden Sea. In: Proceed. of the 5th International Wadden Sea Symposium, Esbjerg 1986: 161-169. The National Forest and Nature Agency and The Museum of Fisheries and Shipping, Esbjerg.
- Herlyn, M., Millat, G. and B. Petersen, 2008: Documentation of sites of intertidal blue mussel (*Mytilus edulis* L.) beds of the Lower Saxonian Wadden Sea, southern North Sea (as of 2003) and the role of their structure for spatfall settlement. Helgol. Mar. Res., DOI 10.1007/s10152-008-0106-y.
- Høj, A., Lindhardt, C., Frederiksen, J., Dagnæs-Hansen, K., Jensen, L., Lauenborg, M., Guldborg, M., Eriksen, S. and Rasmussen, S., 2007. Vadehavet Kulturarvsatlas. 130 pp. Kulturarvsstyrelsen 2007.
- Jacobsen, N.K., 1993. Shoreline development and sea-level rise in the Danish Wadden Sea. J Coast Res 9: 721-729.
- Jensen, K., 1990. Management and agricultural use of saltmarshes from the Danish-German border to Esbjerg. In: Proceed. of the Second Trilateral Working Conference on Saltmarsh Management in the Wadden Sea Region, Rømø 1989: 47-50. The Ministry of the Environment, The National Forest and Nature Agency.
- Jensen, K.T., 1987: The Importance of an artificial saltwater lagoon in the Danish Wadden Sea to marine animals and waterfowls. In: Proceed. of the 5th International Wadden Sea Symposium, Esbjerg 1986: 37-68. The National Forest and Nature Agency and The Museum of Fisheries and Shipping, Esbjerg.
- Jensen, K.T., 1992. Macrozoobenthos on an intertidal mudflat in the Danish Wadden Sea: comparisons of surveys made in the 1930s, 1940s and 1980s. Helgol Meeresunters 46:363-376.
- Jepsen, P.U., 2000. Vadehavsbilleder - natur og mennesker i et tidevandsområde. Museet for Varde By og Omegn, Varde, 137 pp.
- Johannsen, W. and Runz, M.F., 2010. Vadehavet - mennesker og natur. 220 pp. Forlaget Crexcrex, Esbjerg 2010.
- Jonge, V.N. de, Pinto, R. and Kerry Turner, R., 2012. Integrating ecological, economic and social aspects to generate useful management information under the EU Directives' 'ecosystem approach'. Ocean & Coastal Management 86: 169-188.
- Kabat, P., Bazelmans, J., van Dijk, J., Herman, P.M.J., van Oijen, T., Pejrup, M., Reise, K., Speelman, H. and Wolff, W.J., 2012. The Wadden Sea Region: Towards a science for sustainable development. Ocean & Coastal Management 86: 4-17.
- Kristensen, P.S. and Pihl, N.J., 2006. Blåmuslinge- og stillehavsøsterbestanden i det danske Vadehav 2006. Rapport fra Danmarks Fiskeriundersøgelser, 2006.
- Krøyer, H., 1837. De danske Østerbanker. København.
- Laursen, K. and Frikke, J., 1987: Vinterforekomst af dykænder, lommer og alkefugle i den sydøstlige del af Vesterhavet. Dansk Orn. Foren. Tidsskr., 81: 167-172.
- Laursen, K. and Frikke, J., 1999. Vandfugle i Vadehavet 1996-1999. Danmarks Miljøundersøgelser, faglig rapport nr. 304.
- Laursen, K. and Frikke, J., 2006. Assessment of sustainable management of staging waterbirds in the Danish Wadden Sea. Wildfowl 56:152-171.
- Laursen, K. and Frikke, J., 2008: Hunting from motorboat displaces Wadden Sea Eiders (*Somateria molissima*) from their favoured feeding distribution. Wildlife Biology, vol. 14: 423-433.
- Laursen, K., Blew, B., Eskildsen, K., Günther, K., Hälderlein, B., Kleefstra, R., Lüerßen, G., Potel, P. and Schrader, S., 2011. Migratory Waterbirds in the Wadden Sea 1987- 2008. Trend, Phenology, Distribution and Climate Aspects. Wadden Sea Ecosystem No. 30. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.
- Laursen, K., 2005. Curlews in the Wadden Sea - Effects of shooting protection in Denmark. Wadden Sea Ecosystem No. 20, p. 171 - 184. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

- Laursen, K., 2005. Forekomst af yngle- og trækfugle i seks EF-fuglebeskyttelsesområder i Vadehavets marsk. Arbejdsrapport fra Danmarks Miljøundersøgelser, nr. 219. 2005.
- Laursen, K., Asferg, K.S., Frikke, J. and Sunde, P., 2009. Mussel fishery affects diet and reduces body condition of Eiders *Somateria mollissima* in the Wadden Sea. *J Sea Res.* 62:22-30.
- Laursen, K., Frikke, J. and Salvig, J., 1997. Vandfugle i relation til menneskelig aktivitet i Vadehavet 1980-1995 med en vurdering af reservatbestemmelserne. Danmarks Miljøundersøgelser, faglig rapport nr. 187.
- Look, T., Overdijk, O., Horn, H. and Piersma, T., 2009. The Spoonbill *Platalea leucorodia* population of the Wadden Sea islands: does population growth level off? *Limosa* 82: 149-157.
- Maagaard, L. and Jensen, T., 1994. Prey size selection, intake rate and distribution of staging Oystercatchers (*Haematopus ostralegus*) feeding on an intertidal mussel bed (*Mytilus edulis*). *Ophelia Suppl.* 6:201-215.
- Madsen, A.T., Murray, A.S., Andersen, T.J. and Pejrup, M., 2010. Spatial and temporal variability of sediment accumulation rates on two tidal flats in Lister Dyb tidal basin, Wadden Sea, Denmark. *Earth Surf. Process. Landforms* 35:1556-1572.
- Madsen, J., 1988. Autumn feeding ecology of herbivorous wild-fowl in the Danish Wadden Sea and impact of food supplies and shooting on movements. *Danish Rev. Game Biol.* 13 (4):1-32.
- Madsen, J., 1990. Saltmarshes in the Danish Wadden Sea: Significant as feeding habitat for migratory waterfowl. In: *Proceed. of the Second Trilateral Working Conference on Saltmarsh Management in the Wadden Sea Region, Rømø 1989*: 119-123. The Ministry of the Environment, The National Forest and Nature Agency.
- Marencic, H. and de Vlas, J. (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.
- Marencic, H., Eskildsen, K., Farke, H. and Hedtkamp, S., (Eds), 2010. Science for Nature - Conservation and Management: the Wadden Sea Ecosystem and EU Directives. *Proceedings of the 12th International Scientific Wadden Sea Symposium in Wilhelmshaven, Germany, 30 March - 3 April 2009.* Wadden Sea Ecosystem No. 26. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.
- Meesenburg, H. and Tougaard, S., 1976. Vadehavets Økologi. 130 pp. P. Haase Et Søns Forlag, København 1976.
- Meltofte, H., Blew, J., Frikke, J., Rösner, H-U. and Smit, C.J., 1994. Numbers and distribution of waterbirds in the Wadden Sea. CWSS and IWRB Publication 34 / Wader Study Group Bull. 74, Special issue 1-192.
- Millat, G., Borchardt, T., Bartsch, I., Adolph, W., Herlyn, M., Reichert, K., Kuhlenskamp, R. and Schubert, P., 2012. Die Entwicklung des eulitoralen Miesmuschelbestandes (*Mytilus edulis*) in den deutschen Wattgebieten (aktualisierte Fassung des Berichts 2009/5). *Meeresumwelt Aktuell Nord- und Ostsee, 2012/2*, BSH, Hamburg und Rostock.
- Millat, G., Borchardt, T., Herlyn, M. and Adolph, W., 2009. Die Entwicklung des eulitoralen Miesmuschelbestandes (*Mytilus edulis*) in den deutschen Wattgebieten. *Meeresumwelt Aktuell Nord- und Ostsee, 2009/5* BSH, Hamburg und Rostock.
- Möbius, K., 1877. Die Auster und die Austernwirtschaft. Wiegandt, Hempel & Parey, Berlin.
- Möbius, K., 1893. Über die Thiere der Schleswig-holsteinischen Austernbänke, ihre physikalischen und biologischen Lebensverhältnisse. *Math. Naturwiss. Mittl. Kgl. Preuss. Akad. Wiss., Berlin*:33-58.
- Nielsen, N., 1935. Eine Methode zur exakten Sedimentationsmessung. *Medd. Skalling Laboratoriet* 1:1-97.
- Oost, A., P. Kabat, A. Wiersma and J. Hofstede, 2009. Climate. Thematic Report No. 4.1. In: Marencic, H. and Vlas, J. de (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.
- Oost, A.P., Hoekstra, P., Wiersma, A., Flemming, B., Lammerts, E.J., Pejrup, M., Hofstede, J., van der Valk, B., Kiden, P., Bartholdy, J., van der Berg, M.W., Vos, P.C., de Vries, S. and Wang, Z.B., 2012. Barrier island management: Lessons from the past and directions for the future. *Ocean & Coastal Management* 86: 18-38.
- Philippart, K. and E. Epping, 2009. Climate change and ecology. Thematic Report No. 4.2. In: Marencic, H. and Vlas, J. de (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany
- Reise, K., Baptist, M., Burbridge, P., Dankers, N., Fischer, L., Flemming, B., Oost, A.P. and Smit, C., 2010. The Wadden Sea – A Universally Outstanding Tidal Wetland. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 7 - 24.
- Roomen, M. van, Laursen, K., van Turnhout, C., van Winden, E., Blew, J., Eskildsen, K., Günther, K., Hälterlein, B., Kleefstra, R., Potel, P., Schrader, S., Lüerssen, G. and Ens, B.J., 2012. Signals from the Wadden Sea: Population declines dominate among waterbirds depending on intertidal mudflats. *Ocean & Coastal Management* 86: 79-88.
- Salvig, J.C., Laursen, K. and Frikke, J., 1994. Bird life in the Danish Wadden Sea. *Ophelia Suppl.*6: 327-332.
- Smidt, E.L.B., 1951. Animal production in the Danish Wadden Sea. *Medd. Komm. Danmarks Fiskeri- og Havunders.* Ser. Fiskeri 11(6):1-151.
- Sørensen, H.E., 1976. Vadehavet, marsk og mennesker. 85 pp. Melbyhus, Skærbæk, 1976.
- Spaans, B., Brugge, M., Dekinga, A., Horn, H., van Kooten, L. and Piersma, T., 2009. Space use of Red Knots *Calidris canutus* in the Dutch Wadden Sea. *Limosa*: 82: 113-121.
- Thamdrup, H.M., 1935. Beiträge zur Ökologie der Wattenfauna. *Medd. Komm. Danmarks Fiskeri- og Havunders.* Ser. Fiskeri, 10:1-125.
- Thorup, O., 2007: Ynglefugle i den danske del af Vadehavet 2006. Rapport fra Danmarks Miljøundersøgelser, Afd. for Vildtbiologi og Biodiversitet, 2007.
- Thorup, O. and Laursen, K., 2008. Status of breeding Oystercatcher *Haematopus ostralegus*, Lapwing *Vanellus vanellus*, Black-tailed Godwit *Limosa limosa*, and Redshank *Tringa totanus* in the Danish Wadden Sea in 2006. *Dansk. Orn. Foren. Tidsskr.* 102:255-267.

Tougaard, S., 1989. Monitoring harbour seal (*Phoca vitulina*) in the Danish Wadden Sea. Helgoländer Meeresunters. 43:347-356.

Wang, Z.B, Hoekstra, P., Burchard, H., Ridderinkhof, H., De Swart, H.D. and Stive, M.J.F., 2012. Morphodynamics of the Wadden Sea and its barrier island system. Ocean & Coastal Management 86: 39-57.

Weisse, R., von Storch, H., Niemeier, H.D. and Knaack, H., 2012. Changing North Sea storm surge climate: An increasing hazard? Ocean & Coastal Management 86: 58-68.

Wesenberg-Lund, C., 1904. Investigations published in E. Warming: Bidrag til Vadernes, Sandenes og Marskens Naturhistorie. Kgl. Danske Vid. Selsk. Skr., / Rk. Naturvid. og Math. Afd. 2,1. København.

Wiersma, A.P., Oost, A.P., Meindert, W. van der Berg, Vos, P.C., Marges, V. and Vries, S. de, 2009. Geomorphology. Thematic Report No. 9. In: Marencic, H. and Vlas, J. de (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.

Wolff, W. J., Bakker, J. P., Laursen, K. and Reise, K., 2010. The Wadden Sea Quality Status Report - Synthesis Report 2010. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, pp. 25-74.

8. Contact Information

8. CONTACT INFORMATION

8.a Preparer

Jens Enemark
 Common Wadden Sea Secretariat
 Virchowstr. 1
 D 26382 Wilhelmshaven
 T +49(0)4421 91080
 F +49(0)4421 910830
enemark@waddensea-secretariat.org

8.b Official local institution/ agency

Denmark

Bent Rasmussen
 Nature Agency
 Skovridervej 3,
 DK - 6510 Gram
 T +45 73 51 44 66
 F +45 73 51 44 66
brasm@nst.dk

Germany

Dr. Christiane Paulus
 Federal Ministry for the Environment, Nature
 Conservation and Nuclear Safety
 Head of Division N I 2
 Habitat Protection, Natura 2000, Marine Nature
 Conservation
 Robert-Schuman-Platz 3
 D 53175 Bonn
 T +49(0)228 99 3052620
 F +49(0)228 99 3052694
christiane.paulus@bmu.bund.de

Niedersachsen

Hubertus Hebbelmann
 Ministry for Environment, Energy and Climate
 Protection Niedersachsen
 Archivstraße 2
 D 30169 Hannover
 T +49(0)511 1203382
 F +49(0)511 120993382
hubertus.hebbelmann@mu.niedersachsen.de

Peter Südbeck
 Wadden Sea National Park Authority of Lower
 Saxony
 Virchowstr.1
 D 26382 Wilhelmshaven
 T +49(0)4421 911281
 F +49(0)4421 911280
peter.suedbeck@nlpv-wattenmeer.niedersachsen.de

8.c Other local institutions

Denmark

Organisation	Address	Postal code	City	E-mail
Tønder Kommune	Kongevej 57	DK-6270	Tønder	toender@toender.dk
Esbjerg Kommune	Torvegade 74	DK-6700	Esbjerg	raadhuset@esbjergkommune.dk
Varde Kommune	Bytoften 2	DK-6800	Varde	vardekommune@varde.dk
Fanø Kommune	Skolevej 5-7	DK-6720	Fanø	raadhuset@fanoe.dk
NaturKulturVarde	Gl. Skovfogedbolig, Roustvej 111	DK-6800	Varde	pms@naturkulturvarde.dk
Natur- og Kulturformidlingssentret Myrthuegård	Myrthuevej 39	DK-6710	Esbjerg V	myrthuegaard@esbjergkommune.dk
Nationalpark Vadehavet	Havnebyvej 30	DK-6792	Rømø	vadehavet@danmarksnationalparker.dk
Fiskeri- og Søfartsmuseet	Tarphagevej 2	DK-6710	Esbjerg V	fimus@fimus.dk
Vadehavets Formidlerforum	Havnebyvej 30	DK-6792	Rømø	ulrik@vadehav.dk
Kommunernes Vadehavssekretariat	Havnebyvej 30	DK-6792	Rømø	anks@esbjergkommune.dk
Vadehavscentret	Okholmvej 5, Vester Vedsted	DK-6760	Ribe	info@vadehavscentret.dk
Mandøcentret	Vestervej 1, Mandø	DK-6760	Ribe	mandocentret@mail.dk
Møllehuset			Skærbæk	
Naturcenter Tønningård	Havnebyvej 30	DK-6792	Rømø	info@tonnisingaard.dk
Tøndermarskens Naturcenter	Slusevej 2	DK-6280	Højer	srj@nst.dk
Skalling Laboratory	Skallingevej 19, Ho	DK-6857	Blåvand	mp@geo.ku.dk
Sort Safari	Slotgaden 19, Møgeltønder	DK-6270	Tønder	info@sortsafari.dk

Germany

Niedersachsen

Public Relations Official of	Address	Postal code	City	E-mail
Landkreis Aurich	Fischteichweg 7-13	D-26603	Aurich	info@landkreis-aurich.de
Landkreis Wittmund	Postfach 13 55	D-26400	Wittmund	landkreis@lk.wittmund.de
Landkreis Leer	Friesenstr. 46	D-26789	Leer	info@landkreis-leer.de
Landkreis Wesermarsch	Postfach 13 52	D-26913	Brake	landkreis-wesermarsch@lkbra.de
Landkreis Friesland	Lindenallee 1	D-26441	Jever	landkreis@friesland.de
Landkreis Cuxhaven	Postfach 328	D-27453	Cuxhaven	info@landkreis-cuxhaven.de
Stadt Wilhelmshaven	Postfach 1140	D-26380	Wilhelmshaven	info@stadt.wilhelmshaven.de
Stadt Cuxhaven	Postfach 680	D-27456	Cuxhaven	info@cuxhaven.de
Stadt Emden	Frickensteinplatz 2	D-26721	Emden	stadt@emden.de
Nationalpark-Häuser Besucherzentren	Address	Postal code	City	E-mail
Nationalpark-Haus Baltrum	Haus Nr. 177	D-26579	Baltrum	nlpe.baltrum@gmx.de
Nationalpark-Haus Carolinensiel	Pumphusen 3	D-26409	Wittmund-Carolinensiel	info@wattwelt.de
Nationalpark-Haus Dangast	Zum Jadebusen 179	D-26316	Varel-Dangast	nph-dangast@web.de
Nationalpark-Haus Dornumersiel	Oll Deep 7	D-26553	Dornumersiel	post@nordseehaus-dornumersiel.de
Nationalpark-Haus Feddersiel	Am Hafen 4	D-26969	Butjadingen	nlph.museum-butjadingen@ewetel.net
Nationalpark-Haus Greetsiel	Schatthäuser Weg 6	D-26736	Krummhörn-Greetsiel	nationalparkhaus@greetsiel.de

Nationalpark-Haus Juist	Carl-Stegmann-Str. 5	D-26571	Juist	nationalparkhaus@juist.de
Nationalpark-Haus Wurster Nordseeküste	Am Kutterhafen 1	D-27632	Dorum	info@wursternordseekueste.de
Nationalpark-Haus Norddeich	Dörper Weg 22	D-26506	Norden	info@seehundstation-norddeich.de
Nationalpark-Haus Norderney	Am Hafen 1	D-26548	Norderney	nph.norderney@web.de
Nationalpark-Haus Wangerooge	Friedrich-August-Str. 18	D-26486	Wangerooge	nationalparkhaus@wangerooge.de
Nationalpark-Schiff "Feuerschiff Borkumriff"	Am Nordufer	D-26757	Borkum	fsbr@gmx.de
UNESCO-Weltnaturerbe Wattenmeer Besucherzentrum Cuxhaven	Hans-Claußen-Str. 19	D-27476	Cuxhaven	wattbz@cuxhaven.de
UNESCO-Weltnaturerbe Wattenmeer Besucherzentrum Wilhelmshaven	Südstrand 110 B	D-26382	Wilhelmshaven	info@wattenmeer-besucherzentrum.de
Nationalpark-Haus Wittbülten Spiekeroog	Hellerpad 2	D-26474	Spiekeroog	info@wittbuelten.de
Nationalpark-Haus Wangerland	Kirchstraße 9	D-26434	Wangerland-Minsen	nationalpark-haus@wangerland.de

8.d Official Web addresses

The official website of the property with links also to further websites

www.waddensea-worldheritage.org

9. Signatures

9. SIGNATURES

For the Kingdom of Denmark

For the Government of the Federal Republic of Germany

Minister of Culture

Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Germany

.....

.....

Marianne Jelved

Peter Altmaier

Prime Minister of Niedersachsen

.....

David McAllister

Co-signed by the Kingdom of the Netherlands as state party to the property

Minister for Agriculture

.....

Sharon Dijksma



**The Wadden Sea,
Germany and Netherlands (N1314) –
Extension Denmark and Germany**

- Volume Two -

ANNEXES



Annexes

Annex 1	List of Wadden Sea fish species. _____	5
Annex 2	List of Wadden Sea bird species. _____	13
Annex 3	List of endemic salt marsh species. _____	19
Annex 4	The Wadden Sea Quality Status Report 2009. Marencic, H. and de Vlas, J. (Eds.), 2009. Wadden Sea Ecosystem No. 25. (only on DVD) _____	29
Annex 5	The Wadden Sea Quality Status Report – Synthesis Report 2010. Wolff, W.J, Bakker, J.P., Laursen, K. and Reise, K., 2010. Wadden Sea Ecosystem No. 29. _____	31
Annex 6	Sylt Declaration and 2010 Joint Declaration. 11 th Trilateral Governmental Conference on the Protection of the Wadden Sea, Westerland/Sylt, 18 March 2010. _____	109
Annex 7	Administrative Agreement 2010 on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea. _____	181
Annex 8	Agreement on the Conservation of Seals in the Wadden Sea according to Article 4 of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention), 1990. _____	189
Annex 9	Trilateral Wadden Sea Plan 2010. _____	197
Annex 10	German Federal Nature Conservation Act, § 30 Legally Protected Biotopes, February 2012. _____	303
Annex 11	Act on the National Park “Niedersächsisches Wattenmeer”, amended February 2010. _____	307
Annex 12	Danish Nature Protection Act, LBK nr 933 of 24/09/2009. _____	343
Annex 13	Danish Statutory Order on Nature Conservation and a Nature Reserve in the Wadden Sea, Statutory Order BEK nr 867 of 21/06/2007. _____	377
Annex 14	Danish Act on National Parks, LOV nr 533 of 06/06/2007. _____	389
Annex 15	Danish Statutory Order on National Park Wadden Sea, BEK nr 1159 of 30/09/. _____	399
Annex 16	Danish National Park Plan Wadden Sea 2013 – 2018. (only on DVD) _____	405
Annex 17	Designation of the Wadden Sea as Particularly Sensitive Sea Area (PSSA) by the International Maritime Organization, 2002. _____	407
Annex 18	Regional declarations supporting the nomination. _____	433
Annex 19	Image inventory list. _____	441
Annex 20	40 topographical maps of the property, scale 1:50,000. _____ extra supplement	
Annex 21	DVD with photographs, GIS data, topographical maps and all documents. _____ extra supplement	

Annex 1

List of Wadden Sea fish species.

List of Wadden Sea fish species

compiled by Ralf Vorberg

Main tasks of the TMAP ad-hoc working group fish are the development of targets and assessment tools for trilateral Wadden Sea fish. A possible target could be "presence of a typical Wadden Sea fish fauna". As a provisional assessment tool a priority list of Wadden Sea fish species was defined, using data from the existing demersal and pelagic fish surveys. Another tool could be the definition of a range for species composition and/or species abundances. For this purposes a comprehensive compilation of fish species occurring in the Wadden Sea turned out to be useful.

Information derived from running monitoring programmes as the 30-year data sets of the demersal (young) fish survey, DFS and DYFS as listed in table, in the Netherlands and Germany and of the stow net fishery in Schleswig-Holstein, Lower Saxony and from the river Elbe. In addition species lists from the literature were used (Zijlstra et al., 1979; Fricke et al., 1994; Vorberg & Breckling, 1999).

The compilation of Wadden Sea fish species yielded a total of 149 proofs, of which 13 are freshwater species. The total number of North Sea fish species at the moment is 189 (Fröse & Pauly 2007). what means that about 72% of all North Sea fish species (can) occur in the Wadden Sea. With regard to a trilateral monitoring and assessment program only one half of all species is of practical importance: 50 species (33,6%) are common, 25 species (16,8%) are fairly common. 74 species (49,7%) have to be regarded as rare or even extremely rare in the Wadden Sea.

Literature

FRICKE, R.; BERGHAHN, R.; RECHLIN, O.; NEUDECKER, T.; WINKLER, H.; BAST, H.-D. & HAHLBECK, E. (1994): Rote Liste und Artenverzeichnis der Rundmäuler und Fische (Cyclostomata Pisces) im Bereich der deutschen Nord- und Ostsee. IN: NOWAK, E.; BLAB, J. & BLESS, R.: Rote Liste der gefährdeten Wirbeltiere in Deutschland. - Kilda Vlg.: 157-176.

FROESE, R. and D. PAULY. Editors. 2007. FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2007).

VORBERG, R. & BRECKLING, P. (1999): Atlas der Fische im schleswig-holsteinischen Wattenmeer. Schriftenreihe des Nationalparks Schleswig-Holsteinisches Wattenmeer, Heft 10: 180 S.

WITTE, J.Y. & ZIJLSTRA, J.J. (1979): The species of fish occurring in the Wadden Sea. In: DANKERS, N.; WOLFF, W.J. & ZIJLSTRA, J.J.: Fishes and fisheries of the Wadden Sea. - A. A. Balkema, Rotterdam: 10-25.

Annex 1 List of Wadden Sea fish species

No	Scientific name	English name	German name	Dutch name	Danish name	DYF S	DFS	Witte & Zijl- stra	Red List	occurrence (e)r: (extremely) rare fc: fairly common c: common
1	<i>Abramis brama</i>	Carp Bream	Brasse	Brasem	Brasen	x				(e)r
2	<i>Acipenser sturio</i>	Sturgeon	Stör	Steur	Almindelig stør			x	x	(e)r
3	<i>Agonus cataphractus</i>	Hooknose	Steinpicker	Harnasmannetje	Almindelig panserulke	x	x	x	x	c
4	<i>Alburnus alburnus</i>	Bleak	Ukelei	Alver	Almindelig løje					(e)r
5	<i>Alopias vulpinus</i>	Thresher	Fuchshai	Voshaai	Almindelig rævehaj			x		(e)r
6	<i>Alosa alosa</i>	Allis Shad	Maifisch	Elft	Majsild		x	x	x	fc
7	<i>Alosa fallax</i>	Twaiite Shad	Finte	Fint	Stavsild	x		x	x	c
8	<i>Ammodytes marinus</i>	Lesser Sandeel	Kleiner Sandaal	Noorse Zandspiering	Havtobis	x	x	x	x	c
9	<i>Ammodytes tobianus</i>	Small Sandeel	Tobiasfisch	Zandspiering	Kysttobis				x	(e)r
10	<i>Anarhichas denticulatus</i>	Northern Wolffish	Blauer Seewolf	Zeewolf	Blå havkat				x	(e)r
11	<i>Anguilla anguilla</i>	Eel	Aal	Aal	Europæisk ål	x	x	x	x	c
12	<i>Aphia minuta</i>	Transparent Goby	Glasgrundel	Glasgrundel	Glaskutling		x	x	x	c
13	<i>Argyrosomus regius</i>	Meagre	Umberfisch	Ombervis	Almindelig ørnefisk				x	(e)r
14	<i>Arnoglossus laterna</i>	Scaldfish	Lammzunge	Schurftvis	Almindelig tungehvarre	x	x	x	x	c
15	<i>Aspitrigla cuculus</i>	Red Gurnard	Seekuckuck	Engelse Poon	Tværstribet knurhane			x	x	(e)r
16	<i>Aspius aspius</i>	Asp	Rapfen	Roofblei	Asp					(e)r
17	<i>Atherina presbyter</i>	Sand-smelt	Ährenfisch	Koornaarvis	Almindelig stribefisk	x	x	x	x	c
18	<i>Atherina boyeri</i>	Big-scale Sand Smelt	Kleiner Ährenfisch	Kleine Koornaarvis	Lille Stribefisk				x	(e)r
19	<i>Barbus barbus</i>	Barbel	Barbe	Barbeel	Barbe					(e)r
20	<i>Balistes carolinensis</i>	Trigger-Fish	Grauer Drückerfisch	Trekkervis	Almindelig aftrækkerfisk			x		(e)r
21	<i>Belone belone</i>	Garfish	Hornhecht	Geep	Almindelig hornfisk	x	x	x	x	c
22	<i>Blicca bjoerkna</i>	White Bream	Güster	Kolblei	Flire	x				(e)r
23	<i>Boops boops</i>	Bogue	Gelbstrieme	Bokvis	Okseøjefisk			x	x	(e)r
24	<i>Brama brama</i>	Ray's Bream	Brachsenmakrele	Braam	Almindelig havbrasen			x	x	(e)r
25	<i>Buglossidium luteum</i>	Solenette	Zwergzunge	Dwergtong	Glastunge	x	x	x	x	c
26	<i>Callionymus lyra</i>	Dragonet	gestreifter Leierfisch	Pitvis	Stribet Fløjfisk	x	x	x	x	c
27	<i>Callionymus maculatus</i>	Spotted Dragonet	gefleckter Leierfisch	Rasterpitvis	Plettet Fløjfisk	x				(e)r
28	<i>Callionymus reticulatus</i>	Reticulated Dragonet	Ornament-Leierfisch	Gevlektepitvis	Kortfinnet fløjfisk	x		x		(e)r
29	<i>Carassius carassius</i>	Crucian Carp	Karausche	Kroeskarper	Karusse					(e)r
30	<i>Cetorhinus maximus</i>	Basking Shark	Riesenhai	Reuzehaai	Brugde			x		(e)r

Annex 1 List of Wadden Sea fish species

3

31	Cheilopogon heterurus	Atlantic Flying-Fish	Fliegender Fisch	Noordse Vliegende Vis	Almindelig flyvefisk				x	(e)r
32	Chelon labrosus	Thick-lipped Mullet	Dicklippige Meeräsche	Diklip Harder	Tyklæbet multe	x	x	x	x	c
33	Ciliata mustela	Five-bearded Rockling	Fünfbärtelige Seequappe	Vijfdradige Meun	Femtrådet havkvabbe	x	x	x	x	c
34	Clupea harengus	Herring	Hering	Haring	Atlantisk sild	x	x	x	x	c
35	Conger conger	Conger Eel	Meeraal	Zeepaling	Almindelig havål			x	x	(e)r
36	Coregonus oxyrinchus	Houting	Nordseeschnäpel	Houting	Snæbel			x	x	fc
37	Crystallogobius linearis	Crystal Goby	Kristallgrundel	Kristalgrundel	Krystalkutling				x	(e)r
38	Ctenolabrus rupestris	Goldsinny	Klippenbarsch	Kliplipvis	Havkarusse			x		(e)r
39	Cyclopterus lumpus	Lumpsucker	Seehase	Snotolf		x	x	x	x	c
40	Cynoglossus browni	Nigerian tonguesole	Hundszunge	Nigeriaanse Hondstong	Nigeriansk hundetunge				x	(e)r
41	Cyprinus carpio	Carp	Karpen	Karper	Karpe					(e)r
42	Dasyatis pastinaca	Common Stingray	Stechrochen	Pijlstaartrog	Europæisk pigrokke		x	x	x	fc
43	Dentex maroccanus	Morocco Dentex	Marokkanische Zahnbrasse	Rode Tandbrasem	Marokkansisk havrude				x	(e)r
44	Dicentrarchus labrax	Sea Bass	Wolfsbarsch	Zeebaars	Havbars	x	x	x	x	c
45	Echiichthys vipera	Lesser Weever	Vipernqueise	Kleine Pieterman	Lille Fjæsing	x	x	x	x	fc
46	Enchelyopus cimbrius	Four-bearded Rockling	Vierbärtelige Seequappe	Vierdradige Meun	Firtrådet havkvabbe		x	x	x	fc
47	Engraulis encrasicolus	Anchovy	Sardelle	Ansjovis	Europæisk ansjos	x	x	x	x	c
48	Entelurus aequoreus	Snake Pipefish	Große Schlangennadel	Adderzeenaald	Snippe	x	x	x	x	c
49	Eutrigla gurnadus	Grey Gurnard	Grauer Knurrhahn	Grauwe Poon	Grå knurhane	x	x	x	x	c
50	Gadus morhua	Cod	Kabeljau	Kabeljauw	Almindelig torsk	x	x	x	x	c
51	Gaidropsarus mediterraneus	Shore Rockling	Mittelmeer-Seequappe	Driedradige Meun	Tretrådet havkvabbe					(e)r
52	Gaidropsarus vulgaris	Three-bearded Rockling	Dreibärtelige Seequappe	Driedradige Meun	Almindelig gråhaj	x	x	x	x	fc
53	Galeorhinus galeus	Tope Shark	Hundshai	Ruwehaai	Almindelig gråhaj			x	x	fc
54	Galeus melastomus	Blackmouth Catshark	Fleckhai	Hondshaai	Ringhaj				x	(e)r
55	Gasterosteus aculeatus	Stickleback	Dreistacheliger Stichling	Driedoornige Stekelbaars	Trepigget hundestejle	x	x	x	x	c
56	Glyptocephalus cynoglossus	Witch	Hundszunge	Witje	Skærising	x			x	fc
57	Gobiusculus flavescens	Two-spotted Goby	Schnappgrundel	Blonde Grondel	Toplettet kutling				x	(e)r
58	Gymnocephalus cernuus	Ruffe	Kaulbarsch	Pos	Nøgentobis	x	x			fc
59	Hexanchus griseus	Bluntnose Sixgill Shark	Grauhai	Grauwe Haai	Almindelig seksgælllet haj				x	(e)r
60	Hippocampus hippocampus	Sea-Horse	Seepferdchen	Zeepaardje	Søhest			x		(e)r
61	Hippoglossoides platessoides	American Plaice	Doggerscharbe	Lange Schar	Håising	x			x	fc
62	Hyperoplus immaculatus	Greater Sand-Eel	Ungeflecker Großer Sandaal	Effen Smelt	Upletet tobiskonge				x	(e)r

Annex 1 List of Wadden Sea fish species

4

63	<i>Hyperoplus lanceolatus</i>	Great Sandeel	Gefleckter Großer Sandaal	Smelt	Plettet tobiskonge	x	x	x	x	c
64	<i>Labrus bergylta</i>	Balan Wrasse	Gefleckter Lippfisch	Gevlekte Lipvis	Berggylte			x		(e)r
65	<i>Lamna nasus</i>	Porbeagle	Heringshai	Neushaai	Almindelig sildehaj			x		(e)r
66	<i>Lampetra fluviatilis</i>	River Lamprey	Flußneunauge	Rivierprik		x	x	x	x	c
67	<i>Leucaspius delineatus</i>	Sunbleak	Moderlieschen	Vetje	Regnløje					(e)r
68	<i>Leuciscus idus</i>	Ide	Orfe	Winde	Almindelig Rimte					(e)r
69	<i>Limanda limanda</i>	Dab	Kliesche	Schar	Ising	x	x	x	x	c
70	<i>Liparis liparis</i>	Sea Snail	Großer Scheibenbauch	Slakdolf	Finnebræmmet Ringbug	x	x	x	x	c
71	<i>Liparis montagui</i>	Montagu's Sea Snail	Kleiner Scheibenbauch	Montagu's Slakdolf	Særfinnet Ringbug	x			x	c
72	<i>Lipophrys pholis</i>	Shanny	Schan	Slijmvis	Tangkvaabbe			x	x	(e)r
73	<i>Liza aurata</i>	Golden Grey Mullet	Goldmeeräsche	Goudharder	Guldmulte			x	x	(e)r
74	<i>Liza ramada</i>	Thin-lipped Grey Mullet	Dünnlippige Meeräsche	Dunlip Harder	Multe			x	x	(e)r
75	<i>Lophius piscatorius</i>	Angler	Seeteufel	Zeeduivel	Europæisk havtaske			x		(e)r
76	<i>Mauroliscus muelleri</i>	Pearlsides	Lachshering	Lichtend Sprotje				x	x	fc
77	<i>Melanogrammus aeglefinus</i>	Haddock	Schellfisch	Schelvis	Kuller			x	x	(e)r
78	<i>Merlangius merlangus</i>	Whiting	Wittling	Wijting	Hvilling	x	x	x	x	c
79	<i>Merluccius merluccius</i>	European Hake	Seehecht	Heek	Europæisk kulmule	x		x	x	fc
80	<i>Micromesistius poutassou</i>	Blue Whiting	Blauer Wittling	Blauwe Wijting	Blåhvilling			x	x	fc
81	<i>Microstomus kitt</i>	Lemon Sole	Limande, Rotzunge	Tongschar	Rødtunge	x	x	x	x	c
82	<i>Mola mola</i>	Sunfish	Mondfisch	Maanvis	Almindelig klumpfisk			x	x	(e)r
83	<i>Molva molva</i>	Ling	Leng	Leng	Almindelig lange					(e)r
84	<i>Mullus barbatus</i>	Red Mullet	Rote Meerbarbe	Gewone Zeebarbeel	Rød mulle				x	(e)r
85	<i>Mullus surmelutus</i>	Surmullet	Streifenbarbe	Mul	Stribet mulle	x	x	x	x	c
86	<i>Mustelus mustelus</i>	Smooth Hound	Glatthai	Gladde Haai	Almindelig glathaj			x		(e)r
87	<i>Myoxocephalus scorpius</i>	Bull Rout	Seeskorpion	Zeedonderpad	Almindelig ulk	x	x	x	x	c
88	<i>Nerophis lumbriciformis</i>	Worm Pipefish	Krummschnauzige Schlangennadel	Kleine Wormzeenaald	Stor næbsnog				x	(e)r
89	<i>Onchorhynchus mykiss</i>	Rainbow Trout	Regenbogenforelle	Regenboogforel	Kamchatka-ørred					(e)r
90	<i>Osmerus eperlanus</i>	Smelt	Stint	Spiering	Europæisk smelt	x	x	x	x	c
91	<i>Pagellus acarne</i>	Axillary Seabream	Achselfleckbrasse	Spaanse Zeebrasem	Akarnaisk blankesten				x	(e)r
92	<i>Pagellus bogaraveo</i>	Blackspotted Seabream	Graubarsch	Zeebrasem	Almindelig blankesten				x	(e)r
93	<i>Pagellus erythrinus</i>	Common Pandora	Rotbrasse	Zeebrasem	Rød blankesten				x	(e)r
94	<i>Parablennius gattorugine</i>	Tompot Blenny	Gestreifter Schleimfisch	Gehoornde Slijmvis	Stribet slimfisk			x	x	(e)r
95	<i>Perca fluviatilis</i>	European Perch	Flussbarsch	Baars	Europæisk aborre		x			(e)r
96	<i>Petromyzon marinus</i>	Sea Lamprey	Meerneunauge	Zeeprik	Havlampret		x	x	x	c

Annex 1 List of Wadden Sea fish species

5

97	<i>Pholis gunellus</i>	Butterfish	Butterfisch	Botervis	Tangspræl	x	x	x	x	c
98	<i>Phrynorhombus norvegicus</i>	Norwegian topknot	Norwegischer Zwergbutt	Dwergtarbot	Smáhvarre				x	(e)r
99	<i>Platichthys flesus</i>	Flounder	Flunder	Bot	Skrubbe	x	x	x	x	c
100	<i>Pleuronectes platessa</i>	Plaice	Scholle	Schol	Rødspætte	x	x	x	x	c
101	<i>Pollachius pollachius</i>	Pollack	Pollack	Pollak	Lubbe		x	x	x	fc
102	<i>Pollachius virens</i>	Saithe	Seelachs	Koolvis	Gråsej	x	x	x	x	fc
103	<i>Pomatoschistus lozanoi</i>	Lozano's Goby	Lozanos Grundel	Lozanos Grondel	Lozanos kutling		x	x	x	fc
104	<i>Pomatoschistus microps</i>	Common Goby	Strandgrundel	Brakwatergrondel	Lerkutling	x		x	x	c
105	<i>Pomatoschistus minutus</i>	Sand Goby	Sandgrundel	Dikkopje	Sandkutling	x		x	x	c
106	<i>Pomatoschistus pictus</i>	Painted Goby	Fleckengrundel	Kleurige Grondel	Spættet kutling			x		fc
107	<i>Psetta maxima</i>	Turbot	Steinbutt	Tarbot	Pighvarre	x	x	x	x	c
108	<i>Pterycombus brama</i>	Atlantic Fanfish	Silberbrassen	Zilverbraam	Sølvbrasen				x	(e)r
109	<i>Pungitius pungitius</i>	Ninespine Stickleback	Zwergstichling	Tiendornige stekelbaars	Nipigget hundestejle	x			x	fc
110	<i>Raja clavata</i>	Thornback	Nagelrochen	Stekelrog	Sømrøkke			x	x	(e)r
111	<i>Raniceps raninus</i>	Tadpole-Fish	Froschdorsch	Vorskwab	Sortvels			x		(e)r
112	<i>Remora remora</i>	Common Remora	Ansauger	Remora	Almindelig sugefisk				x	(e)r
113	<i>Rutilus rutilus</i>	Roach	Rotaug	Blankvoorn	Almindelig Skalle		x			(e)r
114	<i>Salmo salar</i>	Salmon	Lachs	Zalm	Atlantehavslaks	x		x	x	c
115	<i>Salmo trutta</i>	Sea Trout	Meerforelle	Zeeforel	Almindelig ørred	x		x	x	c
116	<i>Sardina pilchardus</i>	Sardine	Sardine	Sardien	Almindelig sardin	x	x	x	x	c
117	<i>Scomber japonicus</i>	Chub Mackerel	Mittelmeermakrele	Spaanse Makreel	Spansk makrel				x	(e)r
118	<i>Scomber scombrus</i>	Mackerel	Atlantische Makrele	Makreel	Makrel	x	x	x	x	c
119	<i>Scorpaenopsis scorpaena</i>	Skipper	Makrelenhecht	Makreelgeep	Almindelig makrelgedde			x		(e)r
120	<i>Scophthalmus rhombus</i>	Brill	Glattbutt	Griet	Europæisk slethvarre	x	x	x	x	c
121	<i>Scyliorhinus caniculus</i>	Lesser spotted Dogfish	Kleingeflecker Katzenhai	Hondshaai	Småpletet rødhaj			x	x	(e)r
122	<i>Scyliorhinus stellaris</i>	Greater spotted Dogfish	Großgeflecker Katzenhai	Kathai	Storpletet rødhaj				x	(e)r
123	<i>Sebastes marinus</i>	Redfish	Rotbarsch	Noorse Schelvis	Stor rød fisk			x		(e)r
124	<i>Serranus cabrilla</i>	Comber	Sägebarsch	Zaagbaars	Lille Rødfisk				x	(e)r
125	<i>Solea solea</i>	Sole	Seezunge	Tong	Almindelig tunge	x	x	x	x	c
126	<i>Spinachia spinachia</i>	Sea Stickleback	Seestichling	Zeestekelbaars	Tangsnarre	x		x	x	fc
127	<i>Spodyliosoma cantharus</i>	Black Sea Bream	Streifenbrasse	Zeekarper	Almindelig havrude			x		(e)r
128	<i>Sprattus sprattus</i>	Sprat	Sprotte	Sprot	Europæisk brisling	x	x	x	x	c
129	<i>Squalus acanthias</i>	Spur-Dog	Dornhai	Doornhaai	Almindelig pighaj			x		(e)r
130	<i>Squatina squatina</i>	Monkfish	Meerengel	Zeeengel	Europæisk havengel			x	x	(e)r

Annex 1 List of Wadden Sea fish species

6

131	Stizostedion lucioperca	Pike Perch	Zander	Snoekbaars	Sandart	x	x		x	fc
132	Symphodus melops	Corkwing	Goldmaid	Zwaartooglipvis	Almindelig savgylte			x		(e)r
133	Syngnathus acus	Great Pipefish	Große Seenadel	Grote Zeenaald	Stor Tangnål		x	x	x	c
134	Syngnathus rostellatus	Nilsson's Pipefish	Kleine Seenadel	Kleine Zeenaald	Lille Tangnål	x	x	x	x	c
135	Syngnathus typhle	Deep-snouted Pipefish	Grasnadel	Trompetterzeenaald	Almindelig tangnål			x	x	fc
136	Taractes asper	Rough pomfret	Kleine Brachsenmakrele	Hoogvinbraam	Højfinnet havbrasen				x	(e)r
137	Taractichthys longipinnis	Bigscale Pomfret	Langflossen- Brachsenmakrele	(Langvinbraam)	Langfinnet havbrasen				x	(e)r
138	Taurulus bubalis	Long-spined Sea Scorpion	Seebull	Groene Zeeonderpad	Langtornet Ulk			x	x	fc
139	Trachinotus ovatus	Derbio	Gabelmakrele	Gaffelmakreel	Almindelig gaffelmakrel				x	(e)r
140	Trachinus draco	Greater Weaver	Petermännchen	Grote Pieterman	Almindelig fjæsing	x		x	x	fc
141	Trachurus trachurus	Horse Mackerel	Stöcker	Horsmakreel	Almindelig hestemakrel	x	x	x	x	c
142	Trigla lucerna	Tub Gurnard	Roter Knurrhahn	Rode Poon	Rød knurhane	x	x	x	x	c
143	Trisopterus esmarki	Norway Pout	Stintdorsch	Kever	Calypso	x			x	fc
144	Trisopterus luscus	Bib	Franzosendorsch	Steenbolk	Skægtorsk	x	x	x	x	c
145	Trisopterus minutus	Poor Cod	Zwergdorsch	Dwergbolk	Glyse	x	x	x	x	fc
146	Xiphias gladius	Sword-Fish	Schwertfisch	Zwaardvis	Sværdfisk			x		(e)r
147	Zeugopterus punctatus	Topknot	Haarbutt	Gevlekte Griet	Hårhvarre			x	x	(e)r
148	Zeus faber	Dory	Heringskönig	Zonnevis	Sanktpetersfisk			x		(e)r
149	Zoarces viviparus	Eelpout	Aalmutter	Puitaal	Almindelig ålekvabbe	x	x	x	x	c

Annex 2

List of Wadden Sea bird species.

List of Wadden Sea bird species

The table below indicates the birds species monitored in the trilateral Joint Monitoring of Migratory/Breeding Birds program to the EU Birds Directive.

Bird species are listed

- a) according EU Birds Directive Annex I/II in Special Protection Areas (SPA) of the Wadden Sea in Denmark, Schleswig-Holstein, Hamburg, Niedersachsen and The Netherlands and
- b) in the trilateral "Joint Monitoring of Migratory Birds" (JMMB) and "Joint Monitoring of Breeding Birds" (JMBB) program

Remark:

B,M,BM - bird linked as "Breeding", "Migratory" or as "Breeding and Migratory" bird to SPA.

List of Wadden Sea bird species

No	Species, scientific name	SH	HH	Nds	NL	DK	JMMB JMJB	Danish name	German name	Dutch name	Order	Family
1	Red-Throated Diver (<i>Gavia stellata</i>)	M		M	M			Rødstrubet Lom	Sternaucher	Roodkeelduiker	Gaviiformes	Gaviidae
2	Black-Throated Diver (<i>Gavia arctica</i>)	M			M			Sortstrubet Lom	Prachtaucher	Parelduiker	Gaviiformes	Gaviidae
3	Little Grebe (<i>Tachybaptus ruficollis</i>)				M			Lille Lappedykker	Zwergtaucher	Dodaars	Podicipediformes	Podicipedidae
4	Great Crested Grebe (<i>Podiceps cristatus</i>)				M			Toppet Lappedykker	Haubentaucher	Fuut	Podicipediformes	Podicipedidae
5	Red-Necked Grebe (<i>Podiceps grisegena</i>)							Gråstrubet Lappedykker	Rothalstaucher	Roodhalsfuut	Podicipediformes	Podicipedidae
6	Black-Necked Grebe (<i>Podiceps nigricollis</i>)	M						Sorhalset Lappedykker	Schwarzhalstaucher	Georde Fuut	Podicipediformes	Podicipedidae
7	Northern Fulmar (<i>Fulmarus glacialis</i>)							Mallemuk; Stormfugl	Eissturmvoegel	Noordse Stormvoegel	Procellariiformes	Procellariidae
8	Great Cormorant (<i>Phalacrocorax carbo</i>)	BM		BM	BM		BM	Skarv	Kormoran	Aalscholver	Pelecaniformes	Phalacrocoracidae
9	Bittern (<i>Botaurus stellaris</i>)	B		B	B			Rørdrum	Rohrdommel	Roerdomp	Ciconiiformes	Ardeidae
10	Little Egret (<i>Egretta garzetta</i>)				BM		B	Silkehejre	Seidenreier	Kleine Zilverreiger	Ciconiiformes	Ardeidae
11	Grey Heron (<i>Ardea cinerea</i>)	M						Fiskehejre	Graureier	Blauwe Reiger	Ciconiiformes	Ardeidae
12	White Stork (<i>Ciconia ciconia</i>)	B		B		B		Fiskehejre	Weißstorch	Ooievaar	Ciconiiformes	Ciconiidae
13	Eurasian Spoonbill (<i>Platalea leucorodia</i>)	BM		BM	BM		BM	Fiskehejre	Löffler	Lepelaar	Ciconiiformes	Threskiornithidae
14	Mute Swan (<i>Cygnus olor</i>)			M				Knopsvane	Höckerschwan	Knobelzwaan	Anseriformes	Anatidae
15	Bewick's Swan (<i>Cygnus columbianus bewickii</i>)	M		M	M			Pibesvane	Zwergschwan	Kleine Zwaan	Anseriformes	Anatidae
16	Whooper Swan (<i>Cygnus cygnus</i>)	M		M		M		Sangsvane	Singschwan	Wilde Zwaan	Anseriformes	Anatidae
17	Bean Goose (<i>Anser fabalis</i>)				M			Sædgås	Saatgans	Toendrijetgans	Anseriformes	Anatidae
18	Pink-Footed Goose (<i>Anser brachyrhynchus</i>)					M		Kortnæbbet Gås	Kurzschanbelgans	Kleine Rietgans	Anseriformes	Anatidae
19	White-Fronted Goose (<i>Anser albifrons</i>)	M		M				Blisgås	Blaessgans	Kolgans	Anseriformes	Anatidae
20	Greylag Goose (<i>Anser anser</i>)	M		M	M	M		Grågås	Graugans	Grauwe Gans	Anseriformes	Anatidae
21	Barnacle Goose (<i>Branta leucopsis</i>)	BM		M	M	M	BM	Bramgås	Nonnengans, Weißwangengans	Brandgans	Anseriformes	Anatidae
22	Brent Goose (<i>Branta bernicla</i>)	M	M	M	M		M	Knortegås	Ringelgans	Rotgans	Anseriformes	Anatidae
23	Shelduck (<i>Tadorna tadorna</i>)	BM		M	M	BM	BM	Gravand	Brandgans	Bergeend	Anseriformes	Anatidae
24	Wigeon (<i>Anas penelope</i>)	M		M	M	BM	BM	Pibeand	Pfeifente	Smient	Anseriformes	Anatidae
25	Gadwall (<i>Anas strepera</i>)			B	M			Knarand	Schnatterente	Krakeend	Anseriformes	Anatidae
26	Teal (<i>Anas crecca</i>)	M		BM	M		M	Krikand	Krickente	Wintertaling	Anseriformes	Anatidae
27	Mallard (<i>Anas platyrhynchos</i>)	M		M	M		M	Gråand	Stockente	Wilde Eend	Anseriformes	Anatidae
28	Pintail (<i>Anas acuta</i>)	M		M	M	BM	BM	Spidsand	Spießente	Pijlstaart	Anseriformes	Anatidae
29	Garganey (<i>Anas querquedula</i>)	M		B				Atlingand	Knäkente	Zomertaling	Anseriformes	Anatidae
30	Shoveler (<i>Anas clypeata</i>)	M		BM	M	M	M	Skeand	Löffelente	Slobeend	Anseriformes	Anatidae
31	Scaup (<i>Aythya marila</i>)				M			Bjergand	Bergente	Toppereend	Anseriformes	Anatidae
32	Common Eider (<i>Somateria mollissima</i>)	BM		BM	BM	BM	BM	Ederfugl	Eiderente	Eidereend	Anseriformes	Anatidae
33	Common Scoter (<i>Melanitta nigra</i>)	M		M	M			Sortand	Trauerente	Zwarte Zeeend	Anseriformes	Anatidae
34	Goldeneye (<i>Bucephala clangula</i>)				M			Islandsk Hvinand	Schellente	Brilduiker	Anseriformes	Anatidae
35	Smew (<i>Mergus albellus</i>)	M						Lille Skallesluger	Zwergsäger	Nonnetje	Anseriformes	Anatidae
36	Red-breasted Merganser (<i>Mergus serrator</i>)	BM			M		B	Toppet Skallesluger	Mittelsäger	Middelste Zaagbek	Anseriformes	Anatidae
37	Goosander (<i>Mergus merganser</i>)				M			Stor Skallesluger	Gänsesäger	Grote Zaagbek	Anseriformes	Anatidae
38	Red Kite (<i>Milvus milvus</i>)							Rød Glente	Rotmilan	Rode Wouw	Falconiformes	Accipitridae
39	White-Tailed Eagle (<i>Haliaeetus albicilla</i>)	M			M		M	Havørn	Seeadler	Zeearend	Falconiformes	Accipitridae

40	Marsh Harrier (<i>Circus aeruginosus</i>)	B		B	B	B		Rørhøg	Röhrweihe	Bruine Kiekendief	Falconiformes	Accipitridae
41	Hen Harrier (<i>Circus cyaneus</i>)	B		B	B	BM	B	Blå Kærhøg	Kornweihe	Blauwe Kiekendief	Falconiformes	Accipitridae
42	Montagu's Harrier (<i>Circus pygargus</i>)	B		B		B		Hede­høg	Wiesenweihe	Grauwe Kiekendief	Falconiformes	Accipitridae
43	Rough-Legged Buzzard (<i>Buteo lagopus</i>)						M	Fjeldvåge	Rauhfußbussard	Ruigpootbuizerd	Falconiformes	Accipitridae
44	Merlin (<i>Falco columbarius</i>)						M	Dværgfalk	Merlin	Smelleken	Falconiformes	Falconidae
45	Peregrine Falcon (<i>Falco peregrinus</i>)	B	BM			M	M	Vandrefalk	Wanderfalke	Slechtvalk	Falconiformes	Falconidae
46	Water Rail (<i>Rallus aquaticus</i>)			B				Vandrikse	Wasserralle	Waterral	Gruiformes	Rallidae
47	Spotted Crake (<i>Porzana porzana</i>)	B		B	B	B		Plettet Rørvagtel	Tüpfelsumpfhuhn	Porseleinhoen	Gruiformes	Rallidae
48	Corn Crake (<i>Crex crex</i>)	B		B		B		Engsnarre	Wachtelkönig	Kwartelkoning	Gruiformes	Rallidae
49	Oystercatcher (<i>Haematopus ostralegus</i>)	BM	BM	M	M	M	BM	Strandskade	Austernfischer	Scholekster	Charadriiformes	Haematopodidae
50	Black-Winged Stilt (<i>Himantopus himantopus</i>)							Stylteløber	Stelzenläufer	Steltkluut	Charadriiformes	Recurvirostridae
51	Avocet (<i>Recurvirostra avosetta</i>)	BM	BM	BM	BM	BM	BM	Klyde	Säbelschnäbler	Kluut	Charadriiformes	Recurvirostridae
52	Great Ringed Plover (<i>Charadrius hiaticula</i>)	BM	BM	M	BM		BM	Stor Præstekrave	Sandregenpeifer	Bontbekplevier	Charadriiformes	Charadriidae
53	Kentish Plover (<i>Charadrius alexandrinus</i>)	BM		B	BM	BM	BM	Hvidbrystet Præstekrave	Seeregenpeifer	Strandplevier	Charadriiformes	Charadriidae
54	Golden Plover (<i>Pluvialis apricaria</i>)	M	M	M	M	M	M	Hjejle; Hede­hjejle	Goldregenpeifer	Goudplevier	Charadriiformes	Charadriidae
55	Grey Plover (<i>Pluvialis squatarola</i>)	M	M	M	M	M	M	Strandhjejle	Kiebitzregenpeifer	Zilverplevier	Charadriiformes	Charadriidae
56	Northern Lapwing (<i>Vanellus vanellus</i>)	BM		BM	M		BM	Vibe	Kiebitz	Kievit	Charadriiformes	Charadriidae
57	Knot (<i>Calidris canutus</i>)	M	M	M	M	M	M	Islandsk Ryle	Knutt	Kanoetstrandloper	Charadriiformes	Scolopacidae
58	Sanderling (<i>Calidris alba</i>)	M	M	M	M	M	M	Sandløber; Selning	Sanderling	Drieteenstrandloper	Charadriiformes	Scolopacidae
59	Curlew Sandpiper (<i>Calidris ferruginea</i>)	M		M	M		M	Krumnæbbet Ryle	Sichelstrandläufer	Krombekstrandloper	Charadriiformes	Scolopacidae
60	Dunlin (<i>Calidris alpina</i>)	BM	M	M	M	BM	BM	Almindelig Ryle	Alpenstrandläufer	Bonte Strandloper	Charadriiformes	Scolopacidae
61	Ruff (<i>Philomachus pugnax</i>)	BM	M	M		BM	BM	Brushane	Kampfläufer	Kemphaan	Charadriiformes	Scolopacidae
62	Common Snipe (<i>Gallinago gallinago</i>)	BM		B			B	Dobbeltbekkasin	Bekassine	Watersnip	Charadriiformes	Scolopacidae
63	Black-tailed Godwit (<i>Limosa limosa</i>)	BM		BM	M		BM	Stor Kobbersneppe	Uferschnepfe	Grutto	Charadriiformes	Scolopacidae
64	Bar-Tailed Godwit (<i>Limosa lapponica</i>)	M		M	M	M	M	Lille Kobbersneppe	Pfuhlschnepfe	Rosse Grutto	Charadriiformes	Scolopacidae
65	Whimbrel (<i>Numenius phaeopus</i>)	M		M			M	Lille Regnspove; Småspove	Regenbrachvogel	Regenwulp	Charadriiformes	Scolopacidae
66	Eurasian Curlew (<i>Numenius arquata</i>)	BM	M	BM	M	BM	BM	Stor Regnspove	Großer Brachvogel	Wulp	Charadriiformes	Scolopacidae
67	Spotted Redshank (<i>Tringa erythropus</i>)	M		M	M		M	Sortklire	Dunkelwasserläufer	Zwarte Ruit­er	Charadriiformes	Scolopacidae
68	Common Redshank (<i>Tringa totanus</i>)	BM		BM	M	BM	BM	Rød­ben	Rotschenkel	Tureluur	Charadriiformes	Scolopacidae
69	Greenshank (<i>Tringa nebularia</i>)	M		M	M	M	M	Hvidklire	Grünschenkel	Groenpootruiter	Charadriiformes	Scolopacidae
70	Wood Sandpiper (<i>Tringa glareola</i>)		M					Tinksmed	Bruchwasserläufer	Bosruiter	Charadriiformes	Scolopacidae
71	Turnstone (<i>Arenaria interpres</i>)	BM		M	M		BM	Stenvender	Steinwälzer	Steenloper	Charadriiformes	Scolopacidae
72	Red-Necked Phalarope (<i>Phalaropus lobatus</i>)		M					Odinshane	Odinshühnchen	Grauwe Franjepoot	Charadriiformes	Scolopacidae
73	Mediterranean Gull (<i>Larus melanocephalus</i>)	B					B	Sorthovedet Måge	Schwarzkopfmöwe	Zwartkopmeeuw	Charadriiformes	Laridae
74	Little Gull (<i>Larus minutus</i>)	BM			M	B	B	Dværgmåge	Zwergmöwe	Dwergmeeuw	Charadriiformes	Laridae
75	Black-headed Gull (<i>Larus ridibundus</i>)	BM		M			BM	Hættemåge	Lachmöwe	Kokmeeuw	Charadriiformes	Laridae
76	Common Gull (<i>Larus canus</i>)	BM		M			BM	Stormmåge	Sturmmöwe	Stormmeeuw	Charadriiformes	Laridae
77	Lesser Black-backed Gull (<i>Larus fuscus</i>)	BM		M	B		BM	Sildemåge	Heringsmöwe	Kleine Mantelmeeuw	Charadriiformes	Laridae
78	Herring Gull (<i>Larus argentatus</i>)	BM		M			BM	Sølv­måge	Silbermöwe	Zilvermeeuw	Charadriiformes	Laridae
79	Great Black-backed Gull (<i>Larus marinus</i>)	BM		M			BM	Svartbag	Mantelmöwe	Grote Mantelmeeuw	Charadriiformes	Laridae
80	Kittiwake (<i>Larus tridactylus</i>)	M						Ride	Dreizehenmöwe	Drieteenmeeuw	Larus tridactylus	Laridae
81	Gull-billed Tern (<i>Gelochelidon nilotica</i>)	B		B		B	B	Sandterne	Lachseeschwalbe	Lachstern	Charadriiformes	Sternidae

82	Sandwich tern (<i>Sterna sandvicensis</i>)	BM	BM	BM	B	BM	B	Splitterne	Brandseeschwalbe	Grote Stern	Charadriiformes	Sternidae
83	Common Tern (<i>Sterna hirundo</i>)	BM	BM	BM	B	BM	B	Fjordterne	Flußseeschwalbe	Visdief	Charadriiformes	Sternidae
84	Arctic Tern (<i>Sterna paradisaea</i>)	BM	BM	BM	B	BM	B	Havterne	Küstenseeschwalbe	Noordse Stern	Charadriiformes	Sternidae
85	Little Tern (<i>Sterna albifrons</i>)	BM	BM	BM	B	BM	B	Dværgterne	Zwergseeschwalbe	Dwergstern	Charadriiformes	Sternidae
86	Black Tern (<i>Chlidonias niger</i>)	B	M		M	B		Sortterne	Trauerseeschwalbe	Zwarte Stern	Charadriiformes	Sternidae
87	Guillemot (<i>Uria aalge</i>)	M						Atlantisk Lomvie	Trottellumme	Zeekoet	Charadriiformes	Alcidae
88	Razorbill (<i>Alca torda</i>)	M						Alk	Tordalk	Alk	Charadriiformes	Alcidae
89	Short-eared Owl (<i>Asio flammeus</i>)	B	B	B	B	BM	B	Mosehornugl	Sumpfohreule	Velduil	Strigiformes	Strigidae
90	Kingfisher (<i>Alcedo atthis</i>)							Isfugl	Eisvogel	Ijsvogel	Coraciiformes	Alcedinidae
91	Wood Lark (<i>Lullula arborea</i>)		M					Hedelærke	Heidelerche	Boomleeuwerik	Passeriformes	Alaudidae
92	Sky Lark (<i>Alauda arvensis</i>)			B				Sanglærke	Felderlärche	Veldleeuwerik	Passeriformes	Alaudidae
93	Shore (Horned) Lark (<i>Eremophila alpestris</i>)					M		Bjerglærke	Ohrenlärche	Strandleeuwerik	Passeriformes	Alaudidae
94	Meadow Pipit (<i>Anthus pratensis</i>)							Engpiber	Wiesenpieper	Graspieper	Passeriformes	Motacillidae
95	Blue-Headed Wagtail (<i>Motacilla flava</i>)			B				Gul Vipstjert	Schafstelze	Gele Kwikstaart	Passeriformes	Motacillidae
96	Bluethroat (<i>Luscinia svecica</i>)	B		B		B		Blåhals	Blaukelchen	Blauwborst	Passeriformes	Muscicapidae
97	Whinchat (<i>Saxicola rubetra</i>)			B	B			Bynkefugl	Braunkelchen	Paapje	Passeriformes	Muscicapidae
98	Stonechat (<i>Saxicola torquata</i>)				B			Sortstrubet Bynkefugl	Schwarzkelchen	Roodborsttapuit	Passeriformes	Muscicapidae
99	Wheatear (<i>Oenanthe oenanthe</i>)			B	B			Almindelig Stenpikker	Steinschmätzer	Tapuit	Passeriformes	Muscicapidae
100	Savi's Warbler (<i>Locustella luscinioides</i>)			B				Savisanger	Rohrschwirl	Snor	Passeriformes	Sylviidae
101	Sedge Warbler (<i>Acrocephalus schoenobaenus</i>)			B	B			Sivsanger	Schilfrohrsänger	Rietzanger	Passeriformes	Sylviidae
102	Red-Breasted Flycatcher (<i>Ficedula parva</i>)		M					Lille Fluesnapper	Zwergschnäpper	Kleine Vliegenvanger	Passeriformes	Muscicapidae (Muscicapinae)
103	Bearded Tit (<i>Panurus biarmicus</i>)							Skægmejse	Bartmeise	Baardmannetje	Passeriformes	Timaliidae
104	Red-Backed Shrike (<i>Lanius collurio</i>)				B			Rødrygget Tornskade	Neuntöter	Grauwe Klauwier	Passeriformes	Laniidae
105	Twite (<i>Carduelis flavirostris</i>)					M		Bjergirisk	Berghänfling	Frater	Passeriformes	Fringillidae
106	Snow Bunting (<i>Plectrophenax nivalis</i>)					M		Snespurv	Schneeammer	Sneeuwgors	Passeriformes	Emberizidae

Annex 3

List of endemic salt marsh species.

List of endemic saltmarsh species

The table below lists 271 endemic species in the saltmarshes of the nominated property. A selection of a bibliography in English language with regard to the endemites is given for further information.

ANDRESEN, H., BAKKER, J.P., BRONGERS, M., HEYDEMANN, B. & IRMLER, U. (1990): Long-term changes of salt marsh communities by cattle grazing. *Vegetatio*, 89, 137-148.

DESENDER, K. (1985): Wing polymorphism and reproductive biology in the halobiont Carabid-Beetle *Pogonus chalceus* (Marsham) (Coleoptera, Carabidae). *Biol. Jb. Dodonaea* 53, 89-100.

FOSTER, W.A. & TREHERNE, J.E. (1975): The distribution of an intertidal Aphid, *Pemphigus trehernei* FOSTER, on marine saltmarshes. *Oecologia* 21, 141-155.

FOSTER, W.A. (1983): Activity rhythms and the tide in a saltmarsh beetle *Dicheirotrichus gustavi*. *Oecologia* 60, 111-113.

HEMMINGA, M.A. und VAN SOELEN, J. (1988): Estuarine gradients and the growth and development of *Agapanthia villosoviridescens* (Coleoptera), a stem-borer of the salt marsh halophyte *Aster tripolium*. *Oecologia* 77, 307-312.

MEYER, H., FOCK, H., HAASE, A., REINKE, H.-D. & TULOWITZKI, I. (1995): Structure of the invertebrate fauna in salt marshes of the Wadden Sea coast of Schleswig-Holstein influenced by sheep-grazing. - *Helgoländer Meeresuntersuchungen* 49: 563-589; Hamburg. [D: SH; eco]

REINKE, H.-D., MEYER, H. (1999): Monitoring of the evertbrate fauna in Wadden Sea salt marshes. - *Senckenbergiana Maritima* 29 (Supplement): 127-133., Frankfurt am Main.

SOELEN, J., VAN & MARKUSSE, M.M. (1983): Notes on the distribution of some insect species in the stems of *Aster tripolium* L (Compositae). - *Ent. Berichten Amsterdam* 43: 124-127.

WYATT, T.D. & FOSTER, W.A. (1988): Distribution and abundance of the intertidal saltmarsh beetle *Bledius spectabilis*. - *Ecological Entomology* 13: 453-464.

Order	Family	Species	Salt-typ
Gastropoda		Assiminea grayana (Fleming)	hal-1
Gastropoda		Hydrobia ulvae (Pennant)	hal-1
Gastropoda		Limapontia capitata Müller	hal-1
Gastropoda		Ovatella myosotis (Draparnaud)	hal-1
Crustacea		Corophium volutator (Pallas)	hal-1
Crustacea		Orchestia gammarellus Pallas	hal-1
Oribatei	Oribatei	Ameronothrus nigrofemoratus	hal-1
Oribatei	Oribatei	Ameronothrus schneideri (Oudemanns)	hal-1
Oribatei	Oribatei	Hermannia subglabra Berlese	hal-1
Oribatei	Oribatei	Oribatella arctica litoralis Strenzke	hal-1
Oribatei	Oribatei	Punctoribates quadrivertex (Halbert)	hal-1
Gamasina	Gamasina	Leioseicus salinus (Halbert)	hal-1
Gamasina	Gamasina	Parasitus trouessarti (Berlese)	hal-1
Gamasina	Gamasina	Dendrolaelaps halophilus (Willmann)	hal-1
Collembola	Collembola	Archisotoma pulchella (Moniez)	hal-1
Collembola	Collembola	Folsomia sexoculata (Tullberg)	hal-1
Collembola	Collembola	Isotoma maritima (Tullberg)	hal-1
Collembola	Collembola	Onychiurus debilis (Moniez)	hal-1
Araneae	Dictynidae	Argenna patula Simon	hal-1
Araneae	Linyphiidae	Allomengea scopigera	hal-2
Araneae	Linyphiidae	Baryphyma duffeyi (Millidge)	hal-1
Araneae	Linyphiidae	Ceratinopsis sativa (Simon)	hal-2
Araneae	Linyphiidae	Erigone arctica (White)	hal-2
Araneae	Linyphiidae	Erigone longipalpis (Sundevall)	hal-2
Araneae	Linyphiidae	Erigone vagans (Audouin)	hal-2
Araneae	Linyphiidae	Hypomma bituberculatum (Wider)	hal-3
Araneae	Linyphiidae	Hypselistes jacksoni (O.P. Cambridge)	hal-2
Araneae	Linyphiidae	Oedothorax retusus (Westring)	hal-2
Araneae	Linyphiidae	Porrhomma microphthalmum (O.P. Cambridge)	hal-2
Araneae	Linyphiidae	Silometopus ambiguus (O.P. Cambridge)	hal-1
Araneae	Linyphiidae	Silometopus curtus (Simon)	hal-1-2
Araneae	Linyphiidae	Silometopus incurvatus (O.P. Cambridge)	hal-1
Araneae	Linyphiidae	Silometopus reussi (Thorell)	hal-2
Araneae	Linyphiidae	Walckenaeria vigilax (Blackwell)	hal-2
Araneae	Lycosidae	Pardosa purbeckesis (O.P. Cambridge)	hal-1
Araneae	Theridiidae	Robertus heydemanni Wiehle	hal-1
Araneae	Theridiidae	Enoplognatha mordax (Thorell)	hal-2
Araneae	Thomisidae	Ozyptila westringi	hal-1
Coleoptera	Apionidae	Pseudaplemonus limonii Kirby	hal-1
Coleoptera	Cantharidae	Cantharis fulvicillis F.	hal-2
Coleoptera	Cantharidae	Cantharis rufa var. darwiniana Sharp.	hal-1
Coleoptera	Carabidae	Acupalpus elegans (Dejean)	hal-1
Coleoptera	Carabidae	Agonum monachum (Duftschmidt) [= atratum Duftsch.]	hal-1
Coleoptera	Carabidae	Amara convexiuscula (Marsham)	hal-2
Coleoptera	Carabidae	Amara ingenua (Duftschmidt)	hal-2
Coleoptera	Carabidae	Amara strenua Zimmermann	hal-1
Coleoptera	Carabidae	Anisodactylus poeciloides (Stephens)	hal-1
Coleoptera	Carabidae	Bembidion aeneum Germar	hal-1
Coleoptera	Carabidae	Bembidion ephippium Germar	hal-1
Coleoptera	Carabidae	Bembidion fumigatum Duftschmidt	hal-2
Coleoptera	Carabidae	Bembidion iricolor Bedel	hal-1
Coleoptera	Carabidae	Bembidion lunatum (Duftschmidt)	hal-2-3
Coleoptera	Carabidae	Bembidion lunulatum (Geoffroy)	hal-2-3
Coleoptera	Carabidae	Bembidion maritimum (Stephens)	hal-2
Coleoptera	Carabidae	Bembidion minimum (Fabricius) [= Bembidion pusillum Gyllenhal]	hal-2
Coleoptera	Carabidae	Bembidion normannum Dejean	hal-1
Coleoptera	Carabidae	Bembidion pallidipenne (Illiger)	hal-1

Coleoptera	Carabidae	<i>Bembidion cruciatum polonicum</i> Müller	hal-2
Coleoptera	Carabidae	<i>Bembidion saxatile</i> Gyllenhal	hal-2
Coleoptera	Carabidae	<i>Bembidion tenellum</i> Erichson	hal-1
Coleoptera	Carabidae	<i>Cicindela maritima</i> Dejean	hal-1
Coleoptera	Carabidae	<i>Cillenus lateralis</i> (Leach)	hal-1
Coleoptera	Carabidae	<i>Dicheirotrichus gustavii</i> Crotch	hal-1
Coleoptera	Carabidae	<i>Dyschirius chalceus</i> Erichson	hal-1
Coleoptera	Carabidae	<i>Dyschirius impunctipennis</i> Dawson	hal-2
Coleoptera	Carabidae	<i>Dyschirius obscurus</i> Gyllenhal	hal-2
Coleoptera	Carabidae	<i>Dyschirius salinus</i> Schaum	hal-1
Coleoptera	Carabidae	<i>Pogonus chalceus</i> (Marsham)	hal-1
Coleoptera	Carabidae	<i>Pogonus luridipennis</i> (Germar)	hal-1
Coleoptera	Carabidae	<i>Tachys scutellaris</i> Stephens	hal-1
Coleoptera	Carabidae	<i>Tachys scutellaris</i> Stephens	hal-1
Coleoptera	Cerambycidae	<i>Agapanthia villosoviridescens</i> (de Geer)	hal-2-3
Coleoptera	Chrysomelidae	<i>Longitarsus plantagomaritimus</i> Degeer	hal-1
Coleoptera	Chrysomelidae	<i>Phaedon concinnus</i> Stephens	hal-1
Coleoptera	Coccinellidae	<i>Coccinellia undecimpunctata tripunctata</i> Linne	hal-2
Coleoptera	Curculionidae	<i>Limnobaris dolorosa</i> (Goeze) (= <i>pilistriata</i> Steph.)	hal-2-3
Coleoptera	Curculionidae	<i>Mecinus collaris</i> Germar	hal-2
Coleoptera	Curculionidae	<i>Pelenomus zumpti</i> Wagner	hal-1
Coleoptera	Curculionidae	<i>Polydrusus pulchellus</i> Stephens	hal-1
Coleoptera	Curculionidae	<i>Trichosirocalus thalhammeri</i> (Grenier)	hal-1
Coleoptera	Heteroceridae	<i>Heterocerus flexuosus</i> Stephens	hal-1
Coleoptera	Heteroceridae	<i>Heterocerus fossor</i> Kiesenwetter	hal-1
Coleoptera	Heteroceridae	<i>Heterocerus hispidulus</i>	hal-2-3
Coleoptera	Heteroceridae	<i>Heterocerus maritimus</i> Guérin	hal-1
Coleoptera	Hydraenidae	<i>Ochthebius auriculatus</i> Rey	hal-1
Coleoptera	Hydraenidae	<i>Ochthebius dilatatus</i> Stephens	hal-1
Coleoptera	Hydraenidae	<i>Ochthebius marinus</i> (Paykull)	hal-1
Coleoptera	Hydrophilidae	<i>Cercyon depressus</i> (Stephens)	hal-1
Coleoptera	Hydrophilidae	<i>Cercyon litoralis</i> (Gyllenhal)	hal-1
Coleoptera	Hydrophilidae	<i>Enochrus bicolor</i> (F.)	hal-2
Coleoptera	Malachiidae	<i>Anthocomus coccineus</i> (Schaller) [= <i>rufus</i> Herbst]	hal-2
Coleoptera	Ptiliidae	<i>Ptenidium fuscicorne</i> Erichson	hal-2
Coleoptera	Scirtidae	<i>Cyphon laevipennis</i> Tournier [= <i>phragmiteticola</i> Nyholm]	hal-2
Coleoptera	Staphylinidae	<i>Amischa analis</i> Gray.	hal-2-3
Coleoptera	Staphylinidae	<i>Atheta orbata</i> (Erichson)	hal-2-3
Coleoptera	Staphylinidae	<i>Atheta vestita</i> Gray.	hal-1
Coleoptera	Staphylinidae	<i>Bledius bicornis</i> (Germar)	hal-1
Coleoptera	Staphylinidae	<i>Bledius opacus</i> (Block)	hal-2-3
Coleoptera	Staphylinidae	<i>Bledius spectabilis</i> Kraatz	hal-1
Coleoptera	Staphylinidae	<i>Bledius tricornis</i> (Herbst)	hal-1-2
Coleoptera	Staphylinidae	<i>Brundinia marina</i> (Mulsant & Rey) [= <i>Atheta</i>]	hal-1
Coleoptera	Staphylinidae	<i>Cafius xantholoma</i> Gravenhorst	hal-1
Coleoptera	Staphylinidae	<i>Carpelimus foveolatus</i> (Sahlberg)	hal-2
Coleoptera	Staphylinidae	<i>Carpelimus halophilus</i> (Kiesenwetter)	hal-2
Coleoptera	Staphylinidae	<i>Carpelimus schneideri</i> (Gangelbauer)	hal-1-2
Coleoptera	Staphylinidae	<i>Diglotta submarina</i> Faim.& Lab.	hal-1
Coleoptera	Staphylinidae	<i>Halobrecta flavipes</i> Thompson	hal-1
Coleoptera	Staphylinidae	<i>Halobrecta puncticeps</i> (Thompson)	hal-1
Coleoptera	Staphylinidae	<i>Micalymma marinum</i> (Ström)	hal-1
Coleoptera	Staphylinidae	<i>Omalius riparium</i> Thompson	hal-1
Coleoptera	Staphylinidae	<i>Oxypoda brachyptera</i> (Stephens)	hal-2-3
Coleoptera	Staphylinidae	<i>Oxypoda exoleta</i> Erichson [= <i>bavaria</i> , <i>hütheri</i> Scheerp.]	hal-2
Coleoptera	Staphylinidae	<i>Quedius simplicifrons</i> Fairmaire [= <i>hispanicus</i> Bernhauer]	hal-1
Coleoptera	Staphylinidae	<i>Tomoglossa heydemanni</i> Lohse	hal-1
Lepidoptera	Cochylidae	<i>Phalonidia affinitana</i> (Douglas)	hal-1
Lepidoptera	Cochylidae	<i>Phalonidia vectisana</i> (Humphreys & Westwood)	hal-2

Lepidoptera	Coleophoridae	<i>Coleophora adjunctella</i> Hodkinson	hal-1
Lepidoptera	Coleophoridae	<i>Coleophora artemisiella</i> Scott	hal-2
Lepidoptera	Coleophoridae	<i>Coleophora asteris</i> Mühlig	hal-1
Lepidoptera	Coleophoridae	<i>Coleophora atriplicis</i> Meyrick	hal-1
Lepidoptera	Coleophoridae	<i>Coleophora moeniacella</i> Stainton	hal-1
Lepidoptera	Coleophoridae	<i>Coleophora salicorniae</i> Wocke	hal-1
Lepidoptera	Coleophoridae	<i>Coleophora simillimella</i> Fuchs	hal-2
Lepidoptera	Coleophoridae	<i>Coleophora suaedivora</i> Meyrick	hal-1
Lepidoptera	Coleophoridae	<i>Goniodoma limoniella</i>	hal-1
Lepidoptera	Elachistidae	<i>Elachista scirpi</i> (Stainton)	hal-1
Lepidoptera	Gelechiidae	<i>Aristotelia brizella</i>	hal-2
Lepidoptera	Gelechiidae	<i>Monochroa tetragonella</i> (Stainton)	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa instabiella</i> (Douglas)	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa nitentella</i> (Fuchs)	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa obsoletella</i> (F. v. Röslerstamm)	hal-2
Lepidoptera	Gelechiidae	<i>Scrobipalpa plantaginella</i>	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa salinella</i>	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa samadensis</i> (Pfaff.)	hal-1
Lepidoptera	Gelechiidae	<i>Scrobipalpa strangei</i> (E. Hering)	hal-1
Lepidoptera	Gelechiidae	<i>Xystophora gudmanni</i> Larsen	hal-1
Lepidoptera	Geometridae	<i>Scopula emutaria</i> Hbn. [= <i>Acidalia emutaria</i>]	hal-1
Lepidoptera	Lyonetiidae	<i>Bucculatrix maritima</i> (Stainton)	hal-1
Lepidoptera	Noctuidae	<i>Apamea oblonga</i> (Hayworth)	hal-2
Lepidoptera	Noctuidae	<i>Amphipoea (Mythimna) fucosa</i> (Freyer)	hal-2
Lepidoptera	Noctuidae	<i>Mythimna favicolor</i> (Barret)	hal-1
Lepidoptera	Pterophoridae	<i>Agdistis benneti</i> Curt.	hal-1
Lepidoptera	Pyalidae	<i>Pediarsia aridella</i> (Thenberg)	hal-1
Lepidoptera	Tortricidae	<i>Bactra robustana</i> (Christoph)	hal-1
Lepidoptera	Tortricidae	<i>Eucosoma krygeri</i> Rebel	hal-1
Lepidoptera	Tortricidae	<i>Eucosoma maritima</i> (Humphreys & Westwood)	hal-2
Lepidoptera	Tortricidae	<i>Eucosoma tripoliana</i> (Barret)	hal-1
Lepidoptera	Tortricidae	<i>Lobesia litoralis</i> (Humphreys & Westwood)	hal-2
Rhyncho- Aphidoidea	Aphididae	<i>Aphis tripolii</i> Laing, 1920	hal-1
Rhyncho- Aphidoidea	Aphididae	<i>Chaitaphis suaedae</i> (Mimeur)	hal-1
Rhyncho- Aphidoidea	Aphididae	<i>Coloradoa (Lidaja) heizei</i> (Börner, 1952) / Börner, 1952	hal-1
Rhyncho- Aphidoidea	Aphididae	<i>Hayhurstia atriplicis</i>	hal-2
Rhyncho- Aphidoidea	Aphididae	<i>Macrosiphoniella asteris</i> (Walker, 1849)	hal-1
Rhyncho- Aphidoidea	Aphididae	<i>Macrosiphoniella pulvera</i> (Walker, 1848)	hal-1
Rhyncho- Aphidoidea	Aphididae	<i>Staticobium limonii</i> (Contarini, 1847)	hal-1
Rhyncho- Aphidoidea	Callaphididae	<i>Juncobia leegei</i> (Börner, 1930)	hal-2
Rhyncho- Aphidoidea	Chaitophoridae	<i>Atheroides brevicornis</i> Laing	hal-2
Rhyncho- Aphidoidea	Chaitophoridae	<i>Sipha litoralis</i> (Walker)	hal-1
Rhyncho- Aphidoidea	Pemphigidae	<i>Geoica utricularia</i> (Passerini, 1856) sensu Mordvilko, 1935	hal-1
Rhyncho- Aphidoidea	Pemphigidae	<i>Aploneura lentisci</i> (Passerini)	hal-2
Rhyncho- Aphidoidea	Pemphigidae	<i>Pemphigus trehernei</i> Foster	hal-1
Diptera- Nematocera	Cecidomyiidae	<i>Jaapiella schmidti</i> (RÜBSAAMEN, 1912)	hal-1
Diptera- Nematocera	Cecidomyiidae	<i>Mayetiola agrostivora</i> MEYER, 1985	hal-2

Diptera- Nematocera	Cecidomyiidae	Mayetiola puccinelliae MEYER, 1980	hal-1
Diptera- Nematocera	Cecidomyiidae	Procystiphora gerardii MEYER, 1980	hal-1
Diptera- Nematocera	Cecidomyiidae	Rhopalomyia florum (KIEFFER, 1890)	hal-1
Diptera- Nematocera	Limoniidae	Symplecta hybrida (Meigen)	hal-2
Diptera- Nematocera	Limoniidae	Symplecta stictica (Meigen)	hal-1-2
Diptera- Brachycera	Agromyzidae	Amauromyza luteiceps (HENDEL, 1920)	hal-1
Diptera- Brachycera	Agromyzidae	Cerodontha fasciata (STROBL, 1880)	hal-1
Diptera- Brachycera	Agromyzidae	Cerodontha suturalis (HENDEL, 1931)	hal-1
Diptera- Brachycera	Agromyzidae	Chromatomyia asteris (= Phytomyza) (HENDEL, 1934)	hal-1
Diptera- Brachycera	Agromyzidae	Liriomyza angulicornis (MALLOCH, 1918)	hal-1
Diptera- Brachycera	Agromyzidae	Liriomyza cicerina (RONDANI, 1875)	hal-2
Diptera- Brachycera	Agromyzidae	Liriomyza gudmanni HERING, 1928	hal-1
Diptera- Brachycera	Agromyzidae	Liriomyza latipalpis HENDEL, 1920	hal-1
Diptera- Brachycera	Agromyzidae	Melanagromyza tripolii SPENCER, 1957	hal-1
Diptera- Brachycera	Agromyzidae	Metopomyza junci VON TSCHIRNHAUS, 1981	hal-1
Diptera- Brachycera	Agromyzidae	Napomyza maritima VON TSCHIRNHAUS, 1981	hal-1
Diptera- Brachycera	Agromyzidae	Napomyza tripolii SPENCER, 1966	hal-1
Diptera- Brachycera	Agromyzidae	Ophiomyia ononidis SPENCER, 1966	hal-2
Diptera- Brachycera	Agromyzidae	Phytomyza euphrasiae KALTENBACH, 1860	hal-2
Diptera- Brachycera	Agromyzidae	Phytomyza isais HERING, 1936	hal-2
Diptera- Brachycera	Agromyzidae	Phytomyza plantaginis ROBIN.-DESVOIDY, 1851	hal-1
Diptera- Brachycera	Anthomyiidae	Pegomya betae atriplicis (CURTIS, 1847)	hal-1
Diptera- Brachycera	Chloropidae	Aphanotrigonum fasciellum (ZETTERSTEDT, 1855)	hal-1
Diptera- Brachycera	Chloropidae	Aphanotrigonum femorellum COLLIN, 1946	hal-1
Diptera- Brachycera	Chloropidae	Aphanotrigonum femorellum COLLIN, 1946	hal-1
Diptera- Brachycera	Chloropidae	Chlorops calceatus MEIGEN, 1830	hal-1
Diptera- Brachycera	Chloropidae	Dicraeus fennicus DUDA, 1933	hal-1
Diptera- Brachycera	Chloropidae	Elachiptera cornuta (FALLÉN, 1820)	hal-1
Diptera- Brachycera	Chloropidae	Eribolus slesvicensis BECKER, 1910	hal-1
Diptera- Brachycera	Chloropidae	Eurina lurida MEIGEN, 1830	hal-1
Diptera- Brachycera	Chloropidae	Incertella (= Tropicoscinis) junci n.sp. VON TSCHIRNHAUS, 1981	hal-1

Diptera- Brachycera	Chloropidae	<i>Incertella</i> (= <i>Tropidoscinis</i>) <i>triglochimidis</i> n.sp. VON TSCHIRNHAUS, 1981	hal-1
Diptera- Brachycera	Chloropidae	<i>Melanum laterale</i> (HALIDAY, 1833)	hal-1
Diptera- Brachycera	Chloropidae	<i>Meromyza nigriventris</i> MACQUART, 1835	hal-2
Diptera- Brachycera	Chloropidae	<i>Meromyza puccinelliae</i> n.sp. VON TSCHIRNHAUS, 1981	hal-1
Diptera- Brachycera	Chloropidae	<i>Microcercis</i> (= <i>Tropidoscinis</i>) <i>zuercheri</i> (DUDA, 1933)	hal-1
Diptera- Brachycera	Chloropidae	<i>Microcercis trigonella</i> (= <i>Oscinella</i>) (DUDA, 1933)	hal-1
Diptera- Brachycera	Chloropidae	<i>Oscinimorpha albisetosa</i> (DUDA, 1932)	hal-1
Diptera- Brachycera	Chloropidae	<i>Oscinimorpha albisetosa</i> (DUDA, 1932)	hal-1
Diptera- Brachycera	Chloropidae	<i>Pseudopachychaeta approximatonervis</i> (ZETTERSTEDT, 1848)	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Aphrosylus mitis</i> Verrall, 1912	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Asyndetus longicornis</i> Negrobov, 1973	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Campsicnemus armatus</i> (Zetterstedt, 1849)	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Campsicnemus magius</i> (Loew, 1845)	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus clavipes</i> Haliday, 1832	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus diadema</i> Haliday, 1832	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus latipennis</i> Fallén, 1823	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus plumipes</i> (Scopoli, 1763)	hal-2-3
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus sabinus</i> Haliday, 1838	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus signifer</i> Haliday, 1838	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Dolichopus strigipes</i> Verrall, 1875	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Hydrophorus oceanus</i> (Macquart, 1838)	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Hydrophorus praecox</i> (Lehmann, 1822)	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Machaerium maritimae</i> Haliday, 1832	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Medetera micacea</i> Loew, 1857	hal-2-3
Diptera- Brachycera	Dolichopodidae	<i>Melanostolus nigricilius</i> (Loew, 1871)	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Micromorphus albipes</i> (Zetterstedt, 1843)	hal-1-2
Diptera- Brachycera	Dolichopodidae	<i>Muscidideicus praetextatus</i> (Haliday, 1855)	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Orthoceratium lacustre</i> (Scopoli, 1763)	hal-1
Diptera- Brachycera	Dolichopodidae	<i>Poecilobothrus regalis</i> (Meigen, 1824)	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Rhaphium consobrinum</i> Zetterstedt, 1843	hal-2
Diptera- Brachycera	Dolichopodidae	<i>Rhaphium riparium</i> (Meigen, 1824)	hal-1-2

Diptera- Brachycera	Dolichopodidae	Schoenophilus versutus (Haliday, 1851)	hal-2
Diptera- Brachycera	Dolichopodidae	Sciapus maritimus Becker, 1918	hal-1
Diptera- Brachycera	Dolichopodidae	Sympycnus desoutteri Parent, 1925	hal-2-3
Diptera- Brachycera	Dolichopodidae	Syntormon filiger Verrall, 1912	hal-2
Diptera- Brachycera	Dolichopodidae	Syntormon pallipes (Fabricius, 1794)	hal-2-3
Diptera- Brachycera	Dolichopodidae	Syntormon rufipes	hal-2
Diptera- Brachycera	Dolichopodidae	Thinophilus flavipalpis (Zetterstedt, 1843)	hal-1
Diptera- Brachycera	Dolichopodidae	Thinophilus ruficornis (Haliday, 1838)	hal-1-2
Diptera- Brachycera	Empididae	Hilara lundbecki Frey, 1913	hal-1
Diptera- Brachycera	Empididae	Rhamphomyia (Pararhamphomyia) simplex Zetterstedt, 1849	hal-1
Diptera- Brachycera	Hybotidae	Chersodromia cursitans (Zetterstedt, 1819)	hal-2
Diptera- Brachycera	Hybotidae	Chersodromia speculifera Walker, 1851	hal-1
Diptera- Brachycera	Hybotidae	Crossopalpus curvipes (Meigen, 1822)	hal-2
Diptera- Brachycera	Hybotidae	Stilpon nubilus Collin, 1926	hal-2
Diptera- Brachycera	Stratiomyidae	Nemotelus notatus Zetterstedt	hal-1
Diptera- Brachycera	Stratiomyidae	Nemotelus uliginosus (Linne)	hal-1
Diptera- Brachycera	Syrphidae	Eristalinus sepulchralis (L.)	hal-1
Diptera- Brachycera	Syrphidae	Lathyrophthalmus aeneus	hal-1
Diptera- Brachycera	Tephritidae	Ensina sonchi (LINNÉ, 1767)	hal-1
Diptera- Brachycera	Tephritidae	Paroxyna plantaginis (HALIDAY, 1883)	hal-1
Heteroptera	Miridae	Exolygus maritimus Wagner	hal-2
Heteroptera	Miridae	Conostethus friscus Wagner	hal-1
Heteroptera	Miridae	Melanotrichus moncreaffi D.Sc. [Ortholygus]	hal-1
Heteroptera	Miridae	Melanotrichus rubidus (Puton) [Ortholygus]	hal-1
Heteroptera	Miridae	Plioopterus litoralis Wagner [Plagiognathus]	hal-1
Heteroptera	Tingidae	Agramma confusa (Puton)	hal-1
Heteroptera	Saldidae	Chartoscirta elegantula (Fallen)	hal-2-3
Heteroptera	Saldidae	Chiloxanthus pilosus (Fallen)	hal-1-2
Heteroptera	Saldidae	Chiloxanthus setulosus	hal-1-2
Heteroptera	Saldidae	Halosalda lateralis (Fallen)	hal-1
Heteroptera	Saldidae	Salda littoralis (Linne)	hal-2-3
Heteroptera	Saldidae	Saldula pallipes (Fabricius)	hal-2-3
Heteroptera	Saldidae	Saldula palustris (Douglas & Scott)	hal-1
Heteroptera	Saldidae	Saldula pilosella (Thomson)	hal-2-3
Heteroptera	Saldidae	Saldula saltatoria (L.)	hal-2-3
Auchenorrhyncha	Cicadellidae	Anoscopus limicola (=Aphrodes li. W.Wa.37) (Edwards, 1908)	hal-1
Auchenorrhyncha	Cicadellidae	Arthaldeus pascuellus (Fallén, 1826)	hal-2-3
Auchenorrhyncha	Cicadellidae	Cicadula (Cicadula) quadrinotata (Fabricius, 1794)	hal-2-3
Auchenorrhyncha	Cicadellidae	Conosanus obsoletus (Kirschbaum, 1858)	hal-2-3
Auchenorrhyncha	Delphacidae	Delphax pulchellus (Curtis, 1833)	hal-2-3

Auchenorrhyncha	Cicadellidae	Eupteryx artemisiae (Kirschbaum, 1868) [Poliopterus litoralis]	hal-1
Auchenorrhyncha	Cicadellidae	Macrosteles (Macrosteles) horvathi (W. Wagner, 1935)	hal-1-2
Auchenorrhyncha	Cicadellidae	Macrosteles (Macrosteles) sordidipennis (Stal, 1858)	hal-2
Auchenorrhyncha	Cicadellidae	Paramesus obtusifrons (Stal, 1853)	hal-1
Auchenorrhyncha	Cicadellidae	Psammotettix putoni (= Deltoc. halophilus Edw.24) (Then, 1898)	hal-1
Auchenorrhyncha	Cicadellidae	Stroggylocephalus agrestis (Falle'n, 1806)	hal-2-3

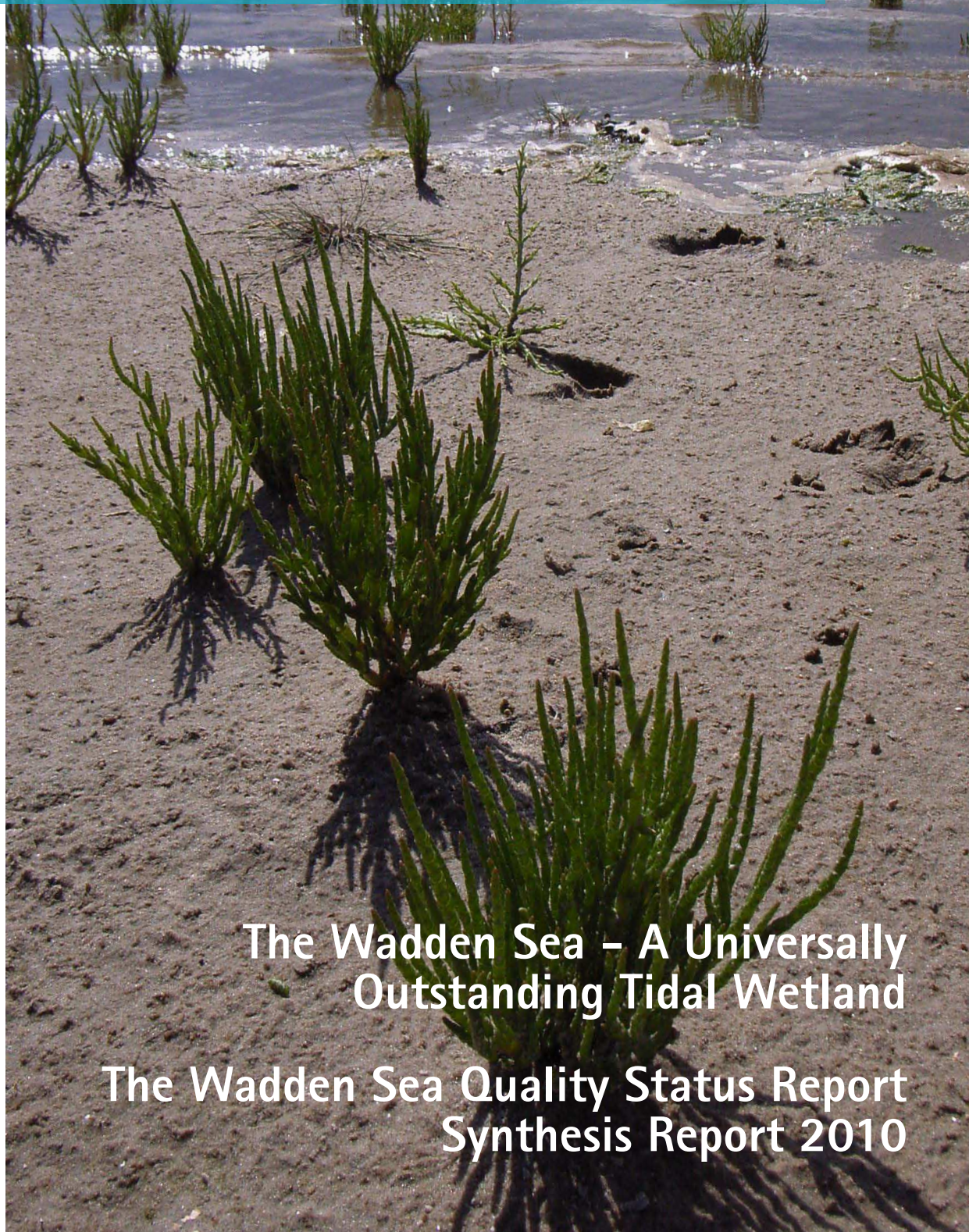
Annex 4

**The Wadden Sea Quality Status Report
2009. Marencic, H. and de Vlas, J. (Eds.),
2009. Wadden Sea Ecosystem No. 25.
(only on DVD)**

Annex 5

**The Wadden Sea Quality Status Report –
Synthesis Report 2010. Wolff, W.J, Bakker,
J.P., Laursen, K. and Reise, K., 2010.
Wadden Sea Ecosystem No. 29.**

The Wadden Sea 2010



The Wadden Sea – A Universally
Outstanding Tidal Wetland

The Wadden Sea Quality Status Report
Synthesis Report 2010

WADDEN SEA ECOSYSTEM No. 29 – 2010



The Wadden Sea 2010

The Wadden Sea – A Universally
Outstanding Tidal Wetland

The Wadden Sea Quality Status Report
– Synthesis Report 2010

Colophon

Publisher

Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany;

Language support

Seabury Salmon

Cover Photo

Klaus Janke

Lay-out and technical editing

Common Wadden Sea Secretariat

Graphic support

Gerold Lürßen

Published

2010

ISSN 0946-896X

This publication should be cited as:

Karsten Reise, Martin Baptist, Peter Burbridge, Norbert Dankers, Ludwig Fischer, Burghard Flemming, Albert P. Oost, Cor Smit, 2010. The Wadden Sea – A Universally Outstanding Tidal Wetland. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 7 – 24.

Wim J. Wolff, Jan P. Bakker, Karsten Laursen, Karsten Reise, 2010. The Wadden Sea Quality Status Report – Synthesis Report 2010. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 25 – 74.

The designation of the Dutch and German parts of the Wadden Sea Conservation Area as a World Heritage Site by UNESCO in June 2009 was a major step in formally recognizing the global importance of the Wadden Sea as a nature area. As such, it is managed through a joint effort of Denmark, Germany and The Netherlands. Therefore, the QSR Synthesis Report 2010 is preceded by a summary report of the universally outstanding and most significant natural values. This is based on the nomination dossier and is here extended to cover the entire Wadden Sea

In this Trilateral Wadden Sea Cooperation, the Trilateral Monitoring and Assessment Program (TMAP) plays a central role, providing the basis for a periodic assessment of the condition of the Wadden Sea ecosystem, and for an evaluation of progress towards the ecological targets set out in the Wadden Sea Plan.

This Quality Status Report 2009 (QSR 2009) was prepared to update the findings of the QSR

2004 and to provide input into the Trilateral Governmental Conference on Sylt on 18 March 2010. The work was coordinated by the Common Wadden Sea Secretariat and the Trilateral Monitoring and Assessment Group. Over 115 scientists from The Netherlands, Germany and Denmark contributed to this project during 2008–2009. They prepared 30 thematic reports which were published in November 2009 (<http://www.waddensea-secretariat.org/QSR-2009/index.htm>).

These thematic reports, together with findings from the 12th International Wadden Sea Symposium (Wilhelmshaven, 30 March – 3 April 2009) (Wadden Sea Ecosystem No. 26) provide the basis for the QSR synthesis report presented here. It summarizes the main findings of the QSR thematic reports and attempts to present an integrated assessment of the main ecosystem developments and identify main issues of concern and gaps of knowledge for science, management and policy.

Common Wadden Sea Secretariat

The Wadden Sea 2010

The Wadden Sea – A Universally Outstanding Tidal Wetland

Karsten Reise, Martin Baptist, Peter Burbridge, Norbert Dankers, Ludwig Fischer, Burghard Flemming, Albert P. Oost, Cor Smit _____ page 7

The Wadden Sea Quality Status Report – Synthesis Report 2010

Wim J. Wolff, Jan P. Bakker, Karsten Laursen, Karsten Reise page 25

WADDEN SEA ECOSYSTEM No. 29

The Wadden Sea – A Universally Outstanding Tidal Wetland

Karsten Reise

Martin Baptist

Peter Burbridge

Norbert Dankers

Ludwig Fischer

Burghard Flemming

Albert P. Oost

Cor Smit

2010
Common Wadden Sea Secretariat

This publication should be cited as:

Karsten Reise, Martin Baptist, Peter Burbridge, Norbert Dankers, Ludwig Fischer, Burghard Flemming, Albert P. Oost, Cor Smit, 2010. The Wadden Sea – A Universally Outstanding Tidal Wetland. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 7 - 24.

Abstract



Bird flock on the Wadden Sea beach (Photo: J. van de Kam).

Along the North Sea shore, the largest coherent tidal flat area of the temperate world has evolved. Sediment supply from the sea has sufficiently balanced a slow sea-level rise in the last 8,000 years to maintain a coastal configuration of a seaward sandy barrier, extensive tidal flats and episodically flooded marshes. The Wadden Sea is unique in that it consists of vast (4,700 km²) bare sand and mud flats, emerging twice daily at low tide. Oceanic waters dominate river influence, and dynamic sandy shoals and dune islands provide a partial shelter against waves and winds of a rough sea. In the course of a year, the Wadden Sea is visited by an unparalleled 10-12 million birds for foraging and resting on their East Atlantic flyway. Food provision in the form of tidal flat fauna is 10-20 times higher than in adjacent deeper waters. When the tide is in, the flats serve as a rich nursery for shrimp and fish. The Wadden Sea

constitutes a gigantic biological filter between land and sea. This filter is primarily composed (1) of extensive beds of molluscan suspension feeders which filter the local tidal volume about twice a month, (2) of sediment kept permeable by bioturbating lugworms, and (3) of marsh vegetation which functions as a filter during episodic storm surges when waters are loaded with re-suspended fine particles. An impressive number of about 10,000 species of plants, fungi and animals thrive in the Wadden Sea. After a long phase of over-exploitation, protection measures have triggered spectacular recoveries in breeding birds and seals. Large-scale land claims have ceased and the Wadden Sea is today highly rated for its serene beauty. Global warming with an accelerating sea-level rise, however, may threaten the sandy barrier and the extent of the tidal flats.

1. Introduction

The earliest and most famous historical testimony of the Wadden Sea is recorded in the 'Historia Naturalis' by Plinius the Elder who visited the southern coast of the North Sea in the year 47 AD. He was amazed by the 'indistinctness' and 'immeasurable expanse' of land inundated by the sea twice daily. The intimate bond between the people and this changeable environment was quite incomprehensible to him. However, perception of pleasure was derived from the Wadden Sea when in the 18-19th centuries the 'aesthetics of the sublime' stimulated human senses to ascribe outstanding value to this serene coastal sea with land diving under water and water running off the land, with an open horizon and limitless sky, and a calm sea which may all of a sudden turn wild with an arising torrential storm (Fischer and Hasse, 2001).

The Wadden Sea is mostly shallow enough to wade across. The unique vastness of the tidal flats and shoals, fringing salt marshes, wide beaches and dune islands with a spectacular abundance of

wildlife has been the motivation for proposing the Wadden Sea as a UNESCO World Heritage Site. The following text is condensed from the description and justification chapters of the Dutch-German nomination dossier (CWSS, 2008, 2009), but here extended to cover the entire Wadden Sea area including the Danish part. The foremost question was: On which universally outstanding, most significant natural values should the inscription be based? We have employed major reviews of scientific knowledge (Wolff 1983), quality assessments (CWSS, 1991; De Jong, 1999; Essink *et al.*, 2005; Marencic & de Vlas, 2009), and cite representative studies on the geomorphology, ecology and biology of the region from the 19th century onwards. Comparisons with other coasts of the world are based on Reineck and Singh (1980), Flemming (2002), Reise (2001) and own surveys (see annex 3 in CWSS, 2008). The purpose of this paper is to provide a concise overview on physical and biotic values which lend the Wadden Sea a universally outstanding status worthy for inscription as UNESCO World Heritage Site.

Figure 1: Satellite images taken in 2000–2002 and combined to show low tide conditions everywhere. In reality tidal waves progress counter-clockwise over a six-hour period through the Wadden Sea (Source: Eurimage, Common Wadden Sea Secretariat & Brockmann Consult). Arrows indicate boundaries between sub-regions. Inset shows tidal basins in the Northern Wadden Sea (modified from CPSL, 2005).



2. Physical Environment

The Wadden Sea has the world's largest continuous belt of bare tidal flats partially sheltered by a sandy barrier against a rough sea, with the latter's waters dominating river influence. When post-glacial sea level rise began to slow down about 8,000 years ago, the Wadden Sea emerged with a seaward barrier of dune islands and sandy shoals, and a landward area of tidal flats and salt marshes (Zagwijn, 1986; Flemming and Davis, 1994). The rates of sea-level rise and sediment supply varied over time and locality, causing continuous dynamics in the coastal morphology of the Wadden Sea. As a result, at times parts of the coast have grown where the sea tides and waves have washed in more sediment from the adjacent offshore zone than was needed to compensate for sea level rise. At other times, the coast retreated in some places when sediment supply has been unable to compensate for sea level rise. In this way, the Holocene history of sea level, climate, and depositional responses has been preserved in the stratigraphic record of the Wadden Sea (Streif, 1989; Bartholdy and Pejrup, 1994; Behre, 2003).

With the Wadden Sea, a universally outstanding coastal landscape has arisen at the southern and eastern shores of the North Sea (Figure 1). Along a coastal stretch of approximately 500 km, an uninterrupted belt of sand and mud flats with a total area of 4,700 km² is exposed to the air and then covered by water twice daily in the rhythm of the tides. This belt of tidal flats is dissected by more than 30 branching tidal inlets and five major estuaries. Such a vast and coherent intertidal area not covered by salt marsh vegetation is found nowhere else in the world.

There are many other sedimentary coasts which, in one way or another, resemble the Wadden Sea morphologically but are much smaller or differ in terms of climate, river influence, tides or waves. Other large tidal flats can be found in the Arctic, but there the tides tend to be smaller than in the Wadden Sea, and the shore is frozen and covered by ice most of the year. In tropical and subtropical climates, the tidal zone is often occupied by mangroves, whereas in the Wadden Sea tidal flats lack upright growing plants, except for salt marsh vegetation above mean high-tide level. On other coasts, most of the sediment is directly supplied from the hinterland by rivers, and salinity is usually low or variable. Examples of such coasts are the Arctic Lena Delta, the temperate Mississippi Delta or tropical deltaic regions of the Amazon, Niger or Ganges. Also, the wide mud flats along the coasts of the Yellow Sea have been built up by rivers.

The Wadden Sea is special in that almost all of the sediments are supplied from the adjacent sea with only a minor or local river influence (Arends, 1833; van Straaten and Kuenen, 1957). Salinity ranges mostly between 20 and 30 psu, which is less than in the open ocean (34) but more than in estuaries (0-20), where most other intertidal flats are found in Europe. Large sand and mud flats occur along the NW African coast where the Banc d'Arguin covers an area of 630 km² and which corresponds to 13% of the tidal flat area of the Wadden Sea (Wolff *et al.*, 1993). These tidal flats constitute a relic from a former river delta, and are intimately linked to the Wadden Sea by its wading birds overwintering there (Wymenga *et al.*, 1990). The Wadden Sea comprises about 60% of the intertidal area at the north-eastern Atlantic shores.

A further feature of the Wadden Sea is a seaward barrier of sandy islands and shoals which is a consequence of moderate tidal ranges, and sand having been supplied from the offshore by waves and subsequently moved by the wind (Oost and de Boer, 1994). Tides have increased with the rising level of the sea and today span from 1.5 to 4 m. Below a tidal range of about 0.5 m, unbroken barrier spits and lagoons develop and above about 3.5 m barrier islands no longer occur due to the large tidal prisms. The Wadden Sea may be divided into three morphological sub-regions (see arrows in Figure 1), based on tidal ranges between 1.5 to 3 m in the South and North, and >3 m in the central part, as well as on coastal orientation and river influence:

- In the Southern Wadden Sea, twelve major barrier islands located 5 to 15 km off the mainland shore, shelter the tidal area against waves generated by northwesterly and northerly winds. Sediment imported from the sea does not fully compensate for sea-level rise and islands migrate landwards. A large embayment, the former brackish Zuiderzee (3,600 km²), was part of the Southern Wadden Sea until it was separated by a dam in 1932. It was subsequently converted into a freshwater lake and arable land. Another embayment, the estuarine Dollard, still exists.
- In the Central Wadden Sea, tidal ranges often exceed 3 m and there are four estuaries causing a lower and more variable salinity than in the other two regions. A seaward chain of barrier islands is absent. Here, sediment import seems to balance sea-level rise. With the Jadebusen, a large embayment extends deep into the low-lying coastal marshland.

- In the Northern Wadden Sea, eight islands and elevated sand bars form a seaward barrier 5 to 25 km off the mainland. They provide shelter against waves generated by the prevailing westerly winds. Mostly, sediment supply does not compensate for sea-level rise, except for an oversupply between the islands of Rømø and Fanø. Several marsh islands are scattered across the tidal area. These are remnants of a coherent marshland which became drowned in late medieval times. In the North, some Pleistocene cliffs meet the sea.

A distinctive hydrological feature of the Wadden Sea is a series of tidal basins which are marine analogues to river catchments (Postma, 1954; Ehlers, 1988). However, flow direction alternates with the tides (see inset in Figure 1). The existence of tidal basins is interrelated with barrier islands and elevated sands. Between these, the tidal flow is compressed and scours deep tidal inlets with a mean flow of about 1 m s^{-1} . Behind the barrier islands, most inlets branch into major tidal channels which, in turn, branch into successively smaller tidal creeks or runnels in a recurrent fractal pattern. In the back-barrier area, flood waters of adjacent tidal inlets meet at tidal divides (watersheds) where currents tend to calm down (Figure 2). Other than in lagoons, tidal divides allow for a direct lateral connection between basins. Seaward of tidal inlets, ebb-delta shoals are formed. Here, ebb currents interact with waves and a long-shore current which runs from southwest towards northeast.

The sediment distribution along deltaic coasts is typically from coarse materials inshore to progressively finer sediments offshore. In the Wadden

Sea, by contrast, the decrease in grain size is the other way round (van Straaten, 1954). This difference is caused by the sediment transport routes perpendicular to the shore running in opposite directions, with the source either rivers or the sea. Along tropical and subtropical coasts, tidal flats may also develop behind a barrier of coralline reefs. Here the sediment particles primarily consist of biogenic carbonates, whereas in the Wadden Sea siliclastic sediments prevail.

Strong hydraulic and aeolian dynamics are an important characteristic of the Wadden Sea region. Twice a day the tides move an average volume of 15 km^3 of sea water through the tidal channels and inlets into the tidal basins where roughly the same volume remains at low tide, thus swelling up to some 30 km^3 at high tide. A high exchange rate of tidal water masses secures the dominance of marine conditions in the back-barrier area (Postma, 1954). In the course of a tidal cycle, the sum of freshwater discharge is $<1\%$ of the tidal volume. The difference in tidal exchange between the phases of the moon amounts to only about 20% in the Wadden Sea. Instead, strong onshore winds may increase high tides up to 4 m above mean high tide. Strong offshore winds are less frequent and may push low tides down to 1.5 m below mean low tide level. Because of this asymmetry in wind speed and direction, tidal flats often remain submerged over several days due to prevailing westerly winds, whereas continuous emergence over several tidal cycles due to southerly or easterly winds is extremely rare (Weisse and Plüß, 2006). This contributes to the dominance of marine over terrestrial organisms in the tidal zone of the Wadden Sea.

Figure 2:
Tidal divide where tidal creeks running northward intersect a coherent seagrass bed (dark colour), while creeks running southwest (upper right) intersect a sandy flat with scattered seagrass patches (Photo: K. Reise).



3. Ecology



Figure 3: Bed of suspension feeding mussels (*Mytilus edulis*) bound together by byssal threads. Shells are partly overgrown by barnacles (mainly *Elminius modestus*), a few oysters (*Crassostrea gigas*), bladder wrack (*Fucus vesiculosus forma mytili*), and periwinkles (*Littorina littorea*) graze on microbial films (Photo: K. Reise).

Ecologically the Wadden Sea functions as a gigantic coastal filter of unique composition, and offers plenty of food to a rich aquatic nursery and to 10–12 million birds in the course of a year. The habitats of the Wadden Sea show in a fascinating way how physical forces and biological activities interact to generate conditions for life in a fragile balance. Along this coast physical forces are strong, biological activities high, and the basic materials are soft sediments and fluid waters. This combination makes the dynamic interactions between organisms and their environment readily apparent and attractive to study. Major habitats are arranged along an offshore–inshore gradient and from deep tidal inlets up to the highest dunes: an offshore belt seaward of the barrier islands, a tidal area with subtidal gullies and shoals, intertidal mud and sand, with seagrass meadows or mixed oyster and mussel beds, a few estuaries, salt marshes on islands and along the mainland coast, beaches and dunes mainly on the islands. These habitats are functionally interrelated and constitute a characteristic combination.

The offshore belt of the Wadden Sea is operationally defined as the zone seaward of the barrier islands and elevated outer sands, extending into the North Sea down to the –15 m depth contour. This belt has no tidal flats and drops off smoothly towards the open North Sea but does not fully comply with it in terms of the biota. There is a continuous exchange of both water and sediment with the tidal area. The sediment supply from the

offshore belt is vital for the resilience of the coast when responding to changes in tidal area, sea level and to disturbances caused by storm surges (Flemming and Bartholomä, 1997). Phytoplankton blooms often start in this belt because turbidity is low enough for sufficient light and nutrient concentrations are high (Postma, 1954; van Beusekom and de Jonge, 2002). Through the tidal channels and inlets this offshore primary production reaches the inshore zoobenthos. In the offshore belt, autotrophic production prevails and in the tidal area, heterotrophic production is dominant. Also larvae of benthic fauna and fish drift from the offshore belt further inshore. Shrimp, fish, diving birds, seals and harbour porpoises readily commute between offshore and inshore zones (Bückmann, 1934; Wolff and Zijlstra, 1980). In severe winters, the offshore belt provides an important refuge for the survival of populations otherwise confined to the tidal area.

Within the tidal area, the subtidal shoals and gullies similarly serve as a refuge for the intertidal fauna when conditions turn harsh. The subtidal fringe and low intertidal zone are the primary sites for beds of suspension feeders, mussels and oysters in particular (Hagmeier and Kändler, 1927). Mussels are kept in bottom cultures and also occur naturally in mixed beds with oysters (Figure 3; Dankers and Zuidema, 1995; Nehls *et al.*, 2006). A native subtidal oyster has been driven to extinction by over-exploitation, while the introduced Pacific oyster recently invaded the intertidal mussel beds.

Together with other suspension feeders, the entire volume of tidal waters is filtered within two weeks (Verwey, 1952). Mussels and oysters also stabilize the bottom and accrete fine sediments, accumulate large amounts of shell material, provide attachment for algae and sessile invertebrates, and shelter for mobile invertebrates and fish. This rich association served as a model for the community concept (biocoenosis) developed by Möbius (1877) with the assumption of balanced species interactions maintaining a community of organisms. This concept is still favoured in ecological textbooks.

Tidal elevation and sediment composition are two major determinants of benthic assemblages on the tidal flats (Thamdrup, 1935; Wohlenberg, 1937; Linke, 1939). Suspended fine particles, mostly comprising aggregates of mineral grains and organics, tend to accumulate on the landward side of the tidal flats (Postma, 1961; Dronkers, 1984). This general phenomenon was initially explained by van Straaten and Kuenen (1957) with a combination of settling lag and scour lag. The former is a time lag between the moment at which a decreasing current is no longer able to hold a particle in suspension and the moment at which this particle reaches the bottom. The latter is the time lag caused, among others, by the extracellular slime of the microalgal film on the bottom, binding settling particles so that stronger currents are required for re-suspension than the velocity at which deposition of the same particle

had occurred. The vast tidal flats of the Wadden Sea serve as a primary example for this progressively shoreward-fining gradient in particle size.

The sediment surface is almost completely covered with microscopic algae and bacterial colonies. Some of these are mobile and once buried under new deposits, they crawl back to the surface. This behavior may generate a laminated structure of mud deposition until reworked by the occasional storm surges (Wohlenberg, 1953). Intertidal seagrass beds may also accumulate fine particles. However, most leaves are shed in autumn and then waves re-suspend the intermittent accretion. The most extensive seagrass meadows occur in the Northern Wadden Sea on approximately 10% of the tidal flat area, and these represent the largest intertidal seagrass beds in Europe (Figure 2; Reise and Kohlus, 2008).

A large proportion of the tidal flats of the Wadden Sea consist of wave-rippled sands. This habitat is maintained by the constant sediment reworking of lugworms (Figure 4). In analogy to Darwin who described the role of earthworms in the shaping of the landscape in England, lugworms shape the appearance of the tidal flats and the spatial relationship between mud and sand flats in the Wadden Sea. Their fecal mounds with coiled strings of sand are the most characteristic feature of the tidal flats in the Wadden Sea. The total population size may comprise about one billion worms and this is considered the largest

Figure 4:
Fecal castings of lugworms
(*Arenicola marina*) which
are reworking and irrigating
vast tidal flats in the Wad-
den Sea, thereby maintain-
ing a permeable sandy
sediment (Photo: K. Reise).





Figure 5:
Staging knots (*Calidris canutus*) probing intertidal sediments of the Wadden Sea for small molluscs. About 450,000 fly towards Greenland and Canada, and 340,000 fly towards Siberia for breeding. During winter, most stay in western Africa (Photo: K. Reise).

worldwide. Lugworms recycle the upper layer of the sediment 10–20 times per year through their guts (Cadée, 1976) and prevent clogging of the interstices of sand with organic material (Volkenborn *et al.*, 2007). They also irrigate their burrows with water from above and build up an oxic environment in otherwise anoxic sediment. This increases bacterial activity and the permeable sand functions as an effective filter for the tidal waters.

The impressive ecological productivity of the tidal flats comprises high bacterial remineralisation rates, strong import of suspended microalgae, and a generally high productivity at the bottom by microscopic algae instead of large plants (Cadée and Hegeman, 1974; Loebel *et al.*, 2007). Together this constitutes a readily consumable food supply for a zoobenthos which builds up an exceptionally high biomass, dominated by molluscan suspension feeders, followed by deposit feeding worms and small snails (Beukema, 1976; Beukema *et al.*, 2002; Asmus, 1987; Reise *et al.*, 1994). These in turn provide plenty of food for small crabs, shrimp and fish which use the flats as a nursery when the tide is in (Smidt, 1951; Kuipers, 1977; Strasser, 2002), and for huge flocks of wading birds, gulls and ducks when the tide is out (Piersma, 1987; Scheiffarth and Nehls, 1997). These have the advantage of searching for prey on a very large intertidal area, with a fair chance of frequently encountering patches of a sufficient quality and quantity of accessible food. On the permanently

submerged bottom of the North Sea, the zoomass is 10–20 times lower than on the tidal flats. This is why the Wadden Sea can feed 10–12 million coastal birds in the course of a year (Blew *et al.*, 2005). Most of these are migrants along the East Atlantic flyway and use the Wadden Sea as their central staging area to replenish energy lost during breeding and long-distance flights (Figure 5). Thus, the Wadden Sea feeds birds which travel to many other coasts or fly further inland. Similarly, the tidal flat fauna offers food for young fish which as adults migrate into the open sea or into the rivers. Seals and harbour porpoises are at the top of the aquatic food web, and birds of prey represent a link to the terrestrial food web (Baird *et al.*, 2004). A diverse assemblage of parasites hitchhikes on these trophic pathways (Thieltges *et al.*, 2006).

The estuaries as tidally influenced transition zones between marine and riverine environments are not a dominant feature and are small in size relative to the marine parts of the Wadden Sea (Harten and Vollmers, 1978). This is in contrast to most other tidal areas in Europe and the world. Nevertheless, these estuaries supply the Wadden Sea with nutrients, are pathways for diadromous fish and add habitats of low and variable salinity.

Mangroves and salt marshes dominate tidal areas along most tropical and temperate sedimentary coasts of the world. However, in the Wadden Sea, climate is too cold for mangroves and salt

marshes are relegated to high-tide level and the episodically flooded supratidal zone. Thus, bare tidal flats prevail. In contrast, the Georgia Bight, on the other side of the Atlantic, represents a geomorphologically similar coast with many tidal areas and seaward barriers of sandy islands over a length of 1,200 km. However, bare mud flats comprise only 300 km², whereas salt marshes occupy 4,200 km² (Dame *et al.*, 2000). In the Wadden Sea this habitat ratio is reversed with tidal flats occupying 4,700 km² and salt marshes 400 km². The reason for this difference is still open to debate. The Georgia Bight is warmer than the Wadden Sea which may be of particular benefit for the cord grass which dominates the marsh there. On the other hand, and unlike the Wadden Sea, the rivers along the east coast of North America supply huge amounts of fine-grained sediments which are trapped in the cord grass meadows, allowing these to expand. In addition, mean wave height in the Wadden Sea is twice that of the back-barrier area in the Georgia Bight. This may also explain why salt marshes are relegated towards high-tide level in the Wadden Sea.

Beaches and dunes are found along many coasts. However, in the Wadden Sea, numerous sandy barrier islands are aligned along the coast like strings of pearls. Sand blown by prevailing westerly winds from dry parts of the beach is trapped by pioneer plants. In the Wadden Sea, the main dune generating species is a marram grass (*Ammophila arenaria*) which is able to grow upwards with the accumulating sand (Figure 6). It does not stabilize the sand sufficiently to prevent further aeolian transport. Along retreating shorelines, one dune may therefore overtop another. When a dune height of 20 m is exceeded, the characteristically strong winds of the North Sea region overrule the marram grass and bare migrant dunes arise (Priesmeier, 1970). Without marram grass, the barrier islands would presumably look very different. This can be inferred from observations made along the coast of Oregon in the northwest of North America. There, marram grass was originally absent. After it had been introduced, it quickly generated a high and permanent fore-dune barrier behind the beach where none had been before.

Figure 6:
Dunes on Wadden Sea barrier islands are generated by an interplay between sand mobilizing wind and stabilizing marram grass (*Ammophila arenaria*) (Photo: K. Reise).



4. Biodiversity

The Wadden Sea displays a complex matrix of habitats across environmental gradients of depth and salinity, height and dryness, exposure to hydrodynamics and winds, and substrates modified by organisms. These habitats occur in dynamic sequences in a highly repetitive pattern due to the long chain of islands and shoals, tidal basins and estuaries, and together accommodate a high diversity of aquatic and terrestrial species. The Wadden Sea has a long tradition of research on the composition of the regional flora and fauna (Wolff, 1983; Gerlach, 2004; Niedringhaus *et al.*; 2008). It forms the habitat for about 2,700 species of marine origin and at least 5,100 semi-terrestrial and terrestrial species, mostly the flora and fauna of salt marshes and dunes on the islands (Table 1). Various unicellular groups and small metazoans such as terrestrial nematodes have not been included in the surveys. Adding these, we estimate that the Wadden Sea area is populated by about 10,000 taxa, not including bacteria and archaea.

Of the taxa recorded, phototrophic plants comprise about 2,300, macrofungi 1,300 and animals 4,200 species. With this impressive species richness the Wadden Sea helps to arrest the loss of coastal biodiversity in temperate coastal zones. Presumably a crucial factor for the high species richness is the repetitive sequences of dynamic habitats on a large scale. This is likely to reduce the risk of extinction. On a sandy beach and sand flat of the island of Sylt, extending 115 m between the high and low tide lines, altogether more than one million individuals have been examined and identified to species level. Most belong to the interstitial fauna, composed of metazoans small enough to move through the interstices of sand without having to push sand grains out of their

way. In toto, 652 species have been recorded, and for 148 of them it is the type locality where they have been described for the first time (Armonies and Reise, 2000). Contrary to larger marine organisms, the hot spot of diversity for the interstitial fauna lies in the intertidal zone rather than at greater depth (Figure 7). Adding estimates for unicellular algae, the territories of almost 1,000 species are trespassed when walking from high to low tide line at that site. Nowhere else in the world has species richness of a beach been analysed in such detail.

An incredible number of small arthropod species live in the salt marshes, mainly insects and spiders (Heydemann 1981). The main primary producers, the vascular plants, comprise only 45 species. Directly feeding on these plants are 6 species of waterfowl and 400 species of insects. Another 500 species have been found to feed on dead plant material, algae and fungi. Predaceous arthropods comprise 245 and parasites 250 species. To this spectrum we may add about 100 species of birds feeding and resting in salt marshes. The sum of all these species is almost 1,600. To these terrestrial organisms some 500 species of aquatic, mostly marine invertebrates of the meiofauna, have to be added. Again, considering unicellular organisms not included in the surveys, the grand total is about 2,300 taxa which may dwell in salt marshes of the Wadden Sea. This compares well with the species richness encountered in European temperate forests. More species occur in salt marshes than in beaches and sand flats because the vegetation generates a more complex habitat.

Of the 140-plus species of fish recorded in the Wadden Sea, 20 spend their entire life in the tidal

Marine aquatic organisms		Terrestrial, semi-terrestrial and freshwater organisms	
Vascular plants	2	Macrofungi (islands)	1,300
Macroalgae	80	Lichens (islands)	347
Pelagic microalgae	380	Mosses (islands)	338
Benthic microalgae	260	Vascular plants	900
Zooplankton	260	Molluscs	70
Benthic microfauna	1,200	Arthropods	2,000
Benthic macrofauna	400	Birds	176
Fish	149	Other vertebrates	40
Marine mammals	3	Man	1

Table 1: Overview of species richness in the Wadden Sea. In some groups, numbers have been estimated. Due to taxonomic uncertainties, not all species complexes have been analysed, and in terrestrial environments surveys on small soil fauna are incomplete. Rare visitors are left out. Most numbers are from lists of species in Wolff (1983).

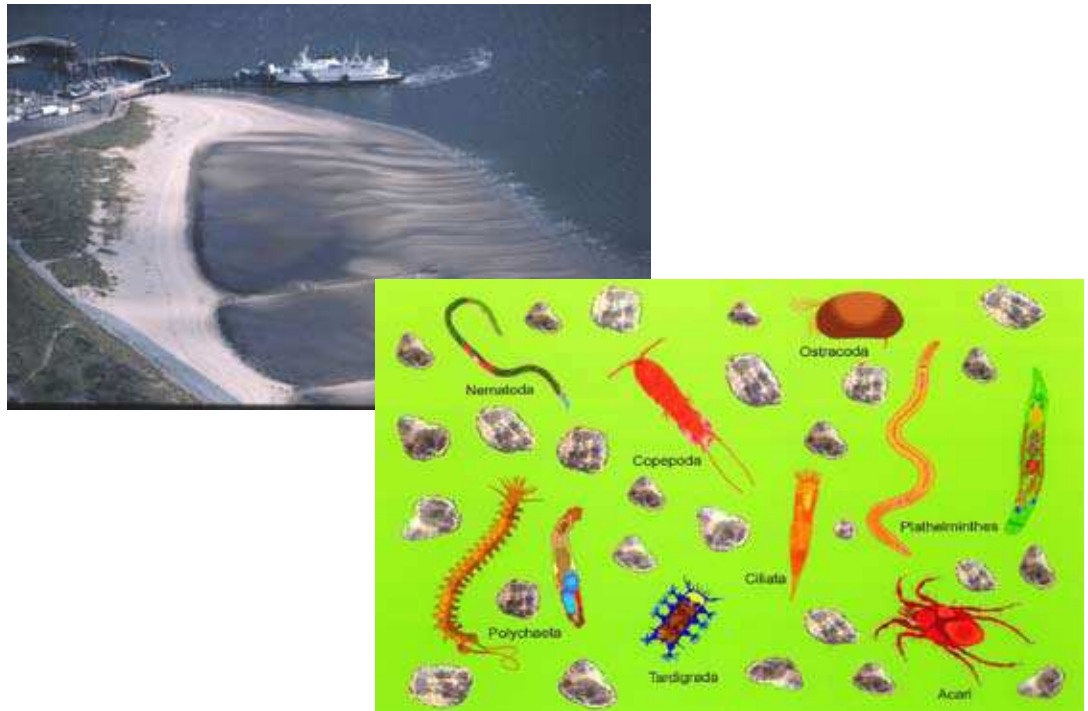
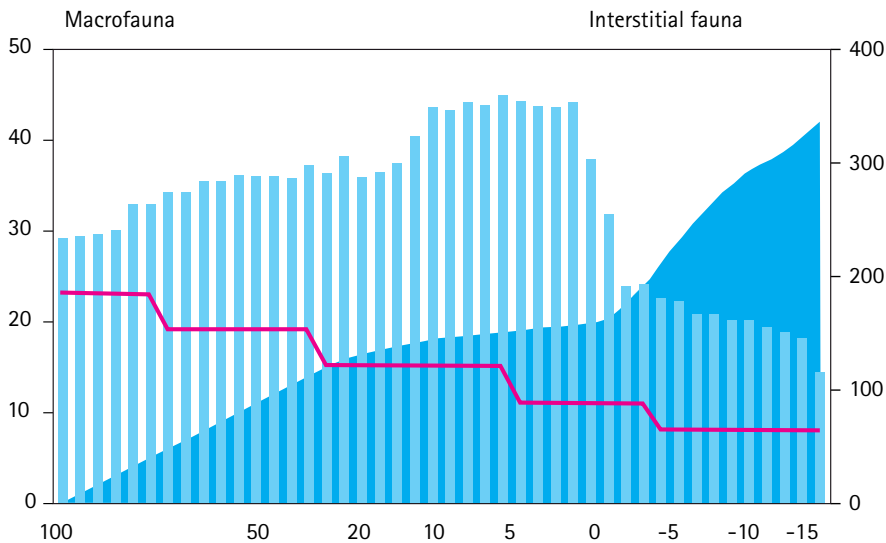


Figure 7: Across 120 m of a sheltered beach and intertidal sand flat (photo, top) the incredibly high species number of the small fauna in the interstices of sand (green panel) attains a maximum near mid tide level (bottom panel, columns, right scale), while macrofaunal species numbers gradually increase towards spring low tide line (red line, left scale). Horizontal axis indicates distance (m) from the bend (0) in the slope between the tide lines (modified after Armonies and Reise, 2000).



area. Plaice (*Pleuronectes platessa*) and sole (*Solea solea*) spawn in the North Sea and their pelagic eggs and larvae drift into the tidal area, metamorphose and settle on the mud flats. There they benefit from ample food and warm temperatures (Zijlstra, 1972). They leave the Wadden Sea as juveniles before their first winter. Also, juveniles of herring (*Clupea harengus*) and sprat (*Sprattus sprattus*) occur in big shoals, particularly at night. Several diadromous species spawn in the rivers and merely pass through the Wadden Sea. Whiting (*Merlangius merlangus*) and cod (*Gadus morrhua*) have open sea nurseries, but in late summer and autumn of some years juveniles make incursions into the Wadden Sea with dramatic

effects on shrimp and small fish on which they prey (Jansen, 2002).

For coastal birds, the Wadden Sea is not only attractive because of the high availability of food. Some of the islands and high sands are without mammalian predators and human disturbance. Almost one million ground-breeding birds belonging to 31 species use these sites (Koffijberg *et al.*, 2006). Of Eurasian spoonbill, avocet, gull-billed tern and sandwich tern more than 25% of the European populations breed in the Wadden Sea region. For 43 species, the Wadden Sea supports more than 1% of the flyway population, which is the criterion of the Ramsar Convention for identifying wetlands of international importance.

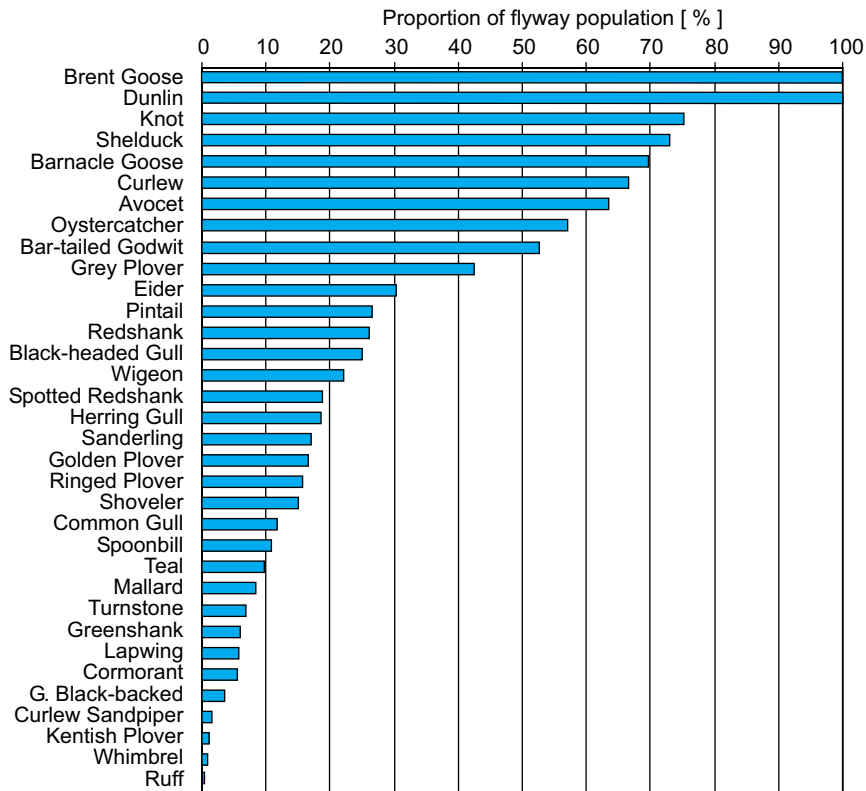


Figure 8:
Maximum estimated numbers of migratory birds between 1992–2000 given as proportion of flyway populations for the entire Wadden Sea (from: Blew *et al.*, 2005).

Of these, 4 are breeding in the Wadden Sea, 15 are only visiting during their seasonal migrations, and 24 do both. Almost the entire population of dark-bellied brent goose (*Branta b. bernicla*) and the entire European and West-Russian population of dunlin (*Calidris alpina*) use the Wadden Sea during periods of the annual cycle (Figure 8). An additional seven species are present with more than 50% and further 14 species with more than 10% of their flyway populations. In absolute numbers, it is estimated that dunlin reaches a seasonal maximum of 1.4 million, oystercatcher 582,000, black-headed gull 499,000, red knot 339,000 and wigeon 333,000. In late summer, almost all shelducks of Northern and Western Europe concentrate with about 200,000 birds for moulting in the least disturbed areas of the Wadden Sea (Blew *et al.*, 2005). Many birds use the Wadden Sea only briefly, others do so for several months and use the area to gain enough energy for further migration. Other species spend the whole winter in the area. Hence, the numbers actually using the area

(10 to 12 million) are much higher than the total numbers present at any one moment. Nonetheless, the Wadden Sea is one of the most spectacular sites for coastal birds in the world.

Indigenous species of marine mammals in the Wadden Sea are common seal (*Phoca vitulina*), grey seal (*Halichoerus grypus*) and harbour porpoise (*Phocoena phocoena*). The Wadden Sea now sustains approximately 20% of the Northeast-Atlantic subspecies of common seal. Archaeological findings suggest that grey seals were the dominant seal species until medieval times and then vanished entirely. The cause was most probably the ease of hunting during whelping on the upper beaches. Recently grey seals have also started a comeback (Reijnders *et al.*, 1995). During the moulting season, 20,250 common seals and 1,900 grey seals resting on sand bars have been counted from the air in 2008. In the Northern Wadden Sea, female harbour porpoise with offspring are observed with a density of 1–2 individuals per km².

5. History and Outlook

Humans have always been present in the Wadden Sea region. Hunting and fishing seem to have driven large animals such as grey whale, Dalmatian pelican, sturgeon and salmon to extinction (Wolff, 2000). These will not come back without active support. Bird and seal populations have strikingly recovered when protection measures became effective in the course of the 20th century, but there is still room for more. Almost a thousand years ago, embanking of salt marsh areas commenced and culminated in the 20th century when also mud flats and entire embayments were cut off from the Wadden Sea by seawalls. This reduced the extent of salt marshes and nearshore mud flats, and at the same time interfered with a further deposition of silt and clay where the tidal zone became narrower and hydrodynamic energy increased per unit area (Flemming and Bartholomä, 1997). These distortions of natural processes constitute a major challenge to habitat restorations along the mainland coast.

In the 1950s and 1960s, pollutants in Wadden Sea organisms reached very high levels and caused incidences of mass mortalities in Eider ducks and sandwich terns, and reduced reproduction rates in seals (Brouwer *et al.*, 1989). Discharges of pollutants have decreased since then. Sublethal effects are hard to detect and persistent pollut-

ants are still in the sediments. Nutrient loads in the rivers debouching into or near the Wadden Sea reached a maximum in the 1970s, but have declined since then. However, they are still 2-5 fold above pre-industrial values. Enhanced algal blooms have been observed in the past and, although somewhat decreased, have not ceased altogether (van Beusekom 2005; Philippart *et al.*, 2007). The question will be, how low do we wish to go with the nutrient loads?

North Sea fish have for a long time been subject to strong fishery pressure (Holm, 2005). After large fish had disappeared, fisheries in the Wadden Sea focused on shellfish and shrimp. This has affected the benthos in general: native oysters have vanished, subtidal mussels are mostly confined to culture lots, and intertidal beds are intermittently strongly decimated, while catches of shrimp (*Crangon crangon*) have been sustained (Lotze, 2005). Industrial cockle fishery has recently been banned completely. There seems to be a large potential for fish and shellfish recovery but management efforts are still in their infancy.

At least 60 alien aquatic species have been unintentionally introduced by shipping or with imported oysters. The Pacific oyster (*Crassostrea gigas*) became extremely abundant on mussel beds and beyond (Figure 9). This species, and others

Figure 9:
Introduced Pacific oysters
are spreading throughout
the Wadden Sea. They have
added new biogenic reefs
and partially displaced
native mussel beds (Photo:
K. Reise).



introduced earlier, seem to particularly benefit from the current trend of warming (Nehring *et al.*, 2009). Around the low-tide line, the epibenthic community is already dominated by alien species, giving rise to new functions and habitats. Preventative measures against further introductions are urgently needed.

In the long run, sea-level rise triggered by global warming is expected to exceed the adaptive capacity of the Wadden Sea. The rise could be of the order of 1 m until the end of this century (Rahmstorf, 2007). Along the mainland, seawalls prevent a landward shift of the tidal area in response to higher water levels, and sediment supply from the North Sea may not keep up with the speed of sea-level rise. A time lag in sediment transport from the offshore belt to the tidal area would result in the intertidal zone being drowned. As the tidal flats provide the core function and services of the Wadden Sea ecosystem, plans should be prepared on how to facilitate sediment supply from the North Sea into the tidal area, and how to trap suspended particles from the tidal waters even in embanked low marshes. This demands an innovative and interdisciplinary research agenda leading towards a strengthening of the regional identity in a changing world (Kabat *et al.*, 2009).

Conclusions

As a universally outstanding combination of attributes, the Wadden Sea

(1) has the largest unbroken belt of bare intertidal mud and sand flats in the world,

- supplied with sediment primarily from the sea,
- and a long chain of barrier islands providing shelter to the tidal area behind,
- adapting to sea-level rise by vertical accretion and by retreat of the sandy barrier,
- being subject to relatively high waves and strong seasonal storm surges,

- with tides doubling the volume of water twice daily,
 - and a strong dominance of oceanic waters over their riverine counterparts;
- (2) functions as a gigantic coastal filter,
- composed of extensive molluscan beds,
 - and the largest lugworm population in the world keeping sediments permeable,
 - and salt marshes confined to areas near high-tide level, unable to encroach on the vast tidal flats;
- (3) offers a wide food availability based on
- phytoplankton imported from an offshore belt and on benthic microalgae,
 - both readily consumed by an abundant benthic fauna,
 - which provides food to an aquatic nursery of shrimp, fish and seals,
 - and food to 10–12 million birds in the course of a year;
- (4) has a complex and repetitive habitat matrix
- with about 10,000 species of aquatic and terrestrial organisms,
 - which is indispensable for 44 populations of 34 species of coastal birds,
 - showing a recovery of bird and seal populations after centuries of exploitation,
 - no longer threatened by land claim ambitions, and being protected by trilateral policy.

The Wadden Sea may thus be perceived as a coast of hope. Extraordinary flocks of coastal birds and abundant seals are indicative of a thriving tidal ecosystem in spite of a history of strong human impacts. Ongoing species introductions and climatic warming will inevitably change the species composition. Eventually, accelerating sea-level rise will threaten the large extent of the tidal flats. This will require nature protection and coastal defence agencies to join forces in a common management plan to maintain the natural values and at the same time to allow for a sustainable shared human use.

Acknowledgements

We are most grateful to the staff of the Common Wadden Sea Secretariat and the many civil servants of Dutch and German Nature Protection Agencies who have been involved in writing the nomination dossier and encouraged this manuscript.

References

- Arends, J.R.L., 1833. Physische Geschichte der Nordsee-Küste und deren Veränderungen durch Sturmfluthen seit der Cymbrischen Fluth bis jetzt. Facsimile print 1974, Verlag Schuster, Leer.
- Armonies, W., Reise, K., 2000. Faunal diversity across a sandy shore. *Mar. Ecol. Prog. Ser.*, 196, 49-57.
- Asmus, H., 1987. Secondary production of an intertidal mussel bed community related to its storage and turnover compartments. *Mar. Ecol. Prog. Ser.*, 39, 251-266.
- Baird, D., Asmus, H., Asmus, R., 2004. Energy flow of a boreal intertidal ecosystem, the Sylt-Rømø Bight. *Mar. Ecol. Prog. Ser.*, 279, 45-61.
- Bartholdy, J., Pejrup, M., 1994. Holocene evolution of the Danish Wadden Sea. *Senckenbergiana maritima*, 24, 187-209.
- Behre, K.E., 2003. Eine neue Meeresspiegelkurve für die südliche Nordsee. Probleme der Küstenforschung im südlichen Nordseegebiet, 28, 9-63.
- Beukema, J.J., 1976. Biomass and species richness of the macrobenthic animals living on the tidal flats of the Dutch Wadden Sea. *Neth. J. Sea Res.*, 10, 236-261.
- Beukema, J.J., Cadée, G.C., Dekker, R., 2002. Zoobenthic biomass limited by phytoplankton abundance: evidence from parallel changes in two long-term data series in the Wadden Sea. *J. Sea Res.*, 48, 11-125.
- Blew, J., Günther, K., Laursen, K., van Roomen, M., Südbeck, P., Eskildsen, K., Potel, P., Rösner, H.U., 2005. Overview of numbers and trends of migratory waterbirds in the Wadden Sea 1980-2000. *Wadden Sea Ecosystem No. 20*, 8-148.
- Brouwer, A., Reijnders, P.J.H., Koeman, J.H., 1989. Polychlorinated biphenyl (PCB) – contaminated fish induces vitamin A and thyroid hormone deficiency in the common seal (*Phoca vitulina*). *Aquatic Toxicology*, 15, 99-106.
- Bückmann, A., 1934. Über die Jungschollenbevölkerung der deutschen Wattenküste der Nordsee. *Ber. Dtsch. Wiss. Komm. Meeresforsch. NS*, 7, 205-213.
- Cadée, G.C., 1976. Sediment reworking by *Arenicola marina* on tidal flats in the Dutch Wadden Sea. *Neth. J. Sea Res.*, 10, 440-460.
- Cadée, G.C., Hegeman, J., 1974. Primary production of the benthic microflora living on tidal flats in the Dutch Wadden Sea. *Neth. J. Sea Res.*, 8, 260-291.
- CPSL, 2005. Coastal Protection and Sea Level Rise. Solutions for Sustainable Coastal Protection in the Wadden Sea Region. *Wadden Sea Ecosystem No. 21*. Common Wadden Sea Secretariat. Wilhelmshaven, Germany.
- CWSS, 1991. The Wadden Sea status and developments in an international perspective. Report to the sixth Governmental Conference on the Protection of the Wadden Sea. National Forest and Nature Agency, the Ministry of the Environment, Denmark and The Common Wadden Sea Secretariat.
- CWSS, 2008. Nomination of the Dutch-German Wadden Sea as World Heritage Site. *Wadden Sea Ecosystem No. 24*, 1-200. Common Wadden Sea Secretariat. Wilhelmshaven, Germany.
- CWSS, 2009. Nomination of the Dutch-German Wadden Sea as World Heritage Site. Supplementary Information. Common Wadden Sea Secretariat. Wilhelmshaven, Germany.
- Dame, M. *et al.*, 2000. Estuaries of the South Atlantic Coast of North America: Their geographical signatures. *Estuaries*, 23, 793-819.
- Dankers, N., Zuidema D.R., 1995. The role of the mussel (*Mytilus edulis*) and mussel culture in the Dutch Wadden Sea. *Estuaries*, 18, 71-80.
- De Jong, F., Bakker, J., van Berkel, K., Dankers, N., Dahl, K., Gätje, C., Marencic, H., Potel, P., 1999. *Wadden Sea Quality Status Report*. *Wadden Sea Ecosystem No. 9*, 1-259.
- Dronkers, J., 1984. Import of fine marine sediment in tidal basins. In: *Proc. Fourth International Wadden Sea Symposium 1983*. *Neth Inst for Sea Res Publ Ser* 10, 83-106.
- Ehlers, J., 1988. *Morphodynamics of the Wadden Sea*. Balkema, Rotterdam.
- Essink, K., Dettmann, C., Farke, H., Laursen, K., Luerßen, G., Marencic, H., Wiersinga, W., (Eds), 2005. *Wadden Sea Quality Status Report 2004*. *Wadden Sea Ecosystem No. 19*, 1-359.
- Fischer, L., Hasse, J., 2001. Historical and current perceptions of landscapes in the Wadden Sea region. In: *Vollmer, M. et al. (Eds.) Landscape and cultural heritage in the Wadden Sea region*. *Wadden Sea Ecosystem No. 12*, 72-97.
- Flemming, B.W., 2002. Geographic distribution of muddy coasts. In: *Healy, T., Wang, Y., Healy J-A (eds) Muddy coasts of the world: processes, deposits and function*. Elsevier Science, Amsterdam, 99-201.
- Flemming, B.W., Bartholomä, A., 1997. Response of the Wadden Sea to a rising sea level: a predictive empirical model. *German J. Hydrogr.*, 49, 343-353.
- Flemming, B.W., Davis, R.A. Jr., 1994. Holocene evolution, morphodynamics and sedimentology of the Spiekeroog barrier island system (southern North Sea). *Senckenbergiana maritima*, 25, 117-155.
- Gerlach, S.A., 2004. Checkliste der Mikro- und Meiofauna im schleswig-holsteinischen Wattenmeer. In: *Bundesanstalt für Gewässerkunde (Ed.) Die Biodiversität in der deutschen Nord- und Ostsee*. Bd. 2. Bericht BfG-1397, Koblenz.
- Hagmeier, A., Kändler, R., 1927. *Neue Untersuchungen im nordfriesischen Wattenmeer und auf den fiskalischen Austernbänken*. *Wiss. Meeresunters. (Helgoland)*, 16, 1-90.
- Harten, H., Vollmers, H., 1978. The estuaries of the German North Sea coast. *Die Küste*, 32, 50-65.
- Heydemann, B., 1981. *Ökologie und Schutz des Wattenmeeres*. Schriftenreihe Bundesministerium Ernährung Landwirtschaft Forsten, Reihe A: Angewandte Wissenschaft, 255, 1-232.
- Holm, P., 2005. Human impacts on fisheries resources and abundance in the Danish Wadden Sea, c1520 to the present. *Helgol. Mar. Res.*, 59, 39-44
- Jansen, S., 2002. *Das Räuber-Beutesystem juveniler Gadiden, Grundeln und Garnelen im Wattenmeer nördlich von Sylt*. PhD Thesis, Hamburg: University Hamburg, 154 pp.
- Kabat, P., Bazelmans, J., van Dijk, J., Herman, P.M.J., Speelman, H., Deen, N.R.J., Hutjes, R.W.A., 2009. Knowledge for a sustainable future of the Wadden. Integrated research agenda of the Wadden Academy-KNAW. The Netherlands, 1-124.
- Koffijberg, K., Dijkens, L., Hälterlein, B., Laursen, K., Potel, P., Südbeck, P., 2006. Breeding birds in the Wadden Sea in 2001. *Wadden Sea Ecosystem No. 22*, 1-132.
- Kuipers, B.R., 1977. On the ecology of juvenile plaice on a tidal flat in the Wadden Sea. *J. Sea Res.*, 11, 56-91.
- Linke, O., 1939. *Die Biota des Jadebusens*. *Helgol. Wiss. Meeresunters.*, 1, 201-348.
- Loebl, M., Dolch, T., van Beusekom, J.E.E., 2007. Annual dynamics of pelagic production and respiration in a shallow coastal basin. *J. Sea Res.*, 58, 269-282.
- Lotze, H.K., 2005. Radical changes in the Wadden Sea fauna and flora over the last 2,000 years. *Helgol. Mar. Res.*, 59, 71-83.

- Marencic, H. and de Vlas, J. (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.
- Möbius, K., 1877. Die Auster und die Austernwirtschaft. Wiegandt, Hempel & Parey, Berlin.
- Nehls, G., Diederich, S., Thieltges, D.W., Strasser, M., 2006. Wadden Sea mussel beds invaded by oysters and slipper limpets: competition or climate control? *Helgol. Mar. Res.*, 60, 135-143.
- Nehring, S., Reise, K., Dankers, N., Kristensen, P.S., 2009. Alien species. Thematic Report No. 7. In: Marencic, H. & Vlas, J. de (Eds), 2009. Quality Status Report 2009. Wadden Sea Ecosystem No. 25.
- Niedringhaus, R., Haeseler, V., Janiesch, P., (Eds.) 2008. Die Flora und Fauna der Ostfriesischen Inseln – Artenverzeichnisse und Auswertungen zur Biodiversität. Nationalpark Niedersächsisches Wattenmeer, 11, 1-470.
- Oost, A.P., de Boer, P.L., 1994. Sedimentology and development of barrier islands, ebbtidal deltas, inlets and backbarrier areas of the Dutch Wadden Sea. *Senckenbergiana maritima*, 25, 65-115.
- Philippart, C.J.M., Beukema, J.J., Cadée, G.C., Dekker, R., Goedhart, P.W., van Iperen, J.M., Leopold, M.F., Herman, P.M.J., 2007. Impacts of nutrient reduction on coastal communities. *Ecosystems*, 10, 96-119.
- Piersma, T., 1987. Production by intertidal benthic animals and limits to their predation by shorebirds: a heuristic model. *Mar. Ecol. Prog. Ser.*, 38, 187-196.
- Postma, H., 1954. Hydrography of the Dutch Wadden Sea. *Archs. Néerl. Zool.*, 10, 405-511.
- Postma, H., 1961. Transport and accumulation of suspended matter in the Dutch Wadden Sea. *Neth. J. Sea Res.*, 1, 148-190.
- Priesmeier, K., 1970. Form und Genese der Dünen des Listlandes auf Sylt. *Schr. Naturw. Ver. Schlesw.-Holst.*, 40, 11-51.
- Rahmstorf, S., 2007. A semi-empirical approach to projecting sea-level rise. *Science*, 315, 368-370.
- Reijnders, P.J.H., van Dijk, J., Kuiper, D., 1995. Recolonization of the Dutch Wadden Sea by the grey seal *Halichoerus grypus*. *Biological Conservation*, 71, 231-235.
- Reineck, H.E., Singh, I.B. (Eds.) 1980. Depositional sedimentary environments. Springer-Verlag, Berlin.
- Reise, K. (Ed.) 2001. Ecological comparisons of sedimentary shores. Ecological studies 151. Springer-Verlag, Berlin.
- Reise, K., Herre, E., Sturm, M., 1994. Biomass and abundance of macrofauna in intertidal sediments of Königshafen in the northern Wadden Sea. *Helgol. Meeresunters.*, 48, 201-215.
- Reise, K., Kohlus, J., 2008. Seagrass recovery in the Northern Wadden Sea? *Helgol. Mar. Res.*, 62, 77-84.
- Scheiffarth, G., Nehls, G., 1997. Consumption of benthic carnivorous birds in the Wadden Sea. *Helgol. Meeresunters.*, 51, 373-387.
- Smidt, E.L.B., 1951. Animal production in the Danish Waddensea. *Med. Kom. Danm. Fiskeri- og Havunders. Ser Fiskeri*, 11(6), 1-151.
- Strasser, M., 2002. Reduced epibenthic predation on intertidal bivalves after a severe winter in the European Wadden Sea. *Mar. Ecol. Prog. Ser.*, 241, 113-123.
- Streif, H., 1989. Barrier islands, tidal flats, and coastal marshes resulting from relative rise of sea level in East Frisia on the German North Sea coast. Proceedings KNGMG Symposium 'Coastal Lowlands, Geology and Geotechnology', 1987, 213-223.
- Thamdrup, H.M., 1935. Beiträge zur Ökologie der Wattfauna. *Medd. Dan. Fisk. Havunders.*, 10(2), 1-125.
- Thieltges, D.W., Krakau, M., Andresen, H., Fottner, S., Reise, K., 2006. Macroparasite community in molluscs of a tidal basin in the Wadden Sea. *Helgol. Mar. Res.*, 60, 307-316.
- Van Beusekom, J.E.E., 2005. A historic perspective on Wadden Sea eutrophication. *Helgol. Mar. Res.*, 59, 45-54.
- Van Beusekom, J.E.E., de Jonge, V.N., 2002. Long-term changes in Wadden Sea nutrient cycles: importance of organic matter import from the North Sea. *Hydrobiologia*, 475/476, 185-194.
- Van Straaten, L.M.J.U., 1954. Composition and structure of recent marine sediments in the Netherlands. *Leidse Geol. Med.*, 19, 1-110.
- Van Straaten, L.M.J.U., Kuenen, P.H., 1957. Accumulation of fine-grained sediments in the Dutch Wadden Sea. *Geol. Mijnbouw*, 19, 329-354.
- Verwey, J., 1952. On the ecology on the distribution of cockle and mussel in the Dutch Waddensea, their role in sedimentation and the source of their food supply. *Archs. Néerl. Zool.*, 10, 171-239.
- Volkenborn, N., Hedtkamp, S.I.C., van Beusekom, J.E.E., Reise, K., 2007. Effects of bioturbation and bioirrigation by lugworms (*Arenicola marina*) on physical and chemical sediment properties and implications for intertidal habitat succession. *Estuar. Coast. Shelf Sci.*, 74, 331-343.
- Weisse, R., Plüß, A., 2006. Storm-related sea level variations along the North Sea coast as simulated by a high-resolution model 1958-2002. *Ocean Dynamics*, 56, 16-25.
- Wohlenberg, E., 1937. Die Wattenmeer-Lebensgemeinschaften im Königshafen von Sylt. *Helgol. Wiss. Meeresunters.*, 1, 1-92.
- Wohlenberg, E., 1953. Sinkstoff, Sediment und Anwachs am Hindenburgdamm. *Die Küste*, 2(2), 33-94.
- Wolff, W.J. (Ed.) 1983. Ecology of the Wadden Sea. Balkema, Rotterdam, The Netherlands.
- Wolff, W.J., 2000. Causes of extirpations in the Wadden Sea, an estuarine area in The Netherlands. *Conservation Biology*, 14, 876-885.
- Wolff, W.J., van der Land, J., Nienhuis, P.H., de Wilde, P.A.W.J., 1993. The functioning of the ecosystem of the Banc d'Arguin, Mauritania: a review. *Hydrobiologia*, 258, 211-222.
- Wolff, W.J., Zijlstra, J.J., 1980. Management of the Wadden Sea. *Helgol. Meeresunters.*, 33, 596-613.
- Wymenga, E., Engelmoer, M., Smit, C.J., van Spanje, T.M., 1990. Geographical breeding origin and migration of waders wintering in West Africa. *Ardea*, 78, 83-112.
- Zagwijn, W.H., 1986. Nederland in het Holoceen. *Rijks Geol. Dienst, Haarlem*, 46 pp.
- Zijlstra, J.J., 1972. On the importance of the Waddensea as a nursery area in relation to the conservation of the southern North Sea fishery resources. *Symp. Zool. Soc. Lond.*, 29, 233-258.

WADDEN SEA ECOSYSTEM No. 29

The Wadden Sea Quality Status Report – Synthesis Report 2010

Wim J. Wolff

Jan P. Bakker

Karsten Laursen

Karsten Reise

2010
Common Wadden Sea Secretariat

This publication should be cited as:

Wim J. Wolff, Jan P. Bakker, Karsten Laursen, Karsten Reise, 2010. The Wadden Sea Quality Status Report - Synthesis Report 2010. Wadden Sea Ecosystem No. 29. Common Wadden Sea Secretariat, Wilhelmshaven, Germany, page 25 - 74.

Contents

1. Protection and Management	29
1.1 Trilateral Wadden Sea Cooperation	29
1.2 World Heritage Site	29
1.3 International protection regimes	30
1.4 National protection regimes	30
2. Human Activities and Impacts	31
2.1 Reclamations and dams between islands and mainland	31
2.2 Damaging effects of water pollution	31
2.3 Dredging and extraction of sand and shells	31
2.4 Cultivation of mussels, oysters and fish	31
2.5 Extraction and transport of natural gas and crude oil	33
2.6 Fisheries for fish, cockles, blue mussels and shrimp	33
2.7 Helicopters and other small aircraft	35
2.8 Tourism, sailing	35
2.9 Military training	35
2.10 Shipping	35
2.11 Hunting	35
2.12 Scientific research	35
2.13 Not listed in 1985: wind energy	35
2.14 Not listed in 1985: climate change and introduced alien species	36
3. Monitoring Habitat and Species	37
3.1 Nutrients, phytoplankton and eutrophication	37
3.2 Hazardous substances	40
3.3 Benthic habitats	42
3.4 Aquatic alien species	46
3.5 Salt marshes	47
3.6 Beaches and dunes	49
3.7 Offshore Area	50
3.8 Estuaries	51
3.9 Fish	53
3.10 Birds	54
3.11 Marine mammals	57
4. The Main Issues	59
4.1. Maintaining a great natural heritage	59
4.2. Healing the old wounds	62
4.3. Mitigating external disturbances	64
4.4. Adapting to global change	66
4.5. Towards excellence in integrated management	67
List of QSR 2009 Thematic Reports	71
Recommendations from the 12th International Scientific Wadden Sea Symposium, March 2009	73

1. Protection and Management

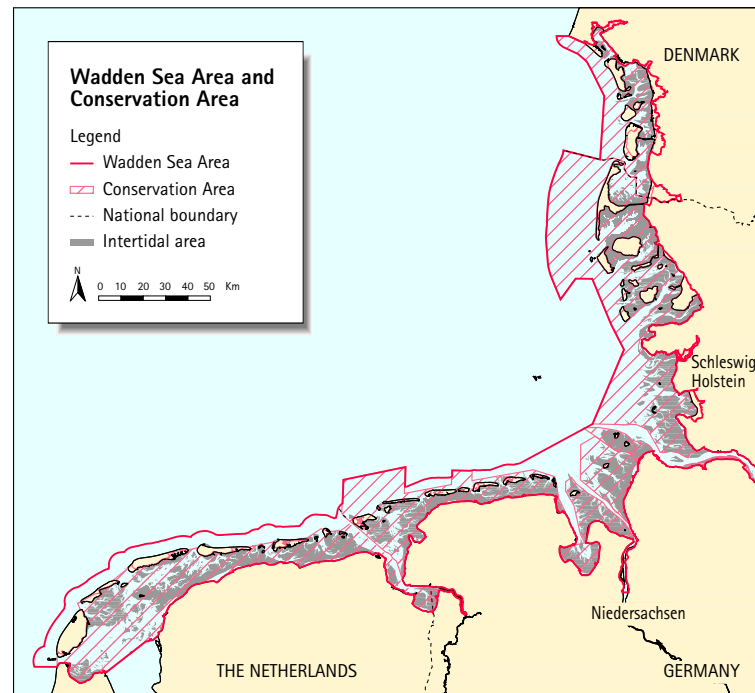


Figure 1.1:
Map of the Wadden Sea
Area and Conservation
Area.

The Wadden Sea is subject to a comprehensive nature protection scheme on national and regional levels as well as to extensive protection and management arrangements between the countries in the framework of the Trilateral Wadden Sea Cooperation. Also, several European directives play a part (e.g., Natura 2000).

Significant new developments since the QSR 2004 are the designation of the Danish Wadden Sea as a National Park (2010), the adoption of a revised Wadden Sea Plan (2010) and the inscription by UNESCO of the Dutch and German parts of the Wadden Sea as a World Heritage Site (2009).

1.1 Trilateral Wadden Sea Cooperation

Since 1978, the Trilateral Wadden Sea Cooperation (TWSC) between Denmark, Germany and The Netherlands has been dealing with the joint protection of the Wadden Sea ecosystem. Central elements of the trilateral arrangements are the guiding principles, common management principles and the common targets upon which common policies

and management have been agreed (Wadden Sea Plan, 2010). The Guiding Principle of the Trilateral Wadden Sea policy is "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". The Wadden Sea Plan, the policy and management plan for the Wadden Sea Area proper, which includes the central objectives and principles of the Wadden Sea Cooperation, was agreed at the 8th Trilateral Wadden Sea Conference at Stade in 1997. The Trilateral Monitoring and Assessment Program (TMAP), associated with the implementation of the Wadden Sea Plan, was launched on the same occasion.

The Wadden Sea Area covers about 14,700 km²; the Conservation Area is about 11,200 km² (Table 1.1).

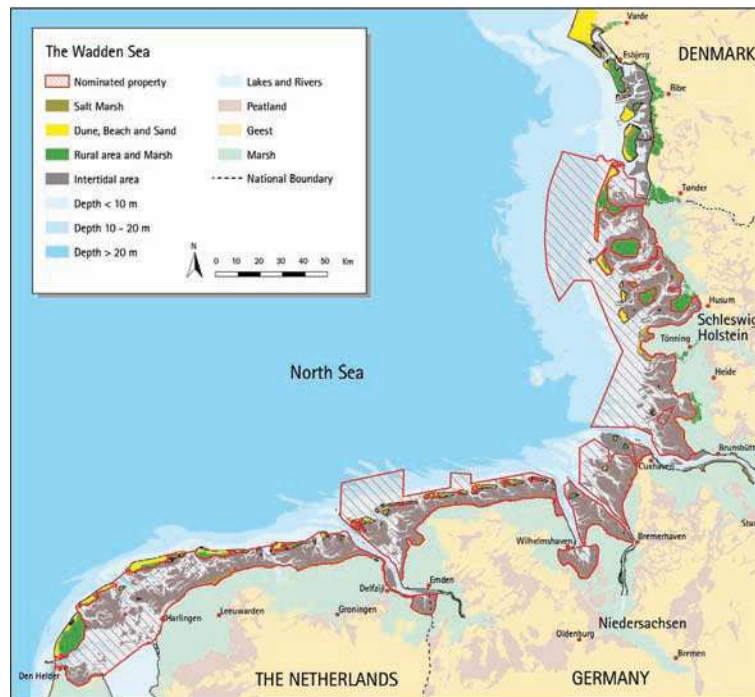
1.2 World Heritage Site

In June 2009, the World Heritage Committee inscribed the Dutch and German parts of the Wadden Sea on the World Heritage List under natural criteria (viii) geomorphology, (ix) ecological and

	Conservation Area (km ²)	Wadden Sea Area (km ²)
Denmark	1,250	1,500
Germany*		9,050
Schleswig-Holstein National Park	4,410	
Hamburg National Park	137.5	
Niedersachsen National Park	2,777	
Nds: NSG Ems, Elbe	34	
Netherlands*	2,600	3,900
Disputed Area (NL, FRG)		250
Trilateral	11,208.5	14,700

Table 1.1:
Size of the Conservation
Area and Wadden Sea Area
(km²). *Because of the
disputed area in the Ems
estuary, the figures for NL
and FRG are approximate.

Figure 1.2:
Map of the Wadden Sea
World Heritage Site (CWSS,
2009).



biological processes, and (x) biological diversity. The Committee also adopted a Statement of Outstanding Universal Value which, according to the Operational Guidelines, forms the basis for the future protection and management of the property (UNESCO, 2009).

1.3 International protection regimes

The European Union's environmental legislation is of specific significance for the Wadden Sea and has increased in importance during the past two decades. The legislation is trans-boundary and, increasingly, covers all environmental policy areas. It also has direct implications for Member States' legislation. Of the comprehensive list of environmental legislation, the Habitats, Birds (Natura 2000) and Water Framework Directives are the most relevant for the protection and sustainable use of the nominated property. The Marine Strategy Framework Directive is currently being implemented and will also be important for Wadden Sea policy.

Other relevant European Union legislation includes the Environmental Impact Assessment Directive and the Strategic Environmental Assessment Directive, which are of central importance for the assessment of the environmental impacts of policies, plans and concrete projects. Also, the recommendation of the European Parliament and the Council on Integrated Coastal Zone Management is of particular importance for the Wadden Sea, because it deals specifically with the inter-

face of land and sea and management of conditions at that interface.

The Wadden Sea countries are contractual parties to several international agreements, conventions and treaties, in particular the Convention on Wetlands of International Importance [especially as waterfowl habitat] (Ramsar Convention), the Convention on Biological Diversity (CBD), the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention) also comprising the Agreement on the Conservation of Seals in the Wadden Sea (Seal Agreement), the Agreement on the Conser-

vation of African-Eurasian Waterbirds (AEWA) and the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS), the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).

1.4 National protection regimes

In The Netherlands, the protection of the Dutch part of the Wadden Sea combines a unique national physical planning approach (the Key Planning Decision Wadden Sea (PKB)) with a designation under the Nature Conservation Act 1998, supported by additional designations.

In Germany, the Wadden Sea is protected as national parks established in 1985, 1986 and 1990 in Schleswig-Holstein, Niedersachsen and Hamburg respectively.

In Denmark, the revised Statutory Order for the Danish Nature and Wildlife Reserve was enacted in 1998. In 2008, the Danish parliament formally agreed to establish the Danish Wadden Sea National Park, which covers almost 146,000 ha. The national park was inaugurated in October 2010, together with the enactment of the Statutory Order.

A comprehensive overview of the national protection and management regimes is given in the QSR 2009 Thematic Report No. 1 "The Wadden Sea – Protection and Management".

2. Human Activities and Impacts

The Trilateral Monitoring and Assessment Program (TMAP) has a predecessor which operated from 1966-1985. This was the International Wadden Sea Working Group, a private organization of Danish, Dutch and German Wadden Sea scientists who aimed at better protection of the Wadden Sea. In 1983 their collective knowledge was published in the three volumes of 'Ecology of the Wadden Sea' and in 1985 these 124 Wadden Sea scientists published a document 'The management of the Wadden Sea'. Because this private working group suffered from a shortage of money, only a Dutch version ('Het beheer van de Wadden') was actually printed. This little-known booklet contains a table in which the threats to the Wadden Sea system are listed and ranked according to the severity of the problem. The ranking is based on: 1) the speed of recovery after occurrence of a human impact, 2) the maximum geographical extent of the effects of an impact, 3) the frequency of the impact. In the following paragraphs these threats or impacts are listed and discussed in a sequence of decreasing impact, as defined in the 1985 document. So, the first human activities listed were supposed to have the largest (potential) impact on the Wadden Sea system. For better understanding some of the activities are brought under the same heading.

This ranked list of human activities illustrates very well the progress which has been made in 25 years of managing the Wadden Sea as a nature reserve. It also shows the areas where little progress has been made. At the same time it makes clear which human activities and impacts still played an important part between the QSR 2004 and the QSR 2009.

2.1 Reclamations and dams between islands and mainland

In 1985, reclamations of salt marshes and intertidal flats were considered to be the largest threat to the Wadden Sea ecosystem, mainly because the impact was seen as irreversible. At that time reclamations of part of the Wadden Sea were still being discussed. Nowadays, Wadden Sea policy in all three countries makes any reclamation highly improbable. Instead, summer polders along the coast of the Wadden Sea are changed to salt marshes and intertidal flats by removing (part of) the surrounding seawalls.

Dams to the islands were also seen as a very serious threat in 1985. Again, this is a discussion of the past.

This changed attitude to reclamation and dam-building shows that the largest threats to the Wadden Sea have been eliminated. This is due to a strong involvement of nature conservation

NGOs and a consequent governmental policy on protection of the Wadden Sea.

2.2 Damaging effects of water pollution

The 1985 report put effects of various forms of water pollution high on the list of threats to the Wadden Sea. PCBs, oil pollution, pesticides, heavy metals, discharge of wastewater with high concentrations of organic matter from agricultural industries, and eutrophication were listed in an order of decreasing impact. Since that time pollution problems have greatly diminished. For example, the huge loads of waste water sluiced by agricultural industries into the eastern Dutch Wadden Sea have completely disappeared. PCBs, pesticides and heavy metals all have strongly decreased and nowadays occur in mainly low quantities (see chapter 3.2). Oil pollution is still present and continues to constitute a problem. Eutrophication of the Wadden Sea was increasing in 1985 but has been decreasing in later years. This reduction of pollution problems is due to an active environmental policy of all states bordering the North Sea. However, some forms of pollution continue to occur in smaller quantities and their presence is still being monitored (see sections 3.1 and 3.2).

2.3 Dredging and extraction of sand and shells

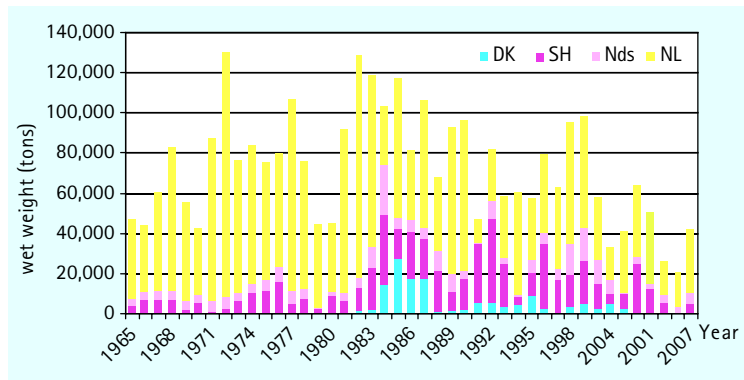
Dredging and extraction of sand and shells figured high on the list of 1985 threats. Since 1985 extraction of sand and shells has been strongly regulated and has been confined to the deeper parts of the Wadden Sea and the North Sea. In parts of the Wadden Sea, sand can only be extracted in combination with dredging; otherwise it has to be brought in from the North Sea.

Dredging of shipping lanes has been increasing since 1985 to accommodate ever larger vessels on their way to the major ports in the Wadden Sea area. At present it constitutes a major problem especially in the estuaries of Ems, Weser and Elbe. Dredging causes water turbidity which cuts light penetration of the water column.

2.4 Cultivation of mussels, oysters and fish

Cultivation of blue mussels occurs in Germany and The Netherlands. The culture is based on the availability of small seed mussels which are fished on wild banks and subsequently sown on the culture plots for growth to marketable size. Since 1985 the collection of seed mussels has had an increasing impact on the presence of wild mussels. Around

Figure 2.1: Landings of blue mussels in the Wadden Sea 1965–2007 (in tons wet weight). (Source: Nehls *et al.*, 2009, QSR 2009, Thematic Report No. 3.5).



1990 an unprecedented low was reached in the Dutch Wadden Sea. At present, regulations to prevent overfishing and damage to natural values are in place in all Wadden Sea countries.

Cultivation of European flat oysters is an activity of the past: this oyster species is now extinct. Its market position has partly been taken over by the Pacific or Japanese oyster, an alien species introduced into the Wadden Sea around 1985. Some experimental fishing is carried out on the now-abundant oyster beds.

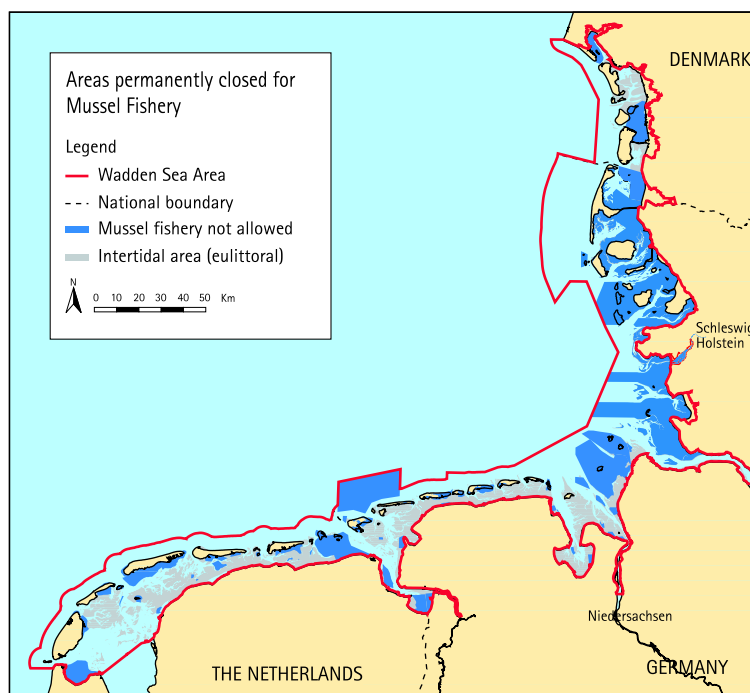
Cultivation of fish does not play an important part in the Wadden Sea.

Amount and abundance of natural spatfall of blue mussels is always varying. Hence, catches of blue mussels show strong fluctuations per year and region. Because of low seed availability, in recent years low catches were reported, accompanied by a decreasing or failing spatfall and declining mussel harvest (Fig. 2.1).

In the period 1994–2007 the average annual landings of mussels were about 56,000 tons wet weight (including shells). Most of them (about 35,000 t) were landed in The Netherlands. On average about 70% of all Wadden Sea mussels are of Dutch origin. A considerable part of the German landings are transported to The Netherlands where the majority of landings are traded. Blue-mussel fishing is regulated in all three countries and in certain areas is not permitted at all (Fig. 2.2).

In The Netherlands the mussel culture was also restructured. Starting in 2008, a programme started to gradually phase out fishing of seed mussels from the sea floor. Instead they were collected from ropes and nets suspended in the water. It is foreseen that in a number of 20% increments, all seed mussels will ultimately be obtained from suspended ropes and nets. Presently, shortages of seed mussels in the Dutch Wadden Sea are compensated by seed mussels imported from the

Figure 2.2: Areas in the Wadden Sea region permanently closed for mussel fishery in 2008.



German Wadden Sea, and mussel cultures off Sylt have even been supplied with imports from the British Isles in recent years.

2.5 Extraction and transport of natural gas and crude oil

Natural gas was extracted from under the Wadden Sea from locations on the mainland (Groningen field) since about 1960. In 1981 licenses were issued for gas extraction directly from the Wadden Sea area in The Netherlands (Zuidwal, Ameland). In the outer part of the Ems estuary gas was extracted from German territory. At that time the impact of gas extraction was not very clear and serious consequences were predicted. Hence, a monitoring program was established at the Ameland site in 1982. The results of this monitoring program were used in discussions about extracting gas from new fields in the Dutch Wadden Sea after 1994. It was finally decided to grant a new license for gas extraction from underneath the Wadden Sea near Lauwersoog. The impact of this activity is closely monitored; if the subsidence of intertidal flats and salt marshes exceeds a certain threshold value, the extraction will be stopped. So far the subsidence of the flats seems to be compensated by sedimentation of sand and mud. Hence, ecological effects seem negligible.

Crude oil is extracted from the Dithmarschen part of the Wadden Sea. Due to strong safety precautions no oil pollution incidents have occurred. The oil was initially brought to the mainland by tankers, but since 2005 this has been done via a pipeline. No incidents have been reported.

Natural gas from the Wadden Sea, the North Sea and the Wadden Sea islands is transported through pipelines. The construction and situation on the seabed of these pipelines had a considerable impact on the tidal flats and channels but

monitoring has shown that the original ecosystem conditions were restored in 5-10 years.

The State Parties confirmed their commitment not to permit exploration and extraction of oil and gas at locations within the boundaries of the Wadden Sea World Heritage Site.

2.6 Fisheries for fish, cockles, blue mussels and shrimp

In the 1985 report, fishing for fish and brown shrimp was believed to have a stronger negative impact than fishing for cockles and seed mussels. Based on a major research effort, this point of view has changed to the present notion that shellfish fisheries are more harmful than fisheries for shrimp.

In the period between QSR 2004 and QSR 2009 fishing in the Wadden Sea hardly involved fish. Brown shrimps and blue mussels were the main catches. Starting in 2005, the mechanized fishing of cockles, which proved particularly harmful to the tidal flat ecosystem, was prohibited in The Netherlands; in Germany and almost all part of the Danish Wadden Sea it was already banned. In The Netherlands also the mussel culture is being restructured. Landings of brown shrimps were high in the period 2004-2008.

2004 was the last year in which mechanized fishing for cockles was allowed in The Netherlands (Fig. 2.3). Nowadays cockle-fishing is prohibited in most of the Wadden Sea. Only a manual cockle fishery is still allowed in The Netherlands with a maximum yearly catch of 5% of the cockle stock. A maximum of 31 licenses for manual cockle fishery have been granted. The fished amounts were between 0.1 and 1.5 % of the stock (Fig. 2.4).

In all three Wadden Sea countries, fishing of brown shrimps (*Crangon crangon*) is carried out in the offshore coastal waters and in almost all

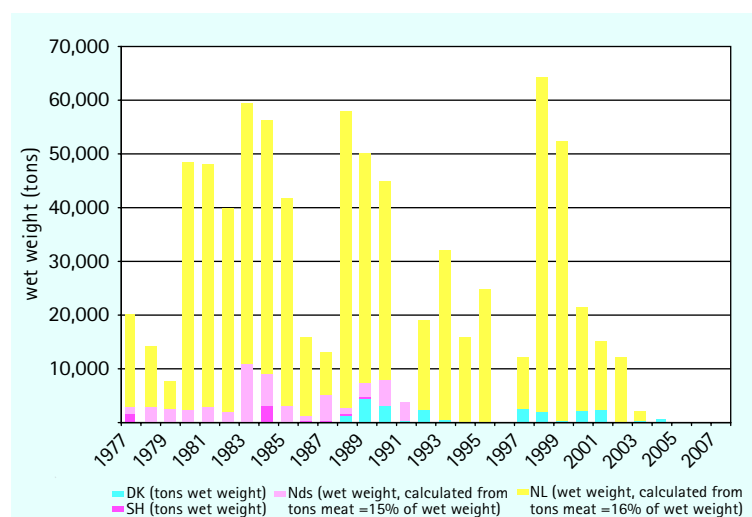
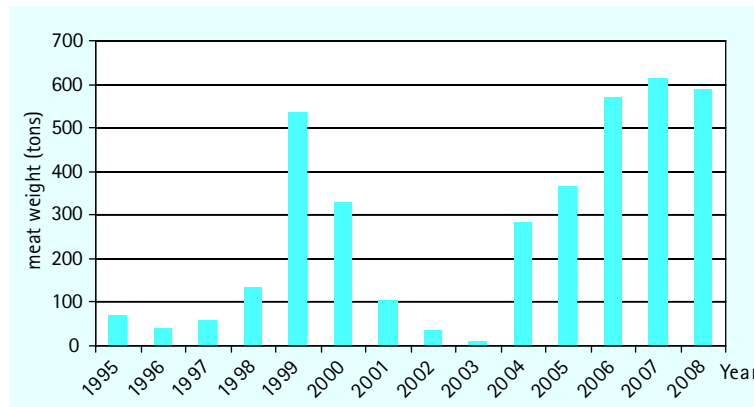


Figure 2.3:
Landings of cockles in the Wadden Sea 1977-2007 (in tons wet weight) (sources: DTU Aqua, Fischerblatt, RIVO, PVIS), (QSR 2009).

Figure 2.4: Cockle catch (meat weight) by hand rakers in the Dutch Wadden Sea (information from Rakers Association, OHV, presented by Bert Keus) (QSR 2009).



gullies and channels within the Wadden Sea. Only in the Danish part of the Conservation Area, in 95% of the area of the Hamburg National Park and in the zero-use zone of the Schleswig-Holstein National Park in Germany is shrimp fishery not allowed. Generally, there are no substantial differences in policies and practices within the Trilateral Cooperation Area, except for Denmark where shrimp fishery is prohibited within the line of barrier islands. Landings are recorded by country and kept separately. Record landings were found in 2005 for all three Wadden Sea countries. However, German landings declined in 2006, posing the question as to whether the lower catch was caused by reduced fishing activity or reduced stock.

The Netherlands

In the Dutch part, shrimp fishery is carried out by 204 licensed vessels. Of these, 90 vessels operate in the Wadden Sea, with 60 exclusively fishing on shrimps. The total average annual catch in The Netherlands (including that from vessels outside the Wadden Sea) was about 15,000 t in most

recent years (Fig. 2.5.). Fishermen estimated that roughly half of these landings are fished in the Wadden Sea.

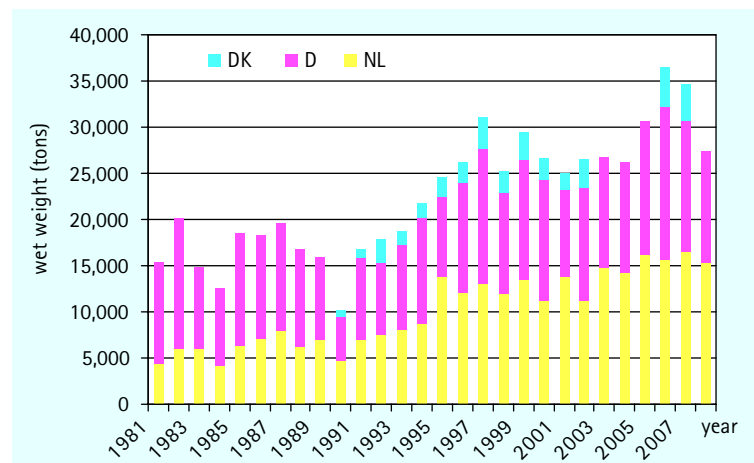
Germany

In Germany, the shrimp catch has on average been 12,000 t/yr (1994-2007). Fishery on small-sized shrimp for animal consumption and fish meal is still carried out in Niedersachsen in the second half of the year. The landings are around 600-1,200 t/yr, which is about 13% of the amount landed for human consumption in Niedersachsen.

Denmark

In the last 15 years, between 21 and 28 licensed vessels have fished for shrimps in Danish waters west of the 'Shrimp Line' (SL) drawn between the Wadden Sea islands from the peninsula of Skallingen to Rømø. Between 100 and 150 vessels (mainly German, Dutch and a few Belgian) fish for shrimps periodically or more permanently in the Danish Economical zone in the North Sea. The SL has been enforced since 1977. In the last 15 years, the Danish landings have been on average

Figure 2.5: Landings of brown shrimps in 1981-2007 (in tons wet weight) (sources: DTU AQUA, Fischerblatt, PVIS) (DK: data for 1991 – 2002 for Danish vessels) (QSR 2009).



around 2,900 t (only Danish vessels) and about 3,400 t annually (including vessels from other EU countries) (in Fig. 2.5, Danish data are total landings including foreign vessels).

2.7 Helicopters and other small aircraft

The 1985 study listed helicopters and small fixed-wing aircraft as causing disturbance of shorebirds and seals. Between QSR 2004–2009, this disturbance decreased, mainly because low-flying aircraft were prohibited.

2.8 Tourism, sailing

Every year many millions of tourists are drawn to the Wadden Sea coast. They constitute an important source of income for the region. For the people living in the predominantly rural regions of the countries bordering the Wadden Sea, there is in most cases no alternative to tourism. Almost 50 million overnight stays, with a turnover of up to 6 billion euro per year, were estimated for the years 2007/2008. However, the available data sources, applied methods and statistics in the countries are too different to allow a reliable quantitative trend analysis and impact assessment for the entire Wadden Sea. To improve the situation, a multi-dimensional market research instrument should be developed with which demand, changes in utilization behaviour, and their impacts on nature and the environment, can be monitored. It should also form the basis for coordinated regional development concepts in the Wadden Sea region. These need to set out a clear overall direction but allow for flexible and pragmatic solutions to the many specific challenges posed by the diverse demands of nature protection, tourism and recreation.

The recent designation of the Dutch-German Wadden Sea as UNESCO World Heritage Site is likely to enhance tourists' awareness of the need to protect the Wadden Sea. The development of a sustainable tourism strategy as requested by the UNESCO World Heritage Committee in June 2009 should be used to establish a reliable basis for monitoring and assessment of tourism impacts on the Wadden Sea.

The 1985 report only discussed sailing and intertidal-flat walking. Their impact was rated moderate.

2.9 Military training

Military training was recorded in the 1985 report as having moderate impact, mainly through disturbance of shorebirds and seals. Now, 25 years later, the impact has been reduced even further.

2.10 Shipping

Along the Wadden Sea coast, a number of large ports of international significance form the destinations of many merchant vessels. The waters off The Netherlands, Germany and Denmark are among the world's busiest shipping routes. Merchant shipping is of high economic importance for the Wadden Sea Region, but a shipping accident could have disastrous ecological and economic consequences for the Wadden Sea. Therefore shipping safety, including avoidance of illegal dumping of oil residues, is of utmost importance.

To raise awareness of the vulnerability of the Wadden Sea, the area was designated as a Particularly Sensitive Sea Area (PSSA) by the International Maritime Organisation (IMO) in 2002.

The high risk and potential consequences of accidents, and the PSSA designation, pointed to the need to maintain and where necessary enhance shipping safety and reduce impacts from shipping on the Wadden Sea. The International and European Communities have introduced several important pieces of legislation aimed at protecting the environment from shipping activities. Also further implementation of policies and actions to prevent oil pollution from shipping – both from illegal discharges and from accidents – as well as control and enforcement measures needs to be continued.

2.11 Hunting

Already in 1985 hunting had a minor impact on the Wadden Sea system. This is still true at the time of QSR 2009.

2.12 Scientific research

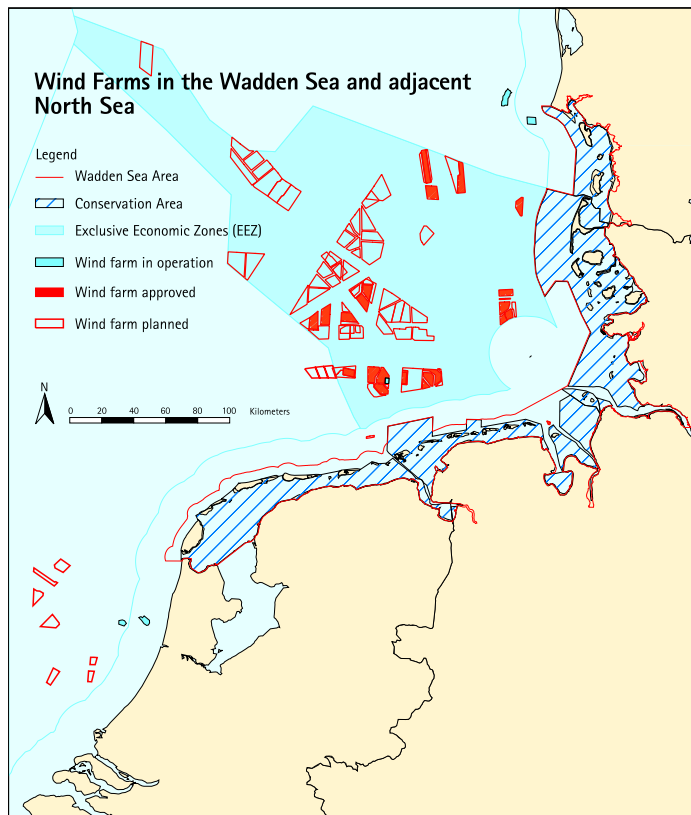
In 1985 it was concluded that scientific field research was not entirely without effects on the Wadden Sea ecosystem. This situation has not changed in 2009.

2.13 Not listed in 1985: wind energy

In 1985, the Wadden Sea area had hardly any large windmills for energy production. These were not seen as a problem for conservation. This has changed considerably.

In 2009 the construction of wind turbines is prohibited in the whole Wadden Sea Conservation Area. On the islands and the adjacent mainland outside the Wadden Sea Conservation Area, the construction of wind turbines and wind farms is only allowed if important ecological and landscape values are not negatively affected. Policies are in

Figure 2.6: Offshore wind farms in the Wadden Sea and adjacent North Sea (status September 2009). Only approved pilot projects and wind farms in operation are shown (QSR 2009, Thematic Report No. 3.6)



force regarding the construction of wind turbines outside the Wadden Sea Area - along the coast and offshore - considering ecological and landscape criteria. In particular, cables crossing the Wadden Sea need attention.

In the Exclusive Economic Zone (EEZ) north of the Dutch Wadden islands, three offshore wind energy projects have been submitted for a license. In Germany, the first offshore wind farm "Alpha Ventus", around 45 km north of the island of Borkum, has been in operation since 2009. A further 18 projects for the German North Sea EEZ are at various stages of planning. In Denmark, three offshore wind farms are currently in operation in the North Sea. The latest one, of about 200 MW, Horns Rev II was inaugurated in September 2009.

2.14 Not listed in 1985: climate change and introduced alien species

The first scientific meeting on the effects of climate change on the Wadden Sea was held in 1988. At that time, climate change was a new subject of scientific research. After more than 20 years the

situation has changed considerably. It has been concluded that the effects of climate change are likely to be large. Enhanced temperatures will cause northern species to disappear and enable the settlement of species adapted to warmer climates. Sea level rise, if the predicted rate comes true, may be the most serious consequence of climate change, since it threatens the very existence of the Wadden Sea.

Climate change is treated in two separate chapters in the QSR 2009 focusing on geomorphological and ecological consequences. Effects of climate change may become apparent in many of the monitoring programs targeted at different groups of plants and animals.

Understanding the functioning of the Wadden Sea morpho-hydro-eco-system as a composite including positive and negative feedback mechanisms, is urgently

needed to develop prognostic models and to construct reliable future scenarios. To this end, monitoring has to be extended to improve both temporal and spatial resolution to improve both the abiotic and biotic modeling of the Wadden Sea system.

However, in order to adequately understand and project the consequences of climate change for hydromorphodynamics, biodiversity and ecosystem functioning of the sea, we need to (1) extend our coastal monitoring efforts; (2) extend our knowledge on sensitivities and adaptation capabilities of (abiotic) key processes and (biotic) species in the marine environment; and (3) develop fit-for purpose models to manage our marine environment.

Species introduced unintentionally with shipping and other transports, as well as introduced on purpose, are spreading at an unprecedented rate in the Wadden Sea. Many of the introductions benefit from recent warming. This invasion is accelerating and is shifting species dominance in the benthos and the dune vegetation in particular.

3. Monitoring Habitats and Species

3.1 Nutrients, phytoplankton and eutrophication

Eutrophication, caused by increased nutrient loadings, is one of the factors influencing the quality of the Wadden Sea area. Since the earliest nutrient measurements in the Wadden Sea, a clear increase in nutrient loadings and concentrations has been documented. Among the negative effects associated with the increased nutrient loads are *Phaeocystis* blooms, a decline of seagrass beds, increased blooms of green macroalgae and anoxic sediments. After a peak in the 1980s, nutrient levels have decreased again.

Eutrophication of the Wadden Sea continues to decrease. A main development since the QSR 2004 is a continuation of the decrease of riverine nutrient input. Also, compared to background estimates of autumn NH_4+NO_2 concentrations in the Wadden Sea, present values are still clearly elevated, but have decreased when compared to the QSR 2004.

3.1.1 Nutrients

Riverine nutrient input showed a gradual decrease during the period 1985–2006 (Fig. 3.1). Since 1985, the specific total nitrogen (TN) load to the Southern and Central Wadden Sea decreased each year by 2.1% on average. The specific total phosphorus (TP) load decreased even more strongly than the specific TN load, but in recent years the rate of decrease has slowed down. It now amounts to 2.9% per year for the Southern Wadden Sea and 2.1% per year for the Central Wadden Sea. Note that during the period 1985–2002 the rates were about 0.4% higher. In the Elbe and Weser, a slow-down in the decrease in specific TP load has been evident since about 1990.

Salinity-normalized nitrate+nitrite concentrations in the German Bight in winter reflect the decreasing total nitrogen load, and in some

Wadden Sea sub-areas a decreasing trend is now apparent.

The salinity-normalized winter nitrate data (at salinity 27) show a downward trend in some areas since the early 1990s. In the Dutch Wadden Sea, a slight decrease was observed from around $50 \mu\text{M}$ (early 1990s) to around $40 \mu\text{M}$ (since 2002). In the Ems river district (Ems estuary and Lower Saxony), winter nitrate decreased from $80 \mu\text{M}$ (early 1990s) to around $60 \mu\text{M}$ (since 2002). In Dithmarschen (Eider district), winter nitrate decreased from $70\text{--}80 \mu\text{M}$ (early 1990s) to around $50\text{--}60 \mu\text{M}$ (since 2002). In the North Frisian Wadden Sea and in the Danish Wadden Sea, no clear trends were observed. Salinity-normalized nitrate concentrations were around $44\text{--}49 \mu\text{M}$.

Salinity-normalized winter phosphate concentrations showed the strongest decrease between 1985 and 1995 (QSR 2004). Since then, no further changes are apparent for most areas and salinity-normalized concentrations range between about $0.9 \mu\text{M}$ in the western Dutch Wadden Sea, and about $1.1 \mu\text{M}$ in the Danish Wadden Sea to around $1.8 \mu\text{M}$ near the Ems and Elbe estuaries. In the western Dutch Wadden Sea only, a further decrease was observed, from $1.4 \mu\text{M}$ during the early 1990s to about $0.9 \mu\text{M}$ since 2002.

However, compared to background estimates of winter nutrient concentrations (DIN $6\text{--}9 \mu\text{M}$, DIP $0.4\text{--}0.5 \mu\text{M}$), present values are clearly elevated.

3.1.2 Primary producers

The decreasing nutrient input (TN loads by Rhine, Meuse, Weser and Elbe) had a significant effect on the phytoplankton biomass (as chlorophyll) in the Southern Wadden Sea (Western Dutch Wadden Sea, Lower Saxonian Wadden Sea, Norderney) in summer. In the Northern Wadden Sea, decreasing TN loads by the rivers Weser and Elbe had a significant effect on the summer chlorophyll levels in the List Tidal Basin and in the Grädyb.

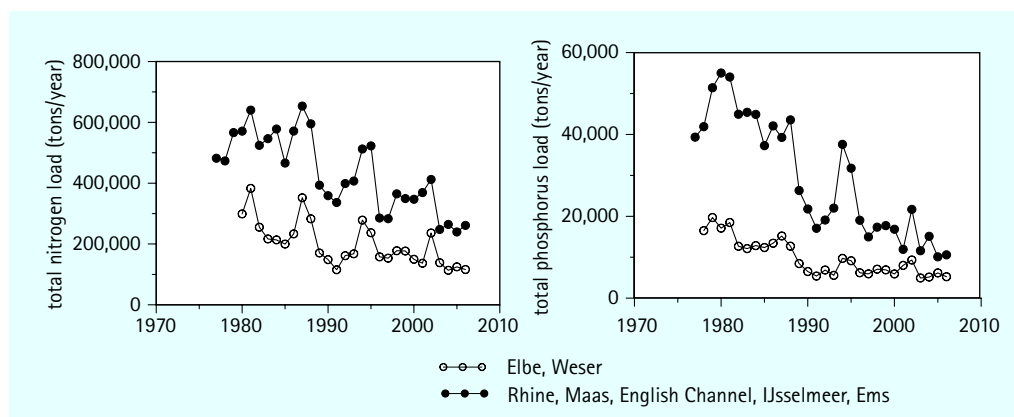


Figure 3.1: Specific nitrogen and phosphorus load (mean annual load / mean annual discharge) to the Southern Wadden Sea (Rhine, Meuse, Noordzeekanaal, IJsselmeer and Ems) and to the Central and Northern Wadden Sea (Weser, Elbe). Data source: DONAR, NLWKN, Lenhart and Pättsch (2001), updated to 2006.

However, the evaluation of present levels against background estimates is difficult because the three Wadden Sea countries use different estimates, time windows and statistics. Background mean chlorophyll levels during the growth season (March–September) for the Dutch Wadden Sea are estimated at 8 µg Chl-*a*/l (Baretta-Bekker *et al.*, 2008). German estimates are almost two times lower and amount to 2–3 µg Chl-*a*/l which are similar to the range in Denmark (1.9 µg and 4.0 µg Chl-*a*/l, (May–September). In all areas, present values are clearly higher than background values.

In general, summer chlorophyll levels are higher in the Southern Wadden Sea than in the Northern Wadden Sea and are in line with the conclusion in QSR 2004 of a higher eutrophication status in the Southern Wadden Sea. However, within both Wadden Sea regions, large differences exist: hotspots are the Eastern Dutch Wadden Sea, the Elbe estuary and Gradyb. Lowest values are found in the Danish and North Frisian Wadden Sea (between Eiderstedt and Gradyb) (Fig. 3.2)

Toxic blooms are observed in all parts of the Wadden Sea, but no decreasing or increasing trend in relation to nutrient input is evident. The main nuisance blooms were due to *Phaeocystis*. Long-term data from the Marsdiep (Western Dutch Wadden Sea) show a decreasing trend in bloom

duration. Present macroalgae abundance in the Northern Wadden Sea correlates with riverine TN input and is below the maximum levels observed during the early 1990s.

3.1.3 Organic matter turnover

The autumn NH_4+NO_2 values are a good indicator of organic matter turnover in the Southern Wadden Sea. The decreasing nutrient input (TN loads by Rhine and Meuse) lead to decreasing autumn NH_4+NO_2 values in the Southern Wadden Sea. In the Northern Wadden Sea, a less clear picture emerges and no correlation with riverine TN input is observed (Table 3.1).

The recent distribution patterns of autumn NH_4+NO_2 values show a similar pattern as summer chlorophyll and both proxies are strongly correlated ($r^2 = 0.87$; $N = 7$; $p < 0.00021$; compare van Beusekom, 2006). This supports the view that the observed regional differences are real. Autumn values identify the same eutrophication hotspots and low eutrophication regions as summer chlorophyll. Compared to background estimates of autumn NH_4+NO_2 values, present values are clearly elevated (Table 3.1) but have decreased when compared to the QSR 2004.

The results show that current policies to reduce nutrient input have been successful with regard

Figure 3.2:
Spatial distribution of summer chlorophyll *a* (May–September) in the Wadden Sea during 2000–2006. Circles indicate the area considered and numbers inside indicate the number of stations used for the mean.

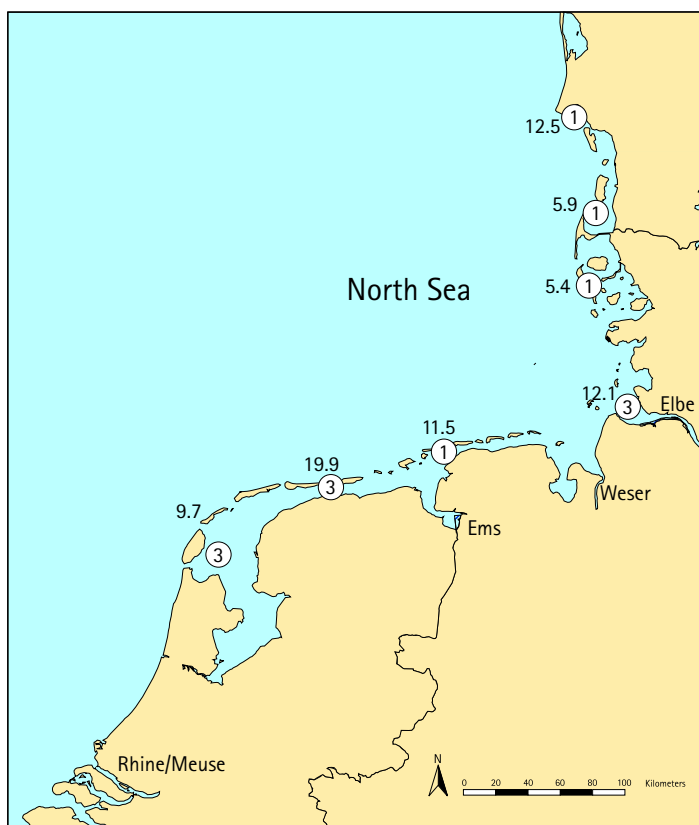


Table 3.1:

Classification of the Wadden Sea into Non-Problem, Potential Problem and Problem Areas based on autumn concentrations of NH_4+NO_2 (μM) as proposed by van Beusekom *et al.* (2001) and modified with data from the recent study. The division in sub-regions is based on the availability of seasonal data. The present autumn values refer to values between 2000 – 2006. Non-problem conditions were based on background values for the Western Dutch Wadden Sea. Values for the other areas proportionally assigned on the basis of present-day values (van Beusekom *et al.*, 2001). All threshold values were formally derived and an uncertainty range of $\pm 1 \mu\text{M}$ should be added. (Beusekom *et al.*, 2009, QSR 2009 Thematic Report No. 6).

Area	Non-Problem conditions	Potential Problem conditions	Problem conditions	Values QSR 2004 (1997-2002)	„Present“ values (2000-2006)
Western Dutch Wadden Sea	<3.0 μM	3.0 μM <> 8.3 μM	> 8.3 μM	9.9 μM	8.2 μM
Eastern Dutch Wadden Sea	<4.0 μM	4.0 μM <> 10.2 μM	> 10.2 μM	19.8 μM	16.8 μM
Lower Sax. Wadden Sea	<3.2 μM	3.2 μM <> 8.2 μM	> 8.2 μM	10.6 μM	9.9 μM
List Tidal Basin	<1.9 μM	1.9 μM <> 4.2 μM	> 4.2 μM	6.1 μM	5.9 μM
Danish Wadden Sea (Gradyb)	<2.5 μM	2.5 μM <> 6.5 μM	> 6.5 μM	10.2 μM	8.3 μM

to phosphorus and nitrogen compounds. The decreasing nutrient loads into the coastal North Sea and directly into the Wadden Sea have led to a decreasing eutrophication status in the entire Wadden Sea. However, the target of a Wadden Sea without eutrophication problems has not been reached yet. Therefore it is recommended that policies to reduce nutrient input are continued.

The present study confirms the previous conclusion (QSR 2004) on regional differences within the international Wadden Sea. The reasons for these differences have to be revealed in order to formulate region-specific standards for a good ecological status, as for instance demanded by the Water Framework Directive. Further effort is needed to understand the regional differences in nutrient patterns and their implications for the coastal ecosystem, and to improve the temporal and spatial resolution of existing monitoring programs in order to cover the entire seasonal cycle.

For the assessment of the phytoplankton eutrophication status in the Wadden Sea, two metrics are presently discussed in the Water Framework Directive: 1) the percentage of observations with *Phaeocystis* bloom conditions ($>10^7$ cells/l);

and 2) deviations from a reference phytoplankton biomass. In the latter case, the 90-percentile of chlorophyll-a during the period March-October is used as indicator. In the Wadden Sea area, no agreement has been reached yet on the reference conditions and boundaries between good and moderate for phytoplankton biomass.

3.2. Hazardous substances

The pollution of the Wadden Sea derives mainly from external sources, *i.e.* the major rivers Elbe, Weser, Ems and the IJssel, the North Sea and the atmosphere. Although long-time downward trends are observed for most hazardous substances, there are no significant differences between the situation described in the QSR 2004 and the present situation described in the QSR 2009. Cleaning-up the Wadden Sea is obviously a slow process.

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 (Fig. 3.3). For some metals, the target of background concentrations in sediment has not yet been reached in all sub-areas of the Wadden Sea. Regarding the "effects range level"

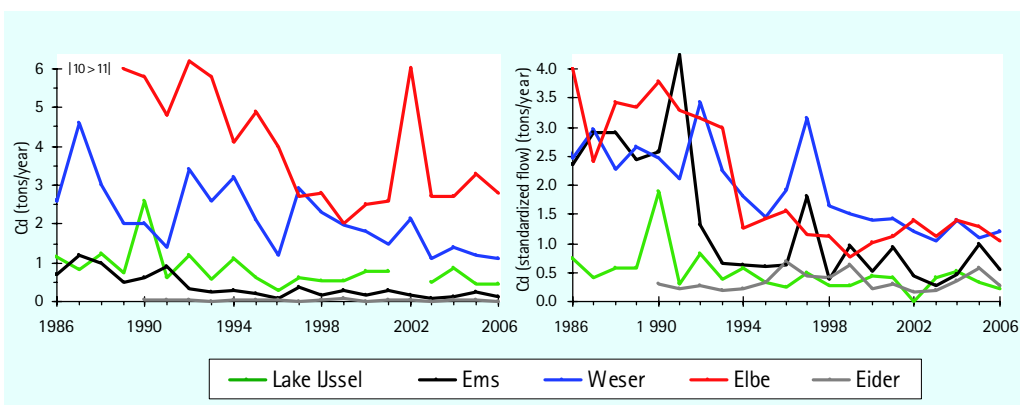
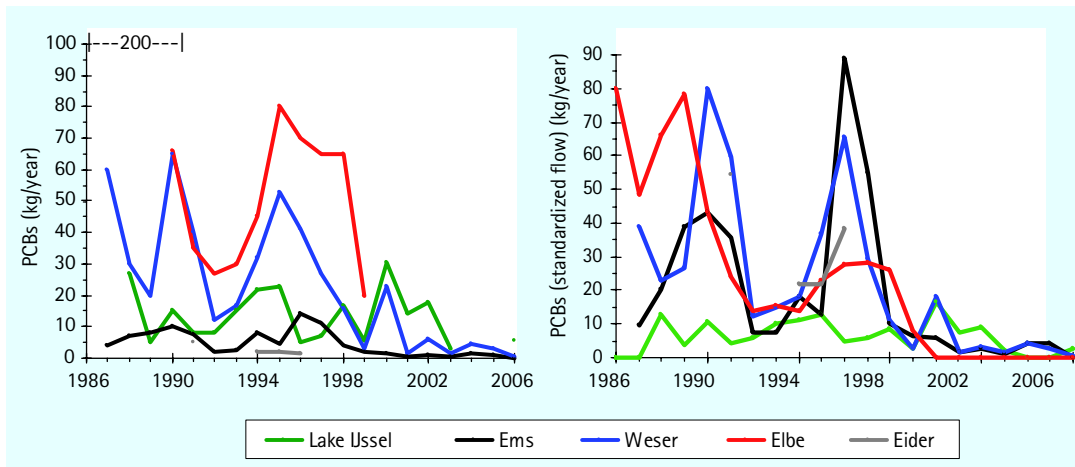


Figure 3.3: Loads of Cadmium by riverine inputs (tonnes/year). Right panel: corrected for flow differences to a standardized flow of $1010 \text{ m}^3\cdot\text{y}^{-1}$ (comparable to the average flow of the Weser). The major decrease occurred until 2002. The rivers Elbe and Weser water concentrations are twice those of Lake IJssel, Eider and Ems (Bakker *et al.*, 2009, QSR 2009 Thematic Report No. 5.1 Hazardous substances).

Figure 3.4: Loads of PCBs by riverine inputs (kg/year). Right panel: corrected for flow differences to a Standardized Flow of 1010 m³·y⁻¹ (comparable to the average flow of the Weser). The major decreases occurred until 1994 (Elbe) and 1999 (Weser). The rivers Elbe and Weser water concentrations are 3-4 fold those of Lake IJssel, Eider and Ems (Bakker *et al.*, 2009, QSR 2009 Thematic Report No. 5.1 Hazardous substances)



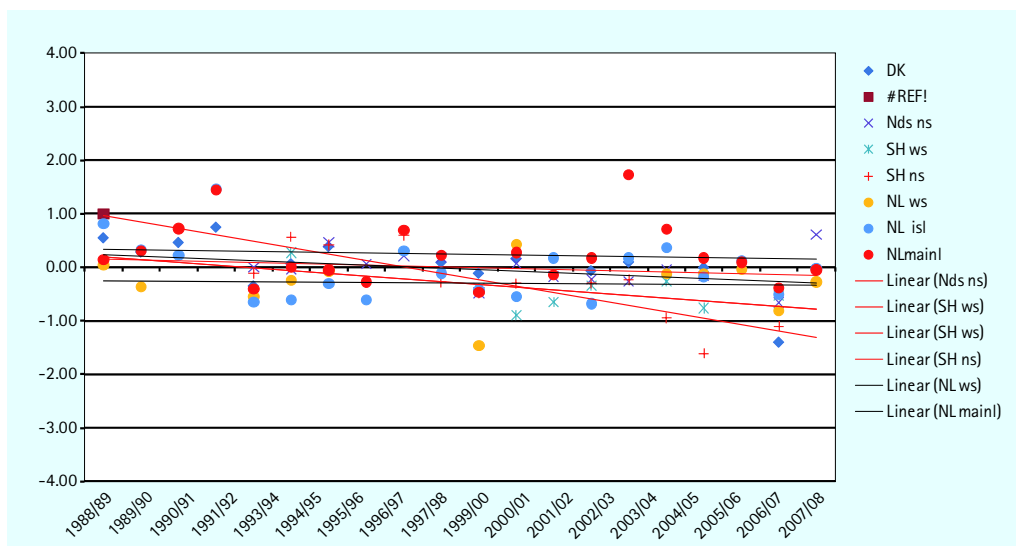
(ERL) by OSPAR, mercury and lead concentrations in the sediments pose a risk to the Wadden Sea ecosystem in the majority of sub-areas. For metals in blue mussels, the target of background concentrations has been reached for copper, zinc and nickel, whereas cadmium, mercury and lead concentrations are above the background. Therefore, continued effort to reduce metal discharges through rivers debouching into the Wadden Sea is necessary.

For a number of xenobiotic (man-made) compounds discharges to and concentrations in the Wadden Sea (Fig. 3.4) have decreased; however, the target (concentrations resulting from zero-emission) has not yet been reached. Some of these substances still pose a risk to the ecosystem. Many newly developed xenobiotics, including hormone disruptors, have a wide occurrence in the Wadden Sea ecosystem, and may have deleterious effects on it. The concentrations of xenobiotic substances in sediment, blue mussels and bird eggs have decreased over the last 20 years due

to a reduction in riverine inputs and a phase-out of compounds such as PCBs, Lindane, DDT and TBT. However, concentrations of some compounds such as PCB still exceed background levels. Unexplained peaks continue to occur as well, which may be related to old deposits. Altogether these fluctuations still may have effects on sensitive biota. The target of "concentrations of man-made substances as resulting from zero-discharge" has not been reached due to the remaining diffuse losses and numerous hazardous substances still being in use. This implies that efforts to further reduce diffuse and also global emissions and losses need to continue.

The major sources of oil pollution at sea in the Wadden Sea region are illegal discharges of fuel oil residues, which are a constant threat to sea- and waterbirds. This is confirmed by a clear clustering of recorded slicks around the major shipping lanes in the southern and in the south-eastern North Sea.

Figure 3.5: Logit-transformed oil rates in common guillemots in the areas around the Wadden and overall declining linear trends in The Netherlands (black lines), and in Germany (red lines). Logit values of 0.0 refer to oil rates to 50%; 100% and 0% are infinitely large positive and negative values respectively. ns = North Sea, ws = Wadden Sea, isl = islands, mainl = mainland (Camphuysen *et al.* 2009, QSR 2009 Thematic Report No. 5.3).



Although the oil rates among beached birds have decreased since the 1980s they are still high.

The oil rate of the guillemot has decreased since the mid 1980s but is still about three times higher than the OSPAR-EcoQO of 10% set for this species (Fig. 3.5). The results give a modest indication of a sharper decline since 1999, and in fact, with the exception of Germany's North Sea exposed coasts, oil rates seem to have stabilized over the most recent years at levels just below 50%.

The Wadden Sea coast is hit regularly by oil spills, which cause the deaths of thousands of birds.

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 does not stop on the borders of the Wadden Sea. Plastic items make up the major part of litter polluting the marine environment. One of the main sources of pollution is the fisheries industry, with lost or discarded nets, although various forms of packaging account for a large proportion of the litter recorded on beaches in the region. OSPAR beach surveys indicate that litter pollution is presently on the increase in the

southern North Sea area and a recent analysis of beached bird data indicates that entanglements with litter are also on the increase in the region (Fleet *et al.*, 2009, QSR 2009 Thematic Report No. 3.8).

3.3 Benthic habitats

Changes of the geomorphology and its driving force, sea level rise, are slow processes and consequently no significant changes have been observed in the short period between the QSR 2004 and the QSR 2009. The same conclusion applies to the area of seagrass beds and the zoobenthic biomass; both are more or less stable. An exception is the Baltic tellin *Macoma balthica* which has strongly decreased. Intertidal mussel beds continued to decline except for the eastern Dutch Wadden Sea.

3.3.1 Geomorphology

The core habitat of the Wadden Sea region is the tidal area with its large extent of coherent intertidal and subtidal flats fringed by salt marshes and beaches, and dissected by branching tidal inlets exchanging half of the tidal volume twice daily with the North Sea. The large intertidal flats came into existence about 5000 years ago when the average tidal range had increased from <1 m

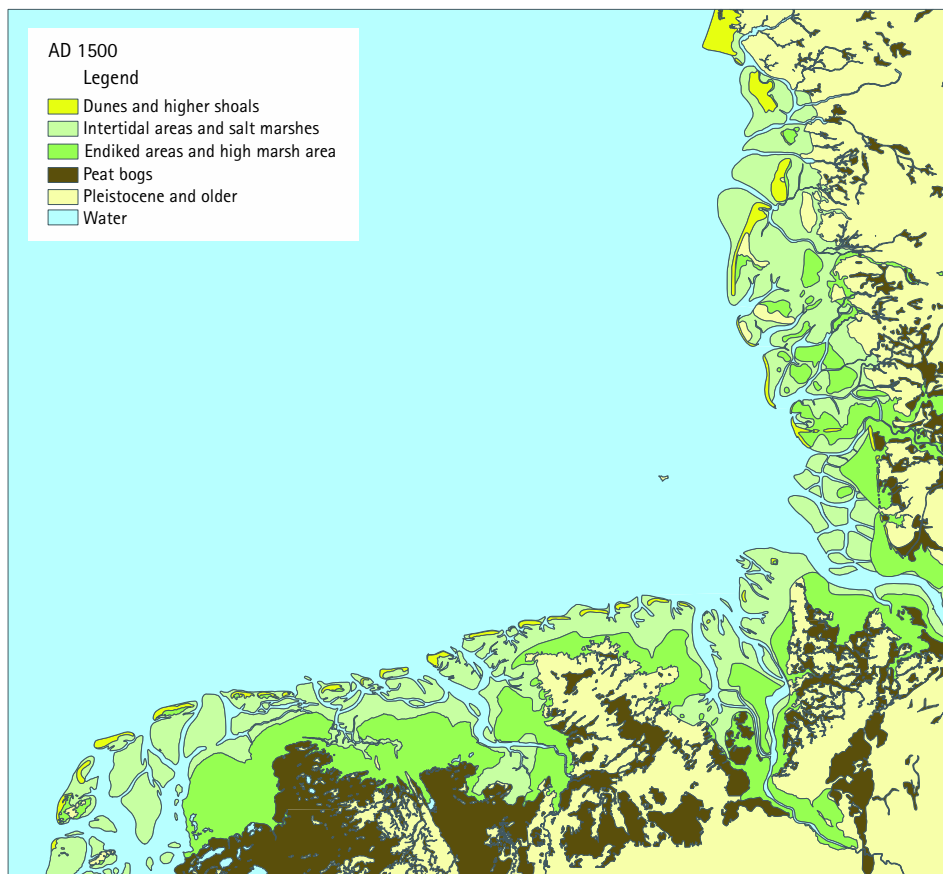
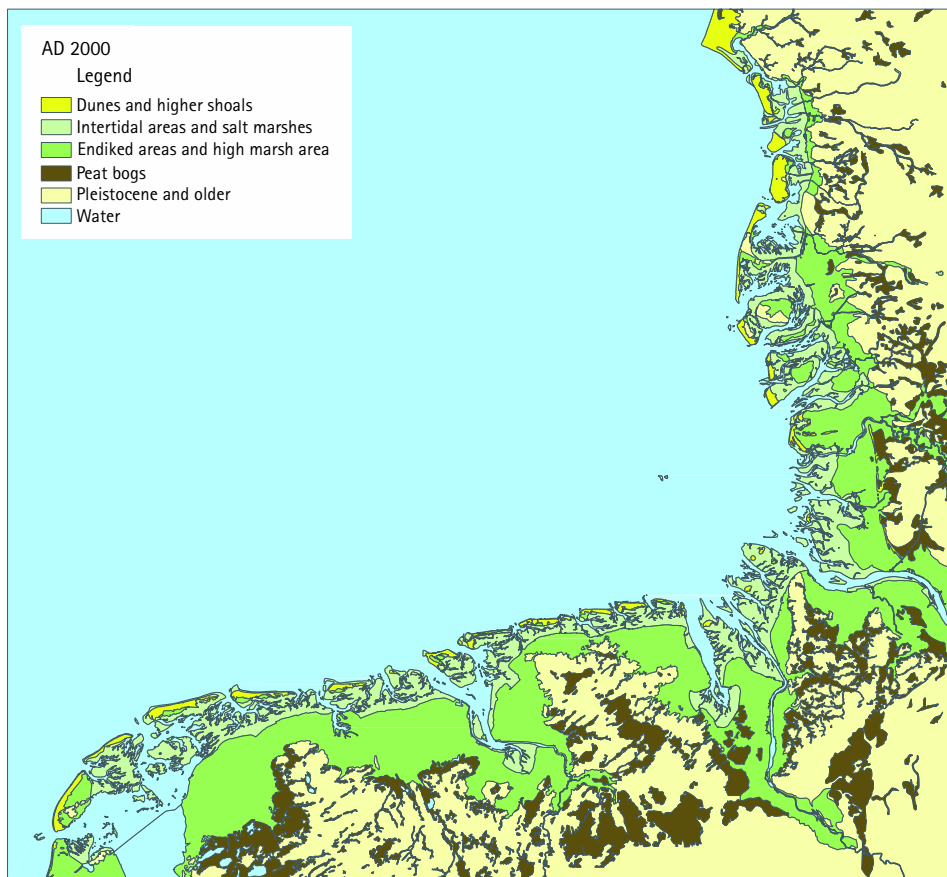
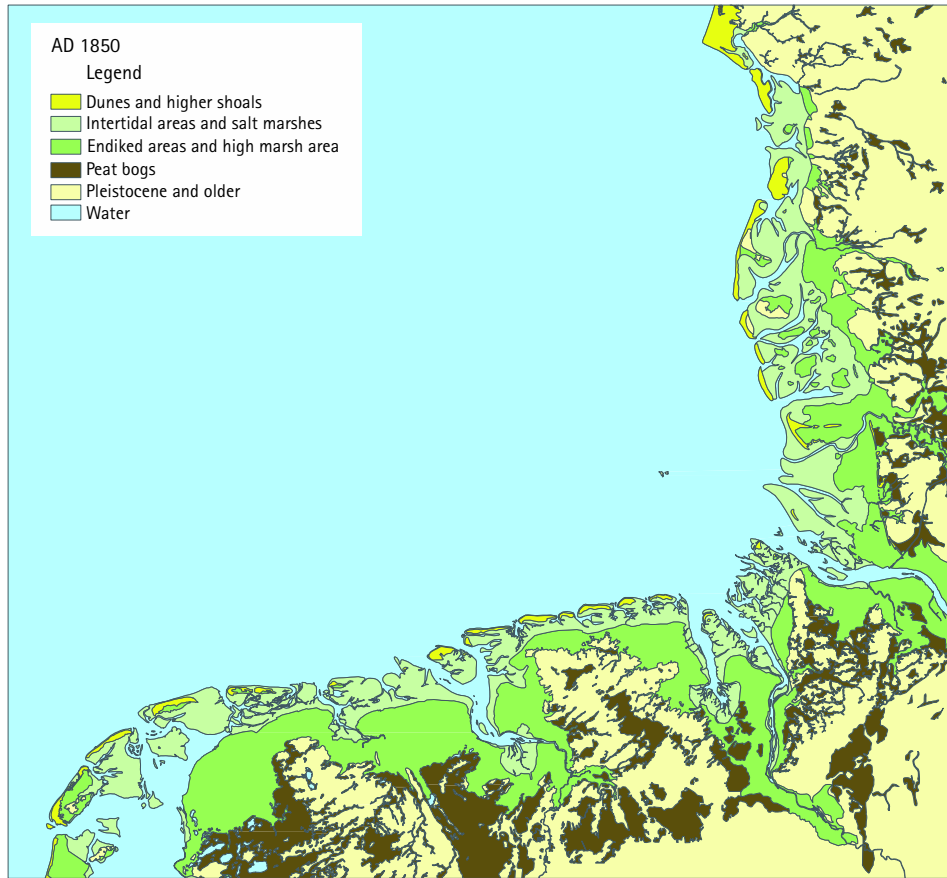


Figure 3.6a:
First attempt of the reconstruction of the entire Wadden Sea coast of 1500 based on historical, geological, geomorphological, topographic and soil maps, as well as on previous reconstructions of parts of the Wadden Sea (Wiersma *et al.*, 2009, QSR 2009, Thematic Report No. 9 Geomorphology). The coast of 1850 and 2000 is in Figure 3.6.b).

Figure 3.6b:
First attempt of the reconstruction of the entire Wadden Sea coast of 1850 and 2000 based on historical, geological, geomorphological, topographic and soil maps, as well as on previous reconstructions of parts of the Wadden Sea (Wiersma *et al.*, 2009, QSR 2009, Thematic Report No. 9 Geomorphology).



to ~2 m. The further course of geological development differed somewhat between the southern, central and northern Wadden Sea, and intermittently some tidal areas turned into brackish and freshwater marshes or bogs. Traces of this history are still evident and occasionally have effects on present day processes.

The main driving force of coastal morphology is a balance between sea level change and sediment supply from shallow zones of the adjacent North Sea. With the onset of land claim by the 13th century AD, the Wadden Sea entered a phase when human engineering interfered with natural developments and which culminated with large-scale embankments in the 20th century. Compared to 1500, the area of tidal flats decreased by about one third, mainly due to land claim and in the north also because of coastal retreat. Still, the large intertidal area has remained the most outstanding natural feature of the Wadden Sea in a world-wide comparison (Fig. 3.6). With an expected rate of sea level rise of about 1 m at the end of this century, it is questionable to what extent a natural sediment supply from the North Sea could keep up with such a rise in water level. In the early post-glacial phase of the Holocene, sedimentation rates were insufficient to fill up the coastal area at such a high rate of sea level rise. Presumably this is what the tidal area of the Wadden Sea is facing in the coming decades.

Sand nourishments are already carried out to defend the outer coastline of barrier islands. In a similar way, supplementing natural sedimentation rates in the tidal basins could be considered

to allow intertidal flats to grow at the same rate as the sea level rises. Accomplishing this without harming the benthic habitats of the tidal area is likely to be a main challenge for the protection of the Wadden Sea in the decades to come.

3.3.2 Seagrass beds and green algal mats

The past geological development and present pattern of sedimentation and erosion are relevant to the distribution of major habitats in the Wadden Sea. For example in the northern region, large meadows of seagrass abound where plants find a firm rooting in peat and clay of drowned land now underlying a thin layer of loose sediment. Conversely, areas where shifting sediments prevail tend to be devoid of seagrass. Seagrass beds are a very sensitive habitat in the intertidal zone. They are very unevenly distributed with small beds of mostly low plant density in the southern and central Wadden Sea whereas, in the northern Wadden Sea, the beds are extensive with a dense cover from July to September. Seagrass beds with a coverage of more than 20% comprise about 11,000 ha with more than 90% of these beds occurring in the North Frisian and Danish part of the Wadden Sea (Fig. 3.7). To what extent this unevenness is natural or caused by eutrophication and other disturbances is still not clear. Climatic differences cannot account for this pattern because seagrass beds of the two species *Zostera noltii* and *Z. marina* thrive all along the Atlantic shores from Scandinavia to northern Africa.

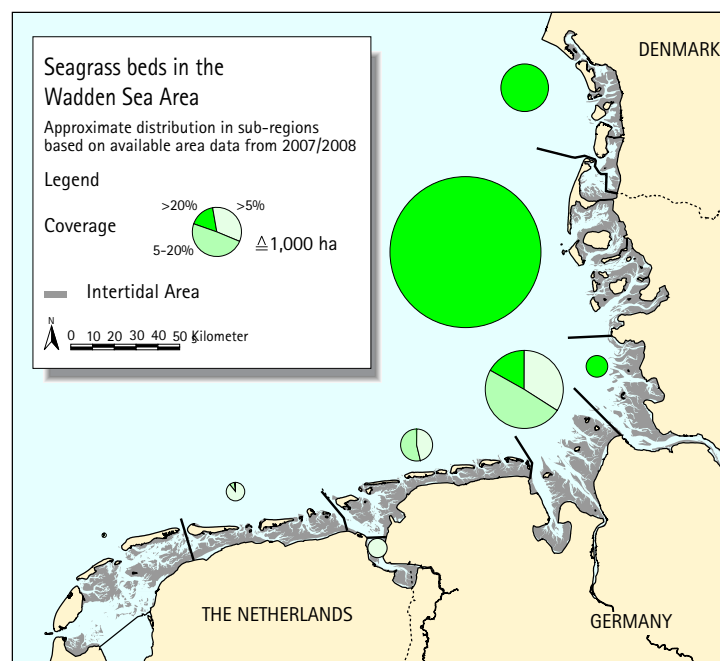
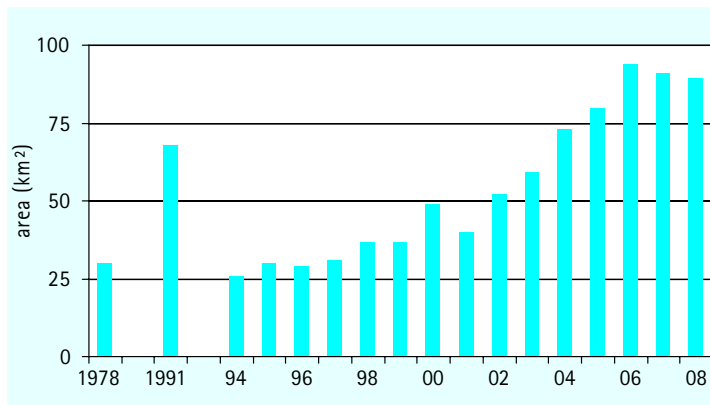


Figure 3.7: Distribution of intertidal seagrass beds (with various densities) in the Wadden Sea (in ha) in different sub-regions in 2007/2008 (van der Graaf *et al.*, 2009, QSR 2009 Thematic Report No. 12).

Figure 3.8:
Seagrass bed (more than 20% coverage) area (km²) in the North Frisian Wadden Sea in August/ September from aerial surveys in 1978, 1991 and 1994–2008 (from Reise *et al.*, unpubl.), (van der Graaf *et al.*, 2009. QSR 2009 Thematic Report No. 12).



After a long-term decline, there has been an increase in seagrass area since the middle of the 1990s. However, this may have come to a halt in recent years. The increase could have been a response to reduced eutrophication stress, improved light conditions, an intermittent decrease in storminess, or a combination of such factors. More research is needed on the cause of seagrass bed development because seagrass provides an important habitat in the Wadden Sea and is used as a main indicator of ecosystem quality. The methods for assessing seagrass beds require further harmonizing in the Wadden Sea. Management should continue to reduce nutrient loads to improve the growth of the two seagrass species which are best adapted to oligotrophic conditions. There is also concern that dredging and dumping of sediments and the subsequent light attenuation has been harmful to seagrass.

Green algal mats attained massive proportions in the summer months of the early 1990s. Subsequently they fluctuated strongly at a moderately high level with a strong peak in 2001. Omitting this peak value, the area covered by green algae, as observed from plane in the Schleswig-Holstein intertidal zone, is significantly correlated with the total nitrogen load of the Elbe and Weser. In spite of considerable scatter, this suggests that the extent of green algal mats may serve as an indicator for the eutrophication status in the Wadden Sea. However, other factors also seem to be important for the extent of green algal mats. For example, a rough sea easily removes green algae from exposed tidal flats. Often, drifting green algae become trapped between groynes of sedimentation fields and then smother any seagrass that is present.

3.3.3 Zoobenthos

Intertidal seagrass and green algae serve as food for brent goose and wigeon in particular, while the benthic fauna of all intertidal flats is important for

foraging waders, shelduck and gulls. Particularly the mid tidal zone is rich in zoobenthic biomass. In parts of the subtidal zone quantities of biomass might be even higher. However, the latter habitat has not been sufficiently sampled throughout the Wadden Sea to make a sound estimate.

The deposit-feeding lugworm *Arenicola marina* significantly contributes to biomass on sandy intertidal flats but not on the estuarine mud flats and in the subtidal zone. Suspension-feeding bivalves usually dominate the biomass, *i.e.*, the clam *Mya arenaria* at estuarine sites and the cockle *Cerastoderma edule* at marine sites. Occasionally alien species significantly increase the biomass, *i.e.* the razor clam *Ensis americanus* at the lowest tidal zone and the worm *Marenzelleria viridis* on mudflats in the Dollard. The establishment of such invaders suggests that the resident fauna had been below carrying capacity, probably under top-down control in the food web rather than being limited by food availability.

Over the past decades there are neither consistent temporal trends in total biomass in macrozoobenthos nor in the abundances of 19 species at ten localities spread throughout the Wadden Sea. The zoobenthos in general may not be very suitable for indicating trends in eutrophication. However, the tellin *Macoma balthica* has probably responded with enhanced growth and biomass to eutrophication in the 1980s to the mid 1990s in the western Dutch Wadden Sea. With the exception of the Dollard and a site near Norderney, this major food source for the large flocks of knots is now declining throughout the Wadden Sea.

The recent predominance of mild winters is having a negative effect on recruitment in many bivalves including *M. balthica*. The underlying process seems to be improved survival and early arrival in the tidal zone of predaceous crabs and shrimps which then prey heavily on bivalve spat in subsequent spring and summer. Severe winters

cause high mortality or delay in the appearance of these predators in the tidal zone. This may allow young bivalves to survive their early benthic stage. However, there seem to be many exceptions to this pattern.

Many sites show an increase in species richness after mild winters and none shows a decline. This may be seen already as a consequence of global warming. Monitoring of zoobenthos should be generally extended into the subtidal zone, and sampling efforts should be spread more evenly through the entire Wadden Sea. The macrozoobenthos is an important trophic link between the productive microalgae and the coastal birds in the Wadden Sea, and thus serves as a good indicator of ecological quality. This particularly applies to the mussel beds (*Mytilus edulis*) of the Wadden Sea which occur in the lower intertidal and at sheltered sites in the subtidal zone.

3.3.4 Mussel beds

After a strong decrease of intertidal mussel beds in the early 1990s, mussel fishing has been banned from substantial parts of the tidal area. Despite considerable efforts to protect stable mussel beds, most continued to decline. As outlined above, this may be caused by mild winters favouring predators on mussel spat. However, increases of mussels in 2001, 2003 and 2005 in parts of the Dutch Wadden Sea and locally also in Lower Saxony, indicates that factors other than winter temperature need to be considered to explain the population dynamics. The management target to increase the area of mussel beds has only been achieved in parts of the Dutch Wadden Sea. As with zoobenthos in general, more monitoring of mussels in the subtidal zone is necessary for a better understanding of the dynamics. The recent spread of introduced Pacific oysters on intertidal mussel beds as well as in the shallow subtidal will be discussed below in a section on alien species.

Mussels are cultured on the bottom in the subtidal Dutch and German Wadden Sea. For this a total area of 11,000 ha has been reserved, but only about half of that area is actually in use. The main reason for this is that parts of the reserved plots are unsuitable for mussel culture for hydrographical and geomorphological reasons. Young mussels are harvested from natural beds for transfer to the culture lots. In recent years, the scarcity of these so-called seed mussels was partly compensated by imports from the British Isles. Experiments are underway to collect young mussels on ropes and nets suspended in the water. These are out of reach of the benthic predators and survival of young mussels is much higher there than on the

sea floor. Collecting spat in this way is common practice on many coasts in the world and has the potential to eventually free natural mussel beds from the disturbances caused by dredging for seed mussels in the Wadden Sea.

3.3.5 Subtidal habitats

Roughly one half of the tidal area consists of subtidal flats and deep gullies. This habitat is not as unusual as the large coherent intertidal flats of the Wadden Sea which supply the huge flocks of birds with food. However, on a European scale it is certainly important, with diving birds and marine mammals exploiting the subtidal habitats. Shrimp, crabs and fish commute between the inter- and subtidal zones. Many invertebrates and some macroalgae have partial populations in both zones. Very often the intertidal serves as a nursery and the adults occur subtidally, although the reverse occasionally occurs as well (i.e., the worms *Nephtys hombergii* and *Phyllodoce mucosa*).

In previous centuries, beds of the European oyster *Ostrea edulis* in the shallow and deep subtidal zone have been overexploited. This species no longer occurs in the Wadden Sea. Also almost all reefs of the colonial tubeworm *Sabellaria spinulosa*, which once occurred in the deep gullies in the Danish and German Wadden Sea, are gone. Direct destruction with heavy chains to remove these obstacles which affected trawling for shrimp may have caused the decline. Other factors such as sediment dredging to ease shipping may have played a role as well. Repeated small disturbances by bottom trawling may prevent re-colonization. However, experimental studies should explore this issue.

Beds of subtidal seagrass *Zostera marina* in the northern and western Wadden Sea vanished in the wake of an epidemic disease in the 1930s and they never recovered. As with the native oyster beds and *Sabellaria*-reefs, the lack of recovery is not well understood. It is possible that the mere absence of factors which have caused the decline is not sufficient to trigger a recovery. In the westernmost Dutch Wadden Sea, the construction of the Afsluitdijk in 1932, causing changes in the hydrography, may have played a part as well. But even without these conspicuous biogenic habitats, the subtidal is a zone of high biodiversity, probably because of the relative shelter against strong surf from the open sea and high food availability in the shallows. There are indications that benthic biomass is even higher on shallow subtidal flats than in the mid intertidal.

Together with requirements of European Directives on ecological qualities, all this highlights that

more research and monitoring needs to be done in the subtidal part of the Wadden Sea. For the intertidal and terrestrial parts, aerial photographs have been of great help to map the distribution of habitats. In the subtidal part, acoustic methods may help in an analogous way. With sidescan sonars towed behind a ship, the strength of the returning acoustic beam is measured and provides information on objects protruding from the sediment. Multibeam sonar systems have been mounted on the hull of a research vessel. The time between emission and the backscatter to the receiver is measured. This instrument provides highly accurate bathymetric records and can even be used for sediment classification. However, it cannot be used at very shallow subtidal flats. A combination of methods in addition to acoustic devices, such as underwater video, sediment coring and conventional oyster dredges, is required for surveying the subtidal Wadden Sea. This is regarded as an urgent task to improve nature conservation, as is restoring the Wadden Sea below low tide level where possible.

3.4 Aquatic alien species

The number of alien species in the Wadden Sea continues to increase. An important new addition to the range of alien species since the QSR 2004 is the American comb jelly *Mnemiopsis leidyi*. It is thought to cause major changes in marine ecosystems. The Pacific oyster *Crassostrea gigas* has continued its invasion of the Wadden Sea.

Alien species have been transported by human means across their natural boundaries, interact with native species, and may irrevocably alter ecosystem functions and the services ecosystems

provide to humanity. The introduction of alien species for aquaculture or by shipping is not a new phenomenon. However, in recent years, such aliens are beginning to play a predominant role in the Wadden Sea ecosystem and can no longer be neglected as agents of change (Fig. 3.9). Just to name some of these changes: Dense swards of the introduced *Spartina*-grass extend salt marshes and displace other pioneer plants and intertidal flat organisms. Larvae of Pacific oysters *Crassostrea gigas* settle on mussels, grow faster and larger, and finally turn intertidal mussel beds into oyster reefs. After a few years, these in turn provide shelter for Pacific shore crabs of the genus *Hemigrapsus*. On the shells, an Australasian barnacle *Austrominius modestus* dominates native ones. In the shallow subtidal zone, clumps of these oysters provide anchorage to a more than 3-m long Pacific seaweed *Sargassum muticum*. On these branching algae cling Pacific ghost shrimp *Caprella mutica* and drifting American comb jelly *Mnemiopsis leidyi* also becomes entangled in this kelp forest. Overall, it constitutes a completely new habitat in the Wadden Sea.

At least 50 introduced alien algae and invertebrate species have established with permanent populations in the Wadden Sea. Some remain rare, others first boost and then bust, and some achieve continuing dominance. In most cases they constitute additions, fill apparently empty niches, and provide new habitat structures. At times they benefit native species, but they may also harm or displace them. It is impossible to simply categorize aliens as bad or good. Their interactions with natives and among each other, their effects on habitats and on human health may vary between sites and with time. More subtle are introductions of genetically different individuals which then interbreed with residents. It is also possible that new reciprocal adaptations have evolved in the course of interactions between alien and native species. All these introductions and their consequences are essentially irreversible developments, changing the biota of the Wadden Sea forever. Their number is rapidly increasing and none of them has gone again or is likely to do so.

This conspicuously advancing tide of alien invaders is primarily facilitated by a global exchange of aquaculture organisms and by more, larger and faster ships carrying more alien organisms. Establishment is eased by the common availability of floating objects such as buoys and pontoons where introduced species may settle in the absence of benthic predators. Also, hard coastal defence structures often constitute gateways for alien

Figure 3.9:
Razor clams *Ensis americana*, introduced with ballast water, are washed up on a bed of Pacific oysters *Crassostrea gigas* that were introduced for farming in the Wadden Sea near Sylt (Photo: K. Reise).



species. A breakthrough for aliens is now provided by the recent trend of warming by an average of 1.5°C in the past 30 years.

Most donor regions of introduced species are at coasts with a warmer climate than it used to be in the Wadden Sea. Either newcomers now meet easier conditions to become established, or aliens which were already introduced a long time ago now no longer suffer from severe winters and benefit from warmer summers. The combined effect of increasing global trade and global warming has triggered a revolution in the biotic composition of the Wadden Sea compared to the earlier rates of changes. Alien species introductions are a global phenomenon and some alien species become universal. For instance, the Pacific oyster is spreading to almost all coasts within temperate zones, heading a progressing homogenization of the world's coastal biota.

This tends to undermine the biotic uniqueness of the Wadden Sea, calling for a global management to reduce the rate of introductions. Treatment of ballast water and control of hull fouling, halting the use of alien species in open aquaculture facilities, and banning any other form of intentional introductions are obvious steps to be implemented in the framework of international conventions. The Trilateral Wadden Sea needs a common approach to the prevention, management and monitoring of aquatic and terrestrial alien species introductions. Monitoring and early detection is necessary because eradication is only feasible at a very early stage of invasion. Above all, a strong effort is required to raise more awareness among professionals and the general

public as a prerequisite for effective precautionary measures.

3.5 Salt marshes

The QSR 2009 revealed an increase of nearly 1,600 ha (about 5%) of salt marshes in the Dutch and German parts of the Wadden Sea when compared to the QSR 2004. However, changes in the vegetation between the QSR 2004 and the QSR 2009 feature a decrease in the pioneer zone and an extension of late successional and climax stages.

Salt marshes occupy the upper parts of the intertidal zone and the supralittoral, *i.e.* the interface between land and sea and extend vertically from well below the mean high-tide level up to the highest water mark. They constitute precious and irreplaceable habitat for a wide range of organisms, although the number of species per unit area may be relatively low. With about 40,000 ha (Table 3.2), salt marshes of the Wadden Sea make up about 20% of the total area of salt marshes along the European Atlantic and Baltic coasts.

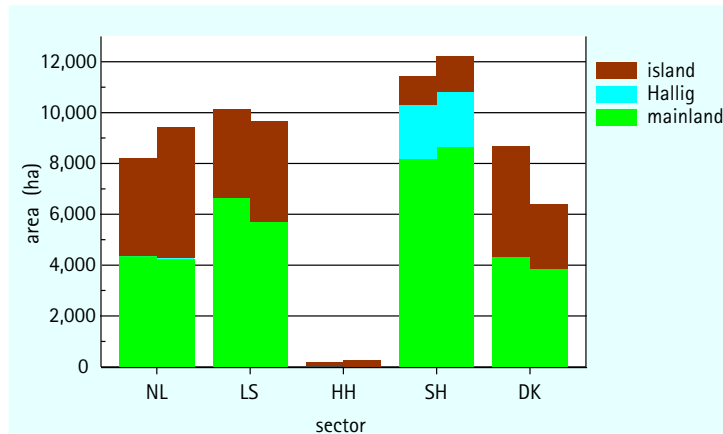
3.5.1 Area of salt marshes has increased

The QSR 2009 revealed an increase of the total extent of salt marshes in The Netherlands and German parts of the Wadden Sea when compared to the QSR 2004 (39,680 ha and 40,620 ha, respectively, Fig. 3.10). The new marshes comprise mainly young natural salt marsh including embryonic dunes and driftline vegetation. This increase occurred predominantly on both the islands and the mainland coast of Schleswig-Holstein.

Landform	The Netherlands	Lower Saxony	Hamburg	Schleswig-Holstein	Denmark ¹⁾	Total (ha)
Year of survey	2002-2006	2004	2004	2006/2007	2005	
Islands						
Back-barrier (foreland incl.)	4,280	3,660	260	1,250	2,230	11,770
Green beaches	850	280	4	100	320	1,550
De-embanked (summer)polder	90 ²⁾	150	40			280
Summerpolder	10	60	80			150
Mainland						
Back-barrier				720	1,620	2,340
Foreland-type	3,910	5,460		7,880	2,240	19,490
De-embanked summer-polder	320	240 ³⁾				560
Summerpolder	960	1,400			10	2,370
Hallig						
	50			2,160		2,210
Total	10,470	11,250	380	12,200	6,320	40,620
1) Habitat type 1330 only (cf. Appendix I)						
2) Total de-embanked area						
3) includes both de-embanked and opened summerpolder						

Table 3.2: Recent extent (ha) of salt marshes in different parts of the Wadden Sea specified according to their geomorphology. The areas include the pioneer zone, except for Denmark. The pioneer zone has been defined as the area where pioneer vegetation cover \geq 5%; in Schleswig Holstein, this threshold value was 10%. On the islands, de-embanked summerpolders may be added to the back-barrier marshes; on the mainland to the foreland-type salt marshes. (Esselink *et al.*, 2009, QSR 2009 Thematic Report No. 8).

Figure 3.10: Comparison of the extent of salt marshes in different parts of the Wadden Sea during the 1995/2001 (left-hand bars) and the 2002/2007 (right-hand bars) salt marsh surveys. For Denmark, the data from the consecutive surveys were not comparable and did not include pioneer salt marsh. Data of the 1995/2001 survey after QSR 2004 (Esselink *et al.*, 2009, QSR 2009 Thematic Report No. 8).



also lead to a decline of the specific invertebrate diversity in a salt marsh.

The salt-marsh succession may be driven by three factors, namely: (1) an increase in marsh elevation by sedimentation (dominates in the foreland-type salt marshes), (2) an increase in plant nutrients, especially nitrogen (main factor in sandy back-barrier marshes), and (3) cessation of livestock grazing. A lack of natural spatial

3.5.2 Vegetation development and ageing

The main result from the comparison of vegetation changes in the QSR 2009 is a decrease of the pioneer zone and an extension of late successional and climax stages in many salt marshes across all Wadden Sea regions. These climax communities are usually formed by almost monospecific stands of the dominant plant species (namely *Elytrigia atherica* community on the high salt marshes, *Phragmites australis* community in brackish marshes, and *Atriplex portulacoides* community in low salt marshes). Hence, climax communities have a low species and structural diversity. See Fig. 3.11 for examples without or reduced live-stock grazing from The Netherlands and Fig. 3.12 for examples from Germany. The examples also show that the changes take not years but decades.

Not only does ageing affect the floristic diversity on the salt marsh, but also the diversity of the entire salt-marsh community. About one third of the invertebrate fauna is phytophagous, among which a considerable number are highly specialised monophagous species. Thus extension of climax plant communities at the expense of early succession communities will inevitably

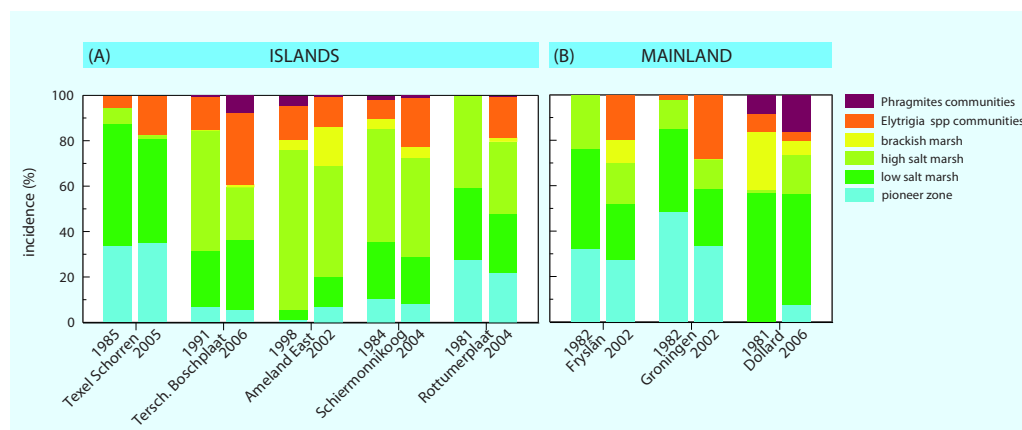
dynamics may form another important factor for the observed overall trend of ageing. The contemporary Wadden Sea salt marshes have to a large extent been dictated by human activities.

Within that framework recommendations are (1) a reduction of artificial drainage which may increase abiotic variation and a retardation of the ageing processes in wet parts, (2) creation of wide salt marshes (in combination with de-embankments as indicated in the next paragraph) which have the possibility to develop wet parts, (3) superimposed on the abiotic conditions, discussion on the target type of community for conservation, including plant and animal species composition, structure of the vegetation being affected by livestock grazing (intensive grazing with a homogeneous sward, moderate grazing with a heterogeneous sward, no grazing with a homogeneous sward at the long term), or 'laissez faire' without further discussion.

3.5.3 Salt-marsh restoration

In the QSR 2004, an increase of the area of salt marshes was assessed as management target and de-embankment of summer polders was considered an appropriate measure. Over 800 ha of salt marsh have been restored so far. In addition to

Figure 3.11: Vegetation change in three mainland salt marshes and on five barrier islands in The Netherlands Wadden Sea over an approximately 25-year period. The graphs present the incidence (%) of the main vegetation zones and climax communities (Dijkema *et al.* 2007). Data from vegetation mapping 1978 – 2006 by RWS-DID (Esselink *et al.*, 2009, QSR 2009 Thematic Report No. 8).



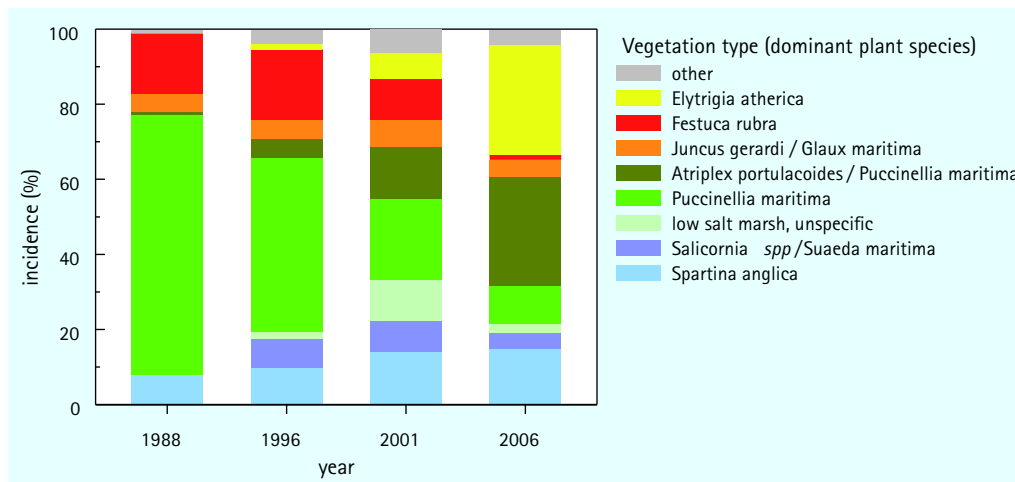


Figure 3.12: Vegetation development on the Hamburger Hallig from 1988 until 2006 based on vegetation surveys of the total area. Note that the whole area was grazed intensively with sheep until 1991, when three management regimes were introduced in different parts of the area. Vegetation types are according to TMAP typology. For graphical reasons, vegetation types with a limited distribution (incidence < 5% in all years) were merged into one collective group (other) (Esselink *et al.*, 2009, QSR 2009 Thematic Report No. 8).

the total area, de-embankment of summer polders may improve the quality of the salt marshes, because de-embankment creates the possibility to restore wide salt marshes with a more complete hydrodynamic gradient than most of the existing narrow salt marshes. Removal of artificial sand dikes may restore washovers and rejuvenate salt marshes on barrier islands (see next paragraph). Through de-embankment, sedimentation gives the area the possibility to adapt to the expected sea-level rise and climate change. The composition and structure of the vegetation depends on the grazing regime, as in existing salt marshes.

3.6 Beaches and Dunes

Since the QSR 2004, no progress was made in 1) increasing the dynamics of dune systems, 2) reduction of atmospheric deposition, and 3) in reduction of groundwater extraction.

Beaches and coastal dunes together constitute one morphogenetic habitat system and play an important role in the Wadden Sea. They build the barrier islands and provide habitats for many, often highly specialized, species. In their shelter, salt marshes can develop. At the same time, they are important for coastal defence and as recreation areas.

3.6.1 The status of the dune fauna

It is increasingly acknowledged that the fauna in the dunes plays an important role. Of course, livestock is introduced into many dune systems. This is done partly to enhance the dynamics and partly to retard or stop succession towards climax stages. The effects on the geomorphology and vegetation are often part of monitoring programmes. However, the status of natural fauna elements including birds, mammals and invertebrates, is largely unknown. Programmes that monitor the

effects of management practices should be extended to include the fauna.

3.6.2 A new geo-ecological concept of Wadden Sea barrier islands

In response to questions about both climatic change and coastal safety on the one hand, and different scenarios for a nature-conservation strategy on the other hand, a new model of the geo-ecological functioning of Wadden Sea barrier islands has been developed (ten Haaf & Buijs 2008; de Leeuw *et al.* 2008; Löffler *et al.* 2008, see details in Lammerts *et al.*, QSR 2009 Thematic Report No. 15). The model identifies the most important geomorphic driving forces at different spatial and temporal scales. As a result, a barrier island in the model comprises five geomorphological main units with several sub-units (Fig. 3.13):

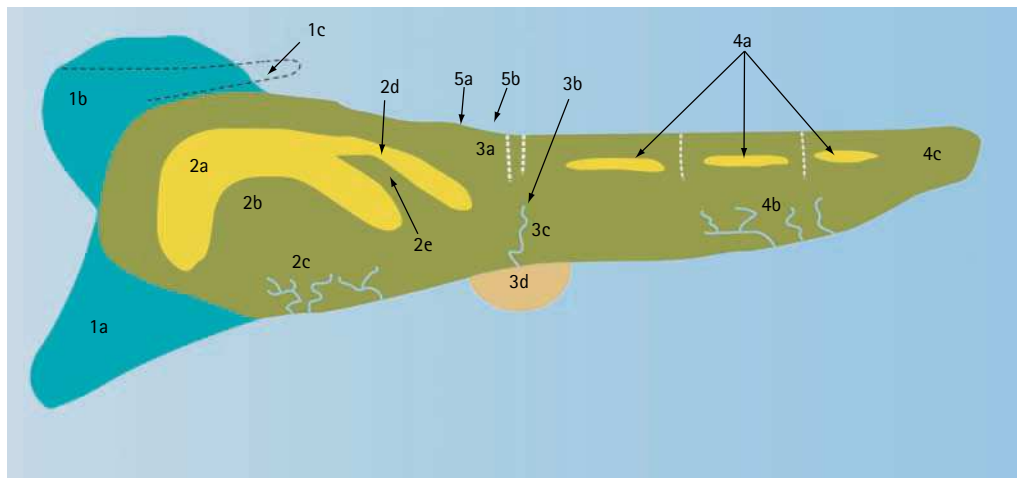
(1) Island heads:

The development of island heads depends on the sedimentation and erosion processes in the tidal deltas between the islands. Periodically bare beach plains grow together with islands: at the north side when the sand comes from the outer (ebb) delta, at the south when it comes from the inner (flood) delta. On the island heads, green beaches may develop in places where the beach plain is partly cut-off from the sea by embryonic dunes. The vegetation of green beaches is characterized by a combination of pioneer species from salt marshes and dune slacks. Salt marshes may also develop on the leeside of embryonic dunes or dune ridges.

(2) Dune-bow complexes:

The dune bow complex comprises an old central part of the model island, where much sand has been blowing in during long periods of sedimentation. Different dune ridges merged to large

Figure 3.13: New geomorphological model of a barrier island with its characteristic main units and sub-units (for explanation see text and QSR 2009 Thematic Report 2009 No. 15). Salt marshes may be found in sub-units 2c, 3bc, 4b and 5a. This representation of the model is characteristic for the Dutch and Lower Saxony barrier islands (Lammerts *et al.*, 2009, QSR 2009 Thematic Report No. 15).



parabolic dune systems which include grey dunes, heath lands, dune slacks, scrub and woodland. Extensive salt marshes have developed on the south side of dune-bow complexes under the influence of inundation by seawater from the Wadden Sea. These marshes are characterized by different vegetation zones from high to low salt marsh and pioneer vegetation. Large parts of these salt marshes have been turned into agricultural areas through embankment.

(3) Wash-over complexes:

A wash-over consists of a north-south oriented part of the beach plain accompanied at both sides by natural dune ridges. Wash-over complexes that are formed on the North Sea side of the island gradually merge with salt-marsh vegetation on the Wadden Sea side. However, this connection has often been closed by artificial sand dikes. The wash-over complex itself can either be bare, covered with algae or with pioneer salt-marsh or dune vegetation comparable to green beaches. A dynamic wash-over complex is subject to both the deposition and erosion of sand by wind, as well as to frequent inundation by seawater and sedimentation from the water column. These processes affect both succession and rejuvenation processes of the salt marsh that fringes the wash-over complex to the south.

(4) Island tails:

The island tail consists of a beach plain at the eastern side of the island. Initially, island tails are bare sand flats that are periodically subject to erosion and accretion. On these sand flats, small embryonic dunes may be formed, and may grow into larger dune complexes that are separated from each other by wash-overs. On most of The Netherlands islands, these dune complexes have been connected by an artificial dune ridge, especially during the 20th century. On the leeside of

these artificial dune ridges extensive salt marshes have developed, such as the Boschplaat on the island of Terschelling. The presence of the artificial dune ridges explains why in a quantitative sense, island tails are the most important units for salt-marsh vegetation, and why the actual extent of island salt marshes is well above historic reference values. In addition, the almost complete elimination of morphodynamic influences from the North Sea on both sedimentation and erosion explains that young succession stages are almost absent, and old succession stages generally dominate the northern fringe of these marshes.

(5) Beach and foreshore

The beach and foreshore at the North Sea side are important elements as a transport route for sedimentation and erosion. The beach can harbour embryonic dunes. Periodically, extensive areas of green beach may develop, and then may disappear quickly when large-scale dynamic processes are less favourable.

The next step could be the extension of this model to all barrier islands in the Wadden Sea. Moreover, experimental tests are needed to validate the model.

3.7 Offshore Area

No major geomorphological changes in the offshore zone have been recorded. A comprehensive monitoring programme for the offshore zone is lacking in TMAP. Bird monitoring in the offshore zone of the Wadden Sea has been started only by Schleswig-Holstein in 2004. There is insufficient monitoring data to draw conclusions on biological changes.

The Offshore Area of the Wadden Sea Cooperation Area is defined as the near-shore zone between the barrier islands and the line three nautical miles off the baseline (respectively 12

nautical miles when the conservation area exceeds this line). The boundaries of this 4,000-km² area are artificial. However, with its slope from about 15 m depth up to the island shores and ebb delta shoals in front of the inlets, this zone constitutes an important transition from the Wadden Sea proper to the open North Sea. In this zone, the most violent breakers occur, and many ships have been wrecked during storms in this turbulent sea. Waves mobilize sand from the bottom, and the net transport processes of sand may play a key role for the sediment budget of the Wadden Sea. The permanent exchange of water masses, sediments, planktonic drift and animals migrations between the tidal areas and the offshore zone justify the inclusion of the latter in the Cooperation Area.

Among the multiple anthropogenic pressures in the offshore zone, offshore wind farms, ship traffic, fisheries and sand and gravel extractions are of primary concern. The increasing interest in building wind farms brings another risk to 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 and others are planned close to this area, and can, therefore, influence parts of the same populations that use both the offshore area and the tidal area. Off the northern part of the Danish Wadden Sea at Horns Rev, a 160 MW wind farm has operated since 2002 and a 200 MW wind farm was opened in 2009. Follow-up studies on the 160 MW wind farm have shown that bird species such as divers avoid the farm while common scoters occur there in smaller densities, gulls and terns occur in the same densities and cormorants in larger densities than in the surrounding waters. Birds on migration through the area initiate a change of their route by 3–4 km to avoid the wind park. Thus the parks influence the birds' utilization of the offshore area, but up to now not seriously. However, the cumulative effects of more wind parks in the North Sea may aggravate the situation.

Currently, there are no indications of major geomorphological changes in the offshore zone, however, accelerated sea-level rise and altering sediment dynamics must be taken into account as probable causes of future changes. Upcoming coastal defence measures (including sand and gravel extraction and beach nourishment) might impact the natural sediment dynamics at least on a regional spatial scale.

Crustaceans, bivalves and polychaetes are the most important benthic organisms in the offshore zone. With respect to nutrition of seabirds,

bivalves (mainly *Spisula* and *Ensis*) are of highest importance. Fish in the offshore zone are crucial for a variety of piscivorous seabird species. Breeding failures of several species currently indicate fundamental changes in availability and/or quality of fish. Among the seabird species, black-headed gull, common eider and herring gull as well as common scoter are most important. There are significant proportions of the respective biogeographic populations of common eiders, sandwich terns and lesser black-backed gulls in the offshore water of Germany alone. There is insufficient monitoring data to draw conclusions on biological changes.

It is strongly recommended to continue the monitoring program of birds in the offshore zone of the Wadden Sea that has been started by Schleswig-Holstein in 2004, and to extend it to Niedersachsen, Denmark and The Netherlands.

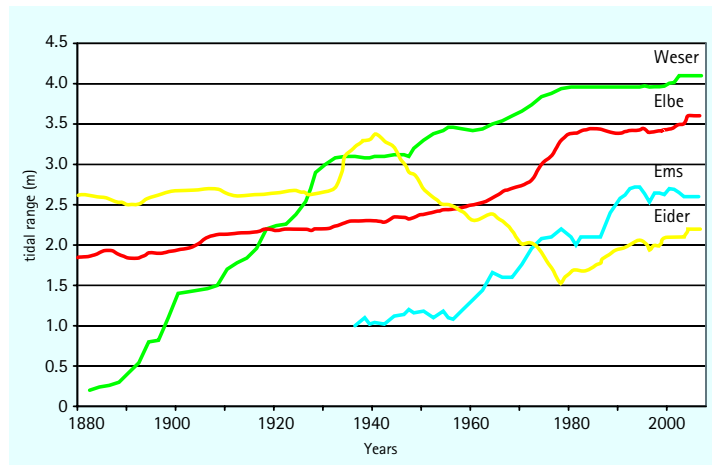
3.8 Estuaries

The estuaries constitute the part of the Wadden Sea in the worst ecological condition. Although the Wadden Sea estuaries are subject to many strong, human-induced pressures, the available monitoring data from TMAP is insufficient to prove any significant ecological change since the QSR 2004. On a longer time-scale, water quality in most estuaries has improved whereas many other characteristics show a declining quality.

Estuaries are tidal river mouths with a free water exchange with the sea. They are characterized by tidal brackish and freshwater areas forming the transition zone between rivers and high-salinity 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.

The estuaries are of high relevance for the Wadden Sea ecosystem because they are the pathways along which nutrients, toxic substances and silt from the rivers reach the Wadden Sea; and because they serve as migration, nursery and feeding areas for animals. On the other hand, the estuaries themselves are 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 for migrating species (in particular birds and fish), but additionally they are inhabited by various characteristic brackish-water and estuary-endemic species. The brackish salt-marsh vegetation along the shores produces more biomass than any other

Figure 3.14: Changes in tidal range between 1880 and 2005 in the Eider (gauges Tönning and Friedrichstadt), Elbe (gauge Hamburg St. Pauli), Weser (gauge Bremen Oslebshausen) and Ems (gauge Herbrum) (5-year-running mean) (Schuchardt and Scholle, QSR 2009 Thematic Report No. 16).



salt marsh. With proper management, this attracts large numbers of ducks and geese.

Most of the river outflows (especially the smaller ones) in the Wadden Sea Area have sluices or storm surge barriers that prevent or reduce natural mixing of fresh and salt water and the establishment of transition zones. The estuaries of the rivers Elbe, Weser and Ems constitute the seaward access routes to the major German and Dutch sea ports and are among the most industrialized regions of the Wadden Sea Area. The industrial development along these rivers and their estuaries has resulted in significant alterations in morphology, hydrography (including tidal amplitude), flora and fauna, amongst others as a result of deepening of channels and embankment of river banks, including the resulting loss of brackish marshes. The increase of the tidal range of the estuaries (Fig. 3.14) may serve to illustrate the strong human influence on the state of the estuaries. A gradual increase reflects the ongoing narrowing and deepening, while the ups and downs at the Eider have been caused by barrage construction.

Large sections of the foreland and water areas of the estuaries have been designated as Natura 2000 sites, thus creating the basic conditions for sound ecological management. However, restoration of brackish marshes and meadows along the estuaries has so far not been achieved. That is also the case for tidal forests and marshes in the freshwater tidal part of the estuaries. On the other hand, loads of nutrients and several contaminants have been reduced during the past 20 years (see Figures 3.1, 3.3, 3.4). Water quality should be improved much more, however.

The ecological importance of the upper Ems estuary and especially its tidal freshwater reach has drastically deteriorated over the past 20

years. The water quality is affected in particular by a huge increase of suspended solids and by oxygen depletion. Consequently the aquatic fauna has strongly declined. These developments have occurred mainly as a result of deepening of the upper estuary for shipyard purposes. In addition, a storm surge barrier (also in use as a temporary tidal weir to enable passage of newly built ships) has been constructed; its effects have not been well studied.

During the past 20 years the Weser ecosystem has undergone fewer changes than that of the Ems. However, further deepening of the estuary has occurred and the resulting increase of the tidal amplitude is very large. The tidal freshwater reach of the Elbe estuary shows bad water quality (especially oxygen deficiency). High dredged volumes and further deepening of the fairway have further changed the ecological system. The Varde Å estuary has morphologically changed least, but its forelands have been subject to intensive agricultural exploitation for decades. Hence, 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 2400 hectares of marshland.

Apart from the large estuaries there are few natural transitions between fresh and salt water left, such as several tributaries of the large estuaries. These should be conserved. Some progress has been made modifying sluice regimes, building fish passages and restoring brackish marshes, thus increasing the opportunities to develop habitats and species depending on natural transition zones.

All taken together, the estuaries constitute the part of the Wadden Sea with the worst ecological condition. It will require a huge effort to preserve, let alone to augment the ecological

values still remaining in and along the estuaries. Such an effort will no doubt be hampered by a tendency to further increase the draught of the vessels heading for the ports along the Ems, the Weser and the Elbe, requiring further deepening of the channels. Climate change will also affect the ecological situation in the estuaries due to changes in the freshwater flow regime, accelerated sea level rise, rising temperature and others. Because of climate change adaptation, measures will become necessary with respect to e.g. coastal defence. This may lead to additional impact on the estuarine ecosystem.

3.9 Fish

Few conclusions can be drawn on changes in fish populations since the QSR 2004 because the TMAP did not include a fish monitoring program. However, the inclusion of fish since the QSR 2004 is an important step in itself. Below is an analysis of the state of the Wadden Sea fish fauna based on various sources.

Based on a number of unrelated fish monitoring programs, the QSR 2004 described and assessed the temporal trends and spatial distribution of 20 fish species and the brown shrimp (*Crangon crangon*). Because of the unrelatedness of these monitoring programs, it underlined the need for a regular assessment of the fish fauna and formulated recommendations on management, monitoring and research. These were adopted in the recommendations of the 11th International Scientific Wadden Sea Symposium in Esbjerg (April 2005), and it was advised to include fish monitoring in the ongoing Trilateral Monitoring and Assessment Program (further indicated as TMAP) revision process. Following the Trilateral Ministers Conference 2005, a TMAP ad hoc expert group on fish monitoring was established in March 2006. For the first time, the QSR 2009 provided a comprehensive and harmonized analysis of the fish fauna of the entire Wadden Sea.

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 protection and flood defence and the direct or diffuse input of substances from industry and agriculture are main threats. In the Wadden Sea proper, shrimp fishery and mussel culture also affect the fish fauna. Many fish migrate between the Wadden Sea and the North

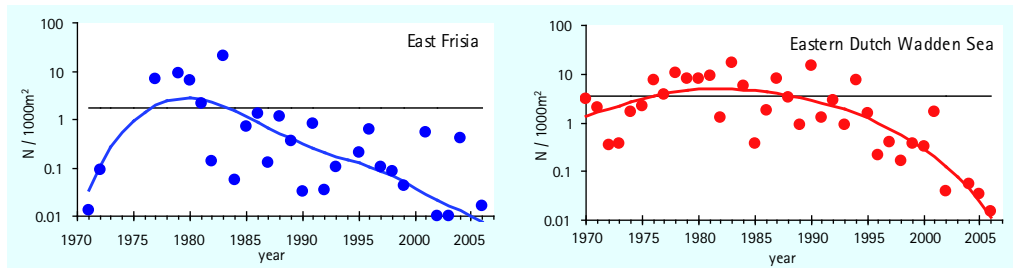
Sea. The latter is subject to increasing human impacts by shipping, exploitation of resources (gas and oil, sand and gravel), fishery and wind energy. Intermingled with the anthropogenic pressures that are exerted, natural variability plays a very important role.

Next to past overexploitation, the migrant (diadromous) fish currently seem to suffer most from bottlenecks in the upstream parts of (some) estuaries, where water quality is low and essential habitats are failing, resulting in some species (almost) missing (sturgeon, allis shad, salmon, houting) and low abundance of others (twait shad, sea lamprey, river lamprey). Only sea trout, smelt, eel and flounder, although decreased in number, are more common in the estuaries. Unhindered migration for almost extinct species such as the houting and salmon, good water quality, suitable spawning habitats and favourable conditions for larval growth are essential to restore or maintain vital populations of diadromous fish in the estuaries and river systems in the Wadden Sea. Attempts to re-introduce the exterminated sturgeon have not been successful up to now. The houting belongs to the most endangered fish species of the Wadden Sea/North Sea and is a prioritized species under the EC Habitats Directive. Previously, it was common in the Wadden Sea Area and adjacent river systems, but today it is only found in the Danish part of the Wadden Sea Area (and maybe also in Schleswig-Holstein) and in certain adjacent rivers. The actual conservation status is unfavourable.

Most of the larger fish species occurring in the past, now are rare or even absent from the Wadden Sea. This applies in the first place to slowly reproducing species such as thornback ray, sting ray, and several species of small sharks. Their decline is probably related to the intensive demersal fisheries in the North Sea, since these species spend part of the year in the North Sea to visit the Wadden Sea, especially in summer. But cod and whiting have also decreased in the Wadden Sea; in this case there might also be a relationship with increased water temperatures in the North Sea due to global warming.

Flatfishes such as dab and sole showed very pronounced decreases in abundance in most of the sub-areas in the Wadden Sea and a similar trend occurred in I-group plaice (= plaice in their second calendar year of life), although this was masked in the current analysis by the still abundant presence of 0-group individuals that dominate the catches. The declining trend in I-group plaice abundance is reflected in the decrease in mean length of plaice in the western Wadden Sea.

Figure 3.15: Catch density (N/1000 m²) of cod in East Frisia (left panel) and whiting in the eastern Dutch Wadden Sea (right panel). The trend is indicated by a drawn line, whereas the horizontal black line indicates the long-term average abundance (Jager *et al.*, 2009, QSR 2009 Thematic Report No. 14).



An offshore shift in the spatial distribution of young plaice appeared to occur in the Dutch Wadden Sea in the 1990s, which is attributed primarily to increased summer temperatures. At the same time, a decrease in predation risk and competition in the offshore areas allowed the juvenile plaice to distribute more widely. The shift in distribution of juvenile plaice was also manifest in the German Wadden Sea. By comparing 1987 to 1991 and 2002 to 2006 abundance data, it could be demonstrated that the distribution of young plaice shifted from the 5-m-depth strata towards the deeper areas as well as from inshore areas towards the further offshore areas. This is an indication that, throughout the Wadden Sea, young plaice have either changed their preference towards deeper and more offshore areas or that an earlier exodus occurs. Whether it is caused by faster growth and/or differences in environmental conditions needs still to be proven.

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. Similar to the observed phenomenon in juvenile flatfish, brown shrimp also appear to have undergone a distribution shift to more offshore, and also to more northerly waters.

Increasing water temperatures have a positive effect on the occurrence of more southern species such as the anchovy. Exotic or alien fish species, introduced from outside the North East Atlantic seas, are still rare in the Wadden Sea.

The estuarine resident species, *i.e.* those species spending the major part of their life cycle in the Wadden Sea, 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.

In contrast to the estuaries, there is no existing fish index or tool to assess the status of the Wadden Sea fish fauna. Some fish species are not adequately covered in the current monitoring programs. Although the number of fish species and the species composition 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. The factors (natural or anthropogenic) causing these changes are still largely unknown.

3.10 Birds

Since the QSR 2004, nearly half of the breeding birds have continued their decreasing trends in parts of the Wadden Sea. For migratory birds, decreasing trends for several species have changed to stable or increasing numbers, especially for Arctic-breeding species. However, some bird species are still decreasing. There are some indications that overfishing, as well as insufficient large roosting and moulting areas affect numbers and distribution of migratory birds.

3.10.1 Birds in the Wadden Sea area

The Wadden Sea region is one of the most important breeding areas for birds in Western Europe, especially for those species connected to coastal areas such as beaches, salt marshes and polder areas with extensive grassland. Despite the large areas of these habitat types in the Wadden Sea, and despite these landscapes being considered as well conserved and protected, large numbers of the breeding bird species are decreasing, and some species will soon be on the edge of extinction from the Wadden Sea area.

For the migratory birds, the Wadden Sea is of outstanding importance, and is one of the most significant staging and wintering sites in the world. Between 10-12 million birds rest here during autumn, moulting their feathers after the breeding season and refuelling their fat reserves before flying further on to the Mediterranean Sea, to West Africa and for some even further to South Africa where they spend the winter. During spring they return to build up their body reserves for the flight to the breeding areas that stretch from Canada in the west over Iceland and Scandinavia to European Russia and Siberia in the east. This shows that birds from a huge area of the northern hemisphere depend on the Wadden Sea. Large

numbers of the migratory birds are supported by the tidal areas that constitute large and reliable feeding grounds.

The results for several of the breeding bird species show that the situation is critical. Large decreases are observed, and for several species this can probably be attributed to management of the Wadden Sea salt-marsh habitats. For the migratory species, decreases are also documented but, except for the mussel eating birds, these decreases can probably not be tied to conditions in the Wadden Sea habitats. However, some of the migratory species are also showing increases and these, together with some of the decreasing species, seem to be bio-geographical changes involving a much larger scale than the Wadden Sea.

3.10.2 Breeding birds

Since the QSR 2004, 13 species of breeding birds have continued their decreasing trends in many

parts of the Wadden Sea, 8 species are increasing, and 7 species are stable. Many breeding bird species dependant on the salt-marsh areas and extensively managed grasslands are declining (Fig 3.16). Several reasons for the declines are mentioned, such as increased predation by foxes, effect of climate change (some species are also decreasing outside the Wadden Sea), and salt-marsh management. Several of the breeding wader species depend more or less on grazing or mowing of their breeding habitats. The monitoring results for the salt marshes show large areas that are left ungrazed and which are following the succession pattern to a climax stage dominated by tall plants. These habitat types are obviously not suitable for breeding wader species, and could contribute to their decreasing numbers. Increased summer floodings may also cause losses of fledglings.

Change of climate during recent years affects several bird species breeding near the shoreline

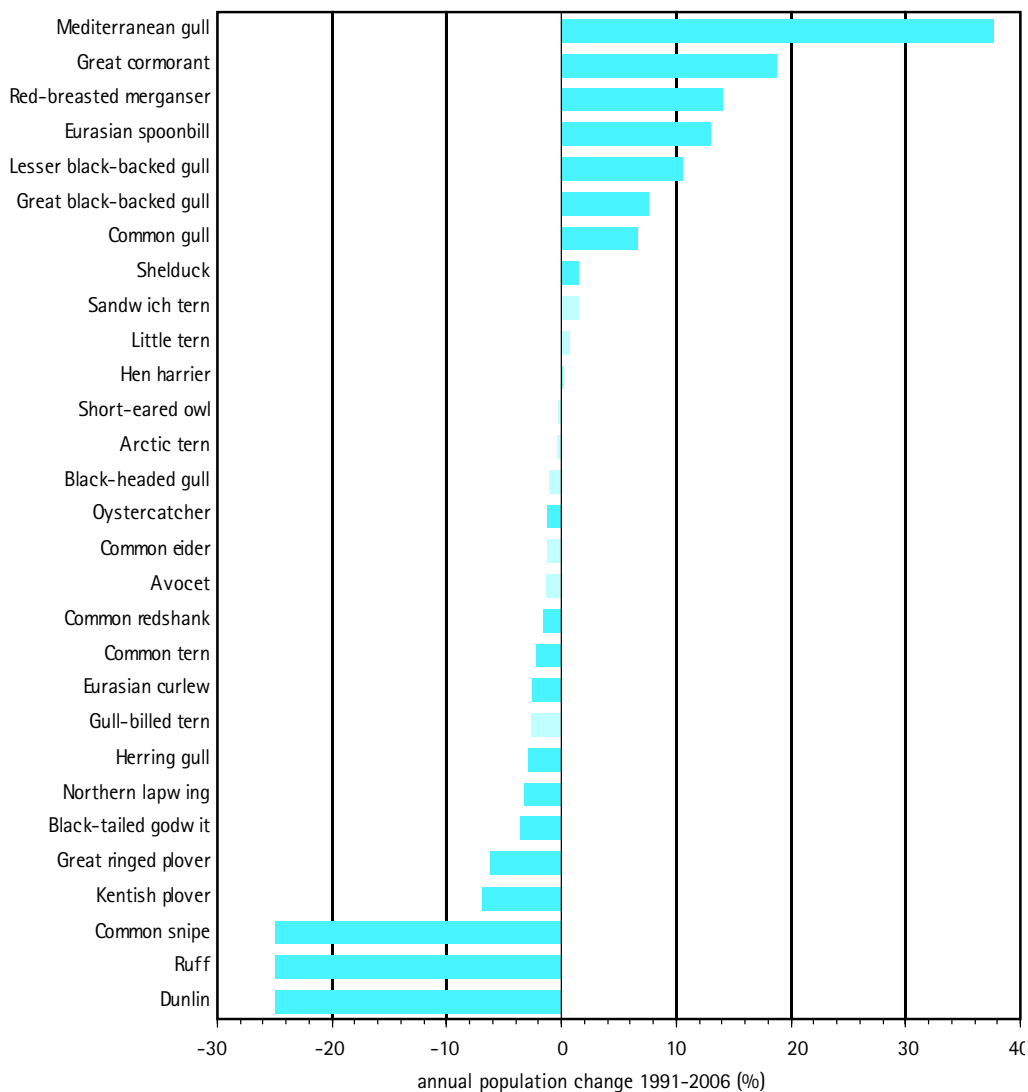


Figure 3.16: Trends in breeding birds 1991-2006, expressed as the rate of annual population change (in %). Non-significant changes are marked light-blue. Population changes in common snipe, ruff and dunlin are estimated from the data of the total counts in 1991, 1996, 2001 and 2006 (Koffijberg *et al.*, 2009, QSR 2009 Thematic Report No. 18).

and on the beaches. High water levels during the breeding season increase the risk of destroying bird nests and eggs, causing losses in recruitment. For several species these breeding failures cannot be prevented but for gulls and terns, artificial sand-fields or barge-vessels can be established as breeding sites or platforms.

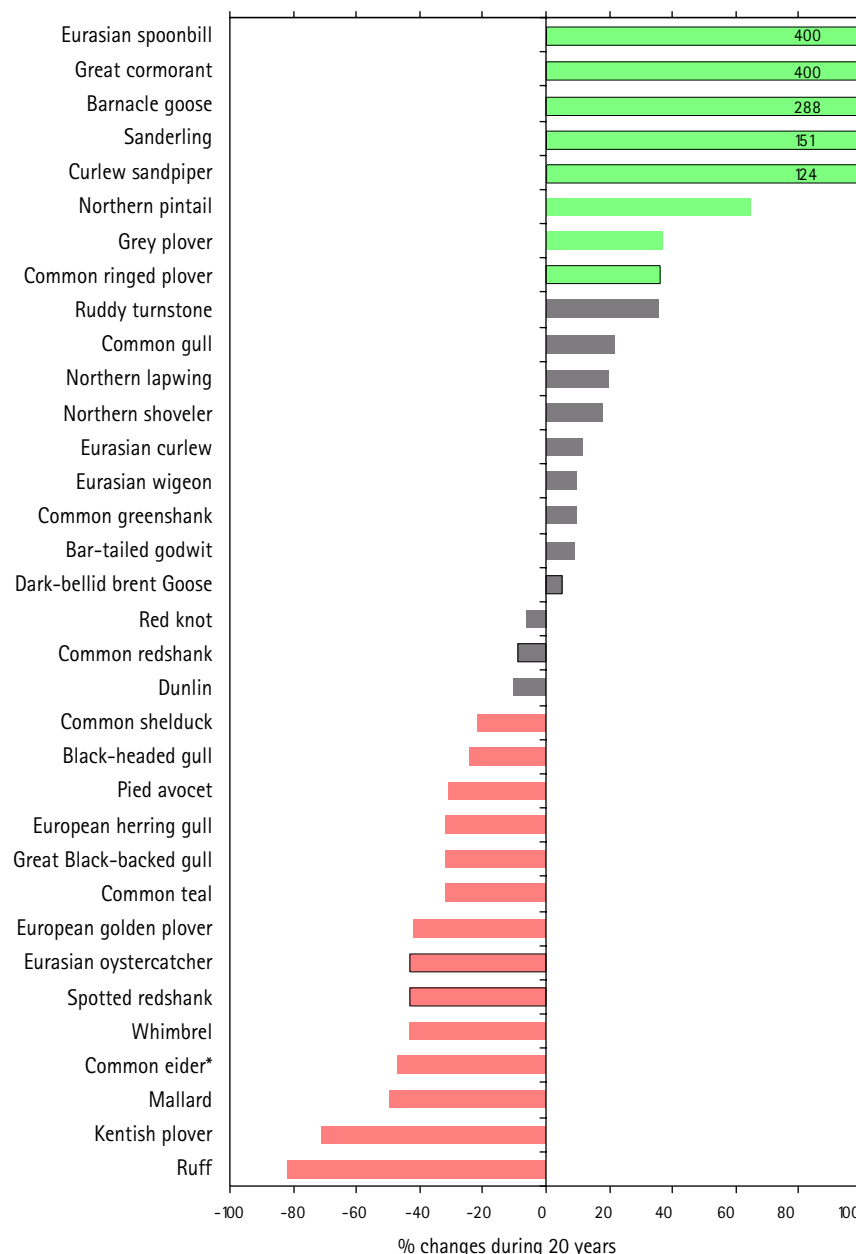
The negative trends in some populations of breeding birds have become more dominant compared to the QSR 2004. These are most obvious in waders, in shellfish-eating species, and in beach-breeding species, and suggest that the conservation status of many species has become worse recently. The background to this decline is only partly known and is related to less favourable food availability, poor breeding performance,

increased predation, and disturbance by outdoor recreations, the latter in the case of beach-breeding species. The impact of other factors, such as changes in salt-marsh management, climate change or changes in the ecosystem, is largely unknown yet.

3.10.3 Migratory birds

Since the QSR 2004, 14 species of migratory birds have decreased, 8 species have increased and 12 species show stable populations. A few years ago, the Arctic species generally showed decreasing trends, but several of these species have now stabilized (Fig. 3.17). The present results show that the species still declining are those breeding in North, Central and Western Europe. Except for

Figure 3.17: Changes in numbers of 34 migratory waterbird species in the Wadden Sea over 20 years (1987/88-2006/07). Green columns indicate species with significant, increasing numbers; grey indicate species with stable numbers and orange columns indicate species with significant, decreasing numbers. *Data for common eiders are from 1992/93-2006/07 (Laursen *et al.*, 2009, QSR 2009 Thematic Report No. 19).



the shellfish-feeding species these bird species do not show a common preference for the same habitat types, indicating that the causes are not to be found in the Wadden Sea ecosystem. The shellfish-feeding bird species have shown a long-term decline in The Netherlands due to intensive mussel and cockle fisheries. The mechanized cockle fishery was terminated in The Netherlands in 2004. Recently the blue mussel biomass has increased in The Netherlands. However, this has not stopped the decreasing trends for the shellfish-feeding species, indicating that other factors are probably involved.

The analyses of the migratory birds suggest that large-scale changes have taken place. During recent years several species arrive earlier and stay longer in autumn in the Wadden Sea area than in former years. Also, several species arrive earlier in spring from the winter areas and leave the Wadden Sea later than before. Species showing these changes in periods of occurrence are geese, ducks and waders, using quite different habitat types. These longer stays during autumn and spring could indicate an increased biomass due to a milder climate. For the Dutch Wadden Sea at least, a general increase in the winter biomass for macrozoobenthos was found. For the biomass in spring there are no trilateral monitoring results, but surveys in the Danish Wadden Sea show increasing macrozoobenthos biomass during recent years. This could support a longer stay for wader species during spring. The longer stay of most of these species gives no management problems, but in some areas the increasing goose numbers cause damage to farmers' crops, especially during winter and spring. Since the goose numbers increase in all parts of the Wadden Sea region, a trilateral approach of goose management, such as proposed by the Wadden Sea Forum, is necessary.

It can be concluded that long-term trends for migratory birds reveal some improvement in the development of several species. Species which show an increasing trend have also increased in their overall flyway population. Species with decreasing numbers mainly breed in North, Central and Western Europe, many of them using inland polder areas and mussel beds for feeding in the Wadden Sea. There are some indications that over-fishing, as well as insufficiently large roosting and moulting areas, affect numbers and distribution of migratory birds. A management concept should be developed on a species flyway scale and this should also take into account changes caused by climate conditions.

3.11 Marine mammals

Since the QSR 2004 the number of harbour seals in the Wadden Sea has increased strongly – by about 25%. Even stronger was the increase of the grey seal population, which almost doubled. Less is known about the harbour porpoise; numbers seem to be stable at least.

The harbour (or common) seal, the grey seal and the harbour porpoise are indigenous Wadden Sea species. 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 needs, demand special attention. Because of their longevity and dependence both directly and indirectly on large areas, they can be vulnerable to disturbance and pollution.

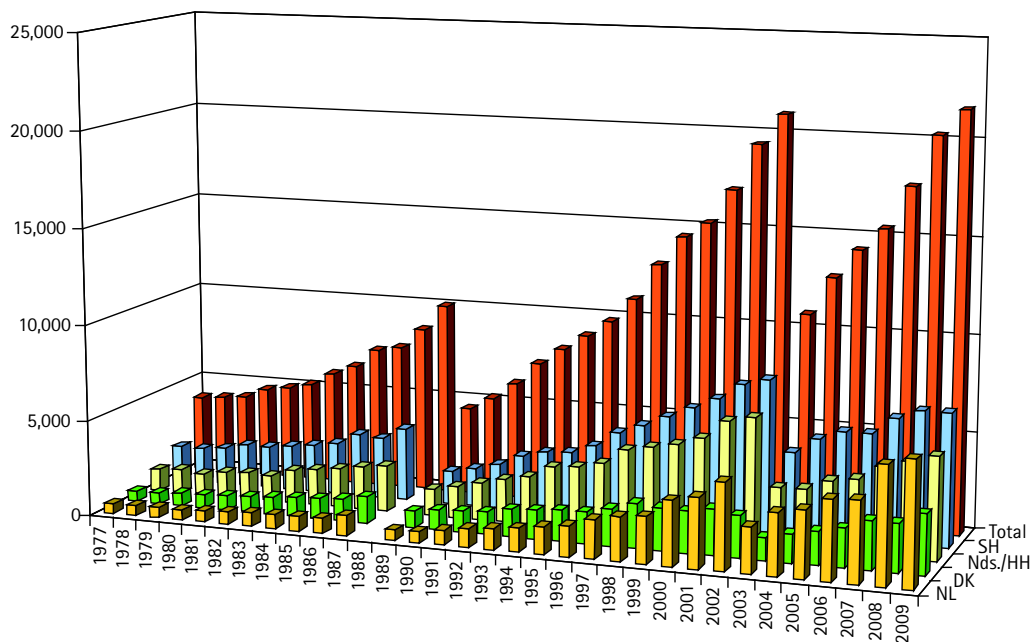
In the years after the virus epidemics in 1988 and 2002, the population of the harbour seal has shown a rapid recovery. During coordinated flights in the entire Wadden Sea Area in 2008, a total of 20,250 seals was counted, the highest number ever counted in the Wadden Sea during the moulting season.

Grey seals have relatively recently re-colonized the Wadden Sea. Currently the species is regularly seen in all countries, including the Danish Wadden Sea area, which seems to be the last area to be colonized. The maximum number of grey seals counted during the moult in 2008 in the Wadden Sea and at Helgoland, was 2,224 animals.

Estimates in 2005 of harbour porpoise numbers, for the total North Sea area, amount to 335,000 animals. The main concentrations seem to have shifted from the northern North Sea southwards. As porpoise may migrate into coastal waters and close to the Wadden Sea, numbers recorded have been 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). Knobsände off Amrum and the island of Sylt show a relatively high density of mother-calf groups (the suckling period of this species lasts approximately 8 months). It can be concluded that this area is important for rearing harbour porpoises.

The present 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, construction of offshore wind parks, fisheries, air traffic and some military activities)

Figure 3.18: Number of counted harbour seals in the Wadden Sea 1975 - 2009; NL = The Netherlands, DK = Denmark, Nds/HH = Niedersachsen and Hamburg, SH = Schleswig-Holstein, Total = entire Wadden Sea (Reijnders *et al.* 2009, QSR 2009 Thematic Report No. 20).



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. At current levels the seal species do not seem to be affected in their population growth. Attention to possible new sources of pollutants should remain, however.

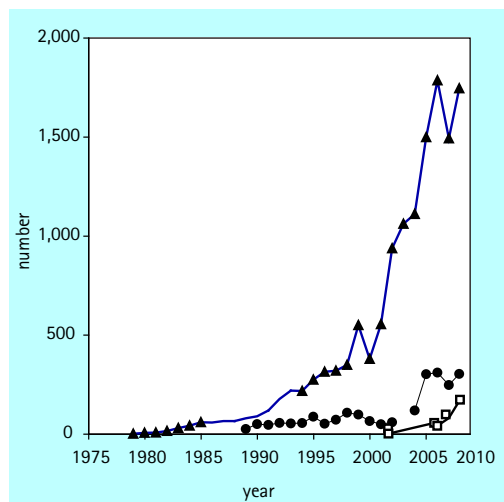
Though probably still not at the population level of around 1900, the harbour seal population has recovered well from the very low numbers observed in the mid-1970s after hunting was forbidden, and after the 1988 and 2002 epidemics. The total population size indicates that the present harbour seal population can be regarded as viable. Data are lacking to estimate the natural reproduction capacity directly, but comparison

with 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 the good protection of the main resting and nursing places.

For both the grey seal and the harbour porpoise, data are lacking to enable to assess whether the current stocks dependent on the Wadden Sea area are viable, or to adequately estimate the natural reproduction capacity. In both cases the current stocks seem strongly dependent on the stocks occurring elsewhere in the North Sea.

The numbers of grey seals and harbour seals observed in the Wadden Sea have increased over the past years. The question may arise whether and at what point the population may reach the carrying capacity of the area when biological regulating processes will occur (resulting in lowered reproduction and survival, a stagnating growth rate, increasing prevalence of parasites and diseases). General issues of concern with regard to marine mammals are increasing disturbance through noise (e.g. offshore wind farms) and disturbance (e.g. increase of unregulated recreational activities). In particular, insights into the cumulative effects of the various factors are lacking.

Figure 3.19: Counts of grey seals in the Wadden Sea during the moult (March/April). ▲ data for The Netherlands (source: IMARES); ● data for Schleswig-Holstein and Helgoland (source: National Park Schleswig-Holsteinisches Wattenmeer); □ data for Niedersachsen (source: Nationalpark Niedersächsisches Wattenmeer). (Reijnders *et al.* 2009, QSR 2009 Thematic Report No. 20).



4. The Main Issues

The guiding principle “to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way” (Ministerial Declaration Esbjerg, 1991) is based on the observation that the present level of quality of the Wadden Sea is affected by ongoing disturbances and developments which interfere with the natural processes and threaten the sustainability. Therefore, a Trilateral Wadden Sea Plan (WSP Stade, 1997 and updated 2010) has been adopted with specified environmental targets. This is combined with a Trilateral Monitoring and Assessment Program (TMAP) which measures indicators of the actual status of the Wadden Sea ecosystem. Periodically, this status and the corresponding targets are compared in a Wadden Sea Quality Status Report. In the updated version of the Wadden Sea Plan an ecosystem approach is explicitly adopted and as overarching themes climate change, alien species and shipping safety are addressed. Below, the authors focus on some main issues with an outlook on possible long-term developments in the Wadden Sea region.

4.1. Maintaining a great natural heritage

The Dutch and German parts of the Wadden Sea Conservation Area have been given the rank of a World Heritage by the UNESCO World Heritage Committee in June 2009. This recognizes on a global level the outstanding natural values which are under excellent nature conservation management supported by a broad societal consensus. Compared to other coasts of the world which are also inhabited by highly developed agricultural and

industrial societies, the geo-morphological shape and the ecological conditions of the Wadden Sea have been well preserved. Maintaining this high level of environmental quality for the coming generations would be a great achievement.

The Wadden Sea's most outstanding natural feature is the large extent of its intertidal sand and mud flats, interacting with adjacent salt marshes and beaches. This is its core value already expressed in its name, which implies that one can wade across this sea when the tide is out. Thus, maintaining the tidal area (intertidal and subtidal area) with its morphological dynamics and its food supply for the spectacular flocks of coastal birds deserves highest priority. The tidal area is sheltered by a sandy barrier against a rough North Sea. This furthers special living conditions, but many biota commute between the tidal area and the offshore zone in order to select the best opportunities, depending on season and life stage. On the landward side, the intertidal flats transcend into salt marshes and into estuaries. Birds especially commute between the intertidal flats for foraging and the salt marshes for breeding and resting, while many fish migrate into or through the estuaries. Offshore zone, sandy barrier islands, salt marshes and estuaries surround the tidal flat area and interact with it in many ways. Each habitat is essential for the functioning of the Wadden Sea ecosystem as a whole. However, these habitats are not as universally outstanding as the tidal flat area. In addition to natural habitats, there are also interactions with the neighbouring rural areas which are therefore partially integrated into management and monitoring.

Figure 4.1:
Dike built in 1980/81 at the Danish-German border of the Wadden Sea to shorten and strengthen the line of defence. The embanked area is maintained as a semi-natural wetland. In front of the dike, a foreland has been developed to dissipate wave energy. Further off the dike, natural saltmarsh succession has commenced (lower left), (Photo: K. Reise).



Throughout its existence over the past 5,000 years, the tidal area has undergone considerable changes, with marshes advancing and retreating in line with the balance between sea level change and sediment supply. In the last millennium, human engineering increasingly impacted the landscape of the Wadden Sea. Following an early period of reclaiming and draining peat areas and embanking salt marshes, the intertidal area grew again because storm surges breached seawalls and flooded embanked marshes. Due to a subsiding land level, the intruding tidal waters could not be easily kept out again. Tidal flat areas in the westernmost Dutch Wadden Sea, Dollard, Jadebusen and in the Northfrisian region now extend where once an agriculturally exploited marshland had been. With advances in coastal defence, the size of the tidal area began to decrease again until land claim was halted, towards the end of the past century (Fig. 4.1). The cessation of claiming land from the sea was triggered by the fading need for more agricultural land and its economical feasibility in the European economy and at the same time by a growing appreciation of the natural values of the tidal area.

The changeable extent of the tidal area makes it impossible to derive objectively a reference size of the area from the past which could then serve as an environmental target. It is therefore best to set a target that the present-day size of the area should not be diminished. This is an important decision because sea level is expected to rise faster in the wake of global warming. Under the present rate of sea level rise most tidal flats and salt marshes seem able to keep pace with sea level rise. It is not known exactly to what extent natural

sedimentation can compensate for the acceleration of the rising sea level to keep the size of the tidal zone constant. If a sediment deficit arises studies should explore how sand nourishments could compensate such a development and could contribute to maintaining the outstanding natural values. Spatial planning to adapt coastal zones to higher levels of the sea may include buffer zones which in addition to their purpose for defence could develop into zones of high natural value.

Targets for the tidal area in the Wadden Sea Plan do not refer to the size of the area per se but to "a natural dynamic situation in the tidal area" and "an increased area of geomorphologically and biologically undisturbed tidal flats and subtidal areas". This implies that it is best to avoid disturbing the natural dynamics of the area by harmful activities – dredging and stabilizing channels, dumping sediments, changing natural erosion and sedimentation patterns or the seafloor level, by dredging or raking away biogenic structures or by removing organisms. Levels of turbidity, contamination and eutrophication should also be minimized.

Although to a casual observer the tidal area may appear to be OK, all the disturbances of the natural dynamics listed above are evident, as outlined in this report. To a large extent, these are concessions to human needs and rights in the area. The challenge for the future is to fulfil human requirements and still lower the level of interference with the natural dynamics. For example, instead of widening and deepening channels to accommodate the growing size of ferries which commute between mainland and islands, new types of ferries should be designed which do not



Figure 4.2:
While exposed beaches at Sylt are regularly replenished with sand nourishments to combat erosion, its more sheltered Wadden shores are still enforced with new hard structures. More sustainable in the face of sea level rise would be dunes and beaches created with sand borrowed from the North Sea (Photo: K. Reise).

require expanded channels with larger ports and longer revetments. This would be a substantial contribution to improving natural sediment dynamics in the tidal area. As another example, the bottom cultures of the mussel fishery are supplied with so-called seed mussels which traditionally have been dredged after settlement as wild beds. Now, promising experiments are being conducted with collectors of young mussels. Such collectors are ropes or nets suspended above the bottom. Supply of seed mussels from such collectors could free the natural beds from recurrent dredging and their dynamics could proceed in an undisturbed way. Hopefully, other disruptions to the natural dynamics can eventually be resolved by ingenious inventions. There should be incentives and awards to promote such endeavours.

The targets for the tidal area to have more natural mussel beds, more worm reefs, more seagrass beds and favourable food availability for birds cannot be regarded as fulfilled. However, management may not be able to do much in these cases. The reasons for a lack of recovery are not clear enough to take immediate action and food shortages for shellfish-feeding birds may have to do more with climatic developments than the fishery. Present monitoring is largely confined to the intertidal part of the tidal area. This severely limits our understanding of population dynamics in many benthic species. More emphasis on the subtidal shallow areas and gullies is necessary in monitoring. To promote epibenthic biogenic habitats, more experimental research is needed. When touristic and military facilities began to invade the barrier islands of the Wadden Sea, many kinds of hard core defences were used to stabilize

the shoreline positions. Some sandy beaches were partially displaced by artificial rocky shores. Thus, the use of sand nourishments were a great achievement. Sand sucked up at offshore source areas is carried to the shore by ship and pipeline. It is either directly sprayed upon eroding beaches or it is deposited in front of the beaches to protect the island shores. There is still a large potential for coastal defence with sand nourishments. For example, at Sylt the exposed beaches facing the North Sea are supplied every year with about one million m³ of sand to balance natural erosion. On its other side, where the island is facing the tidal area, beaches are still replaced by more hard structures (Fig. 4.2). These spoil the landscape and reduce natural biodiversity. Maintaining natural shores at barrier islands would require more sand nourishments rather than enforcing and extending hard structures of defence.

Salt marshes along the mainland coast are almost all of the artificial foreland-type. The natural salt marshes have disappeared with past embankments. Foreland grew at the expense of intertidal flats by means of sedimentation fields surrounded by brushwood groynes, combined with digging ditches for drainage. The original purpose of such land claim for agriculture has given way to coastal defence and conservation purposes since the 1970–80s. Forelands absorb wave energy which otherwise would hit the seawall. Except for a few sites, the present extent of foreland is regarded as sufficient. Occasionally, existing foreland is protected against erosion. Overall, a status quo between areas of foreland and intertidal flats is now maintained.

Estuaries as a whole are in a very bad shape. Small ones have either been closed with sluices or storm-surge barriers reducing tidal flow. Large estuaries have been converted into shipping channels for ever larger vessels. This increased the tidal range, caused silting up of side-arms, oxygen deficiencies at the bottom, a high load of suspended particles and it requires constant dredging. These problems are so severe that grand solutions have to be thought of – as radical as shifting port functions from inshore to offshore locations. Such a partial shift of port activities out of the estuaries and away from the shallow coast could release estuaries from the burden of accommodating incompatible functions. The estuaries should not be adapted to the growing size of vessels and the volume of trade. Rather, the mode of cargo transfer should be adapted to conserve the shape and form of the coast. Solutions should be sought to conserve the natural values rather than satisfy the immediate human need.

In conclusion, maintaining the great natural heritage of the Wadden Sea is a very challenging task. The current size of the intertidal zone cannot be taken for granted. Mitigating the level of interference with the natural dynamics of the tidal area requires innovative ideas. Maintaining barrier islands relies on proper ways to enhance artificial sand supply, while the unsustainable situation in the estuaries needs radically new solutions. Maintaining the natural heritage would require considerably more than conventional nature conservation and asks for a joint effort of all coastal agencies.

4.2. Healing the old wounds

The historical conversion of episodically flooded marshes and regularly flooded tidal flats into embanked agricultural land cut through the coastal gradient across which matter had been exchanged in natural processes between land and sea. There was no natural seaward growth of the tidal area, so this loss was not compensated for. In particular, brackish transitions between freshwater marshes and salt marshes, once common all along the mainland coast, are nowadays relegated to estuaries. Forelands are not relicts of former salt marshes but have been created in front of seawalls (see above). Forelands mostly look very different from natural salt marshes because of their parallel ditches, the vegetation grazed down to a lawn and a deviating species composition.

As a success of nature management, large artificial forelands are gradually developing towards a more natural state as brushwood groynes at sheltered localities go unrenewed, drainage ditches are neglected and livestock grazing pressure is reduced. Summer dikes have been removed at several locations to allow pasture land to revert to salt marsh meadows. The adopted policy and management is based on sound science and comprehensive monitoring. It has over the years advanced to a great success in regaining natural salt marsh vegetation and the associated fauna. This is a classic case of a win-win situation for coastal defence and nature conservation and is a path which should be continued.

Dunes on the Wadden Sea islands suffer from past stabilization programs. Where salt marshes

Figure 4.3:
One of the last free moving dunes in the Wadden Sea area is approaching a busy road. Will winds continue to shift this dune across the island of Sylt or will it be stopped by artificial planting? (Photo: K. Reise).





Figure 4.4:
Grey seals once driven out of the Wadden Sea are now recolonizing their former habitat. This constitutes a great success of dedicated nature protection (Photo: K. Reise).

have developed in the shelter of such dunes, these also lack the influence of natural disturbances. This promotes ageing. Plant succession as such is a natural process. However, the dominance of late successional or climax-stages is a result of preventing or repairing physical disturbances such as strong winds and wash-overs. On some islands, trampling by visitors has introduced some small-scale disturbances that have remobilized drifting sand. For the sake of coastal protection, this has been stopped. Eutrophication, decreased grazing and invading bushes and trees have led to a more dense vegetation than there would have been under natural conditions. To restore more natural and dynamic states, a new and promising geo-ecological concept has been developed for barrier islands. This approach has still to gain more public support and needs to be fine-tuned to individual islands. It is a promising first step to reverse the degrading development of dune landscapes and back-barrier salt marshes. Re-introducing more dynamics on the barrier islands would also contribute to their long-term persistence (Fig. 4.3). Similar concepts should be developed for tidal basins and estuaries.

Coastal birds and their eggs were severely over-exploited when a large market for coastal products grew in the expanding cities within reach of the Wadden Sea region. A tipping point was reached at the onset of the 20th century. The sad condition of coastal bird populations was realized and sanctuaries for breeding colonies were secured. Finally, large-scale egg collecting and hunting ceased, together with control of chemical pollution. These initiatives have surely increased the colonial breeding bird species as gulls and terns

and also spoonbill and cormorants are increasing. However, despite protection and conservation large parts of the breeding bird species are decreasing, and some species are about to get lost from the Wadden Sea area. A recently observed threat is the increasing number of floodings of salt marshes during the summer period when the fledglings can not yet fly, and are drowned. For the migratory species that especially rely on the huge areas of intertidal flats, large changes in numbers occur. However, except for the shellfish-feeding bird species, they do not show a common preference for the same habitat types, indicating that the causes for the changing numbers are not only to be found inside the Wadden Sea ecosystems, but rather in geographical ranges involving larger regions than the Wadden Sea area. The increasing goose numbers have in part resulted from successful conservation strategies, namely livestock grazing, and huge flocks of these big birds can be seen all over the Wadden Sea area.

Similarly, the recovery of seals after a ban on hunting, the avoidance of disturbances at resting and haul-out places, declining contaminants, together resulted in counts of about 20,000 harbour seals and about 2,000 grey seals in the past year (Fig. 4.4). Seal watching has grown into an important recreational activity and decreasing disturbance distances of seals facilitated this development. Two virus epidemics interrupted the recovery of harbour seals and highlighted that even the best management cannot protect against threats from outside.

There is still a large potential for habitat restoration and population recovery in the Wadden Sea. Among fish, only the houting in the Danish

part of the Wadden Sea and its tributaries received the benefit of a well-planned and comprehensive management to achieve a recovery. A good next candidate would be sturgeon which was fished to extinction in the estuaries of the Wadden Sea early in the last century. Reintroducing and protecting such a large and conspicuous fish would draw public attention to the poor state of fish populations in the Wadden Sea compared to what it could be. However, little can be done within the confines of the Wadden Sea unless fishery pressure is reduced in the North Sea.

In conclusion, important steps have been taken to reintroduce a more natural development for salt marsh and dune habitats. The recovery of seal populations is a great success, demonstrating that a consequent pursuit of the respective targets is the right way to go and should be extended to other old wounds as well.

4.3. Mitigating external disturbances

As with coastal regions in general, the Wadden Sea is wide open to external influences from both, the land and the sea. Eutrophication and pollutants have received much attention in the past and their mitigation is one major objective of the European Water Framework Directive. Riverine loads of nutrients are declining at a rate of about 2% per year. Compared to assumed background levels, the eutrophication status is still elevated in the tidal area, salt marshes and dunes of the Wadden Sea. There are apparent sub-regional differences and the signals differ for groups of phytoplankton,

benthic macroalgae, turnover of organic matter and dominant grasses in the salt marshes and dunes. No alarming blooms of algae or of sediments turning anoxic up to the surface have been observed during the last decade. The question arises: how low should we go with the reduction of nutrient loads and contaminants? Pre-industrial conditions may be out of reach. Would the money needed to achieve such a target be used better to mitigate other threats? These are important questions which require comparisons between relevant impacts and consideration of their interactions in order to arrive at a sound decision.

Litter in the countryside has become a rare sight and much effort goes into recycling of garbage. By contrast, huge amounts of plastic packaging continue to spoil beaches after a storm. Particularly embarrassing is the high share of debris from fisheries. On a short stretch of coastline, one can easily find enough orange rubber gloves to model a dragon or a fisherman on the beach (Fig. 4.5).

Many fish and birds are migrating species for which threats have to be assessed at a scale larger than the Wadden Sea to identify the factor most limiting the populations. In fish, particularly in top predators, this is usually the fishery in the North Sea which would overrun any attempts of conservation within the Wadden Sea. In birds, hunting pressure along the migration routes and the breeding success in the Arctic or in Eastern Europe may often be crucial for population development. In such cases, more awareness of the fate of fish and birds has to be raised in the respective countries to influence international policies.

Raising more awareness is also required in the case of introduced alien species. Particularly in the epibenthos of the tidal area but also in dunes adjacent to housing estates, alien invasions have increased in the last couple of years to such an extent that aliens often predominate in biotic communities. They originate from distant coasts and have arrived directly by human carriers or indirectly when introduced to other European coasts from where secondary dispersal has brought them into the Wadden Sea. The latter has been by far the prevailing route of immigration. This highlights that preventative measures such as ballast water treatment, control of hull fouling, banning the use of exotic organisms in open aquacultures and seaside aquaria, can only be effective if all coastal countries implement adequate prevention according to international conventions. Parliaments of the Wadden Sea countries should be urged to ratify such conventions.

Figure 4.5:
Watchman of the beach
modelled from gloves of
sailors and fishermen and
other debris washed ashore
on a stretch of less than
one kilometre (Photo: K.
Reise).



Once alien aquatic organisms have arrived, only immediate action has a chance to eradicate immigrants. Dispersal with the currents and broadcasting of vast numbers of spores or larvae severely limits the prospects of successfully controlling such invaders. Some invaders are poorly integrated into the food web and hence may affect the performance of the ecosystems. However, the main issue is an ongoing homogenization of coastal biota on a global scale. Successful universal invaders produce a growing similarity between distant biota which once had no species in common. This process has received little attention in the past because most of the introduced coastal organisms are small and inconspicuous. With the invasion of Pacific oysters, this has changed (Fig. 4.6). Wide intertidal flats will never be as before. A common management strategy on the issue of alien species is needed.

The Wadden Sea region is expected to be challenged by an accelerating rise in sea level. As this is a consequence of increasing greenhouse gas emissions, one could assume this region would be at the forefront of climate change mitigation. This is not the case. Power plants using fossil carbon particularly abound in the Wadden Sea region. Gas extraction amounts to 10 billion m³ per year in the Dutch Wadden Sea, and in the German part about two million tons of oil is extracted annually. There is no indication that this might become less in the coming years. Islands such as Sylt and Texel make no effort to reduce traffic with cars using combustion engines. This paradox may produce a rather bad image.

Although the Wadden Sea is supplied almost continuously with wind which could drive large numbers of wind turbines, the policy to keep wind

turbines out of the Conservation Area is justified because of the high density of coastal birds and the importance of preserving an unspoiled land- and seascape in a touristic area. However, the adjacent rural areas accommodate one of the highest densities of wind turbines. The offshore area next to the Wadden Sea is planned to deliver as much as 20,000 to 25,000 MW per year from giant wind turbines by 2030. This industrial neighbourhood will inevitably entail a burden to the Wadden Sea and care is necessary to minimize the effects on the protected nature area. For example, effects of cable crossing through the conservation area should be minimized by bundling these on a single line.

In conclusion, for the wide open Wadden Sea external disturbances play a major role in the performance of the geo-ecosystem. Efforts over the past decades to reduce the influx of excess nutrients and contaminants have improved the ecological quality, but residual problems remain. No success has been achieved so far in stemming the amount of litter washed ashore. The implementation of international strategies is necessary to improve situations of migrating birds and fish. Fish migrating between the tidal area of the Wadden Sea and the North Sea are particularly under-represented in the ecosystem. This distorts the food web and thus ecosystem functioning. On the other hand, too many alien species are invading the Wadden Sea and international conventions to reduce their dispersal by human carriers are not yet implemented. Unlimited alien invasions are undermining efforts of restoring past diversity and are seriously changing the biotic composition in the ecosystem.



Figure 4.6:
Vast areas of tidal flats have been overgrown by invading Pacific oysters. These have been intentionally introduced to the island of Sylt for sea ranching but these oysters have reproduced to such an extent that they are now out of control (Photo: K. Reise).

4.4. Adapting to global change

The Wadden Sea cannot be a museum in a changing world. Mean annual sea surface temperature has increased by 1.5°C within the past 25 years in the inner North Sea and the Wadden Sea. Rising temperature entails an increased frequency of mild winters and hot summers, more precipitation during winters and more weather extremes at any time of the year. In the shallow Wadden Sea, water temperature follows air temperature very closely and this is predicted to rise further by almost 2°C in the next decades. This corresponds to water temperatures now encountered on the French coast south of Brittany. Although the Wadden Sea and the Atlantic shores of France have many coastal species in common, there will still be a considerable change in species composition and abundances. The warmer stage will have a number of new actors and their interplay will be different from what we are used to.

To make predictions in this biotic realm is almost impossible. The speed of northward dispersal by southern species and genotypes may exhibit a wide range and we know almost nothing of specific dispersal rates under conditions of a rapid increase in temperature. From present observations, so-called mismatch phenomena between prey and predator will intermittently abound. More southern species will immigrate than Boreal species will leave the Wadden Sea. Introduced alien species often find themselves in a pole position because they originate in most cases from coasts warmer than the Wadden Sea. They may occupy niches before other species arrive by natural dispersal from adjacent southern

regions. Compared to previous times, there will be a revolutionary rate of change in the coastal biota. Intensified monitoring will be necessary to keep track of these changes (Fig. 4.7). Otherwise we will lose any understanding of what goes on in the interplay of life and cannot explain the novel phenomena in the ecology of the Wadden Sea.

However, at the regional scale nothing can be done to mitigate this kind of change. The best precaution for not losing too many species and genotypes in a period of rapid change is to maintain or restore a wide spectrum of habitats. A more complex array of habitats will lower the chance of a loss in genetic diversity within populations, prevent competitive exclusion between species and extirpations of plants, prey and hosts by grazers, predators and parasites, respectively. Therefore, faced with climate change, efforts to prevent displacements of natural habitats and to restore degraded habitats deserve a high priority.

An expected rate of sea level rise in the order of one metre at the end of this century will presumably cause a much greater challenge to the Wadden Sea region than the mere change in temperature or precipitation. Sea level rise affects the safety of the people; may squeeze salt marshes; and may drown the intertidal flat zone in front of defended coastlines. It will raise the input of hydrodynamic energy and be followed by a loss of mud relative to sand and a loss of seagrass as sand waves arise in the tidal zone. The barrier islands will be affected most by erosion. In spite of these dim long-term prospects, one metre of sea level rise within a century is still in an order of magnitude where adaptations to the consequences seem possible.

Figure 4.7:
The Asian crab *Hemigrapsis sanguineus* is currently spreading throughout the Wadden Sea and may potentially displace the native shore crabs. Monitoring and research is needed to keep track of such invasions and its ecological effects (Photo: K. Reise).



Other than with weather or the outcome of multiple biotic interactions, sea level is reasonably predictable in the long term. This allows a careful planning of the adaptations, learning by experience, and most importantly, there is time to harmonize cultural, socio-economic and geo-ecological consequences. Probably the most difficult problem is that our society has not yet learned to cope with such slow but relentless changes – changes which demand timely adaptations so that subsequent generations will not be faced with more to do than they can handle.

The present coastal configuration is not sustainable. Large parts of the embanked land lie below sea level and cannot rise in concert with the sea. Salt marshes in front of the seawalls and in back-barrier position may, in large part, be adapted to rise with the sea. It is known that net surface elevation change (sedimentation minus compaction) of salt marshes depends on the position in the tidal basin, elevation, distance to the source of sediment input, and structure of the vegetation as affected by grazing. For tidal flats, the adaptation is very uncertain and may depend on the size and shape of tidal basins as well as a variable sediment supply from the adjacent North Sea. Keeping island shores in position will require more and more effort. Concepts such as the geo-ecological model of barrier islands (see paragraph 3.6.2) will be helpful.

In due time we should shift from online coastal defence, with its focus on strengthening seawalls and beaches, to a coast growing with the sea with a focus on sand nourishments from offshore to inshore and attempts to trap sediments behind seawalls for raising the surface of embanked land. Both parts of this strategy require spatial planning and learning by experience. For the islands and the tidal area, the aim is to keep them more or less as they are, while in the low-lying embanked mainland structural adaptations to survive hazards would be an option. Without such adaptations, the Conservation Area would risk losing its universally outstanding natural values, and the rural area would run an ever-higher risk of disaster if its protective seawalls were ever breached.

Sand nourishments should be done with the least possible energy demand or by tapping energy from offshore wind parks. Sand extraction should be limited to offshore areas. Sand should be supplied in a way that minimises interference with the natural sediment dynamics. At present there is insufficient knowledge as to how islands and the tidal area can be maintained with sand nourishments. This ought to be an area of research

with high priority. Raising the level of embanked marshes may be even more challenging than finding proper strategies for sensible sand nourishments.

In conclusion, the inevitable change in species composition in the wake of global warming is best accommodated with a high diversity of habitats. This aspect is already sufficiently covered by the existing targets. Adaptation to the expected rise in sea level seems possible by sand nourishments at the barrier islands and in the tidal area. Without such gradual adaptations to the consequences of climate change, the Wadden Sea natural heritage is at risk in the long term.

4.5. Towards excellence in integrated management

Integrated management taking into account ecological, socio-economic and cultural values requires informed, involved and committed societies in the three Wadden Sea countries. Joining the forces of the Trilateral Wadden Sea Cooperation and the Wadden Sea Forum to represent the interests of the stakeholders promises to meet the challenges of the major issues, particularly the envisioned adaptations to global change. The UNESCO World Heritage nomination dossier for the Wadden Sea, the Wadden Sea Quality Status Report 2009, the insights and recommendations from the 12th Scientific Wadden Sea Symposium and the Wadden Sea Plan 2010 provide a sound basis for a common management approach towards solving the main issues. It has been proven successful to treat the Wadden Sea as a coherent system and to imbed the Conservation Area into a wider regional structure of the adjacent land and the Exclusive Economic Zones in the North Sea belonging to the Wadden Sea countries.

Accelerating sea level rise, increasing temperature and introduced alien species complicate the interpretation of signals received from indicators thought to be specific for certain targets. Warming seems to facilitate pelagic and benthic grazing pressure on phytoplankton, suppressing blooms which otherwise would indicate that nutrients are still at a level too high to tolerate. Increased benthic grazing pressure follows from invasive alien species, notably the Pacific oysters and American slipper limpets which have benefited from warming. Identifying effects caused by the mussel fishery is hardly possible any more because mussel recruitment is affected by warming and intertidal mussel beds are overgrown by Pacific oysters. Both warming and alien species contribute to an increasing number of species. High

species richness would otherwise have been taken as evidence of successful conservation management. The crux is that these rapid changes lower our understanding of the ecological system and increase the risk of misinterpreting indicators. The only way out is to intensify research and monitoring. Monitoring should be long term and at a large scale, e.g. that of the tidal basins between islands. This is a better way to quantify cumulative impacts of exploitation instead of the present ad hoc small-scale and short-term "research".

Global warming inevitably entails sea-level rise, albeit with some time lag. However, breeding birds have recently faced higher summer floods on salt marshes than in the past. Moreover, there is already a rising high tide level in the German Bight which is higher than the global rate of mean sea level rise. This gives a foretaste of what may come under global temperature rise. Predictions on the magnitude of sea level rise until the end of this century are still unreliable, but the direction is not. Falsely assuming that sea level will not rise as predicted and thus rejecting adaptive measures may have more serious consequences than falsely assuming the reverse. Adaptations such as sand

nourishments within tidal basins collide with the target of a natural dynamic situation. What is "natural" is hard to define under conditions of a global change triggered by anthropogenic greenhouse gas emissions (Fig. 4.8). Probably we have to relax the geomorphological target under these circumstances and focus on the main issue of not losing intertidal flats.

The overriding consequences of global change demand a more integrated approach to the targets than has been taken up to now. A more hierarchical approach may be considered to ease management decisions. More importantly, adaptations in the Wadden Sea region to cope with changing precipitation patterns and with sea level rise have effects on coastal defence and many cultural, social and economic values. These have to be considered alongside geo-ecological concerns. The Wadden Sea community has already started along this path but there is a tremendous challenge before us. Although sticking to the path will be difficult, doing so offers the prospect of successfully conserving the Wadden Sea's sublime nature and wildlife, thereby making the region even more worthwhile to live in.



Figure 4.8: Well integrated management is required to meet multiple targets. The salt marsh (lower left) has received dredged sediment from an adjacent harbour site which is silting up. Construction of brushwood groynes for land claim disturb a seagrass bed (dark patch in centre), and in the shelter of these groynes, the introduced *Spartina* grass is spreading into the mud flat. Protecting natural values at such a shore will be a growing challenge when sea level rise accelerates in the coming decades (Photo: K. Reise).

List of QSR 2009 Thematic Reports

- Harald Marencic (Ed.), 2009. The Wadden Sea – Protection and Management. QSR 2009, Thematic Report No. 1.
- Schroor, M., Kühn, J., Brown, N., Enemark, J., Vollmer, M., 2009. Landscape and Culture. QSR 2009, Thematic Report No. 2.
- Jacobus Hofstede, Trilateral Working Group CPSL, 2009. Coastal Defence. QSR 2009, Thematic Report No. 3.1.
- Nickie Butt, Paul Wright, Natalie Vigar, 2009. Harbors and Shipping. QSR 2009, Thematic Report No. 3.2
- Georg Nehls, Sophia Witte, Norbert Dankers, Jaap de Vlas, Floor Quirijns, Per Sand Kristensen, 2009. Fishery. QSR 2009, Thematic Report No. 3.3.
- Anna Christine Brandt & Anja Wollesen, 2009. Tourism and Recreation. QSR 2009, Thematic Report No. 3.4.
- Harald Marencic and Stefan Nehring, 2009. Military Activities. QSR 2009, Thematic Report No. 3.5.
- Georg Nehls and Sophia Witte, 2009. Energy. QSR 2009, Thematic Report No. 3.6.
- Georg Nehls and Sophia Witte, 2009. Extractoin and Dredging. QSR 2009, Thematic Report No. 3.7.
- David Fleet, Jan van Franeker, Jeroen Dagevos and Merijn Hougee 2009. Marine Litter. QSR 2009, Thematic Report No. 3.8.
- Albert Oost, Pavel Kabat, Ane Wiersma and Jacobus Hofstede, 2009. Climate. QSR 2009, Thematic Report No. 4.1.
- Katja Philippart and Eric Epping, 2009. Climate change and ecology. QSR 2009, Thematic Report No. 4.2.
- Joop Bakker, Gerold Lüerßen, Harald Marencic, Kristine Jung, 2009. Hazardous Substances. QSR 2009, Thematic Report No. 5.1.
- Peter H. Becker and Tobias Dittmann, 2009. Contaminants in Bird Eggs. QSR 2009, Thematic Report No. 5.2.
- Kees (C.J.) Camphuysen, M. S. Dieckhoff, D. M. Fleet & K. Laursen, 2009. Oil Pollution and Seabirds. QSR 2009, Thematic Report No. 5.3.
- J.E.E. van Beusekom, P.V.M. Bot, J. Carstensen, J.H.M. Goebel, H. Lenhart, J. Pätsch, T. Petenati, T. Raabe, K. Reise and B. Wetsteijn, 2009. Eutrophication. QSR 2009, Thematic Report No. 6.
- Stefan Nehring, Karsten Reise, Norbert Dankers and Per Sand Kristensen, 2009. Alien species. QSR 2009, Thematic Report No. 7.
- Esselink, P., J. Petersen, S. Arens, J.P. Bakker, J. Bunje, K.S. Dijkema, N. Hecker, U. Hellwig, A.-V. Jensen, AS. Kers, P. Körber, E.J. Lammerts, M. Stock, R.M. Veeneklaas, M. Vreeken & M. Wolters, 2009. Salt Marshes. QSR 2009, Thematic Report No. 8.
- Ane P. Wiersma, Albert P. Oost, Meindert W. van der Berg, Peter C. Vos, Veronique Marges and Sieb de Vries, 2009. Geomorphology. QSR 2009, Thematic Report No. 9.
- Sandra van der Graaf, Jaap de Vlas, Marc Herlyn, Joachim Voss, Karin Heyer, Jan Drent, 2009. Macrozoobenthos. QSR 2009, Thematic Report No. 10.
- Georg Nehls, Sophia Witte, Heike Büttger, Norbert Dankers, Jeroen Jansen, Gerald Millat, Mark Herlyn, Alexandra Markert, Per Sand Kristensen, Maarten Ruth, Christian Buschbaum and Achim Wehrmann, 2009. Beds of blue mussels and Pacific oysters. QSR 2009, Thematic Report No. 11.
- Sandra van der Graaf, Ilse Jonker, Marc Herlyn, Jörn Kohlus, Hanne Fogh Vinther, Karsten Reise, Dick de Jong, Tobias Dolch, Grethe Bruntse, Jaap de Vlas, 2009. Seagrass. QSR 2009, Thematic Report No. 12.
- Ralf Vorberg, Frouke Fey and Jeroen Jansen, 2009. Mapping of subtidal habitats. QSR 2009, Thematic Report No. 13.
- Zwanette Jager, Loes Bolle, Andreas Dänhardt, Britta Diederichs, Tom Neudecker, Jörg Scholle, Ralf Vorberg, 2009. Fish. QSR 2009, Thematic Report No. 14.
- Evert Jan Lammerts, Jörg Petersen, & Axel Hochkirch, 2009. Beaches and Dunes. QSR 2009, Thematic Report No. 15.
- Bastian Schuchardt & Jörg Scholle, 2009. Estuaries. QSR 2009, Thematic Report No. 16.
- Stefan Garthe, Philipp Schwemmer, Ib Krag Petersen and Karsten Laursen, 2009. Offshore Area. QSR 2009, Thematic Report No. 17.
- Kees Koffijberg, Lieuwe Dijkens, Bernd Hälterlein, Karsten Laursen, Petra Potel and Stefan Schrader, 2009. Breeding Birds. QSR 2009, Thematic Report No. 18.
- Karsten Laursen, Jan Blew, Bruno Ens, Kai Eskildsen, Klaus Günther, Bernd Hälterlein, Kees Koffijberg, Petra Potel and Marc van Roomen, 2009. Migratory Birds. QSR 2009, Thematic Report No. 19.
- Peter J.H. Reijnders, Sophie M.J.M. Brasseur, Thomas Borchardt, Kees Camphuysen, Richard Czeck, Anita Gilles, Lasse Fast Jensen, Mardik Leopold, Klaus Lucke, Sven Ramdohr, Meike Scheidat, Ursula Siebert and Jonas Teilmann, 2009. Marine Mammals. QSR 2009, Thematic Report No. 20.

All QSR 2009 Thematic Reports are available as PDF download at:
<http://www.waddensea-secretariat.org/TMAP/Monitoring.html>

12th Int. Scientific Wadden Sea Symposium

Recomendations from the 12th International Scientific Wadden Sea Symposium

Wilhelmshaven, 30 March – 3 April 2009

General Preamble

Nature conservation and management in the Wadden Sea should, as formulated in the trilateral Guiding Principle, aim "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way". Much has already been achieved in recent decades but the Wadden Sea is still facing issues of concern such as retarded recovery of biological diversity, the loss of salt marshes, and ongoing contamination with new chemical substances. There is also the need to develop strategies to deal with the consequences of global developments such as climate change and invasive alien species. Finally, in terms of policy and management, there is an increasingly complex system of international, European and national legal instruments and agreements which can both lead to confusion and/or work at cross-purposes. Therefore, there is an urgent need for a better integration in research, monitoring and management with timely involvement and participation of all stakeholders (researchers from various disciplines, government agencies, NGOs and other sectors). A similar holistic and integrative approach should be applied when exploring possibilities for EU-funding.

The Twelfth International Scientific Wadden Sea Symposium discussed these issues under the title 'Science for Nature Conservation and Management'. Given that the trilateral Wadden Sea Cooperation serves as an example in the wider European or even global context, the symposium considered the following recommendations to be of strategic importance for the three Wadden Governments.

Recommendations to the Trilateral Governmental Conference 2010

1. Develop one comprehensive scheme for the conservation and sustainable development of the trilateral Wadden Sea in order to implement the various EU Directives more effectively. Such a scheme will serve as an example for the wider EU. In this context it is important that:
 - a. The trilateral Wadden Sea is considered as a sub-region according to the Marine Strategy Framework Directive and
 - b. the definitions of "Good Ecological Status / Favourable Conservation Status / Good Environmental Status" as respectively required by the Water Framework Directive / Habitats and Species Directive and the Marine Strategy Framework Directive have to be harmonised to ensure that also the implementation of these Directives is harmonised.
 - c. the Ecosystem Approach should be applied to Wadden Sea policy and management.
 - d. we must build on existing trilateral structures, agreements and instruments, including monitoring and data handling.
2. Extend the trilateral cooperation area by adding the adjacent off-shore conservation areas, because there is a strong relationship between the Wadden Sea and these areas and treat the inshore and near offshore areas as a single system.

3. The monitoring efforts of the trilateral area should not be restricted to the minimum requirements resulting from the Natura2000, Water and Marine Strategy Framework Directives as these do not provide sufficient information for a proper and scientifically sound ecosystem management of the Wadden Sea. Accordingly, the TMAP should be expanded to develop trilateral strategies and methodologies for monitoring and assessing the ecological values of in particular the subtidal area. Furthermore, a large effort should be given to the development of conservation objectives which underpin the whole management process.
4. Where necessary and possible restore the natural structure and functioning both to increase resilience to the impacts of accelerating sea level rise and to enhance sustainable economic development, taking due account of geo-morphological conditions.
5. The natural landscape of the Wadden Sea and the cultural landscape of the adjacent land area must be regarded as complementary parts of the same landscape. Therefore cooperation between the cultural and environmental heritage should be improved.
6. Governments need to join and reinforce ongoing international efforts to prevent alien species introductions and develop an alien species management strategy for the Wadden Sea.

Annex 6

**Sylt Declaration and 2010 Joint
Declaration. 11th Trilateral Governmental
Conference on the Protection of the
Wadden Sea, Westerland/Sylt,
18 March 2010.**

SYLT DECLARATION and 2010 Joint Declaration



11th Trilateral Governmental Conference
on the Protection of the Wadden Sea,
Westerland/Sylt 18 March 2010

SYLT DECLARATION

**Ministerial Council Declaration of the
Eleventh Trilateral Governmental Conference
on the Protection of the Wadden Sea
Westerland/Sylt, 18 March 2010**

**2010 Joint Declaration on the
Protection of the Wadden Sea**

Publisher

Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany

Cover

National Park Administration Schleswig-Holstein

Conference photos

Martin Stock, Kristine Jung

Translations

Ministry of the Environment; Danish Forest and Nature Agency, Denmark

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany

Ministry of Agriculture, Nature and Food Quality, The Netherlands

Lay-out

CWSS

Print

BMU Hausdruckerei

Number of copies

1,600

Published

2010

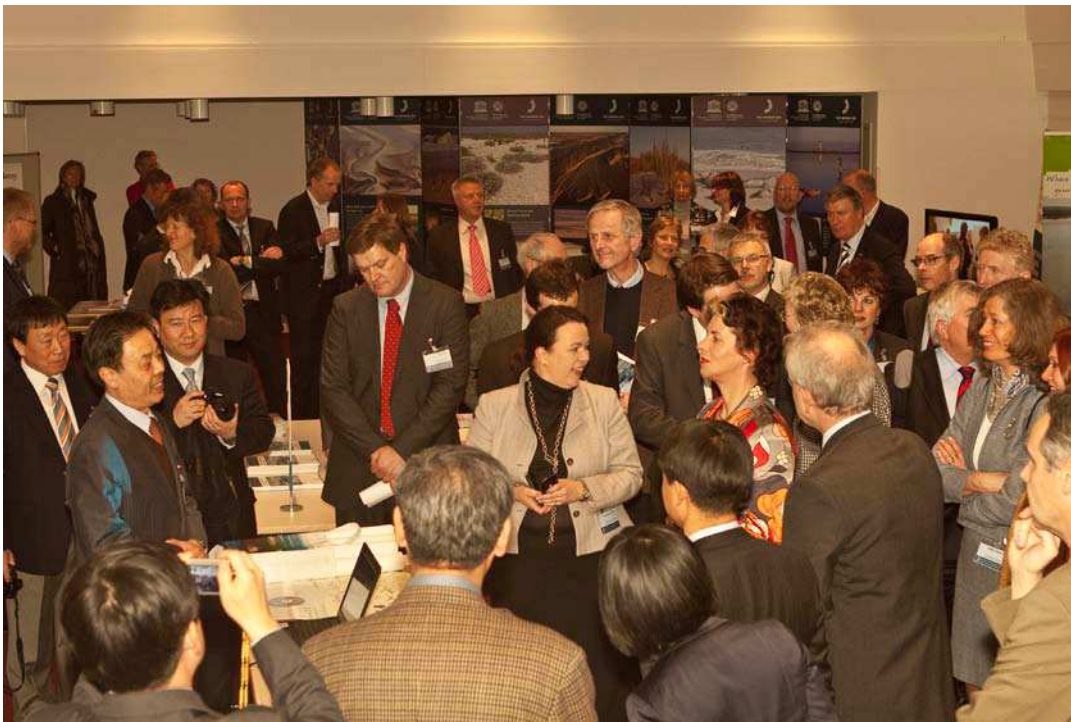
This publication should be cited as:

Common Wadden Sea Secretariat, 2010. Sylt Declaration. Ministerial Council Declaration of the Eleventh Trilateral Governmental Conference on the Protection of the Wadden Sea. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

Contents

Preface	5
Sylt Declaration	7
Erklärung von Sylt (Deutsch)	19
Verklaring van Sylt (Nederlands)	31
Sild-deklarationen (Dansk)	43
2010 Joint Declaration	55
List of Acronyms and Glossary	67

The Ministerial Council Declaration, the Sylt Declaration 2010, has been translated into Danish, German and Dutch. It is emphasized that the English version is the original one. The 2010 Joint Declaration which replaces the Joint Declaration signed at the 1982 Wadden Sea Conference in Copenhagen has been attached to the Ministerial Council Declaration. All conference documents are available from www.waddensea-secretariat.org



Opening of the exhibition at the Conference Center in Westerland/Sylt on 17 March 2010
(Photo: Martin Stock)

Preface

The 11th Trilateral Governmental Conference on the Protection of the Wadden was held on the German Wadden Sea island of Sylt on 17 - 18 March 2010 under the chairmanship of the German State Secretary Ursula Heinen-Esser. The Dutch and the Danish governments were represented by Minister Gerda Verburg and Minister Karen Ellemann.

In June 2009, the Dutch-German Wadden Sea was inscribed on the World Heritage List. The nomination has been a tremendous success and been embraced by the region. Denmark was not able to nominate its parts because of the ongoing process of establishing a national park for its Wadden Sea. The ministers agreed to start in the forthcoming period a possible nomination of the Danish Wadden Sea and the nomination of the Hamburg Wadden Sea National Park for inclusion on the World Heritage List.

A revised Wadden Sea Plan was also adopted. The 2010 Wadden Sea Plan updates the trilateral policies and management since the first Wadden Sea Plan was adopted at the 8th Conference in Stade in 1997. The Wadden Sea Plan constitutes the common framework for the protection and sustainable management of the Wadden Sea as an ecological entity.

In addition to agreements to enhance the international cooperation to protect the migratory birds, for which the Wadden Sea is a key site, climate change, sea level rise, coastal protection and alien species were high up on the minister's agenda. Climate change and its consequences such as enhanced sea level rise, increased temperatures, and increasing sediment deficits will have impacts on the ecology and landscape of the Wadden Sea and may affect the safety of the inhabitants. It was agreed that there is a further need to strengthen the natural processes of the Wadden Sea in order to cope with such changes and to further cooperate in developing common strategies and enhancing the knowledge. For invasive species, which is an issue of concern for all parts of the Wadden Sea, a common approach will also be developed in the coming period.

Shipping safety was again on the agenda. It remains an issue which is of great concern for the region since an accident can have potentially enormous impact, ecologically and economically. It is of the highest priority that safety is kept on a high level and that everything is done to prevent accidents. The ministers agreed to a number of actions in this field including to continue to raise the awareness of the significance of the Wadden Sea amongst the maritime sector.

A highlight of the Conference was the signing of the 2010 Joint Declaration on the Protection of the Wadden Sea in a formal signing ceremony at the Kurhaus in Westerland. The 2010 Joint Declaration replaces the Joint Declaration, signed at the 1982 Wadden Sea Conference in Copenhagen, which had become progressively outdated. It will not alter the spirit or legal status of the Cooperation. This will remain a formal (but not legally binding) Cooperation between the governments of the three countries. In conjunction with the signing of the 2010 Joint Declaration new governance structures will be launched and replace the existing structures. The Trilateral Wadden Sea Board is the governing body of the Cooperation. Peter Ilsøe, Denmark, was appointed by the ministers as the first chairman of the Board.

The Sylt Conference introduced a new element into the Wadden Sea Conference. During the open session of the Conference an interactive discussion with the ministers, stakeholders and guests on "A Vision for the Wadden Sea - Steps to Achievement" was held. The overall objective for this session was to encourage all participants that they have a part to play in achieving the vision for the Wadden Sea. The session was moderated by Dr. Andy Brown who had earlier evaluated the Cooperation and had gained a considerable knowledge of the Cooperation. This session was much appreciated by the participants because it was felt that this was a central function of the Conferences: To obtain the good ideas and commitment of key stakeholders for the protection of the Wadden Sea, and a fruitful continuation of the Wadden Sea Cooperation.

Common Wadden Sea Secretariat
November 2010



The interactive discussion at the conference moderated by Mr. Andy Brown (Photo: Kristine Jung).

SYLT DECLARATION

**Ministerial Council Declaration of the
Eleventh Trilateral Governmental Conference
on the Protection of the Wadden Sea**

Westerland/Sylt, 18 March 2010

Contents

Sylt Declaration

Governance Wadden Sea Cooperation _____	10
Wadden Sea World Heritage _____	10
Nature Conservation and Management _____	11
Sustainable Use of the Wadden Sea _____	12
Landscape and Cultural Heritage _____	12
Climate, Sea Level Rise and Coastal Protection _____	12
Alien Species _____	13
Shipping and Ship's Safety _____	13
Communication _____	14
Monitoring, Assessment and Scientific Research _____	14
Wadden Sea Forum _____	15
International Cooperation _____	15
Cooperation 2010 - 2013 _____	16
Signatures _____	16

SYLT DECLARATION

Ministers responsible for the protection of the Wadden Sea of the Netherlands, Denmark and Germany and representing their respective Governments in the **Trilateral Wadden Sea Governmental Council** on the Protection of the Wadden Sea on the island of Sylt;

Acknowledging the positive outcome of the evaluation of the Cooperation carried out since the 2005 Schiermonnikoog Wadden Sea Conference, confirming that the Cooperation is a pioneering model for the protection and management of a trans-boundary ecological system of international importance and the need for a continued effective Cooperation to conserve the Wadden Sea;

Appreciating the refreshment of the Joint Declaration on the Protection of the Wadden Sea and the Governance Arrangements;

Reaffirming the objective of the Joint Declaration 2010 to protect and manage the Wadden Sea as a single ecological entity shared by the three countries in accordance with the Guiding Principle for the Nature Conservation Area, which is to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way. This is done in the recognition that this can only be attained in cooperation with those who live, work and recreate in the area and are willing to endow its protection. Conditions for safety and sustainable development must be maintained;

Welcoming with appreciation the inclusion of the Dutch-German Wadden Sea on the UNESCO World Heritage List and thus the global recognition of its outstanding universal value;

Welcoming with appreciation the designation of the Danish Wadden Sea as a national park;

Appreciating the support and input of the Wadden Sea Forum and other stakeholder fora and the wider community for the protection and sustainable use of the Wadden Sea and to further sustainable regional development;

Recognizing the unique status of the Wadden Sea, notably in the Year of Biodiversity 2010 and its contribution to the biodiversity targets of the European Union, as well as the targets of the Convention of Biological Diversity;

Welcoming the Quality Status Report 2009, which provides a comprehensive overview of the status of the Wadden Sea and a valuable basis for developing appropriate policies and management initiatives;

Acknowledging the recommendations of the 12th International Scientific Wadden Sea Symposium for the further development of the protection and management of the Wadden Sea as an ecological entity;

Recognizing the improvements of the environmental and natural status of the Wadden Sea and the need to continue to act on specific areas to further improve the status of the Wadden Sea and expand the cooperation for the protection and management of the Wadden Sea, as outlined in the Policy Assessment Report;

Acknowledging the shared landscape and cultural heritage of the Wadden Sea Region.

Welcoming the international cooperation, in particular with West Africa, the Republic of Korea and The Wash/North Norfolk Coast to further the international protection of tidal areas and their biodiversity;

Concerned about the possible impacts from human uses, invasive alien species and particularly climate change;

Determined to meet these challenges and to continue to protect and manage the Wadden Sea for present and future generations;

and therefore share the view to:

Governance Wadden Sea Cooperation

1. Authorize the Wadden Sea Board to commence its activities as the governing body of the Cooperation, to provide strategic and collective leadership and to ensure performance and accountability through good governance and good external relations and communication with all key stakeholders in accordance with Article 5 (2) of the Joint Declaration.
2. Appreciate the willingness of stakeholders to act as advisors to the Board.

Wadden Sea World Heritage

3. Welcome the inscription of the Dutch-German Wadden Sea on the World Heritage List under natural criteria (viii), (ix) and (x) by decision of the UNESCO World Heritage Committee at its 33rd Session, Seville, June 2009 and acknowledge that the Statement of Outstanding Universal Value adopted by the Committee encompassing the current rules and regulations and management and enforcement activities governing the protection of the Wadden Sea constitutes the basis for the future protection and management of the property according to Article 155 of the Operational Guidelines.
4. Agree to start in the forthcoming period a possible nomination of the Danish Wadden Sea in accordance with encouragement of the World Heritage Committee and the nomination of the Hamburg Wadden Sea National Park including, where necessary and appropriate, minor boundary modifications for inclusion on the World Heritage List to complement the existing property.

5. Instruct the Board to initiate and organize the development of an overall Sustainable Tourism Development Strategy for the Wadden Sea World Heritage Site, in order to meet the request of the World Heritage Committee, the Hamburg Wadden Sea National Park, and the Danish National Park, pending formal approval by its forthcoming board, and as a first step to adopt a Wadden Sea Communication and Marketing Programme 2010-13.
6. Engage in a close cooperation with the African Eurasian Waterbird Agreement (AEWA) with a view to promote and strengthen cooperation on management and research on the African Eurasian Flyways with relevant state parties as requested by the World Heritage Committee and establish cooperation for the protection and management of migratory birds relying on the Wadden Sea.

Nature Conservation and Management

7. Adopt the Wadden Sea Plan 2010 as elaborated in accordance with §6 of the Schiermonnikoog Declaration.
8. Acknowledge the broad spectrum of harmonisation already achieved within the trilateral cooperation and its value added, in particular with regard to monitoring and assessment at an integrated ecosystem level.
9. Focus future harmonisation efforts on high priority challenges, for example climate change, invasive non-native species, decline of birds, and on fisheries, in the national implementation of the Birds, Habitats, Water Framework and Marine Strategy Framework Directives.
10. Support the further development of integrated assessments and reporting in the framework of these Directives, including investigating the option of preparing a common integrated Natura 2000 Wadden Sea report.
11. Increase collaboration in relation to appropriate assessments under the Habitats Directive, and especially to exchange experience on the interpretation and application of site integrity, in combination effects and compensation measures.
12. Support the start of necessary further developments of the Wadden Sea Plan during the Danish presidency, e.g. regarding the harmonized application of European legislation and taking account of the preliminary recommendations of the High Level Review study on strategic elements.
13. Authorize the Board to develop and adopt a programme of projects and measures for the forthcoming period to support the implementation and further development of the Wadden Sea Plan with a view to strengthen and, where necessary, also restore the natural functioning of the Wadden Sea, incorporating the appropriate actions and activities of this Declaration.
14. Welcome the Guidance for Goose Management in the Wadden Sea Region as prepared under the leadership of the Wadden Sea Forum, in cooperation with the Trilateral Wadden Sea Cooperation, and declare their willingness to support the development of a Goose Management Plan in cooperation with relevant authorities, to achieve a balanced management to accommodate geese in the Wadden Sea region.
15. Reaffirm the guidelines concerning taking and releasing of seals from the Leeuwarden Declaration (§§60 and 61) and instruct the Board to update the Seal Management Plan, which will expire this year, for the period 2011 – 2016, based on an evaluation of the current Plan.

Sustainable Use of the Wadden Sea

16. Reaffirm the concept of sustainable use as defined by the Convention on Biological Diversity in protecting and conserving the ecological integrity of the Wadden Sea ecosystem, thus supporting lasting economic prosperity and social well-being.
17. Acknowledge promising developments of recent years towards sustainable fisheries, notably on shrimps and blue mussels, and ask the Board to develop Wadden Sea wide trilateral policy principles for a further development of sustainable fisheries, inter alia aiming at the consistent implementation of the Natura 2000 objectives, in close cooperation with the fisheries sector and nature NGOs.

Landscape and Cultural Heritage

18. Acknowledge that a comprehensive draft cultural landscape strategy has been developed in the framework of the LancewadPlan project. The cooperation on landscape and cultural heritage takes place to a large extent outside the Cooperation Area, for which the governments of The Netherlands, Germany and Denmark have declared their cooperation.
19. Request the Board to discuss and evaluate the draft strategy in order to decide together with the relevant regions upon whether or not parts of it may be accepted by the Trilateral Wadden Sea Cooperation.
20. Encourage the competent authorities to develop the accepted parts into a trilateral policy provided that the principles and policies of the Wadden Sea Plan are reflected.

Climate, Sea Level Rise and Coastal Protection

21. Concerned that climate change and its consequences such as enhanced sea level rise, higher storm surges, increased temperatures and increasing sediment deficits will have impacts on the ecology and landscape of the Wadden Sea and may affect the safety of the inhabitants.
22. Aware of the long time scales of the processes and reactions involved, and thus of the urgent need to strengthen natural processes, to continue mitigation activities and to start concrete measures for adaptation to the expected impacts of climate change in the Wadden Sea Area and to ensure the safety of the inhabitants of the region and the ecological integrity.
23. Aware that more knowledge is needed for adaptation and mitigation measures and therefore determined to improve the trilateral knowledge base and instruct the Board to
 - Initiate a trilateral study on sustainable solutions to balance the expected sediment deficits on the basis of research questions specified by the CPSL.

- Initiate a project developing model spatial plans for pilot sites in the Wadden Sea region with the aim of developing a practicable spatial planning methodology to meet the challenges of climate change.
 - Establish a working group focusing on increasing the adaptability of the Wadden Sea ecosystem and landscape to climate change, also responsible for coordinating and supervising the above studies.
24. Support the global and national efforts to mitigate causes of climate change at the regional level, by calling especially upon local and regional competent authorities and stakeholders, to work towards developing the Wadden Sea Region into a CO₂-neutral area by 2030 or before, putting the focus on the special threats for coastal zones by global warming and sea level rise.

Alien Species

25. Support the ongoing international efforts to prevent and manage alien species introductions inter alia by ratifying the 2004 International Convention for Control and Management of Ships' Ballast Water and Sediments (BWM Convention) as soon as possible, but in all cases not later than 2013 and instruct the Board to investigate the possibility to get involved in already ongoing ballast water projects covering the Wadden Sea (e.g. the Interreg Project "North Sea Ballast Water Opportunity").
26. Instruct the Board to develop during the period until the next Ministerial Conference a common strategy for dealing with alien species introductions in the Wadden Sea, also taking account of the request of the UNESCO World Heritage Committee and the BWM Convention.

Shipping and Ship's Safety

27. Acknowledge the progress made in improving ship safety and reducing the environmental impact of shipping since the designation of the Wadden Sea Particularly Sensitive Sea Area (PSSA) in 2002 by the IMO and the improvements resulting from the implementation of the Schiermonnikoog Declaration.
28. Welcome all efforts to reduce air emissions and water pollution in shipping and in the harbours in the Wadden Sea Region by e.g. the introduction of environmentally friendly energy and logistic infrastructure (so called "Clean Shipping Approach")
29. Recognize the importance of shipping to the Wadden Sea Region but also that it is necessary to continue to raise the awareness of the Wadden Sea as a PSSA and the ongoing efforts of the IMO and the EU to enhance the shipping safety and to reduce the environmental impact from shipping.
30. Coordinate and handle within the Trilateral Monitoring and Assessment Programme the collection of relevant shipping and environmental data for the Wadden Sea PSSA, taking into account existing data bases as SafeSeaNet in order to avoid additional effort.

31. Coordinate and intensify raising the awareness and education for the Wadden Sea PSSA and other relevant regulations to mariners and relevant stakeholders.
32. Establish within the already existing framework of the DenGerNeth Agreement the coordination mechanisms for issues related to the Wadden Sea PSSA.
33. Encourage the competent authorities to complete the entries concerning the Wadden Sea PSSA in charts.
34. Enhance the awareness of the shipping community for container losses and support relevant studies concerning prevention of the loss of containers.
35. Closely follow the steps and outcome of the project "Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK)" under HELCOM and to encourage the competent authorities to consider to transfer the experiences and the methodological approach accordingly to the North Sea, taking into account the objectives and requirements of the Marine Strategy Framework Directive.
36. Reaffirm the importance of shipping safety with respect to any offshore activity. The safety of shipping in the North Sea Area should be kept at least at the present level, irrespective of which kind of offshore development might occur, and where feasible be enhanced.
37. Instruct the Board to evaluate the interrelation and potential conflicts between the interests of shipping and wind energy production and their potential implications for the Wadden Sea ecosystem.
38. Instruct the Board to discuss the PSSA Evaluation Report and further steps of implementation with the relevant competent authorities and develop a vision on the impact of shipping and ship's safety on the Wadden Sea PSSA.

Communication

39. Convinced that the perception of and the identification with the Wadden Sea as a shared ecological and cultural heritage constitute an essential basis for a successful Wadden Sea protection in the long term, and therefore strengthen the communication about the Trilateral Wadden Sea and the Cooperation, in particular regarding the World Heritage Site and the Danish and Hamburg National Parks, by developing a trilateral communication strategy, which should include the activities of the International Wadden Sea School (IWSS), and enable the Common Wadden Sea Secretariat accordingly to fulfil these tasks.

Monitoring, Assessment and Scientific Research

40. Aware that an acceleration of global change entails unprecedented effects on the geomorphology and biodiversity of the Wadden Sea ecosystem, and that in order to be able to cope with these changes, a joint interdisciplinary research agenda for the protection of natural values and the development of sustainable use perspectives in a changing world is needed.
41. Support the establishment of a trilateral research platform preferably directly connected with existing national networks. The platform will elaborate a trilateral agenda for policy-relevant research in consultation with the Board, based upon the QSR

analysis and the outcome of the scientific symposium, and initiate trilateral research projects, explore financing possibilities, and communicate the outcome with the Wadden Sea Board.

42. Reconfirm the central importance of the Trilateral Monitoring and Assessment Programme (TMAP), which was further revised to fit the requirements of relevant EC Directives as stipulated in the Schiermonnikoog Declaration, as the indispensable basis for the joint status assessment and the successful management of the Wadden Sea as a single ecological entity.
43. Reconfirm the continuation of TMAP and incorporate, as necessary, parameters to develop TMAP in order to facilitate an integrated assessment across the relevant EC Directives and better monitor new challenges, e.g. climate change and its impacts, and agree on a long term development strategy to increase its value to a wider range of stakeholders.

Wadden Sea Forum

44. Take into account the activities and recommendations by the Wadden Sea Forum on sustainable development and participatory processes, in particular with regard to
 - The development of a sustainability indicator tool for the Region
 - The further development of ICZM and marine spatial planning
 - Future energy generation developments along and adjacent to the Wadden Sea
 - Trilateral goose management
 - The inscription of the Dutch-German Wadden Sea as a World Heritage site.
45. Support the cooperation with WSF as an independent stakeholder organisation for the period 2011-2013 with a focus on the elaboration of joint projects regarding integrated management and the protection of the Wadden Sea and welcome the mutual exchange of information, ideas and visions and acknowledge the function to act as a platform for developing conflict solutions.

International Cooperation

46. Welcome the aim of the OSPAR Ministerial Meeting 2010 to further develop the ecosystem approach for the Northeast Atlantic Ocean, as well their contribution to the further specification of the Good Environmental Status (GES) definition under the Marine Strategy Framework Directive, because both activities are highly relevant for the protection of the Wadden Sea, which is the world's largest tidal flat ecosystem and World Heritage site
47. Offer to support these activities by contributing the extensive experience of the Wadden Sea states with integrated ecosystem management and sustainable human use in a transboundary context.
48. Continue the cooperation with Korea in the framework of the Memorandum of Understanding, concluded in 2009 with emphasis on information exchange and capacity building.

49. Acknowledge the ongoing cooperation with WWF WAMER for sustainable development of the West African Ecoregion, which plays a key role for migratory birds passing through the Wadden Sea.
50. Continue the exchange of information and experiences on the Wadden Sea and the Wash North Norfolk Coast with Natural England in the framework of the Memorandum of Intent, concluded in 1991.

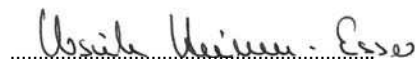
Cooperation 2010 – 13

51. Thank Germany for chairing the Cooperation during a prolonged period of time.
52. Welcome the chairmanship of Denmark for the forthcoming period 2010 – 2013.
53. Hold the next Trilateral Governmental Conference on the Protection of the Wadden Sea and the regular Trilateral Governmental Council meeting in 2013 on the invitation of the Danish Government.
54. Hold the 13th International Scientific Wadden Sea Symposium in 2012 in the Netherlands on the invitation of the Dutch Government.

Signatures

Sylt, Germany, 18 March 2010.

For the Government of the Federal Republic of Germany



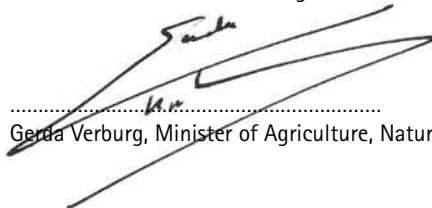
Ursula Heinen-Esser, Parliamentary State Secretary

For the Government of the Kingdom of Denmark



Karen Ellemann, Minister for the Environment

For the Government of the Kingdom of The Netherlands



Gerda Verburg, Minister of Agriculture, Nature and Food Quality



After the signing of the Ministerial Council Declaration: Minister Gerda Verburg, State Secretary Ursula Heinen-Esser and Minister Karen Ellemann (from left to right, Photo: Martin Stock).



The Chairman of the Sylt Conference State Secretary Ms. Heinen-Esser and with the German delegation chaired by the German Senior Official Ms. Nickel (3rd and 4th from the right) (Photo: Kristine Jung).



Opening address by Minister Juliane Rumpf, Schleswig-Holstein (Photo: Martin Stock).

ERKLÄRUNG VON SYLT

Erklärung des Trilateralen Wattenmeer-Rates
(Ministererklärung)
Elfte Trilaterale Regierungskonferenz
zum Schutz des Wattenmeers

Westerland/Sylt, 18. März 2010

Erklärung von Sylt

Strukturen zur Steuerung der Wattenmeer-Kooperation	22
Welterbe Wattenmeer	22
Naturschutz und Management	23
Nachhaltige Nutzung des Wattenmeeres	24
Landschaft und kulturelle Werte	24
Klimawandel, Meeresspiegelanstieg und Küstenschutz	25
Gebietsfremde Arten	25
Schifffahrt und Schiffssicherheit	26
Kommunikation	27
Monitoring, Bewertung und wissenschaftliche Forschung	27
Wattenmeerforum	28
Internationale Zusammenarbeit	28
Kooperation 2010 – 2013	29
Unterschriften	29

ERKLÄRUNG VON SYLT

Die für den Schutz des Wattenmeeres zuständigen **Ministerinnen und Minister** der Niederlande, Dänemarks und Deutschlands als Vertreter ihrer jeweiligen Regierungen im **Trilateralen Wattenmeer-Rat** (*Trilateral Wadden Sea Governmental Council*) zum Schutz des Wattenmeeres auf der Insel Sylt;

In Anerkennung der positiven Ergebnisse der seit der Wattenmeerkonferenz 2005 auf Schiermonnikoog durchgeführten Evaluation der Kooperation, die bestätigt hat, dass die Kooperation ein wegweisendes Modell für den Schutz und das Management eines grenzüberschreitenden ökologischen Systems von internationaler Bedeutung ist und die Notwendigkeit besteht, die erfolgreiche Zusammenarbeit zur Erhaltung des Wattenmeeres fortzuführen;

In Würdigung der Aktualisierung der Gemeinsamen Erklärung zum Schutz des Wattenmeeres sowie der Strukturen zur Steuerung der Zusammenarbeit;

In Bekräftigung des Ziels der Gemeinsamen Erklärung 2010, das Wattenmeer als grenzüberschreitende ökologische Einheit im Einklang mit dem Leitprinzip für das Trilaterale Schutzgebiet zu schützen und zu managen, um so weit wie möglich ein natürliches und sich selbst erhaltendes Ökosystem zu erreichen, in dem natürliche Prozesse ungestört ablaufen können. Dies erfolgt in Anerkennung, dass dies nur in Zusammenarbeit mit den Menschen erreichbar ist, die in diesem Gebiet leben, arbeiten, sich erholen und gewillt sind, es zu schützen. Die Bedingungen für Sicherheit und nachhaltige Entwicklung sind zu erhalten;

In anerkennender Begrüßung der Aufnahme des deutschen und des niederländischen Teils des Wattenmeeres in die UNESCO-Liste des Welterbes und somit die weltweite Anerkennung seines außergewöhnlichen universellen Wertes;

In anerkennender Begrüßung der Ausweisung des dänischen Wattenmeeres als Nationalpark;

In Würdigung der Unterstützung und des Beitrags des Wattenmeerforums (Wadden Sea Forum) und anderer Interessengruppen sowie einer breiteren Öffentlichkeit für den Schutz und die nachhaltige Nutzung des Wattenmeeres und für die nachhaltige Entwicklung der Region;

In Anerkennung des einzigartigen Status des Wattenmeeres, insbesondere im Internationalen Jahr der Biologischen Vielfalt 2010, und seines Beitrags zu den von der Europäischen Union gesetzten Zielen zur biologischen Vielfalt sowie den Zielvorgaben des Übereinkommens über die biologische Vielfalt;

In Begrüßung des Qualitätszustandsberichts (Quality Status Report) 2009, der einen umfassenden Überblick über den Zustand des Wattenmeeres gibt und eine wertvolle Grundlage für die Entwicklung geeigneter Politiken und Managementmaßnahmen ist;

In Anerkennung der Empfehlungen des 12. Internationalen Wissenschaftlichen Wattenmeersymposiums für die Weiterentwicklung von Schutz und Management des Wattenmeeres als ökologische Einheit;

In Anerkennung der Verbesserungen der Umweltbedingungen und des natürlichen Zustands des Wattenmeeres und der Notwendigkeit weiterer Bemühungen in bestimmten Bereichen, um seinen Zustand weiter zu verbessern und die Zusammenarbeit zum Schutz und zum Management des Wattenmeeres auszubauen, wie im Politik-Bewertungsbericht (Policy Assessment Report) dargelegt;

In Anerkennung der gemeinsamen landschaftlichen und kulturellen Werte der Wattenmeer-Region;

In Begrüßung der internationalen Zusammenarbeit, namentlich mit Westafrika, der Republik Korea und The Wash/North Norfolk Coast, zur Förderung des internationalen Schutzes von Wattengebieten und ihrer biologischen Vielfalt;

In Besorgnis über die möglichen Auswirkungen von Nutzungen durch den Menschen, invasiver gebietsfremder Arten und insbesondere des Klimawandels;

In der Entschlossenheit, diesen Herausforderungen zu begegnen und den Schutz und das Management des Wattenmeeres zum Wohle heutiger und künftiger Generationen fortzusetzen;

stimmen überein:

Strukturen zur Steuerung der Wattenmeer Kooperation

1. den Wattenmeer-Ausschuss (*Wadden Sea Board*) zu bevollmächtigen, seine Arbeit als Lenkungsorgan der Kooperation aufzunehmen, die strategische und gemeinschaftliche Führung zu übernehmen und durch eine verantwortungsvolle Steuerung und gute Außen- und Kommunikationsbeziehungen mit allen wichtigen Interessengruppen in Übereinstimmung mit Artikel 5 Absatz 2 der Gemeinsamen Erklärung Effizienz und Glaubwürdigkeit sicherzustellen.
2. die Bereitschaft der Interessengruppen zu würdigen, als Berater (*Advisors*) des Wattenmeer-Ausschusses zu fungieren.

Welterbe Wattenmeer

3. die Eintragung des deutschen und des niederländischen Teils des Wattenmeeres in die Liste des Welterbes nach den Kriterien (viii), (ix) and (x) für Naturgüter durch Beschluss des Welterbekomitees der UNESCO auf seiner 33. Sitzung im Juni 2009 in Sevilla zu begrüßen und anzuerkennen, dass die von dem Komitee angenommene Erklärung zum außergewöhnlichen universellen Wert (*Statement of Outstanding Universal Value*), die die geltenden Regeln und Vorschriften sowie die Management- und Umsetzungsmaßnahmen zum Schutz des Wattenmeeres umfasst, die Grundlage für den künftigen Schutz und das Management des Gebietes gemäß Artikel 155 der Richtlinien für die Durchführung des Übereinkommens zum Schutz des Kultur- und Naturerbes der Welt darstellt.

4. in der kommenden Arbeitsperiode die mögliche Anmeldung des dänischen Wattenmeeres im Einklang mit der Anregung des Welterbekomitees und die Anmeldung des Nationalparks Hamburgisches Wattenmeer zu beginnen, einschließlich, wenn erforderlich und angemessen, geringfügiger Grenzänderungen, zur Eintragung in die Liste des Welterbes, um das eingetragene Gebiet zu vervollständigen.
5. den Wattenmeer-Ausschuss zu beauftragen, die Ausarbeitung einer Gesamtstrategie für Nachhaltige Tourismusentwicklung zu initiieren und durchzuführen, für das Welterbegebiet Wattenmeer entsprechend der Empfehlung des Welterbekomitees, für den Hamburgischen Wattenmeer-Nationalpark sowie für den dänischen Nationalpark, vorbehaltlich der formellen Zustimmung seines künftigen Vorsitzes, und als ersten Schritt ein Kommunikations- und Marketingprogramm 2010-2013 für das Wattenmeer zu verabschieden.
6. enge Arbeitskontakte mit dem Afrikanisch-Eurasischen Wasservogelabkommen (AEWA) zu unterhalten, um die Zusammenarbeit mit den relevanten Vertragsstaaten im Bereich des Managements und der Erforschung der afrikanisch-eurasischen Zugwege, wie vom Welterbekomitee empfohlen, zu fördern und zu verstärken, und Kooperationen zum Schutz und zum Management von Zugvögeln zu etablieren, die auf das Wattenmeer angewiesen sind.

Naturschutz und Management

7. den nach Ziffer 6 der Erklärung von Schiermonnikoog ausgearbeiteten Wattenmeerplan 2010 zu verabschieden.
8. die bereits in weiten Teilen erzielte Harmonisierung innerhalb der Trilateralen Kooperation und ihren Mehrwert anzuerkennen, insbesondere im Hinblick auf die Umweltbeobachtung und Bewertung auf integrierter ökosystemarer Ebene.
9. die künftigen Harmonisierungsbemühungen in der nationalen Umsetzung der Vogelschutzrichtlinie, der FFH-Richtlinie, der Wasserrahmenrichtlinie und der Meeresstrategie-Rahmenrichtlinie auf vordringliche Herausforderungen zu konzentrieren, wie z. B. den Klimawandel, invasive gebietsfremde Arten, den Rückgang der Vogelbestände sowie auf die Fischerei.
10. die weitere Entwicklung integrierter Bewertungen und Berichterstattungen im Rahmen dieser Richtlinien zu unterstützen, einschließlich der Prüfung der Option, einen gemeinsamen, integrierten Natura 2000 - Bericht für das Wattenmeer zu erstellen.
11. die Zusammenarbeit bei der Durchführung von Verträglichkeitsprüfungen nach der FFH-Richtlinie zu verstärken, insbesondere Erfahrungen auszutauschen über die Auslegung und Anwendung der Bestimmung, dass ein Gebiet als solches nicht erheblich beeinträchtigt werden darf, im Hinblick auf Kombinationswirkungen und Ausgleichsmaßnahmen.
12. den Beginn notwendiger Weiterentwicklungen des Wattenmeerplans während der dänischen Präsidentschaft 2010 – 2013 zu unterstützen, z. B. hinsichtlich der abgestimmten Anwendung von EU-Rechtsvorschriften und unter Berücksichtigung der vorläufigen strategischen Empfehlungen der Studie zur Anwendung von EU-Richtlinien mit Blick auf Zusammenarbeit und Harmonisierung (*High Level Review*).
13. den Wattenmeer-Ausschuss zu ermächtigen, für die kommende Arbeitsperiode ein Programm mit Projekten und Maßnahmen zu entwickeln und zu verabschieden, um die Umsetzung und Weiterentwicklung des Wattenmeerplans zu unterstützen, mit

dem Ziel, natürliche Prozesse und Funktionen im Wattenmeer zu stärken und erforderlichenfalls auch wiederherzustellen. Dabei werden die geeigneten Maßnahmen und Aktivitäten dieser Erklärung berücksichtigt.

14. die unter der Leitung des Wattenmeerforums in Zusammenarbeit mit der Trilateralen Wattenmeer-Kooperation erarbeiteten Leitlinien für das Gänsemanagement in der Wattenmeerregion zu begrüßen und die Bereitschaft zu erklären, die Erstellung eines Gänsemanagementplans in Zusammenarbeit mit den zuständigen Behörden zu unterstützen, mit dem Ziel, für die Aufnahme von Gänsepopulationen in der Wattenmeerregion ein ausgewogenes Management zu erreichen.
15. die Richtlinien zur Entnahme und Wiederfreilassung von Seehunden in der Erklärung von Leeuwarden (Ziffer 60 und 61) erneut zu bestätigen und den Wattenmeer-Ausschuss zu beauftragen, den in diesem Jahr auslaufenden Managementplan für Seehunde für den Zeitraum 2011-2016 ausgehend von einer Bewertung des derzeitigen Plans fortzuschreiben.

Nachhaltige Nutzung des Wattenmeeres

16. das Konzept der nachhaltigen Nutzung gemäß der Definition des Übereinkommens über die biologische Vielfalt erneut zu bestätigen, die ökologische Integrität des Wattenmeer-Ökosystems zu schützen und zu erhalten und so dauerhaften wirtschaftlichen Wohlstand und soziales Wohlbefinden zu unterstützen.
17. vielversprechende Entwicklungen der letzten Jahre hin zu nachhaltiger Fischerei, insbesondere in der Miesmuschel- und Krabbenfischerei, anzuerkennen, und den Wattenmeer-Ausschuss zu ersuchen, in enger Zusammenarbeit mit dem Fischereisektor und Naturschutzverbänden wattenmeerweite Grundsätze trilateraler Politik für eine nachhaltige Fischerei zu entwickeln, unter anderem mit dem Ziel einer einheitlichen Umsetzung der Natura 2000-Erhaltungsziele.

Landschaft und kulturelle Werte

18. anzuerkennen, dass im Rahmen des LancewadPlan-Projekts der Entwurf einer umfangreichen kulturlandschaftlichen Strategie erarbeitet worden ist. Die Zusammenarbeit zum Schutz und Erhalt der landschaftlichen und kulturellen Werte der Wattenmeerregion findet zum großen Teil außerhalb des von den Regierungen der Niederlande, Deutschlands und Dänemarks für ihre Zusammenarbeit ausgewiesenen Kooperationsgebiets statt.
19. den Wattenmeer-Ausschuss zu ersuchen, den Strategieentwurf zu erörtern und zu bewerten, um zusammen mit den dafür zuständigen Regionen zu entscheiden, ob Teile daraus von der Trilateralen Wattenmeer-Kooperation übernommen werden können.
20. die zuständigen Behörden zu ermuntern, die akzeptierten Teile zu einer trilateralen Politik zu entwickeln, unter der Voraussetzung, dass die Grundsätze und Politiken des Wattenmeerplans berücksichtigt werden.

Klimawandel, Meeresspiegelanstieg und Küstenschutz

21. die Besorgnis zu teilen, dass der Klimawandel und seine Folgen wie etwa der zunehmende Anstieg des Meeresspiegels, höhere Sturmfluten, erhöhte Temperaturen und ein zunehmendes Sedimentdefizit Auswirkungen auf die Ökologie und die Landschaft des Wattenmeeres haben werden und die Sicherheit der Bewohnerinnen und Bewohner gefährden können.
22. sich der Langfristigkeit der beteiligten Prozesse und Reaktionen und damit der dringenden Notwendigkeit bewusst zu sein, natürliche Prozesse zu stärken, Minderungsmaßnahmen fortzuführen und konkrete Maßnahmen zur Anpassung an die zu erwartenden Auswirkungen des Klimawandels im Wattenmeergebiet einzuleiten, und die Sicherheit der Bewohnerinnen und Bewohner dieser Region sowie die ökologische Integrität zu gewährleisten.
23. sich der Notwendigkeit profunderen Wissens für Anpassungs- und Minderungsmaßnahmen bewusst und daher entschlossen zu sein, die trilaterale Wissensbasis zu verbessern, und den Wattenmeer-Ausschuss zu beauftragen,
 - eine trilaterale Studie zu initiieren, um auf der Basis der von der Arbeitsgruppe Küstenschutz und Meeresspiegelanstieg (CPSL) entwickelten Forschungsfragen nachhaltige Lösungen zu finden, wie die zu erwartenden Sedimentdefizite ausgeglichen werden können,
 - ein Projekt zur Entwicklung modellhafter Raumordnungspläne für Pilotstandorte in der Wattenmeerregion einzuleiten mit dem Ziel, eine praxistaugliche Raumplanungsmethode zur Bewältigung der Herausforderungen des Klimawandels zu entwickeln,
 - eine Arbeitsgruppe einzurichten mit dem Schwerpunkt Erhöhung der Widerstandsfähigkeit des Ökosystems und der Landschaft des Wattenmeeres gegenüber Auswirkungen des Klimawandels, die auch für die Koordinierung und Überwachung der oben genannten Untersuchungen verantwortlich ist.
24. die globalen und nationalen Bemühungen zur Verminderung der Ursachen des Klimawandels auf regionaler Ebene zu unterstützen und hierzu insbesondere die zuständigen Stellen und Interessengruppen auf lokaler und regionaler Ebene aufzufordern, darauf hinzuarbeiten, die Wattenmeerregion bis spätestens 2030 zu einem CO₂-neutralen Gebiet zu entwickeln, wobei sich das Hauptaugenmerk auf die besondere Bedrohung der Küstenzonen durch die globale Erwärmung und den Meeresspiegelanstieg richtet.

Gebietsfremde Arten

25. die laufenden internationalen Bemühungen zu unterstützen, die Einwanderung gebietsfremder Arten zu verhindern und damit umzugehen, unter anderem durch die schnellstmögliche Ratifizierung des Internationalen Übereinkommens von 2004 zur Überwachung und Behandlung von Ballastwasser und Sedimenten von Schiffen (Ballastwasser-Übereinkommen), jedoch spätestens bis 2013, und den Wattenmeer-

Ausschuss anzuweisen, eine mögliche Beteiligung an bereits laufenden Ballastwasserprojekten im Wattenmeerraum zu untersuchen (z.B. das Interreg-Projekt „North Sea Ballast Water Opportunity“).

26. den Wattenmeer-Ausschuss zu beauftragen, in der Zeit bis zur nächsten Ministerkonferenz eine gemeinsame Strategie für den Umgang mit Einschleppungen gebietsfremder Arten in das Wattenmeer zu entwickeln, auch unter Berücksichtigung der Empfehlung des UNESCO Welterbekomitees und des Ballastwasser-Übereinkommens.

Schifffahrt und Schiffssicherheit

27. den Fortschritt, der bei der Verbesserung der Schiffssicherheit und der Reduzierung der Auswirkungen der Schifffahrt auf die Umwelt erzielt wurde, seit die Internationale Seeschiffahrtsorganisation (IMO) im Jahr 2002 das Wattenmeer als besonders empfindliches Meeresgebiet (Particularly Sensitive Sea Area, PSSA) ausgewiesen hat, und die Verbesserungen infolge der Umsetzung der Schiermonnikoog-Erklärung anzuerkennen.
28. alle Bemühungen zu begrüßen, die Luftemissionen und Wasserverschmutzung in der Schifffahrt und in den Häfen der Wattenmeerregion zu reduzieren, z. B. durch die Einführung umweltfreundlicher Energie- und Logistikinfrasturktur (sogenannter "Clean Shipping Approach").
29. die Bedeutung der Schifffahrt für die Wattenmeerregion anzuerkennen, aber ebenso die Notwendigkeit, weiterhin das Bewusstsein für das Wattenmeer als PSSA zu schärfen, wie auch die laufenden Bemühungen der Internationalen Seeschiffahrtsorganisation und der EU, die Sicherheit der Schifffahrt zu erhöhen und die Auswirkungen der Schifffahrt auf die Umwelt zu reduzieren.
30. die Sammlung relevanter Schifffahrts- und Umweltdaten für das PSSA Wattenmeer im Rahmen des trilateralen Monitoring- und Bewertungsprogramms (TMAP) zu koordinieren und zu bearbeiten, wobei bestehende Datenbanken wie SafeSeaNet berücksichtigt werden sollen, um zusätzliche Arbeit zu vermeiden.
31. die Sensibilisierungs- und Aufklärungsbemühungen über das PSSA Wattenmeer und andere einschlägige Regelungen für Seeleute und Interessengruppen zu koordinieren und zu intensivieren.
32. im Rahmen des bereits bestehenden DenGerNeth-Abkommens zwischen Dänemark, Deutschland und den Niederlanden Koordinationsmechanismen für Fragen zum PSSA Wattenmeer einzurichten.
33. die zuständigen Behörden darauf hinzuweisen, die Einträge bezüglich des PSSA Wattenmeer in Seekarten zu vervollständigen.
34. das Bewusstsein der Schifffahrtsindustrie für den Verlust von Containern zu erhöhen und entsprechende Studien zur Vermeidung von Containerverlusten zu unterstützen.
35. die Schritte und Ergebnisse des Projektes „Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK)“ unter dem Dach der HELCOM genau zu verfolgen und die zuständigen Behörden anzuhalten, die Erfahrungen und den methodologischen Ansatz entsprechend auf die Nordsee zu übertragen, wobei die Ziele und Anforderungen der Meeresstrategie-Rahmenrichtlinie zu berücksichtigen sind.

36. die Bedeutung der Schiffssicherheit in Bezug auf jegliche Offshore-Aktivitäten erneut zu bestätigen. Die Sicherheit der Schifffahrt in der Nordsee sollte ungeachtet der möglicherweise auftretenden Offshore-Entwicklungen mindestens auf dem gegenwärtigen Niveau bleiben und, wo möglich, verbessert werden.
37. den Wattenmeer-Ausschuss zu beauftragen, die Wechselbeziehungen und potenziellen Konflikte zwischen den Interessen der Schifffahrt und der Windenergieproduktion und deren möglichen Auswirkungen auf das Ökosystem Wattenmeer zu bewerten.
38. den Wattenmeer-Ausschuss zu beauftragen, den PSSA-Evaluierungsbericht und weitere Umsetzungsschritte mit den zuständigen Behörden zu besprechen und eine Vision hinsichtlich der Auswirkungen der Schifffahrt und Schiffssicherheit auf das PSSA Wattenmeer zu entwickeln.

Kommunikation

39. in der Überzeugung, dass die Wahrnehmung des Wattenmeeres und die Identifizierung mit ihm als ein gemeinsames natürliches und kulturelles Erbe eine wesentliche Voraussetzung für einen langfristig erfolgreichen Wattenmeerschutzes ist, die Kommunikation über das Trilaterale Wattenmeer und die Kooperation zu verstärken, insbesondere im Hinblick auf das Weltnaturerbegebiet und den dänischen und den Hamburgischen Nationalpark, durch Entwicklung einer Trilateralen Kommunikationsstrategie, in die auch die Aktivitäten der Internationalen Wattenmeerschule (IWSS) einbezogen werden sollen, und das Gemeinsame Wattenmeersekretariat in die Lage zu versetzen, diese Aufgaben zu erfüllen.

Monitoring, Bewertung und wissenschaftliche Forschung

40. sich bewusst zu sein, dass eine Beschleunigung des globalen Wandels noch nie dagewesene Auswirkungen auf die Geomorphologie und biologische Vielfalt des Ökosystems Wattenmeer mit sich bringt und dass es einer gemeinsamen interdisziplinären Forschungsagenda zum Schutz der natürlichen Werte und der Entwicklung nachhaltiger Nutzungsperspektiven in einer sich verändernden Welt bedarf, um diesen Veränderungen begegnen zu können.
41. die Errichtung einer trilateralen Forschungsplattform zu unterstützen, vorzugsweise direkt verbunden mit vorhandenen nationalen Netzwerken. Diese Plattform erarbeitet in Absprache mit dem Wattenmeer-Ausschuss eine trilaterale Agenda für politikrelevante Forschung, ausgehend von der Analyse des Qualitätszustandsberichtes (QSR) und den Ergebnissen des wissenschaftlichen Symposiums. Sie veranlasst trilaterale Forschungsvorhaben, erkundet Finanzierungsmöglichkeiten und kommuniziert das Ergebnis mit dem Wattenmeer-Ausschuss.
42. die zentrale Bedeutung des Trilateralen Monitoring- und Bewertungsprogramms (TMAP) erneut zu bestätigen, das, wie in der Erklärung von Schiermonnikoog festgelegt, zur Erfüllung der Anforderungen der relevanten EU-Richtlinien weiter überarbeitet wurde, als unverzichtbare Grundlage der gemeinsamen Zustandsbewertung und des erfolgreichen Managements des Wattenmeeres als ökologischer Einheit.

43. die Fortsetzung des TMAP erneut zu bestätigen, und gegebenenfalls Parameter zur Weiterentwicklung des TMAP aufzunehmen, um eine integrierte Bewertung aller relevanten EU-Richtlinien zu erleichtern und um neue Herausforderungen wie z. B. den Klimawandel und seine Auswirkungen besser überwachen zu können; außerdem eine langfristige Entwicklungsstrategie zu vereinbaren, um den Wert des TMAP für ein breiteres Spektrum von Interessengruppen zu erhöhen.

Wattenmeerforum

44. die Aktivitäten und Empfehlungen des Wattenmeerforums (WSF) zu nachhaltiger Entwicklung und Mitbestimmungsprozessen zu berücksichtigen, insbesondere im Hinblick auf
- die Entwicklung eines Katalogs von Nachhaltigkeitsindikatoren für die Region
 - die Weiterentwicklung des Integrierten Küstenzonenmanagement (IKZM) und der Raumordnung im Bereich des Meeres
 - künftige Entwicklungen im Bereich der Energieerzeugung im Wattenmeer und in der angrenzenden Region
 - das trilaterale Gänsemanagement
 - die Eintragung des niederländisch-deutschen Wattenmeeres als Welterbestätte
45. die weitere Zusammenarbeit mit dem Wattenmeerforum als unabhängiger Interessengruppenorganisation im Zeitraum 2011 bis 2013 mit dem Schwerpunkt auf der Erarbeitung gemeinsamer Projekte bezüglich integriertem Management und dem Schutz des Wattenmeeres zu unterstützen und den gegenseitigen Austausch von Informationen, Ideen und Visionen zu begrüßen sowie die Funktion als Plattform zur Entwicklung von Konfliktlösungen anzuerkennen.

Internationale Zusammenarbeit

46. das Ziel des OSPAR-Ministertreffens 2010, den Ökosystem-Ansatz für den Nordostatlantik weiterzuentwickeln, zu begrüßen, sowie seinen Beitrag zu einer weiteren Präzisierung der Definition eines guten Umweltzustandes im Rahmen der EU Meeresstrategie-Rahmenrichtlinie, da beide Aktivitäten für den Schutz des Wattenmeeres als weltweit größtes Wattenökosystem und Weltnaturerbegebiet enorm wichtig sind.
47. die Unterstützung dieser Aktivitäten anzubieten und die umfangreichen Erfahrungen der Wattenmeerstaaten mit integriertem Ökosystemmanagement und nachhaltiger Nutzung im grenzüberschreitenden Kontext beizutragen.
48. die Zusammenarbeit mit Korea im Rahmen der 2009 geschlossenen Vereinbarung (*Memorandum of Understanding*) fortzusetzen mit den Schwerpunkten Informationsaustausch und Kompetenzaufbau.
49. die bestehende Zusammenarbeit mit WWF WAMER zur nachhaltigen Entwicklung der westafrikanischen Ökoregion zu würdigen, die für die im Wattenmeer durchziehenden Zugvögel eine Schlüsselrolle spielt.
50. den Austausch von Informationen und Erfahrungen mit „Natural England“ über das Wattenmeer und The Wash/North Norfolk Coast im Rahmen der 1991 unterzeichneten Vereinbarung (*Memorandum of Intent*) fortzusetzen.

Kooperation 2010 – 2013

51. Deutschland zu danken, dass es für einen verlängerten Zeitraum den Vorsitz der Kooperation übernommen hat.
52. die Übernahme des Vorsitzes für die kommende Periode 2010 – 2013 durch Dänemark zu begrüßen.
53. die nächste trilaterale Regierungskonferenz zum Schutz des Wattenmeeres und die reguläre Sitzung des Trilateralen Wattenmeer-Rats im Jahr 2013 auf Einladung der dänischen Regierung abzuhalten.
54. das 13. Internationale Wissenschaftliche Wattenmeer-Symposium auf Einladung der niederländischen Regierung 2012 in den Niederlanden abzuhalten.

Unterschriften

Sylt, Deutschland, 18. März 2010

Für die Regierung der Bundesrepublik Deutschland

Ursula Heinen-Esser, Parlamentarische Staatssekretärin im Ministerium für Umwelt, Naturschutz und Reaktorsicherheit

Für die Regierung des Königreichs Dänemark

Karen Ellemann, Ministerin für Umwelt

Für die Regierung des Königreichs der Niederlande

Gerda Verburg, Ministerin für Landwirtschaft, Natur und Lebensmittelqualität



The Dutch delegation with the Minister Gerda Verburg and her Senior Official Mr. Hendrik Oosterveld (3rd and 4th from right) (Photo: Kristine Jung).



Welcome address of Minister Gerda Verburg at the opening of the Sylt Conference (Photo: Martin Stock).

VERKLARING VAN SYLT

Verklaring van de Ministerraad
van de 11^{de} Trilaterale Regeringsconferentie
over de Bescherming van de Waddenzee

Westerland/Sylt, 18 maart 2010

Inhoudsopgave

Verklaring van Sylt

Bestuur Waddenzeesamenwerking	34
Werelderfgoed Waddenzee	34
Natuurbescherming en beheer	35
Duurzaam gebruik van de Waddenzee	35
Landschap en cultureel erfgoed	36
Klimaat, zeespiegelstijging en kustbescherming	36
Uitheemse soorten	37
Scheepvaart en scheepsveiligheid	37
Communicatie	38
Monitoring, beoordeling en wetenschappelijk onderzoek	38
Waddenzee forum	39
Internationale samenwerking	39
Samenwerking 2010 – 2013	40
Ondertekening	40

VERKLARING VAN SYLT

De **Ministers** van Nederland, Denemarken en Duitsland verantwoordelijk voor de bescherming van de Waddenzee en vertegenwoordigers van de respectievelijke regeringen in de **Trilaterale Regeringsraad voor de Waddenzee** over de bescherming van de Waddenzee op het eiland Sylt;

erkennen de positieve resultaten van de samenwerkingsevaluatie uitgevoerd sinds de Waddenzeeconferentie op Schiermonnikoog in 2005 en bevestigen dat de samenwerking een voortrekkersmodel is voor de bescherming en het beheer van een grensoverschrijdend ecosysteem van internationale betekenis en de noodzaak voor een blijvende effectieve samenwerking voor het behoud van de Waddenzee;

waarderen de vernieuwing van de Gezamenlijke Verklaring omtrent de bescherming van de Waddenzee (*Joint Declaration*) en de Bestuursregelingen (*Governance Arrangements*);

bevestigen opnieuw de doelstelling van de Gezamenlijke Verklaring van 2010 om de Waddenzee te beschermen en te beheren als een ecologische entiteit gedeeld door de drie landen volgens het grondbeginsel voor het natuurbeschermingsgebied (*Guiding Principle for the Nature Conservation Area*), nl. het voor zover mogelijk bereiken van een natuurlijk en duurzaam ecosysteem waarin natuurlijke processen ongestoord kunnen plaatsvinden. Dit alles in het besef dat dit alleen kan worden bereikt door samenwerking met de mensen die in het gebied wonen, werken en recreëren en bereid zijn een bijdrage te leveren aan de bescherming van het gebied. De voorwaarden voor veiligheid en duurzame ontwikkeling moeten worden behouden;

verwelkomen met waardering de inschrijving van het Nederlands-Duitse deel van de Waddenzee op de Werelderfgoedlijst van UNESCO en daarmee de wereldwijde erkenning van de bijzondere universele waarde ervan;

verwelkomen met waardering de aanwijzing van de Deense Waddenzee als nationaal park;

waarderen de steun en bijdrage van het Wadden Sea Forum en andere fora van belanghebbenden en de bredere maatschappij voor de bescherming en het duurzaam gebruik van de Waddenzee en het bevorderen van duurzame ontwikkeling;

erkennen de unieke status van de Waddenzee, met name in het Jaar van de Biodiversiteit 2010, en haar bijdrage aan zowel de biodiversiteitsdoelen van de Europese Unie als aan de doelen van het Biodiversiteitsverdrag;

verwelkomen het Quality Status Report van 2009 wat een breed overzicht geeft van de toestand van de Waddenzee en een waardevolle basis biedt voor het ontwikkelen van passend beleid en beheersinitiatieven;

erkennen de aanbevelingen van het 12e Internationale Wetenschappelijk Waddenzeesymposium voor het verder ontwikkelen van de bescherming en het beheer van de Waddenzee als ecologische entiteit;

erkennen de verbetering van het milieu en de natuurlijke toestand van de Waddenzee en de noodzaak te blijven handelen op specifieke terreinen om de toestand van de Waddenzee te verbeteren en de samenwerking uit te breiden voor de bescherming en het beheer van de Waddenzee als beschreven in het beleidsevaluatierapport (*Policy Assessment Report*);

erkennen het gedeelde landschappelijke en culturele erfgoed van het Waddengebied;
verwelkomen de internationale samenwerking, in het bijzonder met West-Afrika, Korea en Engeland (*The Wash/North Norfolk Coast*) ter bevordering van de internationale bescherming van getijdengebieden en hun biodiversiteit;
 zijn bezorgd over de mogelijke invloed van menselijk gebruik, invasieve uitheemse soorten en vooral de verandering van het klimaat;
 zijn vastbesloten deze uitdagingen aan te gaan en de Waddenzee te blijven beschermen en beheren voor de huidige en toekomstige generaties;
 En zijn daarom gezamenlijk van mening:

Bestuur Waddenzeesamenwerking

1. het Bestuur (*Wadden Sea Board*) te machtigen hun activiteiten als bestuurslichaam van de Samenwerking te starten, strategisch en gezamenlijk leiderschap te geven en te zorgen voor uitvoering en verantwoording door middel van behoorlijk bestuur en goede externe relaties en communicatie met alle belangrijke belanghebbenden in overeenstemming met Artikel 5 (2) van de *Joint Declaration*;
2. de bereidheid van belanghebbenden te verwelkomen om op te treden als adviseur van het Bestuur;

Werelderfgoed Waddenzee

3. de inschrijving van het Nederlands-Duitse deel van de Waddenzee op de Werelderfgoedlijst volgens natuurlijke criteria (viii), (ix) en (x) bij besluit van Werelderfgoedcomité van UNESCO tijdens de 33ste vergadering in Sevilla in juni 2009 te verwelkomen en te erkennen dat de Verklaring van bijzondere universele waarde (*Statement of Outstanding Universal Value*) aangenomen door de Werelderfgoedcomité en die de huidige regels en beheers- en nalevingsactiviteiten omvat waaraan de bescherming van de Waddenzee moet voldoen de basis vormt voor de bescherming en het beheer van het erfgoed in de toekomst in overeenstemming met Artikel 155 van de Operationele Richtlijnen.
4. af te spreken de komende periode voorbereidingen te treffen voor de mogelijke nominatie van het Deense deel van de Waddenzee in overeenstemming met de aanmoediging van het Werelderfgoedcomité en de nominatie van het Nationaal Park Waddenzee van Hamburg met inbegrip van kleine grensaanpassingen waar nodig en passend voor inschrijving ervan op de Werelderfgoedlijst om het bestaande erfgoed te complementeren.
5. het Bestuur opdracht te geven een algemene Ontwikkelingsstrategie voor Duurzaam Tourisme voor het Werelderfgoedgebied Waddenzee op te zetten en te organiseren om tegemoet te komen aan het verzoek van het Werelderfgoedcomité, het Nationaal Park Waddenzee van Hamburg en het Deens Nationaal Park hangende de formele goedkeuring door het komend Bestuur en als eerste stap een Communicatie en Marketing Programma voor de Waddenzee 2010-2013 goed te keuren.
6. nauwe samenwerking aan te gaan in het kader van de AEWA (*African-Eurasian Waterbird Agreement*) als verzocht door het Werelderfgoedcomité om de samenwerking met de relevante belanghebbenden inzake beheer en onderzoek van de Afrikaans-Eurazische vogeltrekroutes te bevorderen en te versterken en concrete samenwerking tot stand te brengen voor de bescherming en het beheer van trekvogels die van de Waddenzee afhankelijk zijn.

Natuurbescherming en beheer

7. het Wadden Sea Plan aan te nemen zoals uitgewerkt in overeenstemming met §6 van de Verklaring van Schiermonnikoog.
8. het brede spectrum aan harmonisatie te erkennen dat binnen de Trilaterale Samenwerking al is bereikt als ook de waarde die het toevoegt met name voor wat monitoring en beoordeling op geïntegreerd ecosysteemniveau betreft.
9. harmonisatie-inspanningen in de toekomst te richten op uitdagingen die hoge prioriteit hebben, zoals de verandering van het klimaat, invasieve uitheemse soorten en visserij bij de nationale implementatie van de Vogel- en Habitatrichtlijnen en de kaderrichtlijnen voor Water en Mariene Strategie.
10. de verdere ontwikkeling van integrale beoordelingen en verslaglegging in het kader van deze richtlijnen te steunen, waaronder het verkennen van de optie om een gemeenschappelijk, geïntegreerd Natura 2000 rapport voor de Waddenzee voor te bereiden.
11. de samenwerking met betrekking tot passende beoordelingen voortvloeiend uit de vereisten van de Habitatrichtlijn te vergroten en vooral ervaringen uit te wisselen omtrent de interpretatie en toepassing van gebiedsintegriteit, effecten in combinatie en compensatiemaatregelen.
12. het aanvangen van de nodige verdere ontwikkelingen van het Wadden Sea Plan tijdens het Deens Voorzitterschap te steunen, bijvoorbeeld bij de geharmoniseerde toepassing van Europese wetgeving en rekening te houden met de voorlopige aanbevelingen van de evaluatiestudie (*High Level Review*) over strategische elementen.
13. het Bestuur te machtigen een programma van projecten en maatregelen te ontwikkelen en aan te nemen voor de komende tijd om de implementatie en verdere ontwikkeling van het Wadden Sea Plan te steunen met het oog op versterking en waar nodig ook het herstel van het natuurlijk functioneren van de Waddenzee waarin de passende acties en activiteiten van deze Verklaring zijn verwerkt.
14. de Richtlijnen voor Ganzenbeheer in het Waddengebied als voorbereid onder leiding van het Wadden Sea Forum samen met de Trilaterale Samenwerking te verwelkomen en hun bereidheid te verklaren de ontwikkeling van een Ganzenbeheerplan te steunen in samenwerking met de relevante overheden om een evenwichtig beheer te bereiken om ganzen in het Waddengebied een plaats te geven.
15. de richtlijnen voor het vangen en uitzetten van zeehonden uit de Verklaring van Leeuwarden (§§60 en 61) opnieuw te bevestigen en het Bestuur opdracht te geven het Zeehondenbeheerplan dat dit jaar afloopt te updaten voor de periode 2011-2016 op basis van een evaluatie van het huidige plan.

Duurzaam gebruik van de Waddenzee

16. het concept 'duurzaam gebruik' zoals gedefinieerd in het Biodiversiteitsverdrag bij de bescherming en het behoud van de ecologische integriteit van het ecosysteem van de Waddenzee opnieuw te bevestigen waarmee blijvende economische welvaart en maatschappelijk welbevinden wordt ondersteund.
17. veelbelovende ontwikkelingen op het gebied van duurzame visserij uit de afgelopen jaren met name met betrekking tot garnalen- en mosselvisserij te erkennen en het Bestuur te vragen voor de hele Waddenzee trilaterale beleidsprincipes te ontwikkelen voor een verdere ontwikkeling van duurzame visserij onder meer gericht op

de consequente implementatie van de Natura 2000 doelen in nauwe samenwerking met de visserijsector en NGO's die zich met natuur bezighouden.

Landschap en cultureel erfgoed

18. te erkennen dat er in het kader van het project LancewadPlan een uitgebreide conceptstrategie voor het cultuurlandschap is opgezet. Samenwerking op het gebied van landschap en cultureel erfgoed vindt voor een belangrijk deel plaats buiten het Samenwerkingsgebied, waaraan de regeringen van Nederland, Duitsland en Denemarken hun medewerking hebben toegezegd.
19. het Bestuur te verzoeken deze conceptstrategie te bespreken en te evalueren om samen met de relevante gebieden te besluiten of delen daarvan al dan niet door de Trilaterale Samenwerking kunnen worden geaccepteerd.
20. de bevoegde autoriteiten aan te moedigen de geaccepteerde delen te ontwikkelen tot trilateraal beleid op voorwaarde dat het de uitgangspunten en het beleid van het Wadden Sea Plan weergeeft.

Klimaat, zeespiegelstijging en kustbescherming

21. bezorgd dat de verandering van het klimaat en de gevolgen daarvan, zoals snellere stijging van de zeespiegel, hogere vloedgolven, hogere temperaturen en steeds toenemende sedimenttekorten invloed zullen hebben op de ecologie en het landschap van de Waddenzee en mogelijk de veiligheid van de bewoners in het gedrang kunnen brengen.
22. zich bewust van de lange tijdsduur van de processen en de bijbehorende reacties en dus ook van de urgente noodzaak de natuurlijke processen te versterken, mitigatieactiviteiten te blijven uitvoeren en concrete maatregelen te starten voor aanpassing aan de verwachte invloeden van klimaatverandering in het Waddengebied en de veiligheid van de bewoners van het gebied en de ecologische integriteit te garanderen.
23. zich bewust van het feit dat meer kennis nodig is voor aanpassings- en mitigatiemaatregelen en daardoor vastbesloten de trilaterale kennisstand te verbeteren en het Bestuur opdracht te geven om:
 - een trilaterale studie over duurzame oplossingen in gang te zetten om het verwachte tekort aan sediment weer in balans te brengen op basis van onderzoeksvragen opgesteld door de CPSL groep.
 - een project in gang te zetten voor het ontwikkelen van modellen voor ruimtelijke planning voor pilots in het Waddengebied met als doel een praktische methodologie te ontwikkelen voor ruimtelijke planning om de uitdagingen van klimaatverandering het hoofd te bieden.
 - een werkgroep op te zetten die zich richt op het vergroten van het aanpassingsvermogen van het ecosysteem van de Waddenzee en het landschap aan de verandering van het klimaat, en die ook verantwoordelijk is voor de coördinatie en het toezicht op voornoemde studies.
24. de wereldwijde en nationale inspanningen om de oorzaken van klimaatverandering op gebiedsniveau terug te brengen te steunen, met name door een beroep te doen op lokale en regionale bevoegde overheden en belanghebbenden om te werken aan

het CO₂ neutraal maken van het Waddengebied in 2030 of eerder, en zich vooral te richten op de bedreigingen voor kustzones door de opwarming van de aarde en zeespiegelstijging.

Uitheimse soorten

25. de huidige internationale inspanningen om de introductie van uitheimse soorten te voorkomen en beheersbaar te houden te steunen onder meer door zo snel mogelijk, maar in geen geval later dan 2013, het in 2004 opgestelde Verdrag voor de controle en het beheer van ballastwater en sedimenten (*BWM Convention*) te ratificeren en het Bestuur opdracht te geven de mogelijkheid te onderzoeken voor deelname aan lopende ballastwaterprojecten die betrekking hebben op de Waddenzee (zoals het *Interreg Project North Sea Ballast Water Opportunity*).
26. het Bestuur opdracht te geven om in de periode tot aan de volgende Ministersconferentie een gemeenschappelijke strategie te ontwikkelen voor het aanpakken van de introductie van uitheimse soorten in de Waddenzee, ook rekening houdend met het verzoek van de Werelderfgoedcomite van UNESCO en het ballastwaterverdrag.

Scheepvaart en scheepsveiligheid

27. de vooruitgang te erkennen die is gemaakt in de verbetering van de scheepsveiligheid en het terugbrengen van milieueffecten van de scheepvaart sinds het IMO in 2002 de Waddenzee als *Particularly Sensitive Sea Area* (PSSA, bijzonder kwetsbaar zeegebied) heeft aangewezen en de verbeteringen die het gevolg zijn van de implementatie van de Verklaring van Schiermonnikoog.
28. alle inspanningen te verwelkomen om de uitstoot naar de lucht en vervuiling van het water in de scheepvaart en in de havens in het Waddengebied terug te brengen door bijvoorbeeld de introductie van milieuvriendelijke energie en logistieke infrastructuur (de *Clean Ship Approach*).
29. het belang van de scheepvaart voor het Waddengebied te onderkennen maar ook de noodzaak mensen meer bewust te maken van de Waddenzee als PSSA en van de inspanningen van het IMO en de EU om de scheepvaart veiliger te maken en de milieueffecten van de scheepvaart terug te brengen.
30. het verzamelen van de relevante scheepvaart- en milieugegevens voor de Waddenzee PSSA in het Trilaterale Monitorings- en Beoordelingsprogramma (TMAP) te coördineren en verwerken met inachtneming van de bestaande gegevensbestanden als SafeSeaNet om dubbel werk te voorkomen.
31. de bewustwording van en voorlichting over de Waddenzee als PSSA en andere relevante regelgeving te coördineren en te intensiveren voor schippers en andere relevante belanghebbenden.
32. binnen het bestaande kader van de DenGerNeth Overeenkomst de coördinatiemechanismen op te zetten voor kwesties die met de Waddenzee als PSSA te maken hebben.
33. de bevoegde autoriteiten aan te moedigen de gegevens over de Waddenzee als PSSA op kaarten aan te brengen.

34. de bewustwording van de scheepvaartgemeenschap omtrent het verlies van containers te vergroten en relevante studies over hoe verlies van containers kan worden voorkomen te ondersteunen.
35. de stappen en resultaten van het Brisk project (*Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea*) onder de Verklaring van HELCOM nauwgezet te volgen en de bevoegde autoriteiten aan te moedigen te overwegen de ervaringen en methodologische aanpak dienovereenkomstig over te dragen naar de Noordzee rekening houdend met de doelstellingen en eisen van de kaderrichtlijn Mariene Strategie.
36. het belang van de veiligheid voor schepen met betrekking tot alle offshore-activiteiten opnieuw te bevestigen. De veiligheid voor schepen in het Noordzeegebied moet op z'n minst op het huidige niveau blijven, en waar haalbaar verhoogd, ongeacht welke ontwikkeling aan offshore-activiteit zich ook mag voordoen.
37. het bestuur opdracht te geven het onderlinge verband en de mogelijke conflicten tussen de belangen van de scheepvaart en windenergieproductie in kaart te brengen en wat dat zou kunnen inhouden voor het ecosysteem van de Waddenzee.
38. het Bestuur opdracht te geven om het PSSA evaluatierapport en de verdere stappen ter implementatie met de relevante bevoegde autoriteiten te bespreken en een visie te ontwikkelen over de invloed van scheepvaart en scheepsveiligheid op de PSSA Waddenzee.

Communicatie

39. ervan overtuigd dat de perceptie van en de identificatie met de Waddenzee als gedeeld ecologisch en cultureel erfgoed een wezenlijke basis vormt voor het succes van lange termijn bescherming van de Waddenzee en dus de communicatie over de Trilaterale Waddenzee en de Samenwerking te versterken, vooral met betrekking tot het Werelderfgoedgebied en de Nationale Parken van Hamburg en Denemarken door een trilaterale communicatiestrategie te ontwikkelen, waaronder de activiteiten van de Waddenzeeschool (IWSS) zouden moeten vallen en op die manier het Waddenzee-secretariaat in staat te stellen deze taken te vervullen.

Monitoring, beoordeling en wetenschappelijk onderzoek

40. zich bewust van het feit dat een versnelling van wereldwijde verandering ongekende effecten heeft op de geomorfologie en biodiversiteit van het ecosysteem van de Waddenzee, en dat, om deze veranderingen het hoofd te bieden, een gezamenlijke en interdisciplinaire onderzoeksagenda noodzakelijk is om in een veranderende wereld de natuurlijke waarden te beschermen en duurzame gebruiksperspectieven te ontwikkelen.
41. het opzetten van een trilateraal onderzoeksplatform te steunen dat bij voorkeur rechtstreeks gelieerd is aan bestaande nationale netwerken. Het platform zal in overleg met het Bestuur een trilaterale agenda uitwerken voor beleidsrelevant onderzoek,

gebaseerd op het Quality Status Report en de uitkomst van het wetenschappelijk symposium, en trilaterale onderzoeksprojecten in gang zetten, financieringsmogelijkheden verkennen, en de uitkomst bekendmaken aan het Bestuur.

42. het centrale belang van het Trilaterale Monitorings- en Beoordelingsprogramma (TMAP) dat verder aangepast is om tegemoet te komen aan de voorwaarden van de desbetreffende EG Richtlijnen als bepaald in de Verklaring van Schiermonnikoog opnieuw te bevestigen als onontbeerlijke basis voor de gezamenlijke beoordeling van de toestand van de Waddenzee en een geslaagd beheer van de Waddenzee als ecologische entiteit.
43. de voortzetting van het TMAP opnieuw te bevestigen en waar nodig parameters op te nemen om het TMAP te ontwikkelen teneinde een geïntegreerde beoordeling voor alle relevante EG Richtlijnen mogelijk te maken en nieuwe uitdagingen, zoals klimaatverandering en de invloed hiervan, beter te kunnen monitoren, en een ontwikkelingsstrategie voor de lange termijn overeen te komen waarmee de waarde voor een bredere groep belanghebbenden wordt vergroot.

Waddenzee forum

44. rekening te houden met de activiteiten en aanbevelingen van het Wadden Sea Forum voor wat betreft duurzame ontwikkeling en inspraak met name op het gebied van
 - de ontwikkeling van een duurzaamheidsindicator voor het Waddenzeegebied
 - de verdere ontwikkeling van ICZM (*Integrated Coastal Zone Management*) en mariene ruimtelijke ordening
 - toekomstige ontwikkelingen in energieopwekking in en langs de Waddenzee
 - trilateraal ganzenbeheer
 - de inschrijving van het Nederlands-Duitse deel van de Waddenzee op de Werelderfgoedlijst.
45. de samenwerking met WSF als onafhankelijke belanghebbende partij in de periode 2011-2013 te ondersteunen met het oog op de uitwerking van gezamenlijke projecten met betrekking tot geïntegreerd beheer en de bescherming van de Waddenzee en de uitwisseling van informatie, ideeën en visies te verwelkomen, en de functie te erkennen om als platform op te treden voor het ontwikkelen van oplossingen in conflictsituaties.

Internationale samenwerking

46. het doel van de OSPAR Ministeriële Vergadering 2010 te verwelkomen om de ecosysteem benadering voor het noordoostelijke deel van de Atlantische Oceaan verder te ontwikkelen, evenals de bijdrage van de Vergadering aan de nadere invulling van het *Good Environmental Status* (GES) concept uit de kaderrichtlijn voor Mariene Strategie, omdat beide activiteiten uiterst relevant zijn voor de bescherming van de Waddenzee, 's werelds grootste waddenecosysteem en Werelderfgoedgebied.
47. aan te bieden deze activiteiten te steunen door bij te dragen met de ruime ervaring van de Waddenzeelanden met geïntegreerd ecosysteembeheer en duurzaam menselijk gebruik over de grenzen heen.

48. de samenwerking met Korea in het kader van de *Memorandum of Understanding* uit 2009 voort te zetten, vooral wat betreft het uitwisselen van informatie en het opbouwen van capaciteit.
49. de samenwerking met WWF voor duurzame ontwikkeling van de West-Afrikaanse Mariene Ecoregio (WAMER) te erkennen, die een belangrijke rol speelt voor trekvogels die het Waddengebied aandoen.
50. de uitwisseling van informatie en ervaring tussen de Waddenzee en de *Wash North Norfolk Coast* met *Natural England* voort te zetten in het kader van het *Memorandum of Intent* uit 1991.

Samenwerking 2010 – 2013

51. Duitsland te bedanken voor haar langdurige voorzitterschap van de Samenwerking.
52. Denemarken als voorzitter te verwelkomen voor de komende periode 2010 – 2013.
53. de volgende Trilaterale Regeringsconferentie over de bescherming van de Waddenzee en de reguliere vergadering van de Trilaterale Regeringsraad in 2013 te houden op uitnodiging van Denemarken.
54. Het 13de Internationale Wetenschappelijke Waddenzeesymposium 2012 in Nederland te houden op uitnodiging van de Nederlandse regering.

Ondertekening

Sylt, Duitsland, 18 maart 2010

Namens de regering van Bondsrepubliek Duitsland

Ursula Heinen-Esser, Parlementair-Staatssecretaris in het Ministerie van Milieu, Natuur-
bescherming en Nucleaire Veiligheid

Namens de regering van het Koninkrijk Denemarken

Karen Ellemann, Minister van Milieu

Namens de regering van het Koninkrijk der Nederlanden

Gerda Verburg, Minister van Landbouw, Natuur en Voedselkwaliteit



Meeting of the Ministerial Council (Photo: Martin Stock).



The Danish delegation chaired by Minister Karen Ellemann (Photo: Kristine Jung).

SILD- DEKLARATIONEN

Det Trilaterale Vadehavsråd
11. Trilaterale Regeringskonference
om Vadehavets Beskyttelse

Westerland/Sild, 18. marts 2010

Sild-Deklarationen

Styring af Vadehavssamarbejdet _____	46
Vadehavet som Verdensarvsområde _____	46
Naturbevaring og forvaltning _____	47
Bæredygtig udnyttelse af Vadehavet _____	48
Landskab og kulturarv _____	48
Klima, havspejlsstigning og kystbeskyttelse _____	48
Invasive arter _____	49
Skibsfart og sejladsikkerhed _____	49
Kommunikation _____	50
Overvågning af forskning _____	50
Vadehavsforum _____	51
Internationalt samarbejde _____	51
Vadehavssamarbejdet 2010-13 _____	52
Underskrifter _____	52

SILD- DEKLARATIONEN

Vi, de ansvarlige ministre for Vadehavets beskyttelse i Nederlandene, Danmark og Tyskland, og som repræsenterer de tre regeringer i Det Trilaterale Vadehavsråd,

Anerkender de positive resultater af evalueringen af Det Trilaterale Vadehavssamarbejde, der har fundet sted siden regeringskonferencen om Vadehavet i 2005 på Schiermonnikoog. Resultaterne bekræfter dels, at Samarbejdet er banebrydende for beskyttelsen og forvaltningen af et grænseoverskridende økosystem af international betydning – og bekræfter dels behovet for et fortsat, effektivt vadehavssamarbejde for at bevare Vadehavet.

Værdsætter fornyelsen af "Fælleserklæringen om Vadehavets Beskyttelse" (1982) og af organiseringen af Det Trilaterale Vadehavssamarbejde.

Bekræfter, at formålet med "Fælleserklæringen 2010" for de tre lande fortsat er at beskytte og forvalte Vadehavet som én samlet økologisk enhed i overensstemmelse med Det Vejledende Princip for forvaltningen af Det Trilaterale Naturbeskyttelsesområde. Princippet er så vidt muligt at opnå et naturligt og bæredygtigt økosystem, hvor de naturlige processer forløber uforstyrret. Dette gennemføres i erkendelse af, at det kun kan opnås i et samarbejde med de mennesker, der lever og arbejder i området, de der bruger området i fritiden – samt de der er villige til at bidrage til områdets beskyttelse. Sikkerheden for befolkningen og en bæredygtig udvikling skal opretholdes.

Hilser det meget velkomment, at det nederlandske og det tyske Vadehav er blevet optaget på UNESCO's verdensarvsliste og dermed har opnået global anerkendelse for områdets enestående universelle værdi – samt at det danske Vadehav er blevet udpeget som nationalpark.

Værdsætter støtten og medvirken fra Vadehavsforum og andre fora – samt fra det øvrige samfund - i beskyttelsen og den bæredygtige udnyttelse af Vadehavet, og som dermed bidrager til at fremme den bæredygtige regionale udvikling.

Vedkender sig Vadehavets enestående status som naturområde, navnlig i relation til "Biodiversitetsåret 2010" – samt dets bidrag til EU's målsætninger for biodiversiteten og målsætningerne i Biodiversitetskonventionen.

Hilser rapporten om "Vadehavets miljøtilstand" fra 2009 **velkommen**. Den giver et omfattende indblik i Vadehavets natur- og miljøtilstand, og den tjener samtidig som et

værdifuldt udgangspunkt for at videreudvikle hensigtsmæssige politikområder og forvaltningsinitiativer.

Anerkender anbefalingerne fra det 12. Internationale Videnskabelige Vadehavssymposium om den fortsatte udvikling af beskyttelsen og forvaltningen af Vadehavet som én økologisk enhed.

Anerkender forbedringerne af Vadehavets miljø- og naturtilstand og behovet for en fortsat målrettet indsats med henblik på yderligere at forbedre denne tilstand. **Anerkender** endvidere behovet for at udvide samarbejdet om beskyttelsen og forvaltningen af Vadehavet, som det er skitseret i rapporten "Status over og anbefalinger til den fælles vadehavspolitik".

Anerkender de fælles landskabsværdier og kulturarven i Vadehavsregionen.

Hilser det internationale samarbejde **velkomment**, navnlig med Vestafrika, Sydkorea og med de engelske kystområder the Wash og North-Norfolk Coast for at fremme den internationale beskyttelse af tidevandsområder og disses biodiversitet.

Er bekymrede over de mulige påvirkninger fra menneskelige aktiviteter, fra invasive og fremmede arter samt især fra klimaforandringerne.

Er fast besluttede på at imødegå disse udfordringer og fortsætte med at beskytte og forvalte Vadehavet til gavn for den nulevende og de kommende generationer.

Styring af Vadehavssamarbejdet

1. Bemyndiger vadehavsbestyrelsen, som ansvarligt organ for styringen af Samarbejdet, til at påbegynde sine aktiviteter, til at tilvejebringe et strategisk og kollektivt lederskab samt sikre ansvarlighed og resultater. Dette skal ske gennem god forvaltningspraksis, gode eksterne relationer samt kommunikation med alle væsentlige interessenter - i overensstemmelse med Fælleserklæringens artikel 5, stk. 2.
2. Værdsetter, at interesseorganisationer har indvilget i at fungere som rådgivere for bestyrelsen.

Vadehavet som Verdensarvsområde

3. Hilser det velkomment, at UNESCO's Verdensarvskomité på sit 33. møde i Sevilla i juni 2009 besluttede at optage det nederlandske og tyske Vadehav på verdensarvslisten i henhold til naturkriterierne (viii), (ix) og (x).
Anerkender samtidigt, at ledetråden for beskyttelsen af Vadehavet er komitéens erklæring om områdets enestående universelle betydning sammen med de eksisterende regler, forvaltningspraksis og håndhævelsesprocedurer. Erklæringen vil udgøre grundlaget for den fremtidige beskyttelse og forvaltning af det udpegede område i henhold til artikel 155 i UNESCO's "Operationelle retningslinjer".
4. Er enige om, at påbegynde en mulig indstilling af det danske Vadehav som verdensarvsområde i overensstemmelse med Verdensarvskomitéens opfordring i den kommende periode. Hertil kommer en indstilling af delstaten Hamburgs Nationalpark i Vadehavet som supplement til det nu udpegede område på verdensarvslisten. Beslutningen omfatter tillige mindre ændringer af den nuværende afgrænsning.
5. Anmoder bestyrelsen om at iværksætte og organisere udarbejdelsen af en overordnet udviklingsstrategi for en bæredygtig turisme (1) for verdensarvsområdet med henblik på at leve op til anmodningen fra Verdensarvskomitéen, (2) for delstaten Hamburgs Nationalpark i Vadehavet og (3) for den danske nationalpark i Vadehavet. Sidstnævnte

må afvente accept fra den kommende nationalparkbestyrelse. Som et første skridt vedtages et kommunikations- og marketingprogram for Vadehavet for årene 2010-13.

6. Vil indgå i et tæt samarbejde inden for "Aftalen om beskyttelse af afrikansk-eurasiske trækkende vandfugle" (AEWA) med de relevante stater. Dette skal ske for at fremme og forstærke forvaltningen og forskningen af de afrikansk-eurasiske trækruter efter anmodning fra Verdensarvskomitéen. Endvidere at indlede samarbejde om beskyttelse og forvaltning af de trækfugle, som er afhængige af Vadehavet.

Naturbevaring og forvaltning

7. Vedtager Vadehavsplanen 2010 som er udarbejdet i overensstemmelse med § 6 i Schiermonnikoog-deklarationen.
8. Anerkender den vidtgående harmonisering, der allerede har fundet sted inden for Det Trilaterale Vadehavssamarbejde, og den merværdi, der er opnået, navnlig hvad angår overvågningen af et integreret økosystem.
9. Fokuserer de fremtidige bestræbelser på harmonisering med særlig vægt på f.eks. klimaforandringer, invasive arter, tilbagegange i fuglebestandene samt på fiskeriet - i forbindelse med den nationale implementering af fuglebeskyttelsesdirektivet, habitatdirektivet, vandrammedirektivet samt havstrategi-direktivet.
10. Støtter videreudviklingen af en højere grad af ensartethed i vurderinger og afrapporteringer inden for rammerne af disse direktiver; herunder at undersøge mulighederne for at udarbejde ét fælles EU Natura 2000-bidrag for Vadehavet.
11. Forstærker samarbejdet om analyser og vurderinger inden for rammerne af habitatdirektivet og navnlig udvekslingen af erfaringer vedrørende udlægninger af projekters og planers påvirkninger af områdets integritet samt iværksættelsen af kompenserende foranstaltninger.
12. Støtter påbegyndelsen af nødvendige udviklinger af Vadehavsplanen under det danske formandskab. Dette omfatter f.eks. indarbejdelse af en harmoniseret udmøntning af EU-lovgivningen under hensyntagen til de foreløbige anbefalinger i den eksterne evaluering ("*High Level Review*"), som omfatter de strategiske perspektiver.
13. Bemyndiger bestyrelsen til at udvikle og vedtage et program for projekter og foranstaltninger for den kommende periode med henblik på at styrke gennemførelsen og den videre udvikling af Vadehavsplanen. Hvor det skønnes påkrævet også at genoprette Vadehavets naturlige funktioner under passende inddragelse af beslutninger og aktiviteter indeholdt i denne deklaration.
14. Hilser de retningslinjer for gåseforvaltning i Vadehavsregionen velkommen, som er udarbejdet af Vadehavsforum i samarbejde med Det Trilaterale Vadehavssamarbejde. Erklærer sig villige til at støtte udarbejdelsen af en gåseforvaltningsplan i samarbejde med de relevante myndigheder - med henblik på en afbalanceret forvaltning, som sikrer opretholdelse af gåsebestande i Vadehavsregionen.
15. Stadfæster retningslinjerne i Leeuwarden-deklarationens §§ 60-61 om indfangning og genudsætning af sæler og anmoder samtidig bestyrelsen om at opdatere Den Trilaterale Sælforvaltningsplan - gældende for perioden 2011-2016. Dette skal ske på grundlag af en evaluering af den nuværende plan.

Bæredygtig udnyttelse af Vadehavet

16. Stadfæster princippet om en bæredygtig udnyttelse, som det er defineret i Biodiversitets-konventionen for (1) at beskytte og bevare Vadehavets økologiske integritet og (2) at sikre den økonomiske fremgang og befolkningens trivsel.
17. Anerkender de seneste års lovende udviklinger for at opnå et bæredygtigt fiskeri især af rejer og blåmuslinger. Bestyrelsen anmodes om at udarbejde trilaterale principper for et bæredygtigt fiskeri gældende for hele Vadehavet, som bl.a. tilsigter en ensartet gennemførelse af Natura 2000-målsætningerne. Dette skal ske i et tæt samarbejde med fiskerisektoren og naturbeskyttelsesorganisationerne.

Landskab og kulturarv

18. Anerkender det omfattende udkast til en strategi for Vadehavsregionens kulturlandskaber, som er blevet udarbejdet inden for rammerne af LancewadPlan-projektet. Samarbejdet om landskab og kulturarv foregår i vidt omfang uden for Det Trilaterale Samarbejdsområde, som regeringerne i Nederlandene, Tyskland og Danmark har erklæret at ville samarbejde inden for.
19. Anmoder bestyrelsen om at drøfte og evaluere strategiudkastet med henblik på sammen med de relevante myndigheder – at beslutte om dele af udkastet kan accepteres af Det Trilaterale Vadehavssamarbejde – eller ej.
20. Opfordrer de kompetente myndigheder til at udvikle de accepterede dele til en egentlig trilateral politik, forudsat at de afspejler principper og politikker i Vadehavsplanen.

Klima, havspejlsstigning og kystbeskyttelse

21. Er opmærksomme på, at klimaændringer og konsekvenser heraf – som f.eks. den accelererende havspejlsstigning, de højere stormfloder, de stigende temperaturer samt det voksende sedimentunderskud vil få konsekvenser for Vadehavets økologi og landskab og sandsynligvis også vil påvirke befolkningens sikkerhed.
22. Er bevidste om de lange reaktionstider i processerne, som skyldes klimaændringer. Er tillige bevidste om nødvendigheden af (1) at styrke de naturlige processer og iværksætte forbyggende foranstaltninger og (2) at tage konkrete skridt til at øge Vadehavsområdets tilpasning for at imødegå de forventede forandringer (3) at garantere befolkningens sikkerhed i Vadehavsregionen samt (4) at sikre den økologiske integritet.
23. Er bevidste om, at øget viden er nødvendig for at foretage disse tilpasninger og for at iværksætte forebyggende foranstaltninger. Er derfor fast besluttet på at forstærke den trilaterale viden og anmoder derfor bestyrelsen om:
 - At tage initiativ til en trilateral undersøgelse om bæredygtige løsninger for at opveje det forventede sedimentunderskud i Vadehavet – med udgangspunkt i de spørgsmål, som er rejst af den trilaterale arbejdsgruppe om "kystbeskyttelse og havspejlsstigning" (CPSL).

- At iværksætte et projekt om udvikling af en model for fysisk planlægning i pilotområder i Vadehavsregionen, som indeholder en anvendelig metodik, der lever op til klimaændringernes udfordringer.
 - At nedsætte en arbejdsgruppe, som skal fokusere på at øge økosystemets og landskabernes evne til at tilpasse sig klimaændringerne. Arbejdsgruppen skal samtidig være ansvarlig for koordination og overvågning af ovennævnte undersøgelse og projekt.
24. Støtter de globale og nationale bestræbelser på at mindske de regionale virkninger af klimaændringerne. Det sker især ved at opfordre lokale og regionale kompetente myndigheder og interessenter til at arbejde for at udvikle Vadehavsregionen til et CO₂-neutralt område inden 2030 - eller tidligere. Der skal navnlig fokuseres på de særlige trusler i kystområderne, som skyldes den globale opvarmning og den stigende vandstand i havene.

Invasive arter

25. Støtter de igangværende internationale bestræbelser på at forebygge og forvalte invasive arter ved bl.a. så hurtigt som muligt - men senest i 2013 - at ratificere Ballastkonventionen fra 2004. Desuden ved at anmode bestyrelsen om at undersøge muligheden for at blive involveret i igangværende projekter om ballastvand, som omfatter Vadehavet (f.eks. interreg-projektet "*North Sea Ballast Opportunity*").
26. Anmoder bestyrelsen om, indtil næste ordinære møde i Det Trilaterale Vadehavsråd, at udarbejde en fælles strategi for håndtering af invasive arter i Vadehavet. Denne strategi skal også tage hensyn til anmodningen fra UNESCO's Verdensarvkomité samt til Ballastkonventionen.

Skibsfart og sejladsikkerhed

27. Anerkender de fremskridt, der er opnået med hensyn til at forbedre sejladsikkerheden og mindske dens miljømæssige påvirkninger siden IMO's udpegning af Vadehavet som et "Særligt Følsomt Havområde" (PSSA) i 2002. Anerkender endvidere de forbedringer, som er sket ved gennemførelsen af Schiermonnikoog-deklarationen fra 2005.
28. Hilser skibsfartens og havnemyndighedernes bestræbelser velkommen, som reducerer luft- og havforureningen i Vadehavsregionen - f.eks. ved at introducere miljøvenlige energi- og transportformer ("*Clean Shipping Approach*").
29. Anerkender skibsfartens betydning for Vadehavsregionen, men også nødvendigheden af fortsat at udvikle bevidstheden om Vadehavets status som et "Særligt Følsomt Havområde". Hertil kommer de igangværende bestræbelser på - inden for IMO og EU - at forbedre sejladsikkerheden og mindske skibsfartens miljømæssige påvirkninger.
30. Vil koordinere og forvalte indsamling af relevante skibsfarts- og miljødata for PSSA-Vadehavet inden for det trilaterale overvågningsprogram (TMAP). For at undgå dobbeltarbejde tages hensyn til de eksisterende databaser så som "SafeSeaNet".
31. Vil koordinere og øge forståelsen for udpegningen og undervisningen af PSSA-Vadehavet samt andre relevante bestemmelser over for søfolk og relevante interessenter.

32. Vil etablere procedurer for koordination af spørgsmål i forbindelse med PSSA- Vadehavet inden for de eksisterende rammer af DenGerNeth-aftalen.
33. Opfordrer de kompetente myndigheder til at færdiggøre indtegningen af PSSA-Vadehavet på søkort.
34. Vil øge skibsfartens opmærksomhed på tab af containere og understøtte relevante studier om forebyggelse heraf.
35. Følger udviklinger og resultater i "BRISK-projektet" under HELCOM og opfordrer de kompetente myndigheder til at overveje at overføre erfaringer og metodevalg til Nordsøen under hensyntagen til formålene og bestemmelserne i EU's havstrategi-direktiv.
36. Bekræfter, at sejladsikkerheden er et vigtigt spørgsmål i forhold til enhver offshore-aktivitet. Sejladsikkerheden i Nordsøen bør (1) som minimum fastholdes på det nuværende niveau, uanset hvilken form for offshore-udvikling, der måtte finde sted og (2) om muligt skærpes.
37. Anmoder bestyrelsen om at evaluere sammenhængen og de sandsynlige konflikter mellem søfartens interesser og produktionen af vindenergi samt de mulige konsekvenser for Vadehavets økosystem.
38. Anmoder bestyrelsen om, sammen med de relevante myndigheder, at drøfte rapporten "Evaluering af PSSA-Vadehavet" og de videre skridt i forhold til dens anbefalinger. Desuden at udarbejde en vision for skibsfartens påvirkninger og sejladsikkerheden inden for PSSA-Vadehavet.

Kommunikation

39. Er overbeviste om, at opfattelsen og erkendelsen af Vadehavet som én fælles økologisk enhed og med en fælles kulturarv udgør et vigtigt grundlag for en vellykket og langsigtet beskyttelse af Vadehavet. Derfor skal kommunikationen om det internationale Vadehav og Det Trilaterale Vadehavssamarbejde forstærkes, navnlig med hensyn til Verdensarven og nationalparkerne i Danmark og i delstaten Hamburg. Det skal ske ved at udvikle en trilateral kommunikationsstrategi, som også bør omfatte Den Internationale Vadehavsskoles aktiviteter. Det skal samtidig gøres muligt for Det Fælles Vadehavssekretariat at udføre disse opgaver.

Overvågning og forskning

40. Er bevidste om, at de hastigt stigende, globale forandringer medfører hidtil usete påvirkninger af landskaberne og biodiversiteten i Vadehavets økosystem. For at håndtere disse forandringer er der behov for en fælles strategi for tværfaglig forskning med henblik på at beskytte de naturlige værdier og på at udvikle perspektiver for en bæredygtig anvendelse.
41. Støtter oprettelsen af et trilateralt forskningsforum, fortrinsvis med direkte tilknytning til eksisterende nationale netværk. Forummet skal i samarbejde med bestyrelsen udarbejde en trilateral dagsorden for relevant forskning, som skal udgøre grundlaget for den kommende vadehavspolitik. Det skal ske med udgangspunkt i statusrapporten om "Vadehavets miljøtilstand 2010" (QSR) og resultaterne fra det videnskabelige

symposium i 2009. Desuden skal forummet iværksætte og rådgive om trilaterale forskningsprojekter og undersøge mulighederne for finansiering – samt underrette Vadehavsbestyrelsen.

42. Genbekræfter den centrale betydning af Det Trilaterale Overvågningsprogram (TMAP), som er yderligere revideret for at leve op til kravene i de relevante EU-direktiver, som det blev præciseret i Schiermonnikoog-deklarationen. Heri er TMAP fremhævet som et uundværligt grundlag for den fælles analyse og vurdering af Vadehavets natur- og miljøtilstand og for en vellykket forvaltning af Vadehavet som én samlet økologisk enhed.
43. Genbekræfter fortsættelsen af TMAP og vil indarbejde parametre til at udvikle TMAP for – om nødvendigt (1) at imødekomme en integreret vurdering af natur- og miljøtilstanden på tværs af de relevante EU-direktiver og for (2) at sikre en forbedret overvågning i forbindelse med f.eks. klimaændringerne og følgevirkningerne heraf. Aftaler desuden en langsigtet strategi for at øge kendskabet til TMAP i forhold til en bredere kreds af interessenter.

Vadehavsforum

44. Tager Vadehavsforums aktiviteter og anbefalinger i betragtning vedrørende en bæredygtig udvikling, især med hensyn til:
 - Udviklingen af bæredygtige indikatorer for Vadehavsregionen.
 - Videreudviklingen af en integreret kystzoneforvaltning (ICZM) og den fysiske havplanlægning.
 - Udviklingen af de fremtidige energiproducerende anlæg i Vadehavsregionen.
 - Udviklingen af en trilateral gåseforvaltning.
 - Indskrivningen af det tysk-nederlandske vadehav som verdensarvsområde
45. Støtter samarbejdet med Vadehavsforum som en uafhængig interesseorganisation for perioden 2011-13 – med fokus på udarbejdelsen af fælles projekter omfattende integreret forvaltning og beskyttelse af Vadehavet. Hilser den gensidige udveksling af informationer, ideer og visioner velkommen – og anerkender samtidig forummet som platform for konflikthåndtering.

Internationalt samarbejde

46. Hilser målsætningen fra OSPAR-ministermødet i 2010 velkommen, som er (1) at videreudvikle forvaltningen af det nordøstlige Atlanterhav med udgangspunkt i økosystemets tarv, og (2) at fremme bidraget til opnåelse af "god økologisk status" i henhold til havstrategi-direktivet. Begge aktiviteter er yderst relevante for beskyttelsen af Vadehavet, som er verdens største økosystem af tidevandsflader – og delvist verdensarvsområde.
47. Tilbyder, at støtte disse aktiviteter ved at bidrage med vadehavslanternes store erfaring inden for integreret økosystemforvaltning og bæredygtig udnyttelse i et grænseoverskridende kystområde.

48. Fortsætter samarbejdet med Sydkorea inden for rammerne af hensigtserklæringen mellem parterne fra 2009 – med særlig vægt på udveksling af informationer samt opbygning og udvikling af særlige forvaltningskompetencer og færdigheder.
49. Anerkender det igangværende samarbejde med WWF-WAMER om en bæredygtig udvikling af Den Vestafrikanske Økoregion, som spiller en central rolle for de trækfugle, der passerer gennem Vadehavet.
50. Fortsætter udvekslingen af informationer og erfaringer om Vadehavet og de engelske kystområder "the Wash" og "North Norfolk Coast" med organisationen Natural England inden for rammerne af hensigtserklæringen fra 1991.

Vadehavssamarbejdet 2010–13

51. Takker Tyskland for at have varetaget formandskabet for Samarbejdet i en forlænget periode.
52. Hilser Danmark velkommen som formand for perioden 2010–2013.
53. Afholder den næste trilaterale regeringskonference om Vadehavets beskyttelse og det ordinære møde i Det Trilaterale Vadehavsråd i 2013 – efter indbydelse fra den danske regering.
54. Afholder det 13. Internationale Videnskabelige Vadehavssymposium i 2012 i Nederlandene – efter indbydelse fra den nederlandske regering.

Underskrifter

Sild, Tyskland, den 18. marts 2010

På vegne af regeringen i Forbundsrepublikken Tyskland
Ursula Heinen-Esser, Parlamentarisk Statssekretær

På vegne af regeringen i Kongeriget Danmark
Karen Ellemann, Miljøminister

På vegne af regeringen i Kongeriget Nederlandene
Gerda Verburg, Minister for Landbrug, Naturbeskyttelse og Fødevarekvalitet



The conference excursion "Through the Wadden Sea Plan" - a walk to the ultimate summit
(Photo: Martin Stock).

2010 JOINT DECLARATION ON THE PROTECTION OF THE WADDEN SEA

Working together to meet present
and future challenges



Westerland/Sylt, 17 March 2010

Contents

1. Geographical Area of Cooperation	58
2. Guiding Principle and Vision	59
3. Objectives for the Cooperation	59
4. Areas of Cooperation	60
5. Institutional and Financial Arrangements	60
Annex 1 Wadden Sea Area and Nature Conservation Area	63
Annex 2 Cultural Entities	65

2010 JOINT DECLARATION ON THE PROTECTION OF THE WADDEN SEA

Working together to meet present
and future challenges

THE GOVERNMENTS of the Kingdom of Denmark, the Federal Republic of Germany and the Kingdom of the Netherlands:

REALISE that the Wadden Sea, encompassing the coastal zone from Den Helder in the Netherlands to Blåvands Huk in Denmark, is an exceptional ecosystem of world importance, and also together with its cultural landscapes, is a shared responsibility of the three countries;

RECALL their Joint Declaration in 1982 to cooperate on the Protection of the Wadden Sea, and the many achievements of their cooperation and in particular the high level of nature protection and wise management unprecedented throughout Europe for a transboundary wetland especially with regard to legal protection, harmonised targets, common policy and management, integrated monitoring and assessment procedures and involvement of civil society;

CONSCIOUS that the precious ecosystem of the Wadden Sea and its remarkable biodiversity deserves world class conservation measures;

CONSCIOUS ALSO of the unique landscape and cultural heritage of the Wadden Sea, which complements the natural heritage, and on which an extensive cooperation has developed;

REALISE that the Wadden Sea is an area where people live, work and recreate and whose interests and benefits are an integrated part of our common policy;

RECOGNISE that the safety of inhabitants from flooding must be secured through appropriate coastal defences;

NOTE that since their 1982 Joint Declaration the Wadden Sea has benefited from a comprehensive national and international nature conservation regime, including protection under European legislation, in particular the Birds and Habitats Directives and the Water

Framework Directive and that there is a need to further coordinate and harmonise their efforts to ensure effective and consistent implementation of these obligations;

ACKNOWLEDGE the progress which has been made on other issues related to the protection of the Wadden Sea including the designation of a number of National Parks and Biosphere Reserves, education and the sustainable development of the Wadden Sea Region, and the designation by the International Maritime Organization (IMO) as a Particularly Sensitive Sea Area (PSSA) because of its vulnerability to damage by international maritime activities;

AWARE of the many present and future challenges to the protection, restoration and sustainable use of the Wadden Sea, in particular the long term impacts of pollution, climate change and sea level rise and the loss of biodiversity and of the necessity of raising awareness for these challenges on the basis of this declaration;

CONCERNED to ensure that further progress is made in restoring the natural ecosystem functions, improving water quality, integrating cultural and landscape heritage, and reducing the negative environmental impacts of developments;

RECOGNISE the need to continue to enhance their efforts to protect and conserve the Wadden Sea as an ecological entity and its landscapes and cultural heritage and to promote Integrated Coastal Zone Management;

RECOGNISE ALSO the essential need for active support and involvement of all relevant stakeholders in the future protection and management of the area;

REAFFIRM their intention to consolidate the existing cooperation between the States in consultation with the other governmental bodies involved, and to continue to manage the Wadden Sea as a single ecological entity for its natural, landscape and cultural heritage values, for the benefit of present and future generations.

SHARE THE VIEW ON THE FOLLOWING

1. Geographical Area of Cooperation

1.1 The participating Governments have previously identified a Wadden Sea Cooperation Area and within this a Nature Conservation Area as the geographical basis of their Cooperation:

The Wadden Sea Cooperation Area in short 'Wadden Sea Area':

- the area seaward of the main dike, or where the main dike is absent, the spring-high-tide waterline, and in the rivers, the brackish water limit;
- an offshore zone 3 nautical miles from the baseline as fixed nationally or where the Nature Conservation Area exceeds the 3 nautical mile, the offshore boundaries of the Nature Conservation Area;
- corresponding inland areas to the designated Ramsar and/or EC Bird Directive areas being the adjacent inland marsh areas of the Danish Wadden Sea Region designated as international nature protection areas and the Bird Directive Areas of Schleswig-Holstein adjacent to the Nature Conservation Area;
- the islands.

The 'Nature Conservation Area':

- In the Netherlands, the areas under the Key Planning Decision Wadden Sea;
- In Germany, the Wadden Sea national parks and the protected areas under the Nature Conservation Acts seaward of the main dike and the brackish water limit;
- In Denmark, the Wildlife and Nature Reserve Wadden Sea.

1.2 The current extent of the Wadden Sea Area and the Nature Conservation Area are shown in Annex 1 to this Declaration and this may be amended from time to time by the responsible authorities.

- 1.3 The protection and management of the Wadden Sea Area and the Nature Conservation Area require consideration of impacts which may arise outside these areas and these should be addressed as necessary.
- 1.4 For the specific purposes of cooperation on landscape and cultural heritage the Wadden Sea Area, and an area beyond, has been identified to include the main cultural entities and is shown in Annex 2 to this Declaration. 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.

2. Guiding Principle and Vision

- 2.1 The participating Governments reconfirm the guiding principle for the Nature Conservation Area:

To achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way.

The principle aims at:

- I. maintaining the water movements and the attendant geomorphological and pedological processes;
 - II. improving the quality of water, sediment and air;
 - III. safeguarding and optimizing the conditions for flora and fauna including:
 - a) preservation of the Wadden Sea as a nursery area for North Sea fish;
 - b) conservation of the feeding, breeding and roosting areas of birds, and the birth and resting areas of seals as well as the prevention of disturbances in those areas;
 - c) conservation of salt marshes and dunes;
 - IV. maintaining the scenic qualities of the landscape, in particular the variety of landscape types and the specific features of the wide, open scenery including the perception of nature and landscape.
- 2.2 Recognising the fundamental nature of the guiding principle the participating Governments have developed a vision for the Wadden Sea:

The Wadden Sea is a unique, natural and dynamic ecosystem with characteristic biodiversity, vast open landscapes and rich cultural heritage, enjoyed by all, and delivering benefits in a sustainable way to present and future generations.
 - 2.3 In the measures they take the participating Governments will allow themselves to be guided by the Precautionary Principle and Article 6 of the Habitats Directive.

3. Objectives for the Cooperation

- 3.1 The participating Governments aim to achieve:
 - a) A natural ecosystem, its functions and characteristic biodiversity.
 - b) Adaptability to climate change and other impacts.
 - c) Maintenance of the landscape and cultural heritage.
 - d) Sustainable use as defined by the Convention on Biological Diversity and as referred to in the Habitats Directive.
 - e) Public support for the protection of the Wadden Sea.

- 3.2 The participating Governments share the view that unreasonable impairment of the interests of the local population and its traditional uses in the Wadden Sea Area have to be avoided and that any user interests have to be weighed on a fair and equitable basis in the light of the purpose of protection in general, and the particular case concerned.

4. Areas of Cooperation

The participating Governments will pursue these objectives through:

- a) The development and implementation of plans, policies and projects to maintain and enhance the natural values, landscape and cultural heritage of the Wadden Sea.
- b) Coordinated and consistent management, including the production and implementation of a periodically updated Wadden Sea Plan as a joint management plan to address the requirements of EC Directives and other future needs.
- c) Applying the concept of Integrated Coastal Zone Management.
- d) Contributing to secure sustainable development possibilities for the Wadden Sea taking account of the natural and cultural values.
- e) Coordinating and commissioning research and monitoring to improve understanding of the Wadden Sea ecosystem and changes to it.
- f) Providing further opportunities for the public, with a specific focus on young people, to learn about, enjoy and experience the Wadden Sea, including the cross border context.
- g) Involving all relevant stakeholders and considering their concerns in an adequate manner.
- h) Intensifying international cooperation in relevant fields.
- i) Raising the international profile of the Wadden Sea.

5. Institutional and Financial Arrangements

- 5.1 The participating Governments will, in order to modernize the organisational structure of the Cooperation, establish a Trilateral Wadden Sea Governmental Council, composed of the responsible ministers of the participating Governments to oversee the Cooperation, provide political leadership and strategic guidance.
- 5.2 They will also establish a Wadden Sea Board as the governing body of the Trilateral Wadden Sea Cooperation to be responsible for the implementation of the Joint Declaration and other Council decisions, preparation, adoption and implementation of the Strategy of the Cooperation, trilateral measures and activities, monitoring performance and accountability, and for ensuring strong relations with key stakeholders.
- 5.3 The Board will adopt rules of procedure and financial regulations for the organisation and management of its activities, and in particular:
 - a) Each of the participating national Governments will continue to fund one third of the costs of the Secretariat.
 - b) Projects may be funded on a unilateral, bilateral or trilateral basis.
 - c) Other sources of funding will be pursued as necessary and the appropriate arrangements established to manage such funds.

- 5.4 The Common Wadden Sea Secretariat (CWSS) will be supervised by the Board, and will support the Council and the Board and the implementation of the policies and projects agreed by them in accordance with the Administrative Agreement on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea.

This Declaration supersedes the original 'Joint Declaration on the Protection of the Wadden Sea' signed in 1982.

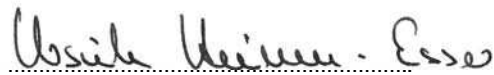
Signed in English this 17 March 2010 in four original copies each being authentic, of which one is deposited at the Common Wadden Sea Secretariat.

For the Government of the Kingdom of Denmark



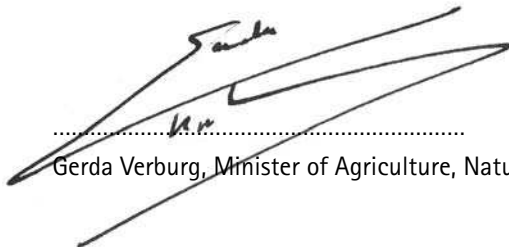
Karen Ellemann, Minister for the Environment

For the Government of the Federal Republic of Germany



Ursula Heinen-Esser, Parliamentary State Secretary

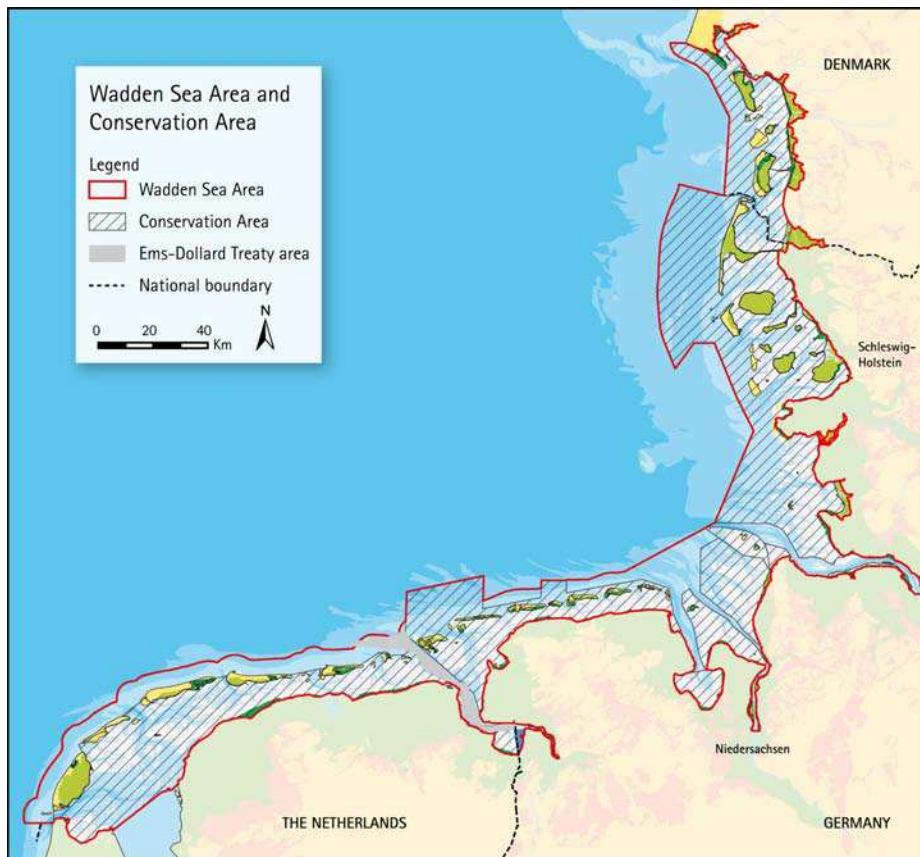
For the Government of the Kingdom of The Netherlands



Gerda Verburg, Minister of Agriculture, Nature and Food Quality

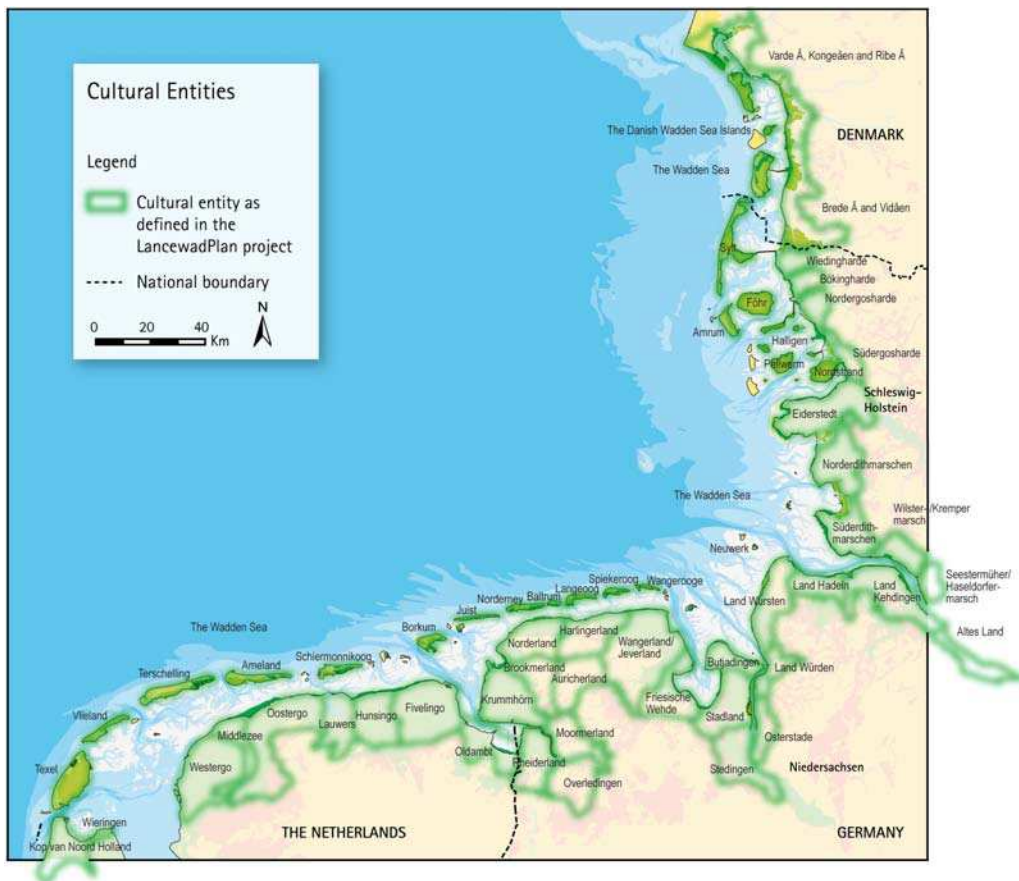
ANNEX 1

Wadden Sea Area and Nature Conservation Area



ANNEX 2

Cultural Entities



Note: Parts of the identified cultural entities are located outside of the Wadden Sea Cooperation Area as defined in 1.1. 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.

List of Acronyms and Glossary

AEWA	Agreement on the Conservation of African-Eurasian Waterbirds
BRISK	Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea
BWM	Ballast Water Management
CBD	Convention on Biological Diversity
CPSL	Trilateral Working Group on Coastal Protection and Sea Level Rise
CWSS	Common Wadden Sea Secretariat
DenGerNeth	Joint maritime contingency plan to combat marine pollution by oil or other harmful substances in Denmark, Germany and the Netherlands.
EC	European Commission
EU	European Union
HELCOM	Helsinki Commission
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
IWSS	International Wadden Sea School
NGO	Non-governmental organization
OSPAR	Oslo and Paris Convention
PSSA	Particularly Sensitive Sea Area
QSR	Quality Status Report
SafeSeaNet	European Platform for Maritime Data Exchange between Member States' maritime authorities
TMAP	Trilateral Monitoring and Assessment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAMER	West African Marine Eco-Region
WSF	Wadden Sea Forum
WSP	Trilateral Wadden Sea Plan
WWF	World Wide Fund for Nature



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit



Ministerie van Landbouw, Natuur en
Voedselkwaliteit

MILJØMINISTERIET

Skov- og Naturstyrelsen

Annex 7

**Administrative Agreement 2010 on a
Common Secretariat for the Cooperation
on the Protection of the Wadden Sea.**

**Bekanntmachung
des deutsch-dänisch-niederländischen Verwaltungs-Übereinkommens
über ein Gemeinsames Sekretariat für die Zusammenarbeit
beim Schutz des Wattenmeers
sowie über das Außerkrafttreten
des früheren Verwaltungs-Übereinkommens von 1987**

Vom 13. Juli 2010

Das vom Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit der Bundesrepublik Deutschland in Westerland, Sylt, am 18. März 2010 unterzeichnete Verwaltungs-Übereinkommen von 2010 über ein Gemeinsames Sekretariat für die Zusammenarbeit beim Schutz des Wattenmeers zwischen dem Ministerium für Umwelt Dänemarks, dem Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit der Bundesrepublik Deutschland und dem Ministerium für Landwirtschaft, Natur und Lebensmittelqualität der Niederlande ist nach seinem Artikel 10 für die Bundesrepublik Deutschland und für Dänemark und die Niederlande

am 18. März 2010

in Kraft getreten. Das Übereinkommen wird nachstehend mit einer amtlichen deutschen Übersetzung veröffentlicht.

Gleichzeitig wird bekannt gemacht, dass nach Artikel 9 dieses Übereinkommens das Verwaltungs-Übereinkommen von 1987 über ein Gemeinsames Sekretariat für die Zusammenarbeit beim Schutz des Wattenmeers zwischen dem Ministerium für Umwelt Dänemarks, dem Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit der Bundesrepublik Deutschland und dem Ministerium für Landwirtschaft und Fischereiwesen der Niederlande (BGBl. 1988 II S. 87, 88) für alle Vertragsparteien

mit Ablauf des 17. März 2010

außer Kraft getreten ist.

Bonn, den 13. Juli 2010

Bundesministerium
für Umwelt, Naturschutz und Reaktorsicherheit
Im Auftrag
Helmut Alda

**Verwaltungs-Übereinkommen von 2010
über ein Gemeinsames Sekretariat
für die Zusammenarbeit
beim Schutz des Wattenmeers
zwischen dem Ministerium für Umwelt Dänemarks,
dem Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
der Bundesrepublik Deutschland
und dem Ministerium für Landwirtschaft, Natur und Lebensmittelqualität
der Niederlande**

**Administrative Agreement 2010
on a Common Secretariat for the Cooperation
on the Protection of the Wadden Sea
between the Ministry of the Environment of Denmark,
the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany
and the Ministry of Agriculture, Nature and Food Quality of the Netherlands**

(Übersetzung)

The Ministry of the Environment of Denmark and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany and the Ministry of Agriculture, Nature and Food Quality of the Netherlands, hereinafter referred to as the Parties,

mindful of the Joint Declaration dated 17 March 2010 of the Federal Republic of Germany, the Kingdom of Denmark and the Kingdom of the Netherlands on the Protection of the Wadden Sea and its implementation,

taking into account the conclusions arrived at in connection with the trilateral governmental conferences on the protection of the Wadden Sea,

recalling the Administrative Agreement on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea, dated 23 October 1987 as well as the revised governmental mechanisms the cooperation agreed upon in the process of evaluation and implementation in the period from 2007 until 2009, establishing a Trilateral Wadden Sea Governmental Council to provide political leadership as well as a Wadden Sea Board, consisting of senior administrative representatives of the three Parties and headed by a Chair, to be the governing body of the Cooperation,

have agreed as follows:

Article 1

**The Common Secretariat
for the Cooperation on the Protection of the Wadden Sea**

(1) The Parties shall maintain the Common Secretariat for the Cooperation on the Protection of the Wadden Sea as established through the Administrative Agreement of 23 October 1987, hereinafter referred to as "the Common Secretariat".

(2) The duties of the Common Secretariat shall be carried out by a Secretary who is provided with adequate support.

Das Ministerium für Umwelt Dänemarks, das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit der Bundesrepublik Deutschland und das Ministerium für Landwirtschaft, Natur und Lebensmittelqualität der Niederlande, im Folgenden als Vertragsparteien bezeichnet, –

im Hinblick auf die Gemeinsame Erklärung der Bundesrepublik Deutschland, des Königreichs Dänemarks und des Königreichs der Niederlande vom 17. März 2010 über den Schutz des Wattenmeers und ihre Durchführung,

unter Berücksichtigung der Schlussfolgerungen, die im Zusammenhang mit den dreiseitigen Regierungskonferenzen über den Schutz des Wattenmeers erzielt wurden,

unter Bezugnahme auf das Verwaltungs-Übereinkommen vom 23. Oktober 1987 über ein Gemeinsames Sekretariat für die Zusammenarbeit zum Schutz des Wattenmeers sowie auf die überarbeiteten Organisationsstrukturen, die von der Wattenmeereszusammenarbeit im Prozess der Evaluierung und Umsetzung in der Zeit zwischen 2007 und 2009 vereinbart wurden und in deren Rahmen ein dreiseitiger Wattenmeer-Rat, der die politische Führung wahrnimmt, sowie als Lenkungsorgan der Wattenmeereszusammenarbeit ein Wattenmeer-Ausschuss, bestehend aus hohen Regierungsvertretern der drei Vertragsparteien und einem Vorsitzenden, eingesetzt wurden –

haben Folgendes vereinbart:

Artikel 1

**Das Gemeinsame Sekretariat
für die Zusammenarbeit beim Schutz des Wattenmeers**

(1) Die Vertragsparteien führen das durch das Verwaltungs-Übereinkommen vom 23. Oktober 1987 gegründete Gemeinsame Sekretariat für die Zusammenarbeit beim Schutz des Wattenmeers, im Folgenden als das „Gemeinsame Sekretariat“ bezeichnet, weiter.

(2) Die Aufgaben des Gemeinsamen Sekretariats werden von einem Sekretär wahrgenommen, der angemessene Unterstützung erhält.

Article 2**Functions of the Common Secretariat**

(1) The Common Secretariat shall facilitate the implementation of the Joint Declaration of the Trilateral Wadden Sea Cooperation and shall provide a focal point for support and coordination of all trilateral activities.

(2.1) The functions of the Common Secretariat under the guidance of the Wadden Sea Board shall encompass:

- to provide high quality Secretariat services to the Wadden Sea Governmental Council and the Wadden Sea Board;
- communication of the work of the Cooperation;
- maintenance and the enhancement of relationships with international partners on behalf of the Wadden Sea Board;
- support of the implementation of the Strategy and the Wadden Sea Plan;
- preparation of plans and reports for consideration and approval by the Wadden Sea Board;
- to collect and disseminate information on conservation measures;
- to analyse legal instruments and/or other means in each country, in existence or needed, in order to fulfil the obligations resulting from the instruments mentioned in the Joint Declaration;
- to make suggestions for a coordinated approach by the Parties in international fora;
- to make an assessment of measures being taken or to be taken by other states adjacent to the North Sea and by the European Union;
- to provide assistance with regard to scientific symposia;
- management of the budget of the Cooperation.

(2.2) A more detailed description of the functions of the Common Secretariat is listed in the Rules of Procedure and Finance, which shall be adopted by the Wadden Sea Board.

(3) The Wadden Sea Board shall establish the annual Work Plans of the Common Secretariat.

Article 3**Appointment of the Secretary**

(1) The Common Secretariat is headed by a Secretary who shall be appointed by the Wadden Sea Board. The Secretary shall be accountable to the Wadden Sea Board through the Chair of the Wadden Sea Board and shall report directly and regularly to the Chair. The Wadden Sea Board shall be responsible for reviewing the performance of the Secretary, annually.

(2) The Secretary shall be appointed for the period between two trilateral Governmental Conferences, which is normally 3 years. The tasks and duties of the Secretary are specified in the Rules of Procedure and Finance.

(3) Important decisions concerning the Secretary, including possible dismissal, shall be taken by the Wadden Sea Board according to the Rules of Procedure and Finance.

Article 4**Supervision of the Common Secretariat**

The Wadden Sea Board shall supervise the performance of the duties of the Common Secretariat.

Artikel 2**Aufgaben des Gemeinsamen Sekretariats**

(1) Das Gemeinsame Sekretariat unterstützt die Durchführung der Gemeinsamen Erklärung der dreiseitigen Wattenmeerzusammenarbeit und stellt eine zentrale Anlaufstelle für die Unterstützung und Koordinierung der dreiseitigen Aktivitäten dar.

(2.1) Die Aufgaben des Gemeinsamen Sekretariats unter Führung des Wattenmeer-Ausschusses umfassen Folgendes:

- Bereitstellung von Sekretariatsdiensten von hoher Qualität für den Wattenmeer-Rat und den Wattenmeer-Ausschuss;
- Kommunikation über die Arbeit der Wattenmeerzusammenarbeit;
- Erhalt und Verstärkung der Beziehungen zu internationalen Partnern im Auftrag des Wattenmeer-Ausschusses;
- Unterstützung bei der Umsetzung der Strategie und des Wattenmeer-Plans;
- Erstellung von Plänen und Berichten zur Berücksichtigung und Annahme durch den Wattenmeer-Ausschuss;
- Sammlung und Verbreitung von Informationen über Maßnahmen im Bereich des Naturschutzes;
- Prüfung des rechtlichen Instrumentariums und/oder sonstiger im jeweiligen Land vorhandener oder benötigter Mittel zur Erfüllung der Verpflichtungen, die sich aus dem in der Gemeinsamen Erklärung genannten Instrumentarium ergeben;
- Vorschläge für ein abgestimmtes Vorgehen der Vertragsparteien in internationalen Gremien;
- Bewertung der von anderen an die Nordsee angrenzenden Staaten und der Europäischen Union getroffenen oder zu treffenden Maßnahmen;
- Hilfeleistung im Zusammenhang mit wissenschaftlichen Symposien;
- Bewirtschaftung des Haushalts der Wattenmeerzusammenarbeit.

(2.2) Eine ausführlichere Beschreibung der Aufgaben des Gemeinsamen Sekretariats ist in der Geschäfts- und Finanzordnung enthalten, die vom Wattenmeer-Ausschuss angenommen wird.

(3) Der Wattenmeer-Ausschuss legt das jährliche Arbeitsprogramm des Gemeinsamen Sekretariats fest.

Artikel 3**Ernennung des Sekretärs**

(1) Das Gemeinsame Sekretariat wird von einem Sekretär geleitet; dieser wird vom Wattenmeer-Ausschuss ernannt. Der Sekretär ist über den Vorsitzenden dem Wattenmeer-Ausschuss rechenschaftspflichtig und erstattet dem Vorsitzenden unmittelbar und regelmäßig Bericht. Der Wattenmeer-Ausschuss ist für die jährliche Bewertung der Arbeitsleistung des Sekretärs verantwortlich.

(2) Der Sekretär wird für den Zeitraum zwischen zwei dreiseitigen Regierungskonferenzen, in der Regel drei Jahre, bestellt. Die Aufgaben und Pflichten des Sekretärs sind in der Geschäfts- und Finanzordnung beschrieben.

(3) Wichtige Entscheidungen, die den Sekretär betreffen, einschließlich seiner etwaigen Entlassung, werden vom Wattenmeer-Ausschuss im Einklang mit der Geschäfts- und Finanzordnung getroffen.

Artikel 4**Aufsicht über das Gemeinsame Sekretariat**

Der Wattenmeer-Ausschuss überwacht die Ausführung der Aufgaben des Gemeinsamen Sekretariats.

Article 5**Budget of the Common Secretariat**

(1) An indicative triennial budget for the Common Secretariat shall be prepared by the Secretary at the start of each triennium, marked by the triennial Governmental Conferences, and confirmed in annual budgets.

(2) Each of the Parties shall finance one third of the annual budget.

(3) The budget shares of the Parties shall be paid at the beginning of every budget year. The budget year of the Common Secretariat shall start on 1 January and end on 31 December of every calendar year. The accounts shall be closed at the end of the same year.

(4) The Wadden Sea Board shall adopt the triennial budget, the annual budgets, and the financial statements, including the salaries of the personnel of the Common Secretariat.

(5) Details are regulated in the Rules of Procedure and Finance.

Article 6**Working Language**

The working language of the Common Secretariat is English.

Article 7**Legal Status and Domicile**

(1) The Common Secretariat is located in the Federal Republic of Germany.

(2) The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety shall, without prejudice to the provisions of Article 3 (1) and Article 4, ensure the transition of the Common Secretariat to an existing or newly established organisational structure under German public law.

(3) The employees of the Common Secretariat shall be taken over with the same status as the current employment relationship. The new position should be in the same location or within the local area. Where the period of employment, service or probation governs the rights laid down in the Collective Agreement for the Public Service (TVöD) and in the collective agreements supplementing, amending or replacing the Agreement in the versions applicable for federal government employees, and in the Collective Agreement to Transfer Federal Employees to the Collective Agreement for the Public Service and to Regulate Transitional Law, periods of employment worked for the current employer shall be credited. Rights to non-cash benefits that were an integral part of the employment contract – where not covered by collective wage requirements and in due consideration of the principle of proportionality – shall be granted as special benefits outside of the collective wage framework as defined in the collective wage provisions.

Article 8**Amendments and Denunciation**

(1) This Agreement can only be amended with the consent of the three Parties.

(2) Each Party may denounce this Agreement by written notification to the other Parties. The denunciation shall take effect 12 months after the last Party has received the notification, under no circumstances however prior to expiry of the period for which the secretary is appointed.

Artikel 5**Haushalt des Sekretariats**

(1) Ein vorläufiger dreijährlicher Haushaltsplan wird vom Sekretär zu Beginn jedes Dreijahreszeitraums, der mit der alle drei Jahre stattfindenden Regierungskonferenz beginnt, für das Gemeinsame Sekretariat erstellt und in Jahreshaushalten bestätigt.

(2) Jede Vertragspartei finanziert ein Drittel des Jahreshaushalts.

(3) Die Beiträge der Vertragsparteien zum Haushalt werden zu Beginn jedes Haushaltsjahrs geleistet. Das Haushaltsjahr des Gemeinsamen Sekretariats beginnt am 1. Januar und endet am 31. Dezember eines jeden Jahres. Der Haushalt wird am Ende desselben Jahres abgeschlossen.

(4) Der Wattenmeer-Ausschuss genehmigt den dreijährlichen Haushaltsplan, den Jahreshaushalt und den Jahresabschluss einschließlich der Gehälter des Personals des Gemeinsamen Sekretariats.

(5) Einzelheiten sind in der Geschäfts- und Finanzordnung geregelt.

Artikel 6**Arbeitsprache**

Arbeitsprache des Gemeinsamen Sekretariats ist Englisch.

Artikel 7**Rechtsstellung und Sitz**

(1) Das Gemeinsame Sekretariat hat seinen Sitz in der Bundesrepublik Deutschland.

(2) Das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit gewährleistet unbeschadet des Artikels 3 Absatz 1 und des Artikels 4, dass das Gemeinsame Sekretariat in eine bestehende oder in eine zu gründende öffentlich-rechtliche Organisationsstruktur der Bundesrepublik Deutschland übergeführt wird.

(3) Die Beschäftigten des Gemeinsamen Sekretariats werden statusgleich aus dem bisherigen Arbeitsverhältnis übernommen. Der neue Arbeitsplatz soll an demselben Ort oder in dessen Einzugsgebiet liegen. Soweit für Ansprüche aus dem Tarifvertrag für den öffentlichen Dienst (TVöD) und den diesen ergänzenden, ändernden oder ersetzenden Tarifverträgen in der für den Bereich des Bundes jeweils geltenden Fassung sowie aus dem Tarifvertrag zur Überleitung der Beschäftigten des Bundes in den TVöD und zur Regelung des Übergangsrechts die Beschäftigungszeit beziehungsweise Dienst- oder Bewährungszeit maßgeblich ist, werden die bei dem bisherigen Arbeitgeber zurückgelegten Zeiten angerechnet. Geldwerte Ansprüche, die Bestandteil des Arbeitsvertrags waren, werden – soweit die tariflichen Voraussetzungen nicht vorliegen und der Grundsatz der Verhältnismäßigkeit gewahrt bleibt – als über beziehungsweise außertarifliche Leistungen entsprechend den tariflichen Bestimmungen weitergewährt.

Artikel 8**Änderungen und Kündigung**

(1) Dieses Übereinkommen kann nur mit Zustimmung der drei Vertragsparteien geändert werden.

(2) Jede Vertragspartei kann dieses Übereinkommen durch schriftliche Notifikation an die anderen Vertragsparteien kündigen. Die Kündigung tritt zwölf Monate nach dem Zeitpunkt in Kraft, zu dem die letzte Vertragspartei die Notifikation erhalten hat, auf keinen Fall jedoch vor Ablauf des Zeitraums, für den der Sekretär bestellt worden ist.

Article 9**Annulment of Former Agreement**

The Danish-German-Dutch Administrative Agreement on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea dated 23 October 1987 shall herewith be repealed on the date of entry into force of this Agreement.

Article 10**Entry into Force**

This Agreement shall enter into force on the date of signature.

Done at Westerland, Sylt on 18 March 2010 in three copies in the English language.

Artikel 9**Aufhebung des bisherigen Übereinkommens**

Das dänisch-deutsch-niederländische Verwaltungs-Übereinkommen vom 23. Oktober 1987 über ein Gemeinsames Sekretariat für die Zusammenarbeit beim Schutz des Wattenmeers wird hiermit am Tag des Inkrafttretens dieses Übereinkommens außer Kraft gesetzt.

Artikel 10**Inkrafttreten**

Dieses Übereinkommen tritt am Tag seiner Unterzeichnung in Kraft.

Geschehen zu Westerland (Sylt) am 18. März 2010 in drei Urschriften in englischer Sprache.

Für das Ministerium für Umwelt Dänemarks
For the Ministry of the Environment of Denmark

Karen Ellemann

Für das Bundesministerium für Umwelt, Naturschutz
und Reaktorsicherheit der Bundesrepublik Deutschland
For the Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

Ursula Heinen-Esser

Für das Ministerium für Landwirtschaft,
Natur und Lebensmittelqualität der Niederlande
For the Ministry of Agriculture,
Nature and Food Quality of the Netherlands

Gerda Verburg

Annex 8

**Agreement on the Conservation of Seals
in the Wadden Sea according to Article 4
of the Convention on the Conservation of
Migratory Species of Wild Animals
(CMS, Bonn Convention), 1990.**

Agreement on the Conservation of Seals in the Wadden Sea, 1990

The Parties,

RECOGNIZING that seals are an irreplaceable component of the Wadden Sea ecosystem and that they are of great importance as indicators of its condition;

AWARE that they constitute a separate population whose main range and the main migration routes are located in the Wadden Sea and which should, as a consequence, be managed as a single unit;

DEEPLY CONCERNED by the conservation status of that population, which as the result of mass deaths of seals has been reduced to the lowest level ever recorded;

WITH A VIEW to improving this conservation status through concerted action on the part of the States that exercise jurisdiction over the range of that population;

RECALLING the Convention on the Conservation of Migratory Species of Wild Animals signed at Bonn on 23 June 1979 and notably its Appendix II which was amended in 1985 to include the Wadden Sea population of the common or harbour seal;

RECALLING the Joint Declaration on the Protection of the Wadden Sea, adopted at the Third Governmental Meeting on the Protection of the Wadden Sea in Copenhagen on 9 December 1982;

RECALLING the Declarations adopted by the First International Conference on the Protection of the North Sea, Bremen, 1 November 1984, and the Second International Conference on the Protection of the North Sea, London, 25 November 1987;

RECALLING the trilateral Administrative Agreement on a Common Secretariat for the Cooperation on the Protection of the Wadden Sea of 23 October 1987;

HAVE AGREED as follows:

I. Relationship with the Convention

This Agreement shall be deemed to be an agreement as defined in Article IV paragraph 4 of the Convention on the Conservation of Migratory Species of Wild Animals signed at Bonn on 23 June 1979.

II. Definitions

For the purpose of this Agreement:

- a) "seal" means an animal of the species *Phoca vitulina*;
- b) the "Agreement Area" means the area of water known as the Wadden Sea, including all sandbanks therein as well as all shore areas of the North Sea coasts of Denmark, the Federal Republic of Germany and the Netherlands between Blaavandshuk to the north and Den Helder to the west. The main ranges and the main migration routes are located in the Wadden Sea;
- c) "seal population" means all seals which, at any time, are present in the Agreement Area;
- d) "habitat" means any part of the Agreement Area which is essential to the maintenance of the vital biological functions of seals, including but not limited to breeding, whelping, nursing, feeding or resting;
- e) "Convention" means the Convention on the Conservation of Migratory Species of Wild Animals signed at Bonn on 23 June 1979;
- f) the terms defined in Article I, sub-paragraphs 1 (a) to (d) and 1 (I) of the Convention shall have the same meaning in this Agreement.

III. Purpose and Object

The Parties shall cooperate closely with a view to achieving and maintaining a favourable conservation status for the seal population.

IV. Conservation and Management Plan

The Parties shall develop on the basis of scientific knowledge a conservation and management plan for the seal population. This plan shall contain a comprehensive statement of actions which are or are to be undertaken by the Parties to achieve the goals of this Agreement. The Parties shall keep the plan under review and amend it, as may be required, taking into consideration, in particular, the results of scientific research.

V. Research and Monitoring

1. 1. The Parties shall co-ordinate their research programmes and projects and their monitoring of the seal population to increase their knowledge of the biology and the habitats including harmful effects of human activities on the seal population to provide a basis for measures to improve its conservation status.
2. 2. They shall, in particular, monitor and co-ordinate their research on,
 - a) population trends e.g. through periodic aerial surveys and counts;
 - b) seal migration;
 - c) seal population parameters, e.g. diseases, survival, age structure, sex ratio.

VI. Taking

1. 1. The Parties shall prohibit the taking of seals from the Wadden Sea.
2. 2. The competent authorities may grant exemptions from the prohibition referred to in the first paragraph authorizing persons to take seals:

- for institutions to be designated performing scientific research into the conservation of the seal population in the Wadden Sea or the conservation of the Wadden Sea ecosystem, insofar as the information required for such research cannot be obtained in any other way; or
- for institutions to be designated nursing seals in order to release them after recovery, insofar as these are diseased or weakened seals or evidently abandoned suckling seals.

Seals which are clearly suffering and cannot survive may be killed by the persons referred to in this paragraph.

1. 3. Any Party having granted exemptions as mentioned above shall notify the other Parties as soon as possible and provide them with an opportunity for review and comment.
2. 4. The Parties shall take appropriate action to suppress illegal hunting and taking of seals.

VII. Habitats

1. 1. The Parties shall take appropriate measures for the protection of habitats. They shall pay due regard to the necessity of creating and maintaining a network of protected areas also in the migration areas of the seals in the Agreement Area and of ensuring the preservation of areas which are essential to the maintenance of the vital biological functions of seals.
2. 2. The Parties shall preserve habitats and seals present from undue disturbances or changes resulting, directly or indirectly, from human activities.
3. 3. The Parties shall have regard to the protection of habitats from adverse effects resulting from activities carried out outside the Agreement Area.
4. 4. The Parties shall explore the possibility of restoring degraded habitats and of creating new ones.

VIII. Pollution

The Wadden Sea States are determined to do their utmost to further reduce pollution of the North Sea from whatever source with the aim of conserving and protecting the Agreement Area.

To this end they shall:

- a) endeavour to identify the sources of such pollution;
- b) co-ordinate their research projects regarding seal diseases and the effects on the seal population of

such substances, e. g. organochlorine compounds, heavy metals and oil, and agree on methods which permit a comparison of research results; c) monitor in the Agreement Area, in particular in seal tissues and in organisms which are preyed upon by seals, the levels of those substances which in the light of the results of research appear to play a major role in the conservation status of the seal population.

IX. Responsible Authorities

Each Party shall inform the other Parties of the authorities which shall be responsible for the implementation of this Agreement.

X. Public Awareness

The Parties shall take such measures as may be required to make the general public aware of the conservation status of the seal population, of the content and aims of this Agreement, and of the measures they have taken pursuant to this Agreement, including the Conservation and Management Plan, to improve this conservation status.

XI. Amendment of the Agreement

Any Party may propose amendments to this Agreement. Any such proposed amendment shall be submitted to the Depositary and communicated by it to all Parties, which shall inform the Depositary of their acceptance or rejection of the amendment as soon as possible after the receipt of the communication. The amendment shall enter into force ninety days after the Depositary has received notifications of acceptance of that amendment from all Parties.

XII. Effects on International Conventions and other Legislation

1. 1. The provisions of this Agreement shall in no way affect the rights or obligations of any Party deriving from any existing bilateral or multilateral convention.
2. 2. The provisions of this Agreement shall in no way affect the right of Parties to adopt stricter domestic measures concerning the conservation of seals.

XIII. Settlement of Disputes

1. 1. Any dispute which may arise between the Parties with respect to the interpretation or application of the provisions of this Agreement shall be subject to negotiation between the Parties involved in the dispute.
2. 2. If the dispute cannot be resolved in accordance with paragraph 1 of this Article within six months, the procedure provided for in the European Convention for the peaceful settlement of disputes of 29 April 1957 shall be followed.

XIV. Reservation

The provisions of this Agreement shall not be subject to reservations.

XV. Ratification, Acceptance, Approval

This Agreement shall be subject to ratification, acceptance or approval. Instruments of ratification, acceptance or approval shall be deposited with the Government of the Federal Republic of Germany,

which shall be the Depositary.

XVI. Entry into Force

This Agreement shall enter into force on the first day of the third month following the date of deposit of the third instrument of ratification, acceptance, approval or accession with the Depositary.

XVII. Denunciation

At any time, after the expiration of a period of five years from the date of entry into force of this Agreement, any Party may by written notice to the Depositary denounce this Agreement with effect from the end of a calendar year. This Agreement shall be terminated twelve months after the Depositary has received such notice.

XVIII. Depositary

1. 1. The original of this Agreement, in the Danish, Dutch, English and German languages, each version being equally authentic, shall be deposited with the Depositary. The Depositary shall transmit certified copies of each of these versions to the States which have signed the Agreement and the Secretariat of the Convention.

2. 2. The Depositary shall inform all signatory States and the Secretariat of the Convention of signatures, deposit of instruments of ratification, acceptance, approval or accession, entry into force of this Agreement, amendments thereto, and notices of denunciation.

3. 3. As soon as this Agreement enters into force, a certified copy thereof shall be transmitted by the Depositary to the Secretariat of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations, and to the Secretariat of the Convention.

IN WITNESS WHEREOF the undersigned, being duly authorized to that effect, have signed this Agreement.

DONE at Bonn on 16 October 1990

For the Government of the Kingdom of Denmark

For the Government of the Federal Republic of Germany

For the Government of the Kingdom of the Netherlands

Annex 9

Trilateral Wadden Sea Plan 2010.

Wadden Sea Plan 2010



11th Trilateral Governmental Conference
on the Protection of the Wadden Sea,
Westerland/Sylt 18 March 2010

Wadden Sea Plan 2010

**ELEVENTH TRILATERAL GOVERNMENTAL
CONFERENCE ON THE PROTECTION
OF THE WADDEN SEA
WESTERLAND/SYLT, 18 MARCH 2010**

COLOPHON

Publisher

Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany

Cover

xxxx

Language Check

Seabury Salmon

Lay-out

CWSS

Published

2010

This publication should be cited as:

Common Wadden Sea Secretariat, 2010. Wadden Sea Plan 2010. Eleventh Trilateral Governmental Conference on the Protection of the Wadden Sea. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

PREFACE

The 11th Trilateral Governmental Conference on the Protection of the Wadden was held on the German Wadden Sea island of Sylt on 17 - 18 March 2010 under the chairmanship of the German State Secretary Ursula Heinen-Esser. The Dutch and the Danish governments were represented by Minister Gerda Verburg and Minister Karen Ellemann.

The Ministerial Council adopted a revised Wadden Sea Plan. The 2010 Wadden Sea Plan updates the trilateral policies and management since the first Wadden Sea Plan was adopted at the 8th Conference in Stade in 1997. The Wadden Sea Plan constitutes the common framework for the protection and sustainable management of the Wadden Sea as an ecological entity.

Common Wadden Sea Secretariat
December 2010

CONTENTS

Introduction	7
I. Integrated Ecosystem Management	11
1 The Ecosystem Approach	13
2 Overarching themes	21
II. The Targets	25
1 Landscape and Culture	27
2 Water and Sediment	31
3 Salt Marshes	35
4 Tidal Area	41
5 Beaches and Dunes	49
6 Estuaries	53
7 Offshore Area	57
8 Rural Area	61
9 Birds	65
10 Marine Mammals	73
11 Fish	77
III. Implementation	81
1 Monitoring and Assessment	83
2 Implementation and Review	89
3 Communication, Information and Education	91
Maps	
Map 1: Wadden Sea Area and Conservation Area	95
Map 2: Wadden Sea Habitats	97
Map 3: Cultural Entities	99
Map 4: Natura 2000 Areas in the Wadden Sea	101

INTRODUCTION

AIM AND BACKGROUND

The Wadden Sea, encompassing the coastal zone from Den Helder in The Netherlands to Blåvands Huk in Denmark, is an exceptional ecosystem of global importance, and together with its cultural landscapes is a shared responsibility of the three countries.

The vision of the Trilateral Wadden Sea Cooperation is a Wadden Sea which is a unique, natural and dynamic ecosystem with characteristic biodiversity, vast open landscapes and rich cultural heritage, enjoyed by all, and delivering benefits in a sustainable way to present and future generations.

1. The participating Governments have identified a Wadden Sea Cooperation Area and within this a Nature Conservation Area as the geographical basis of their Cooperation (see Map 1):

The Wadden Sea Cooperation Area in short 'Wadden Sea Area':

- the area seaward of the main dike, or where the main dike is absent, the spring-high-tide waterline, and in the rivers, the brackish water limit;
- an offshore zone 3 nautical miles from the baseline as fixed nationally or where the Nature Conservation Area exceeds the 3 nautical mile the offshore boundaries of the Nature Conservation Area;
- corresponding inland areas to the designated Ramsar and/or EC Bird Directive areas being the adjacent inland marsh areas of the Danish Wadden Sea Region designated as international nature protection areas and the Bird Directive Areas of Schleswig-Holstein adjacent to the Nature Conservation Area;
- the islands.

The 'Nature Conservation Area':

- In The Netherlands, the areas under the Key Planning Decision Wadden Sea;
- In Germany, the Wadden Sea national parks and the protected areas under the Nature Conservation Acts seaward of the main dike and the brackish water limit;
- In Denmark, the Wildlife and Nature Reserve Wadden Sea.

The Cultural Entities

For the specific purposes of cooperation on landscape and cultural heritage the Wadden Sea Area, and an area beyond, has been identified to include the main cultural entities. 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.

2. The Wadden Sea Plan (WSP-2010) provides, in accordance with the Joint Declaration on the Protection of the Wadden Sea, a framework for the integrated management of the Wadden Sea Area as an ecological entity, as well as its landscape and cultural heritage, within the cultural entities. It sets out a series of Targets, as well as policies, measures, projects and actions to achieve these Targets, to be implemented by the Wadden Sea countries.
3. The Plan is a political agreement (meaning it is a legally non-binding document of common political interest) and will be implemented by the three countries in cooperation, and individually, by the competent authorities on the basis of existing legislation and through the participation of interest groups.

4. Through WSP-2010 the objectives of the Trilateral Cooperation, as contained in the **Joint Declaration**, will be implemented, *i.e.* achieving
 - a. a natural ecosystem, its functions and characteristic biodiversity;
 - b. resilience to climate change and other impacts;
 - c. maintenance of the landscape and cultural heritage;
 - d. sustainable use as defined by the Convention on Biological Diversity and the Habitats Directive;
 - e. public support for the protection of the Wadden Sea.
5. In relation to the Wadden Sea World Heritage Property, the WSP-2010 also serves as the overall management plan to ensure the coordinated management of the Property.
6. WSP-2010 was developed with the participation of local and regional authorities and interest groups. It is a further development of WSP-1997, adopted at the 8th Trilateral Governmental Wadden Sea Conference (TGC-8; Stade 1997), following a decision by the TGC-6 (Esbjerg, 1991) to elaborate a management plan covering the Wadden Sea from Den Helder to Blåvands Huk in order to further substantiate the joint coherent protection. At the 1991 Esbjerg Conference and the subsequent TGC-7, (Leeuwarden, 1994), the cornerstones of the Wadden Sea Plan were adopted: the delimitation of the Trilateral Area of Cooperation and Conservation, the Guiding Principle, the Management Principles, and the Targets.
7. At TGC-10 (Schiermonnikoog, 2005) it was acknowledged that in order to continue and further intensify the cooperation for the protection of the Wadden Sea as an ecological entity, a coordinated and consistent implementation of the European legislation in a transparent way must be ensured. It was therefore agreed to further develop the WSP in accordance with the stipulations entailed in the Habitats, Birds and Water Framework Directives and other European Union directives and regulations, in particular Article 6 (1) of the Habitats Directive.
Therefore the WSP incorporates the relevant EU directives, especially the Birds and Habitats directives, into the management of the Wadden Sea Area.
8. This also encompasses the landscape and culture heritage of the Wadden Sea and will include the relevant regional and local level, with the task to get a detailed insight in best practice and to develop common trilateral strategies for the future management of these assets.
It will furthermore include reviewing the Wadden Sea Forum recommendations for sustainable human use.

INTEGRATED ECOSYSTEM MANAGEMENT

9. The objectives of WSP-2010 will be achieved by applying *inter alia* the instrument of Integrated Coastal Zone Management and by harmonizing conservation objectives and good ecological status to the extent possible and at different levels of implementation, ranging from their definitions to harmonised methodologies for their assessment.
10. In compliance with national legal provisions, the focal point of trilateral nature conservation policy and management is directed towards achieving the Guiding Principle for "the Nature Conservation Area", as laid down in the "Joint Declaration", *i.e.* "to achieve as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way".
Such an ecosystem contains the full range of natural and dynamic habitats (see Map 2), each of which needing a certain quality (natural dynamics, presence of typical species, absence of disturbance, absence of pollution), which can be reached by proper conservation and management. The quality of the habitats shall be maintained or improved by working towards achieving Targets which have been agreed upon for the tidal area, the offshore area, estuaries, salt marshes, beaches and dunes, the

rural area, water and sediment quality, fish, birds and marine mammals, as well as landscape and cultural aspects.

In addition to the Guiding Principle, seven Management Principles have been adopted which are fundamental to decisions concerning protection and management within the Wadden Sea Area:

- the Principle of Careful Decision Making, *i.e.* to take decisions on the basis of the best available information;
 - the Principle of Avoidance, *i.e.* activities which are potentially damaging to the Wadden Sea should be avoided;
 - the Precautionary Principle, *i.e.* to take action to avoid activities which are assumed to have significant damaging impact on the environment, even where there is no sufficient scientific evidence to prove a causal link between activities and their impact;
 - the Principle of Translocation, *i.e.* to translocate activities which are harmful to the Wadden Sea environment to areas where they will cause less environmental impact;
 - the Principle of Compensation, *i.e.* that the harmful effect of activities which cannot be avoided, must be balanced by compensatory measures; in those parts of the Wadden Sea where the Principle has not yet been implemented, compensatory measures will be aimed for;
 - the Principle of Restoration, *i.e.* that, where possible, parts of the Wadden Sea should be restored if it can be demonstrated by reference studies that the actual situation is not optimal, and that the original state is likely to be re-established;
 - the Principles of Best Available Techniques and Best Environmental Practice, as defined by the Paris Commission.
11. The Targets of the Wadden Sea Plan are consistent with the national conservation objectives for habitat types and species in accordance with the EC Habitats and Bird Directives and national conservation laws, as well as water bodies and definitions of good chemical and ecological status in accordance with the EC Water Framework Directive. However, the three Wadden Sea states acknowledge some differences in their implementations of definitions of the Habitats Directive.
 12. As stated in the Joint Declaration, the participating Governments will, in the measures they take, be guided by the Guiding Principle, the Precautionary Principle and Article 6 of the Habitats Directive.
 13. The Targets are a specification of the UNESCO criteria which apply to the Wadden Sea World Heritage property in The Netherlands and in Germany and serve to implement these criteria.
 14. The landscape and cultural heritage compliments the natural and environmental heritage. Despite local and regional diversity, the Wadden Sea has a common history in developing and shaping the landscape, in human survival adaptation strategies and techniques that have created a unique cultural heritage.
 15. The Integrated Ecosystem Management approach is further specified in the Chapter "Integrated management". This chapter also addresses a number of issues, with an overarching character. It concerns climate change, alien species and shipping.

PRECONDITIONS

16. The inhabitants of the coastal marshes and the islands in the larger Wadden Sea region depend upon an adequate coastal protection in a changing climate. The implementation of the Plan will not affect the priority of coastal flood defence and protection and the safety of the local inhabitants against the sea.

17. In accordance with the Joint Declaration, unreasonable impairment of the interests of the local population and its traditional uses in the Wadden Sea Area has to be avoided. Any user interests have to be weighed on a fair and equitable basis in the light of the purpose of protection in general, and the particular case concerned.

ECONOMIC DEVELOPMENT AND POTENTIALS

18. Within the constraints of suitable protection and natural development of the Wadden Sea, economic activities and development remain possible. Tourism and recreation, agriculture, industry, shipping, and fisheries have considerable economic significance for the Wadden Sea and sustainable human uses will continue. They must be continuously balanced in a harmonious relationship between the needs of society and ecological integrity. This will be done in cooperation with stakeholder fora and organizations, e.g. the Wadden Sea Forum.
19. Parts of the Wadden Sea Area of The Netherlands and Germany have been designated by the UNESCO as biosphere reserves participating in the worldwide network of the Man and Biosphere Program (MAB). MAB Reserves are protected areas of representative terrestrial and coastal environments, which have been internationally recognized under the United Nations Educational, Scientific and Cultural Organization (UNESCO) MAB Program for their value in conservation and in providing the scientific knowledge, skills and human values to support sustainable economical development. The WSP encompasses the management of the biosphere reserves.
20. After establishment of nearly the whole German Wadden Sea as National Parks in the years 1985, 1986 and 1990, Denmark has declared most of its Wadden Sea Area, including the islands and some embanked marshlands on the mainland, as National Park in 2010. The aim of the Danish National Park is to maintain a high nature protection level and to improve the culture and landscape aspects, in combination with improved economic sustainable development in order to contribute to a more viable region.

COMMUNICATION, INFORMATION AND EDUCATION

21. For the successful implementation of the Wadden Sea Plan and the long-term protection of the Wadden Sea as an entity, the awareness and support of the people living in this region is important. Communication, stakeholder involvement, information and education are a prerequisite for raising awareness and support. The trilateral approach to communication, information and education is specified in Chapter III.3.

IMPLEMENTATION AND REVIEW

22. Progress on implementing the trilateral policies and management in the Wadden Sea Plan will be evaluated every 6 years. As appropriate, the Plan will be amended on the basis of the conclusions and recommendations of the review process, which is specified in the Chapter III.2.
23. Projects and actions for implementing the trilateral policies are contained in a separate document to be developed and adopted by the Wadden Sea Board.



I. Integrated Ecosystem Management

1 The Ecosystem Approach as applied to the Wadden Sea

1.1 INTRODUCTION

The key message of the Joint Declaration (JD) is that Wadden Sea states will "... continue to manage the Wadden Sea as a single ecological entity for its natural, landscape and cultural heritage values, for the benefit of present and future generations"

The challenge of the Trilateral Wadden Sea Cooperation (TWSC) is to implement ecosystem management of the Wadden Sea Area by applying and integrating relevant EU Directives, as set out in §6 of the Schiermonnikoog Declaration (2005): "... a coordinated and consistent implementation of the European legislation [...] in particular Article 6 (1) of the Habitats Directive [...] and to develop common trilateral strategies for the future management of the landscape and cultural heritage."

The Objectives of the TWSC, as laid down in the JD and § 4 of the Introduction, are particularly relevant for an integrated ecosystem approach.

According to the **Convention on Biodiversity (CBD)**, the ecosystem approach "is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention (conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources). It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems." [CBD, 2000]

In the Preamble to the **Habitats Directive** it is stated "Whereas, the main aim of this Directive being to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, this Directive makes a contribution to the general objective of sustainable development."

Three central elements in the above definitions are essential for integrated management of human activities:

1. The conservation and protection of ecosystem processes, functions, habitats and species and their interactions;
2. Sustainable human use;
3. Cultural diversity.

According to the first element, human activities in ecosystems must be managed for all aspects of the system, not only species or habitats but also processes and interactions.

The second element acknowledges that sustainable human use must be possible and integrated with ecosystem protection and that cultural diversity is part of an integrated approach.

The remainder of this Chapter addresses these elements in more detail:

Section 1.2 addresses the trilateral Targets and relevant EC Directives (Habitats and Birds, Water Framework, Marine Strategy Framework) from the perspective of an integrated ecosystem management approach.

Section 1.3 deals with Landscape and Culture.

Section 1.4 covers the World Heritage Property Wadden Sea.

Section 1.5 deals with sustainable use, in particular its management in and adjacent to the Wadden Sea Area.

In **Section 1.6**, the overall trilateral policy regarding integrated ecosystem management is formulated.

1.2 EC DIRECTIVES

The 1992 Habitats Directive (HD) deals with specific habitats and species which have their own defined characteristics and are clearly delimited in space. Together with the 1979 Birds Directive (BD), it provides the legal basis for establishing a Europe-wide network of representative protected areas (Natura 2000). The Habitats Directive requires member states to designate specific habitats and habitats for specific species as conservation areas and the adoption of conservation objectives for these habitats and species.

The aim is to achieve favourable conservation status for designated species and habitats. The conservation status of a habitat is favourable if: its natural range and area is stable or increasing; if the specific structure and functions necessary for its long-term maintenance exist and are likely to continue for the foreseeable future; and if the conservation status of its typical species is favourable. The latter is the case if the species concerned is a viable part of its natural habitats on a long-term basis, its natural range is not reduced in the foreseeable future and its habitats remain sufficiently large.

The Water Framework Directive (WFD, 2000) aims at improving the aquatic environment. It requires that Member States take a new, holistic approach to managing their waters. Member states are all required to implement the necessary measures in order to achieve "good status" by 2015 in all rivers, lakes, transitional waters, coastal waters and groundwater. "Good ecological status" for surface waters is defined through biological, hydromorphological, chemical and physico-chemical Quality Elements. The specific definition of the status of each quality element for each water category is provided in the Annexes to the Directive. Additionally, surface waters also have to have a good chemical status.

The implementation of the Directive and the setting and achievement of good status and other environmental objectives and targets are to be based on a river basin district structure. Management plans and programmes of measures must be developed for each river basin district.

There is a requirement within the Directive for the linkages between surface and groundwater and water quantity and water quality to be taken into account in meeting objectives. There is also a requirement for the integration of the management of water-dependent Natura 2000 sites and river basin plans, and moreover, consideration must be given to the water needs of wetlands.

The aim of the Marine Strategy Framework Directive (MSFD, 2008) is to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest. It requires the development and implementation of strategies to (a) protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected; and (b) prevent and reduce inputs in the marine environment, with a view to phasing out pollution, so as to ensure that there are no significant impacts on, or risks to, marine biodiversity, marine ecosystems, human health or legitimate uses of the sea. It requires the application of an ecosystem-based approach to the management of human activities and the integration of environmental concerns into the different policies, agreements and legislative measures which have an impact on the marine environment. Table 1 provides a brief comparison of the four Directives.

EC Directives and the ecosystem approach

The above Directives are the main legal instruments for implementing an ecosystem approach but are not ideal for this purpose. This is due to three main factors:

1. Structural differences between the three Directives;
2. Inherent deficiencies within each Directive;
3. Differences in national implementation.

The first factor is related to the broad time span over which the Directives have been developed. This has resulted in substantial differences in structures, making it difficult to integrate the three instruments at the administrative level.

Factor 2 relates to the development history of the three Directives. The differences in contents reflect important developments in nature and environment policies over almost three decades, starting with a sectoral approach (Birds Directive) and ending with a much more integrative approach (MSFD).

Table 1: Comparison of EC Habitats and Birds Directives (HD, BD), Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD).

	BD + HD	WFD	MSFD
General objective	Favourable conservation status	Good ecological status / potential & good chemical status	Good environmental status
Indicators	Habitat (range, structure and function, characteristic/ typical species) Rare species (population, range, maintenance)	Biological (species composition and abundance) hydro-morphological, chemical and physico-chemical Quality Elements	Biological, physical and chemical characteristics, pressures and impacts Environmental targets and associated indicators
Reporting unit	Habitat type, species	Water body	Marine regions
Scale	Per country / bio-geographic area	River basin district	Marine (sub)regions (overlap with WFD)
Time	2007 ¹ , 2015 ¹	2015 ² , 2021 ²	2020 ²
Management plan	N2000 management plan (Art. 6)	River basins management plan (Art 13, 11)	Programme of measures (Art. 13)

¹ Reporting re. HD; ² Reaching Status

As a result, the Directives apply principally different concepts. The HD was the first of the integrative framework directives and focuses on the protection of individual habitats and not on ecosystems as a whole with their different interacting habitats and species.

The WFD has a more integrative approach, but focuses mainly on the status of designated water bodies and not on key ecosystem processes. Biological quality elements are essential to define the status of surface water bodies according to the WFD, but only certain aquatic species are covered, e.g. not birds or mammals.

The MSFD is the "most integrated" Directive. Its relevance for an integrated ecosystem approach for the Wadden Sea ecosystem has not yet been analysed in detail.

Factor 3 is particularly relevant for the management of the Wadden Sea ecosystem, being a transboundary protected area. Because EU Member States implement framework directives at the national level (subsidiarity principle), differences may arise in the designation of areas covered by the directives, as well as conservation and protection aims.

For the Wadden Sea, the various national conservation objectives for habitats and species and the definition of good ecological status have proved to be highly comparable. Moreover, within the EU framework, work is ongoing to further harmonise and tune national implementation, as well as monitoring and assessment methodologies under the above mentioned Directives. This includes e.g. an intercalibration process under the WFD.

There are, however, also some important differences and inconsistencies (see list below).

Habitats and Birds Directives

a. Differences in the designation of Wadden Sea typical habitat and species types

- NL has designated the tidal and offshore area as types 1110 (sandbanks which are slightly covered by seawater all the time) and 1140 (mudflats and sandflats are not covered by seawater at low tide) only. Germany and Denmark have also designated types 1130 (estuaries), 1150 (coastal lagoons), 1160 (large shallow inlets and bays) and 1170 (reefs).*

(*Following the recent clarification on the common definition of 1170 at EU level, the designation of eulitoral mussel banks as reefs in Germany will be revised at the next revision of the standard data forms.)

- There is much variation in the designation of bird species: only 25% of all relevant bird species is commonly designated.

- Variation in designation of fish species under the Habitats Directive.
- b. Differences in the definition of habitat/species conservation objectives
 - Quantified bird conservation objectives in NL and DK. Qualified objectives in D, mainly related to habitat quality.
 - The marine mammal objectives formulated by The Netherlands partly comply with the relevant trilateral Target.
- c. Differences in assessment of size and quality of various habitat types
 - Habitat type 1170 (reefs)
 - Habitat type 1110 (sandbanks which are slightly covered by seawater all the time)
- d. Differences in management policy
 - In NL and DK region-specific Natura 2000 management plans will be developed. In D, the WSP provides the management framework for the Wadden Sea national parks, supplemented by sectoral plans and specific Natura 2000 management plans for bordering sites inside the cooperation area.

Water Framework Directive

- a. Differences in development of WFD reference conditions and classification tools.
 - The development of tools, testing and adaptation of tools as well as fine-tuning is carried out with (partly) different approaches and time scales.
- b. Differences in designation of water bodies
 - Different types and numbers of water bodies (WB): In NL and DK, the Wadden Sea tidal area (intertidal and subtidal) is a single WB. In D, all four WB types have been assigned with a total number of 26 separate WBs (incl. Ems).
 - NL has assigned a 1 sm strip along the Wadden Sea mainland coast as Heavily Modified Water Body (HMWB). In D, only transitional waters are HMWB.
 - DK has no transitional water bodies within its sea territory and has not assigned HMWB in the Wadden Sea Area.
- c. Development of management plans
 - Tuning of WFD and HD not yet carried out (assessment criteria, conservation objectives).
 - Regional differences (e.g. eutrophication) still exist.

Marine Strategy Framework Directive

- a. Differences in application
 - NL complies with the MSFD concerning the articles 2(1) and 3(1) sub a and b. NL will apply the MSFD to the part of the offshore area from the baseline to 3 nautical miles.
 - D and DK will apply the MSFD to the whole Wadden Sea according to Art. 3 (1) of the directive.

The trilateral Target concept

The trilateral Target concept is principally an integrated ecosystem concept and therefore goes beyond the above EC directives. The Target concept fully covers and integrates the Habitats and Birds Directives, the Water Framework Directive and the World Heritage criteria (see Table 2).

The Targets are consistent with the Conservation Objectives and Good Ecological Status approach from the Directives and additionally serve the World Heritage criteria.

The Target concept is, furthermore, a trilateral concept relevant for the whole Wadden Sea Area. It is the common basis for the harmonisation of the different national approaches under the EC Directives.

Table 2: Thematic overlap of Wadden Sea Plan Targets with issues from the EC Directives and the World Heritage criteria

TOPIC	Wadden Sea Plan Targets	Habitats / Birds Directive	WFD	MSFD	World Heritage Criteria
Landscape + Culture	+	-	-		
Water and Sediment	+	(indirectly)	+	+	VIII, IX
Salt Marshes	+	+	+		VIII, IX, X
Tidal Area (eu- / sub-litoral)	+	+	+	+	VIII, IX, X
Beaches and Dunes	+	+	-		VIII, IX, X
Estuaries	+	+	+		VIII, IX, X
Offshore Zone	+	+	-	+	VIII, IX, X
Rural Area	+	+	-		
Birds	+	+	-	+	X
Marine Mammals	+	+	-	+	X
Fish	+	+	+ (transitional)	+	X

1.3 LANDSCAPE AND CULTURE

The cultural landscape heritage complements the natural and environmental assets in the Wadden Sea. Despite local and regional diversity, the Wadden Sea contains a common history in developing and shaping the landscape, in human survival adaptation strategies and techniques and a unique cultural heritage.

Based upon the WSP 1997, two projects regarding the maintenance and planning of the Wadden Sea landscape and cultural heritage have been carried out (Lancewad and LancewadPlan). These projects emphasized that the management of landscape and the cultural heritage is an issue of integrated spatial planning and the implementation of a trilateral strategy should be carried out by, or in close cooperation with, all administrative levels and with support of the people living and working in the region. The involvement of stakeholders is essential for the wise management of the heritage and, in particular, further integration of natural and landscape management should be an aim.

1.4 WORLD HERITAGE PROPERTY

In 2009 the nominated Wadden Sea of The Netherlands, Niedersachsen and Schleswig-Holstein was inscribed in the World Heritage list.

The inscription of the Wadden Sea as **World Heritage Property** is based upon the following criteria

- Criterion VIII: "outstanding examples representing major stages of Earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features"
- Criterion IX: "outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals"
- Criterion X: "contain the most important and significant natural habitats for *in situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation"

These criteria are fully covered by the trilateral Targets, as shown in Table 2.

1.5 SUSTAINABLE USE

The trilateral Wadden Sea Cooperation applies the concept of sustainable use as defined by the Convention on Biological Diversity in protecting and conserving the ecological integrity of the Wadden Sea ecosystem, thus supporting lasting economic prosperity and social well-being.

There are several approaches and instruments applied within the Wadden Sea Region through which sustainable use is developed and promoted. It concerns Integrated Coastal Zone Management (ICZM), zoning instruments, the Man and Biosphere (MAB) approach as well as many examples of interaction with stakeholders

1.5.1 Integrated Coastal Zone Management

Integrated Coastal Zone Management (ICZM) is a concept for achieving sustainable use in the coastal area. In the recommendation of the EU Council and Parliament on ICZM (2002/413/), member states were asked to prepare national ICZM strategies based upon the following principles:

1. A holistic approach and strategic planning (land-sea approach);
2. A long-term perspective;
3. A long-term process;
4. Reflecting local/regional conditions;
5. Working with natural processes;
6. Participative planning;
7. Involvement of all layers of government;
8. Coherent use of a combination of instruments.

Following the ICZM Recommendation, most EU Member States have prepared national strategies for ICZM. At the 10th Wadden Sea Conference, Wadden Sea states agreed to contribute to their national ICZM strategies in a trilaterally coordinated way, in consultation with the Wadden Sea Forum (Sch.D. §13).

In §4c of the Joint Declaration, ICZM is listed as one of the areas of cooperation of the TWSC.

1.5.2 Zoning

Zoning is a management instrument, partly implemented by law, to balance nature protection and human use of the Wadden Sea in space and time. Zoning covers regulations and measures related to specified geographical areas in the Wadden Sea Area to avoid and/or to alleviate conflicting interests in space and time within a protected area. This also includes temporal or permanent closure of areas.

In each country, zoning regulations for specific activities like agriculture, hunting, fisheries or tourism are implemented. Additional general zoning systems are in force in the three countries, regulating several human activities in the whole Wadden Sea Cooperation Area.

Comparing the different approaches to zoning, it appears that some similarities exist with regard to the zoning systems, although, in a formal sense, different protection regimes are implemented in The Netherlands, the three German Federal States and in Denmark.

1.5.3 Man and Biosphere

Biosphere Reserves are protected areas of representative terrestrial and coastal environments or a combination of both, which are designated according to international guidelines in the framework of the UNESCO "Man and Biosphere" (MaB) programme for the worldwide net of Biosphere Reserves (UNESCO 1996). Biosphere Reserves are model regions in which people's life and economic activity are in compliance with nature. The protection of nature is closely linked with sustainable use.

The Wadden Sea has been designated a Man and Biosphere (MAB) Reserve under the UNESCO Man and Biosphere Program by The Netherlands and the German states. Whereas the MAB-Reserve in the Dutch, Niedersachsen and Hamburg part is almost identical with

the Conservation area, the MAB Reserve in Schleswig-Holstein also includes five Halligen islands as a development zone. In Niedersachsen, the uninhabited parts of the islands are included and the designation of a development zone landward of the dikes outside the National Park is in progress.

1.5.4 Danish National Park

The Danish Wadden Sea Area, including the islands and parts of the hinterland on the mainland, has been designated as National Park. Besides nature conservation and preservation of the cultural and landscape heritage, the aim is also to stimulate and promote commercial but sustainable activities like tourism and recreation. Moreover, it leaves space for the development of the more traditional industries (agriculture and fishery). It is intended that the "National Park Wadden Sea" will be a valuable contribution to regional development in the Danish Wadden Sea and serve as an example of ICZM.

1.5.5 Wadden Sea Forum

The Wadden Sea Forum (WSF) was established in 2002, following a decision at the 9th Trilateral Governmental Conference 2001 in Esbjerg. The WSF acts as a cross-border stakeholder forum and an independent body consisting of representatives of Agriculture, Energy, Fisheries, Industry and Harbour, Nature Protection and Tourism, as well as local and regional authorities from The Netherlands, Germany (Niedersachsen and Schleswig-Holstein) and Denmark.

The Ministerial Declaration of the 10th Trilateral Governmental Conference 2005 in Schiermonnikoog reinforces the importance of stakeholder participation and recognizes that the achievement of the Guiding Principle of the Cooperation "can only be obtained in cooperation with those who live, work and recreate in the area and are willing to endow its protection". Geographically, the WSF deals not only with the Wadden Sea Area but with the wider Wadden Sea Region.

In its report "Breaking the Ice" (2005), the WSF developed a vision, agreed upon by all its members, that supports the protection of the Wadden Sea Area and emphasizes:

"The Wadden Sea Region has a strong identity, which is rooted in the cultural heritage, the typical Wadden Sea landscape features and the unique, from a world wide perspective, Wadden Sea nature area. The Region has a natural biodiversity and decreasing concentrations of polluting substances.

The Region is characterized by dynamic urban centres and a vital rural community with a balanced population structure and good public facilities. The Wadden Sea Region offers room for entrepreneurship and economic activities make optimal (i.e. sustainable) use of the specific advantages of the Region, in particular the location by the sea, the nature potentials and the positive population development.

In general people like to live in the Wadden Sea Region. For the Wadden Sea Area, which is the area covered by the Trilateral Cooperation on the Protection of the Wadden Sea, the trilateral Targets represent the ecological objectives. The Area has an unspoilt beauty, is understood as a joint heritage of the entire Region and the ecological Targets are respected by all sectors."

From 2006 the WSF defined the following goals:

- to oversee, stimulate, support, facilitate and evaluate the implementation of the WSF strategies and action plan for sustainable development
- to exchange information on experiences and best practice with regard to the Wadden Sea Region and foster sustainable development within it;
- to bring together the sectoral interests of its members;
- to exchange views on general themes and topical issues;
- to prepare advice on issues related to sustainable development and integrated coastal zone management;
- to initiate and implement projects and actions on topical issues;
- to serve as a consultation body for governments.

In 2008 a Memorandum of Understanding (MoU) was concluded between the WSF and the Trilateral Wadden Sea Cooperation (TWSC) recognizing the importance of a close cooperation. The MoU is based on the mutual acknowledgement by the WSF and the TWSC of the Shared Principles including the Guiding Principle, the Shared Vision and the Targets as laid down in the Wadden Sea Plan, respecting the existing protection levels and ensuring sustainable economic development and quality of life. According to the MoU, WSF serves as an independent trilateral advisory and consultation body to the TWSC and prepares relevant statements and background information. It will be consulted and prepare advice on matters regarding sustainable development of the Wadden Sea Region and will be consulted in the framework of the development of the Wadden Sea Plan, the draft Declaration of the 2010 Wadden Sea Conference, national ICZM strategies and other issues of relevance for the Wadden Sea Region in as far as this is within the mandate of the TWSC. Several joint projects have been agreed upon. Among them are the further development of ICZM and sustainability indicators, the elaboration of a guidance document for a trilateral Goose Management Plan, cooperation on shipping safety issues, including container shipping, and support for and promotion of the Wadden Sea World Heritage Property among the sectors and stakeholders. Finally, the WSF will stimulate and support the cross-border and cross-sector dialogues and will discuss and integrate, to the extent possible, relevant input to the regional Wadden Sea advisory bodies and submit the results to the TWSC on a regular basis.

1.6 TRILATERAL POLICIES

- 1.6.1 The overall policy objective is to further develop a consistent integrated trilateral management approach to the Wadden Sea ecosystem, based on the status of protected areas there and including sustainability of uses, aspects of the landscape and cultural heritage and the integrity of the World Natural Heritage Property. To this end the implementation of relevant EC Directives will be harmonised as far as possible, in particular with regard to differences in national conservation objectives that may, in the medium or long term, aggravate differences in protection level and/or conditions for sustainable use. More specific policies, relevant to harmonisation, are in the Target chapters.
- 1.6.2 In line with the existing protection regimes, sustainable use will be further improved by stimulating relevant initiatives and projects, including the further development and improvement of ICZM and sustainability indicators, in close cooperation with the Wadden Sea Forum and other relevant stakeholder organisations.
- 1.6.3 An overall Sustainable Tourism Development Strategy for the Wadden Sea World Heritage Site will be developed, in order to meet the request of the World Heritage Committee, the Hamburg Wadden Sea National Park, and the Danish National Park, pending formal approval by its forthcoming board. As a first step, a Wadden Sea Communication and Marketing Programme 2010-13 will be adopted.

2 Overarching themes

This chapter concerns climate change, alien species and shipping safety – three themes relevant to all Wadden Sea habitats and for which it is essential to apply an integrated ecosystem approach.

A number of activities, the most prominent ones taking place outside the Wadden Sea Conservation Area, potentially affect the Wadden Sea ecosystem, but are essential for the regional economy and conditions for people living in the area or visiting as tourists. These activities are coastal flood defence and protection, energy generation, shipping and the related (maintenance) dredging of the shipping routes and harbour developments.

For example, the increasing energy production in the Wadden Sea Region, both onshore and offshore, will have several side-effects, such as increasing ship traffic in the coastal sea and cable crossing through the conservation area. Air pollution may increase as well as interference with bird flyways. The increasing ship traffic in general results in increased dredging and harbour extension.

As far as relevant these activities are covered in the respective Target chapters. All activities likely to have a significant effect on the Wadden Sea ecosystem, either individually or in combination with other plans or projects, are subject to licensing following an impact assessment in accordance with the stipulations of the Habitats Directive.

Also, coastal defense may be regarded as an overarching theme which is essential for the safety of the inhabitants while also having impacts on the Wadden Sea ecosystem. Aspects of coastal flood defense and protection are included in the section on Climate change.

2.1 CLIMATE CHANGE

2.1.1 Status and assessment

Climate change will have an impact on Wadden Sea habitats and species, the safety of its people and on cultural heritage and sustainable use. The impacts may become manifest in two ways: first through changes in physical, chemical and biological parameters such as sea level rise, erosion or sedimentation, water temperature, acidity and species composition, *i.e.* fish; and second, through human responses such as coastal flood defence and protection measures.

Changes will affect valuable natural and cultural heritage assets throughout the Wadden Sea. The combined impacts of these changes on the ecosystem are so diverse and numerous that predictions of the expected direction of change are very difficult and in some cases impossible to foresee. Major concerns exist with respect to latest projections on sea level rise that range between 0.5 and 1.3 m for this century. Thus it should be anticipated that, in the long term, not enough sediment will be imported and redistributed by natural processes to maintain present ecological functions. Nature protection, coastal flood defence and protection, cultural heritage and conservation policies and management must therefore become more flexible, so that adaptation to change is possible. This is particularly relevant in the implementation of conservation objectives under the Habitats and Birds Directives and the ecological quality requirements of the Water Framework Directive.

2.1.2 Trilateral Policies

An integrated approach is required. As a first step, a Trilateral working group on Coastal Protection and Sea level Rise (CPSL) was established in 1998, in which experts from coastal and nature protection, and since 2005 spatial planning, have worked together.

A long-term trilateral strategy on increasing adaptability to the effects of climate change will be developed, with a view to protecting the people living in the region and conserving the natural, landscape and cultural heritage qualities of the Wadden Sea.

Such a strategy

- includes guidance on which policy steps to take for different climate impact scenarios;
- aims to make conservation management more flexible by intensifying contacts with relevant scientists so that the latest research and advice is used to adapt monitoring and management programmes;
- indicates concrete steps towards increasing the adaptability of the ecosystem *i.e.* its ability to cope with changes, the natural diversity, especially along the mainland coast. This will be done in close cooperation with responsible coastal flood defence and protection authorities and in close consultation with all stakeholders, taking into account landscape and cultural heritage features;
- contains pilot projects and research programmes on climate change adaptation of the Wadden Sea, the resilience of the ecosystem and on coastal flood defence and protection, and contains initiatives to share best practice and lessons learnt throughout the Wadden Sea. The focus will be on projects combining coastal and nature protection;
- includes concrete steps towards developing and implementing instruments for flexible spatial planning, integrating the living situation and safety of people, as well as the resilience of the ecosystem, and including landscape and cultural heritage features. These instruments will involve all relevant stakeholders and broad communication of the results in the planning process.

2.2 ALIEN SPECIES

2.2.1 Status and Assessment

The dispersal of organisms is a natural process limited by multiple barriers, among which geographical barriers are the most evident. However, for centuries humans have introduced alien species to new areas where they were previously absent. They might survive and subsequently reproduce in a newly occupied habitat. If they are invasive, they are known or expected to have negative effects on native populations and species, natural habitats and ecosystems.

With increasing global trade, the introduction of alien species, both intentional and unintentional, has increased concomitantly and has increased in complexity. Next to global habitat loss and climate change, this biological globalization has become a key process in altering the biosphere.

At the North Sea coast, many of the introduced species, mainly algae and invertebrates, arrived via international ship traffic, especially in ballast waters, but also in aquaculture. They most often became established within estuaries and on hard substrates, with more than 80 known species. About 52 of them occur within the Wadden Sea and a preliminary assessment of the aliens' impact on the natural biodiversity of the Wadden Sea shows that presently most cause no or only minor impacts.

Of the 52, six have already had or are about to have effects on the composition of the existing biota in the Wadden Sea: cord-grass, Japanese seaweed, bristle worm, American razor clam, American slipper limpet and Pacific oyster.

Terrestrial alien plant and animal species have also found – and will find – their way into the Wadden Sea ecosystem. A well-known example is the (former) introduction of the rugose rose, which has in several places outflanked the native species and vegetation types, and reduced the typical dynamics of some dune habitat types. Of the mammalian aliens, the North American mink, ferret and muskrat have caused changes, *e.g.* in the predation pressure on breeding birds and the safety of sea dikes in some places.

2.2.2 Trilateral Policies

The Trilateral Cooperation will support and intensify efforts to harmonise approaches to the prevention, management and monitoring of aquatic and terrestrial alien species

introductions and will develop a common strategy for dealing with invasive alien species associated with ballast waters and aquaculture. This is also in line with a request from the UNESCO World Heritage Committee.

2.3 SHIPPING SAFETY

2.3.1 Status and Assessment

The consequences of shipping accidents for the Wadden Sea can be immense. In order to raise awareness regarding the vulnerability of the Wadden Sea, the area has been designated as a Particularly Sensitive Sea Area (PSSA) by the IMO in 2002. Its effectiveness has been reviewed in 2010, leading to several recommendations.

The general risk and potential consequences of accidents and the PSSA designation lead to the obligation to maintain and where necessary enhance shipping safety and reduce impacts from shipping on the Wadden Sea. Also further implementation of policies and actions to prevent oil pollution from shipping – both from illegal discharges and from accidents – as well as control and enforcement measures needs to be continued. This is also valid for reducing the exhaust emissions from ships.

2.3.2 Trilateral Policies

Shipping and shipping safety is considered as one of the priority issues for the Wadden Sea Region. This concern has also been raised in the Wadden Sea Forum, leading to 35 recommendations concerning policy and management necessities. These recommendations were reviewed in conjunction with the agreements taken at the Esbjerg Conference. Where not already taken, action is needed at both the trilateral and international level. Specific actions should be focused on:

- spatial planning and shipping safety in the EEZ;
- day-to-day joint cooperation in the framework of the DenGerNeth plan;
- appropriate towing and pollution response capacity;
- the practical implementation of Places of Refuge;
- harmonization of the no-special-fees system;
- aerial surveillance in the relevant coastal areas and the EEZ;
- container shipping and loss of containers.

As an important standard, the safety of shipping in the North Sea Area should be kept at least at the present level, irrespective of which kind of offshore development might occur, and where feasible be enhanced.



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 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-bad, 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 "unfavourable".

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. (Identical with 4.6)
- 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 Natura 2000 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 I 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, the grey seal and the harbour porpoise 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 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 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)



III. Implementation

1 Monitoring and Assessment

1.1. OBJECTIVE OF THE TMAP

The Trilateral Monitoring and Assessment Program (TMAP) is the common monitoring program for the Wadden Sea carried out by The Netherlands, Germany and Denmark in the framework of the Trilateral Wadden Sea Cooperation.

The general aim of the trilateral Wadden Sea monitoring, assessment and research is basically twofold, namely

- to provide a scientific assessment of the status of the ecosystem; and
- to assess the status of implementation of the Targets of the Wadden Sea Plan.

Both categories of information are essential for the development and evaluation of the trilateral Wadden Sea conservation policies and management in line with the relevant EC directives, the inscription on the World Heritage list and other international obligations.

1.2. STATUS OF THE TMAP

1.2.1. Parameters

An overview of the TMAP parameters is in **Table 3**. It underlines that most of the TMAP parameters are part of existing or planned monitoring programs in the three countries and already cover the requirements of the EC Directives and other international agreements.

TMAP parameters are coordinated trilaterally and a number of parameters have been harmonised (breeding and migratory birds, harbour seals, blue mussels, salt marshes, contaminants in bird eggs). They have proven their value for the Target assessment (QSR 2004, 2009) and for national and international reporting obligations (such as Ramsar, OSPAR, EC Directives).

A detailed description of TMAP parameters is in the TMAP Handbook, which is accessible at the CWSS website (www.waddensea-secretariat.org).

1.2.2. TMAP Data Management

An elementary component of the TMAP is common data handling, which makes monitoring data available for trilateral assessment. For this purpose, identical TMAP Data Units have been installed in each country where the data can be stored in the same way.

The TMAP data handling system aims to exchange monitoring data in a common format so that it can be used directly in the trilateral assessment work on the following tasks:

- preparation of Quality Status Reports entailing most recent data and developments,
- preparation of trilateral reports on specific topics (thematic reports, like breeding birds, migratory birds, seals, contaminants),
- preparation of reports on unforeseeable events (e.g. eider mass mortality),
- safeguarding long-term storage of relevant Wadden Sea data,
- use of trilateral data for national and international programs.

The TMAP data handling system supports reporting obligations (e.g. national status reports, EU reports concerning Natura 2000 and the Water Framework Directive, World Heritage, international reports concerning OSPAR, RAMSAR or other international conventions) by providing up-to-date and harmonised Wadden Sea data (including GIS) from different sources on the national and international level.

1.2.3 Assessment Reports

Assessment reports on the Wadden Sea ecosystem (Quality Status Reports, QSR) are prepared at regular intervals related to the Trilateral Governmental Conferences. The reports

- describe and evaluate the current ecological status of the Wadden Sea,
- identify changes in this status and their possible causes,
- identify issues of concern and indicate possible measures of redress, including evaluation of the likely effectiveness of these measures,
- identify gaps in knowledge.

Assessments are carried out together with experts and relevant national institutions in charge of the national assessment. Additionally, thematic reports are prepared which entail the results of running trilateral monitoring programs, e.g. monitoring of migratory and breeding birds. The reports on selected subjects are prepared by trilateral expert groups.

1.2.4. Ecological Research

The research component is the flexible element of the TMAP. Ecosystem research studies the environment on a broader perspective, and weighs the more detailed species and habitat research work to gain an overall picture of the condition of the ecosystem. The foremost tasks of ecosystem research are to discriminate between natural fluctuations and human impacts to find the causes of changes observed in the ecosystem. A further task is to continuously improve the efficiency of the monitoring program. These tasks are essential for two goals of policy and management: the capability of providing evidence for man-made causes, and the capability of interpreting and predicting the reactions of the ecosystem correctly.

Because research into the cause of observed changes is a prominent task for concomitant investigations of the ecosystem, new or alternative parameters and monitoring methods must be developed in order to adapt to new developments and to increase the efficiency of the program.

So far, only a few trilateral research projects have been carried out, such as the joint seal project (1990–1994), the first pilot project on breeding success (1996–1997) and the assessment of contrasting trends in migratory birds (2009).

1.3. HOW TO PROCEED

1.3.1 Harmonization

A major challenge for the Trilateral Cooperation is fine tuning the alignment between the national monitoring programs, the requirements of the Trilateral Cooperation and the EC Directives and other international developments. This demands a consistency in parameter selection and monitoring methods, as well as assessment procedures and reporting conditions (see Table 3).

The national assessment schemes of the HD (definition of conservation objectives and favourable conservation status) and WFD (reference condition and a classification scheme for good ecological status) have to be linked with the Wadden Sea Plan (§6 SchD, 2005) in order to develop a harmonised assessment scheme for all parameter groups of the TMAP.

Trilaterally harmonised assessment methods, including quantitative values, should be defined, especially for issues which have to be addressed at a broader scale, such as eutrophication, climate change, alien species, and species and habitats.

On the basis of the Wadden Sea Plan, an overall strategy will be developed on how to harmonize the assessments at national, trilateral and EU level. Thematic experts' workshops will continue to discuss, and if necessary harmonize, assessment criteria and develop quantitative values for Wadden Sea Area.

1.3.2 TMAP Data Handling and Information System

The TMAP data handling is an effective tool and has contributed positively to the QSR work. There is great potential to use the TMAP data for other value-added national and international purposes.

However, there are still some bottlenecks in the data flow from the monitoring institutes to the TMAP data units and the responsible authorities on national and state level need to open these up.

Further investment has to be realized to improve data access for a broader public. An effective TMAP information system should be able to hold complex data like a data warehouse, to be selectively called up and analysed using standard assessment procedures running through Internet browsers. The prototype of such an information system has been set up on basis of the content of the four data units and trilateral GIS data sets from the secretariat. It was presented at the Scientific Symposium in Wilhelmshaven in March 2009 by applying the visualization software 'disy Cadenza'. The system should be further developed by the TDG in the three countries with the aim of establishing an "online-QSR" for trilateral assessments.

1.3.3 Parameters

For some parameter groups, new monitoring strategies have to be developed. This concerns especially monitoring of subtidal habitats and monitoring in the offshore area (up to 12 sm).

Further technical adaptations of TMAP parameters (such as locations, frequencies, methods) have also to be considered, as have their alignment with the HD, WFD and, where appropriate, MSFD assessment schemes which are under development. The main parameters in need concern macrozoobenthos, macrophytes, eutrophication fish and chemical substances. Specifically, the following is needed:

- Development of a trilateral strategy of subtidal monitoring taking into account the existing operational and planned monitoring activities. This has to be tuned with the HD, WFD, and MSFD related activities, especially with regard to assessment and reporting requirements.
- Implementation of a trilateral monitoring strategy for seabird species, in order to harmonize the existing offshore surveys and make the results comparable in a trilateral assessment.
- Investigation into the need for a joint monitoring of harbour porpoise in the framework of the Habitat Directive and, depending on the outcome, integration of such a parameter on the basis of the German monitoring of that species.

1.3.4 Ecological Research

A more comprehensive trilateral research agenda may facilitate ecological research in the Wadden Sea countries, gain synergies and offer an opportunity to apply for funding by EU programs. A Trilateral Research Agenda must be developed in close cooperation with national research institutes and other organizations (such as the Wadden Academy). This can be used to try to secure additional EU funding of trilateral projects (e.g. within the framework of LIFE+).

Table 3: Parameters of the TMAP

TOPIC	Parameter	METHOD	REMARKS
1. TARGETS ON QUALITY OF WATER AND SEDIMENT			
1.1 Eutrophication	<ul style="list-style-type: none"> - nutrient inputs (river, atmosph.) - nutrients in water - chlorophyll a - phytoplankton - macroalgae - macrozoobenthos 	Using OSPAR Common Procedure (see QSR 2004), and WFD guidance	The TMAP parameters cover the existing or planned WFD monitoring programs in the three countries.
1.2 Natural micro-pollutants (metals, PAH)	<ul style="list-style-type: none"> - metals in sediment and biota (mussel, flounder, bird eggs) - PAH (water, sediment, mussel) - Beached (oiled) birds 	Using JAMP guidelines and WFD guidance. Using OSPAR resp. TMAP/TBBS guidelines	WFD priority substances to be monitored in the water column using risk analysis for individual water bodies.
1.3 Man-made substances (xenobiotics)	<ul style="list-style-type: none"> - organochlorines in sediment and biota (mussel, flounder, bird eggs) - TBT (sediment, biota) 	Using JAMP guidelines and WFD guidance	WFD priority substances to be monitored in the water column using risk analysis for individual water bodies.
2. TARGETS ON SALT MARSHES			
	<ul style="list-style-type: none"> - area, - vegetation - selected typical species, - grazing, - drainage 	Vegetation mapping (aerial photographs and ground truth); field surveys (permanent plots or stratified random sampling)	Existing monitoring schemes to be continued. Common TMAP typology can be applied.
3. TARGETS ON TIDAL AREA			
3.1 Geomorphology	<ul style="list-style-type: none"> - area of tidal flats - sediment type distribution 	Remote sensing and field sampling	Comparability of methods to be enhanced.
3.2 Macrozoobenthos	<ul style="list-style-type: none"> - species composition - abundance - biomass - age [not mandatory] 	Field surveys and transects, national WFD guidelines.	
3.3 Biogenic structures			
3.3.a Seagrass	<ul style="list-style-type: none"> - area and distribution - coverage 	Mapping of intertidal seagrass beds (aerial mapping and field surveys).	Revised TMAP guidelines prepared by seagrass group in 2006.
3.3.b Mussel beds	<ul style="list-style-type: none"> - area and distribution - biomass - coverage 	Mapping of intertidal blue mussel beds (aerial photographs and field surveys)	
3.3.c. <i>Sabellaria</i> reefs	<ul style="list-style-type: none"> - area and distribution 	Methods for subtidal habitats under development.	From research projects on subtidal mapping in Niedersachsen, Schleswig-Holstein and The Netherlands.
3.4. Fish			
	<ul style="list-style-type: none"> - distribution and abundance of species in the Wadden Sea 	Existing surveys for demersal fish (IMARES, vTI-SF) and pelagic fish (LKN)	Wadden Sea fish assessment tool in preparation (similar to WFD tool in transitional waters).
	<ul style="list-style-type: none"> - distribution and abundance of species in transitional waters 	Stow net fishery (pelagic fish), 3-4 stations in Ems, Weser, Elbe, Eider	Guidelines developed for WFD monitoring (obligatory)

TOPIC	Parameter	METHOD	REMARKS
4. TARGETS ON BEACHES AND DUNES			
	<ul style="list-style-type: none"> - area - vegetation - selected typical species - nitrogen deposition, - land use 	Vegetation mapping (aerial photographs and ground truth); Field surveys (permanent plots or stratified random sampling)	Existing monitoring schemes to be continued. Common TMAP typology can be applied. Comparability of field survey methods to be enhanced.
5. TARGETS ON OFFSHORE ZONE (from baseline to 3 resp. 12 sm)			
	<ul style="list-style-type: none"> - selected chemicals, - area and location of sand banks and reefs, - selected typical species (birds) - marine mammals 	Using OSPAR guidelines and WFD standards. Methods for subtidal habitats under development in HD. Methods for BD and HD species under development	Research projects on subtidal mapping area carried out in NL and D.
6. TARGETS ON BIRDS			
	<ul style="list-style-type: none"> - number and distribution of breeding birds 	Using JMBB/TMAP guidelines	Existing monitoring schemes to be continued. Adaptation to 6-year reporting cycle.
	<ul style="list-style-type: none"> - breeding success 	JMBB/TMAP Pilot project	Pilot project on "breeding success" started in spring 2009
	<ul style="list-style-type: none"> - number and distribution of migratory birds 	Using JMBB/TMAP guidelines	Existing monitoring schemes to be continued. Adapted to 6-year reporting cycle. Projects to be initiated to assess Targets (food availability, roosting and moulting areas, natural flight distances.)
7. TARGETS ON MARINE MAMMALS			
	<ul style="list-style-type: none"> - numbers and distribution of harbour seals (adults & pups) 	Using TSEG / TMAP guidelines	Existing monitoring scheme to be continued.
	<ul style="list-style-type: none"> - numbers and distribution of grey seals 	National surveys	Harmonization of existing monitoring (ongoing by TSEG)
	<ul style="list-style-type: none"> - numbers and distribution harbour porpoise 	National and/or North Sea wide surveys according to national HD obligations	Monitoring strategy to be developed in cooperation with North Sea wide monitoring schemes.
8. HUMAN ACTIVITIES			
	<ul style="list-style-type: none"> - fishery - recreational activities 	Using TMAP guidelines.	Available data on all other human activities relevant for assessment should also be compiled.
9. GENERAL PARAMETERS			
	<ul style="list-style-type: none"> - coastal protection measures - flooding/hydrology - land use - weather conditions 	All relevant available data from existing sources	Compilation in connection with trilateral assessment (QSR)

2 Implementation and Review

2.1 STRUCTURE OF THE TRILATERAL WADDEN SEA COOPERATION

Decision-making within the Trilateral Wadden Sea Cooperation (TWSC) is limited to two levels.

The Trilateral Wadden Sea Governmental Council (see figure) is the politically responsible body (Ministers) for the Cooperation. It establishes and oversees the Cooperation, approves its strategy, gives political leadership, assures international policy development, harmonisation and decision-making between the three governments.

The Wadden Sea Board is the governing body of the Cooperation. It prepares and implements the Strategy, oversees the operational and advisory bodies, and secures relations with key stakeholders.

The decision-making bodies are supported and advised by three types of operational and advisory bodies, namely advisors, including stakeholder representatives (WSF), Task Groups and Triennial conferences.

The Secretariat for the Trilateral Cooperation is the Common Wadden Sea Secretariat (CWSS). CWSS is responsible for support to the Board and the Council, implementation of the CWSS Work Plan, support to scientific networks and projects, communications and financial management.

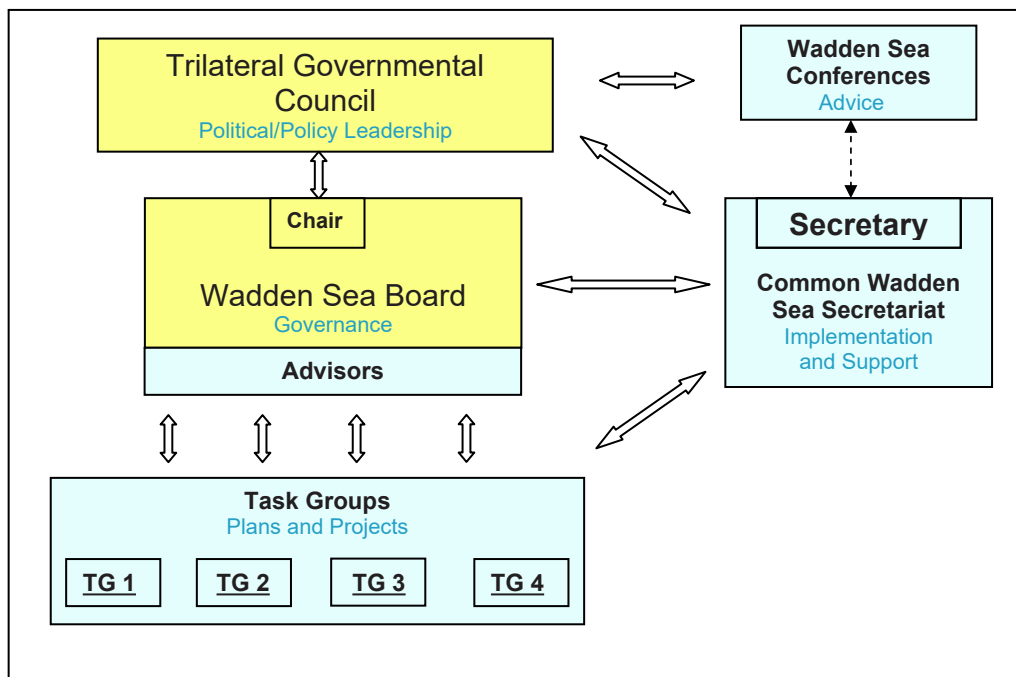


Figure 1: Organizational Structure Trilateral Wadden Sea Cooperation

2.2 IMPLEMENTATION

The Wadden Sea Board is the responsible body for the supervision of the implementation of the Wadden Sea Plan. In addition, the Wadden Sea Board

- Develops, coordinates and implements the Cooperation's policy on major issues (including responses to significant development plans and projects), for approval by the Trilateral Governmental Council.
- Provides advice to Ministers, *inter alia* through annual and triennial reports, the production of Quality Status Reports at regular intervals, and the organisation of International Scientific Wadden Sea Symposia.
- Approves terms of reference for the task groups and monitors their performance.

At the trilateral level, the Trilateral Monitoring and Assessment Program (TMAP) is the main programme for assessing progress in the implementation of the Wadden Sea Plan Targets. The TMAP provides the basis for the overall quality assessment of the Wadden Sea ecosystem (Quality Status Report: QSR) through which feedback to the Wadden Sea Board is arranged. In the framework of the implementation of the TMAP, an expert network has been established which is part of the feedback process of the Wadden Sea Plan implementation and which ensures the involvement of the operational management level in the trilateral process and which informs the regional level.

The Wadden Sea Plan is a joint framework policy and management plan for the Wadden Sea Area, and within that the National Parks the World Heritage Property and the Biosphere Reserves. For the specific purposes of cooperation on landscape and cultural heritage it is also the framework for the cultural entities. The Wadden Sea Plan will be implemented through the responsible authorities in the countries. The close relationship between the regional management of the Wadden Sea Area and the trilateral level is essential to ensure that both levels are well informed and aligned and that issues of common concern throughout the process are discussed and solved in close cooperation.

In order to perform the task of overseeing the implementation and further development of the Wadden Sea Plan, a close connection with the management level in the region is necessary.

2.3 REVIEW

An evaluation of the Wadden Sea Plan with a view to possible revisions takes place at 6 year intervals. Plans and measures launched in the framework of the relevant EC Directives operate within this 6 year timespan. In the framework of the World Heritage Convention, state parties must also report every 6 years on their World Heritage properties. The Wadden Sea Board will supervise the review in particular with regard to

- the status of the implementation of the projects and actions,
- the information from the Quality Status Reports and other assessment reports and scientific findings in relation to the Wadden Sea Plan,
- the ongoing relevance of policies and management measures,
- the consequences for the Wadden Sea Plan of emerging international legislation, in particular from the European Union.

The review will be discussed by the Wadden Sea Board to determine whether and to what extent the Wadden Sea Plan needs revision after the 6 year period.

3 Communication, Information and Education

3.1. WHAT AND WHY TO COMMUNICATE

Trilateral communication will secure public and political support for the protection and integrated management of the Wadden Sea as a shared entity and it will enhance the awareness of the Wadden Sea as a shared heritage.

The Trilateral Cooperation addresses the Wadden Sea as an entity which covers *a.o.* conservation and protection of all habitats and species, policy and management related issues, as well as research, monitoring and assessment. The transboundary and cross-sectoral aspects of such an ecosystem approach and the added value of the trilateral approach in respect to the national and international instruments, such as EU Directives, is the main contents of trilateral communication. The Wadden Sea Plan and Targets are an example of a transboundary management scheme at an ecosystem level which is also unique in a global perspective.

Effective communication of this Plan and the Targets between partners is a prerequisite to securing the active support of relevant authorities, interest groups and local citizens. The close cooperation of politicians, conservationists and scientists, combined with the awareness and enthusiasm of the people living in the region, is key to the successful implementation of the Plan.

The WSP is also the management plan for the World Heritage Property. The ecosystem approach of the Wadden Sea Plan and the Targets should therefore be the focus of trilateral communication.

3.2. TO WHOM AND HOW TO COMMUNICATE

Trilateral communication of the Wadden Sea Plan is focused both on internal and external target groups.

The internal communication ensures that key information has been accurately conveyed to the trilateral working groups (as well as experts groups and workshops), including observer organizations. In addition, the scientific network has been involved since the 1970s in supplying information to support management and monitoring (*e.g.* in scientific projects or on Scientific Wadden Sea Symposia).

External communication of the Wadden Sea Plan and its objectives to other target groups, such as the broad public, press and media, schools and universities, interest groups and international organizations, requires communication strategies tailored to the needs of the various groups.

Trilateral communication is carried out mainly via the CWSS through a website (for internal and external use), an e-mail newsletter (a successor to the printed Wadden Sea Newsletter), leaflets and posters, and thematic workshops and conferences in which the communication of the Wadden Sea Plan and Targets plays a central role.

Comprehensive reports such as the Quality Status Reports and other thematic reports (*e.g.* on bird trends) provide substantial scientific information from the TMAP to experts and the scientific community, including an assessment of the Targets and recommendations for trilateral management.

Network of Information Centers

The overall visitor experience of wildlife, culture and landscape along the Wadden Sea coast has been hugely improved through an extended net of small and large information

centers, visitor information systems, print and digital information and an increasing number of professional guides. This has been beneficial to people and nature.

From data supplied by Schleswig-Holstein, it can be extrapolated, that more than 3 million people a year receive information on the Wadden Sea through visiting centres or participating in guided tours. Thus, the flow of information and communication on all Wadden Sea matters has increased very well over the past ten years. Nevertheless, there is still a gap on coordinated information about the Trilateral Cooperation and the Wadden Sea Plan, *i.e.* the Wadden Sea as a crossborder protected nature area of global importance.

Websites

Extensive information on the Wadden Sea for the broad public is also available electronically. The common link to all aspects of trilateral Wadden Sea matters is the website of the Common Wadden Sea Secretariat (www.waddensea-secretariat.org).

The Dutch link to the Wadden Sea is via "Interwad". This organization develops and operates the website www.waddensee.nl. This website is a focal point for information, questions, answers and opinions related to the Wadden Sea. The objectives are to inform people, to raise awareness and to feed the discussion on all Wadden Sea-related topics.

The German link is via the national park web site www.nationalpark-wattenmeer.de. This official website includes information on practically all aspects related to the protection and management of the German Wadden Sea and the activities of the national park authorities.

In Denmark, the website www.vadehav.dk is based on a cooperation between all the information and education centers in the Wadden Sea area (Vadehavets Formidlerforum). The objectives are, among others, to stimulate the cooperation between Wadden Sea related institutions, to stimulate the awareness and to improve and extend the communication on nature and culture in the Wadden Sea region – with a special effort in relation to children. Vadehav.dk also keeps site visitors informed of the latest news and public events in the Wadden Sea.

Specific information on the Wadden Sea World Heritage Property can be found on www.waddensea-worldheritage.org

International Wadden Sea School

At present, 10 of the environmental education centres in The Netherlands, Germany and in Denmark work together in the International Wadden Sea School (IWSS) network (www.IWSS.org). The IWSS is a cross-border educational project for school classes and other groups of young people from the Wadden Sea countries initiated by the Wadden Sea Cooperation, running from 2003–2010. The aim of the IWSS is to enhance the awareness of the Wadden Sea Area as a shared natural heritage and to create an understanding among young people of the need to protect and sustainably manage the Wadden Sea region as a whole.

The Wadden Sea Forum

The involvement of stakeholders at the trilateral level is carried out via the Wadden Sea Forum (WSF). WSF has been consulted in the preparation of the WSP and is involved in several projects, relevant for the implementation of the WSP.

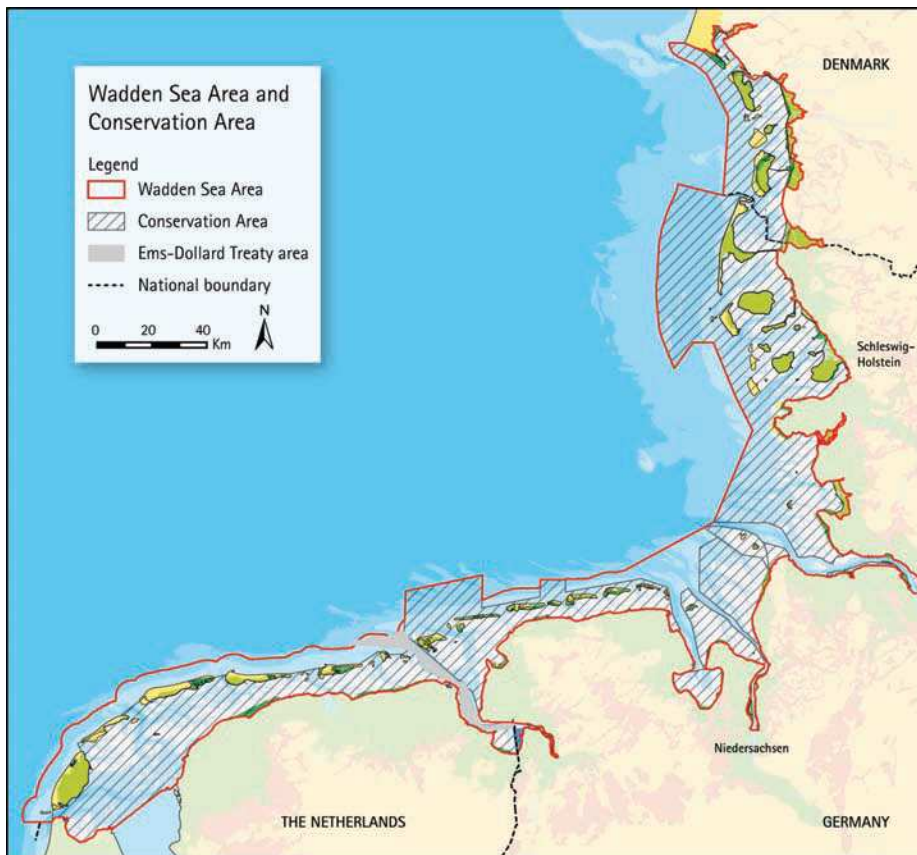
WSF is represented in the Wadden Sea Board as advisor, guaranteeing the interaction between the WSF members and the TWSC about the implementation of the WSP.

3.3. HOW TO PROCEED

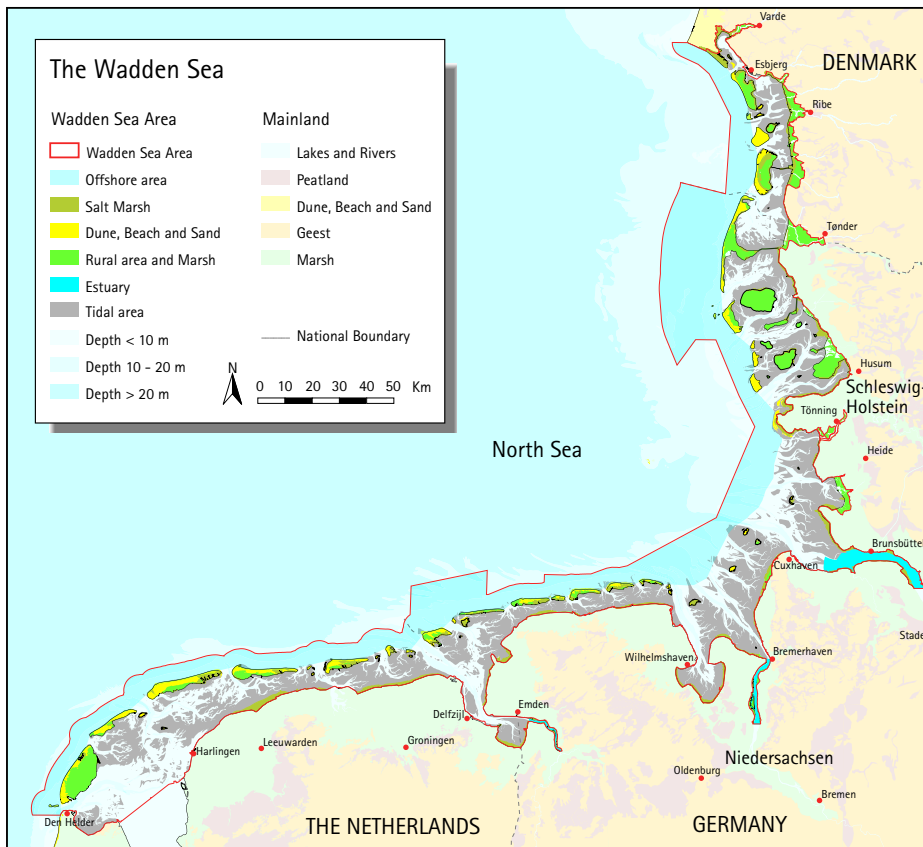
1. Following the recommendation of an External Evaluation of the Trilateral Cooperation in 2007, existing means of communication such as the website and the newsletter will be given a wider audience through improved linking and distribution. We should also make full use of the attention generated by the positive results of the designation of the Dutch-German parts of the Wadden Sea Area as a World Nature Heritage Property, and capitalize on projects like Lancewad.

2. The CWSS will also continue its work to compile and disseminate all relevant scientific information on the Wadden Sea through web-based media, symposiums, workshops and reports, as well as through meetings with other relevant organizations and institutions.
3. The results of the TMAP and assessment of the WSP Targets will be made available for relevant authorities, interest groups and local citizens.
4. The external communication and public promotion of the Wadden Sea Plan will be undertaken by circulating it via existing successful communication networks and by cooperation with external partners and relevant stakeholders such as the Wadden Sea Forum.
5. The International Wadden Sea School (IWSS) has developed specific communication activities to promote the ideas of the Trilateral Cooperation for environmental education for school children, so effectively linking the educational network in the three countries. This experience should be used to strengthen public outreach and to communicate the Wadden Sea Plan to a broader public.

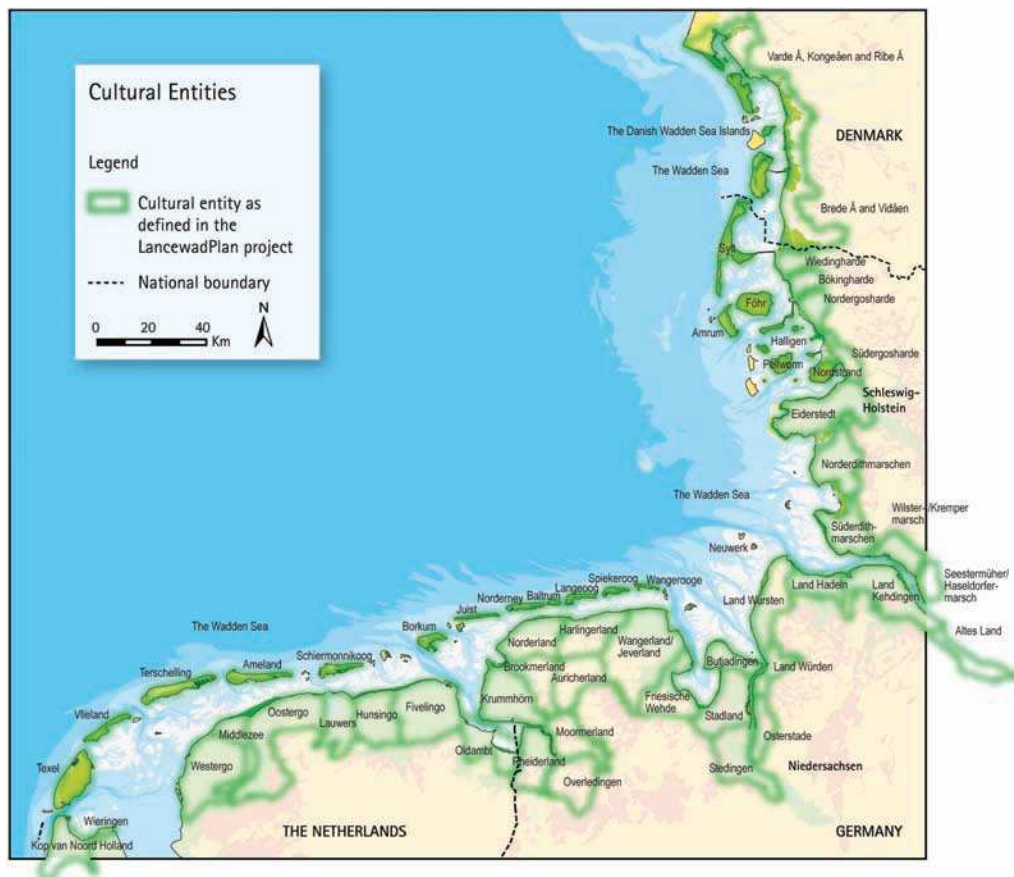
Map 1: Wadden Sea Area and Conservation Area



Map 2: Wadden Sea Habitats

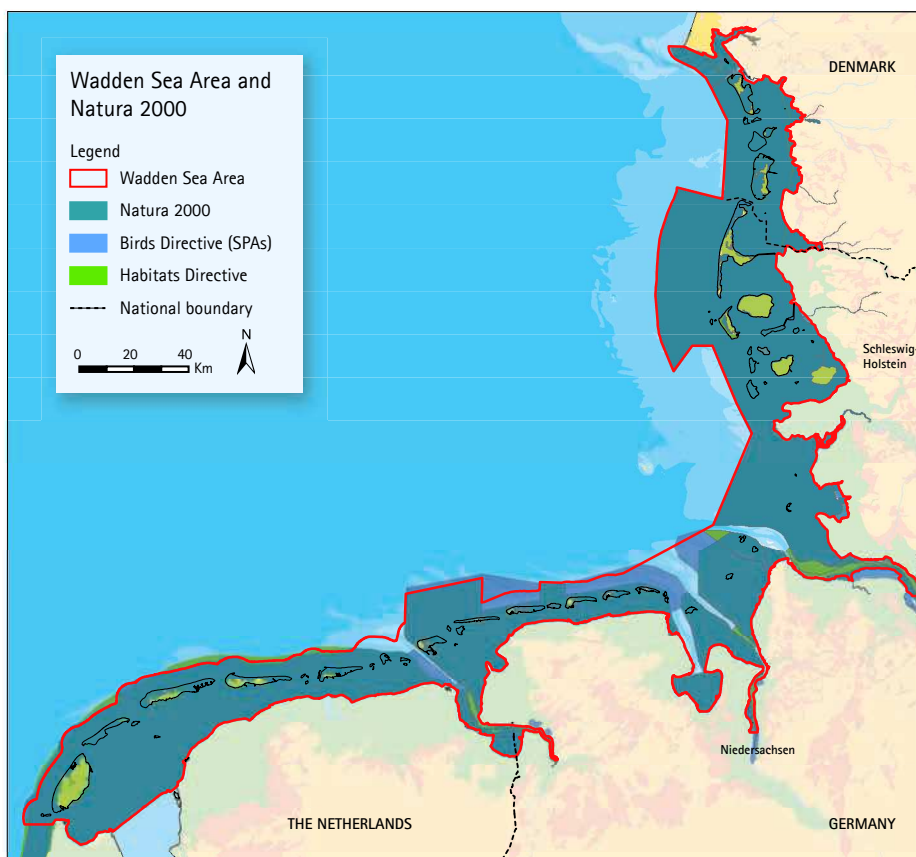


Map 3: Cultural Entities



Note: Parts of the identified cultural entities are located outside the Wadden Sea Cooperation Area as defined in S1 of the Introduction. 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.

Map 4: Natura 2000 Areas in the Wadden Sea



Annex 10

**German Federal Nature Conservation Act,
§ 30 Legally Protected Biotopes,
February 2012.**

§ 30 Legally Protected Biotopes – Extract from the Nature Conservation and Landscape Management Act (Federal Nature Conservation Act – BNatSchG) – Last amended: 6 February 2012

Extract from the Act on Nature Conservation and Landscape Management (Federal Nature Conservation Act – BNatSchG)

“Federal Nature Conservation Act of 29 July 2009 (Federal Law Gazette I p. 2542), as last amended by Article 5 of the Act of 6 February 2012 (Federal Law Gazette I p. 148)”

Status: Last amended by Article 5 of the Act of 6 February 2012 (Federal Law Gazette I p. 148)

(+++ Text reference as of: 1 March 2010 +++)

- unofficial translation: only the german version is legally binding –

§ 30 Legally Protected Biotopes

(1) Certain parts of nature and landscapes that are of special importance as biotopes are protected by law (general principle).

(2) Actions that could lead to the destruction or other significant adverse effects on the following biotopes shall be prohibited:

1. natural or semi-natural zones of running and standing inland waters, including their banks and relevant natural or semi-natural vegetation associated with the banks, together with their natural or seminatural sedimentation areas, backwaters and areas that are regularly flooded,
2. bogs, swamps, reeds and large-sedge reed beds, wetland meadows rich in sedges and rushes, springs and salt inland deposits,
3. open inland dunes, open natural boulder, rubble and scree slopes, clay and loess walls, dwarf-shrub, broom and juniper heaths, mat-grass communities dry meadows, heavy metal grassland, wood- and scrubland in xerothermic locations.
4. fen, bog and riparian forests, forests of ravines, slopes and screes, subalpine Larch and Larch-Swiss Pine forests,

5. open rock formations, alpine grasslands, snowbeds and elfin woodland,
6. rocky coasts and cliffs, coastal dunes and beach ridges, coastal lagoons, bodden waters with aggradation areas, salt meadows and tidal mud flats in coastal regions, seagrass beds and other marine macrophyte populations, reefs, sublittoral sandbanks, mud plains with burrowing megafauna , and species-rich gravel, coarse-sand and shell bottoms in marine and coastal regions.

The prohibitions set forth in Sentence 1 shall also apply to other biotopes protected by the laws of the Federal Länder.

(3) Exceptions to the prohibitions set forth in (2) may be permitted, upon application, if the adverse effects can be compensated for.

(4) If actions within the meaning of (2) are anticipated as a result of preparation, modification or supplementation of building development plans, a decision may be made, upon application by the municipality concerned and prior to preparation of the pertinent building development plan, regarding a necessary exception to, or exemption from, the prohibitions set forth in (2). If an exception has been permitted, or an exemption granted, no further exception or exemption shall be required for the implementation of a project that is otherwise permissible, if the implementation of the project begins within seven years following the entry into force of the relevant building development plan.

(5) In case of legally protected biotopes that have developed during the term of a contractual agreement or during participation in public programmes to restrict utilization, (2) shall not apply to the resumption of any permissible agricultural, forestry or fishing use within ten years after termination of the relevant contractual agreement or participation in the relevant public programmes.

(6) In case of legally protected biotopes that have developed in areas in which permissible extraction of natural resources has been restricted or interrupted, (2) shall not apply to the resumption of extraction within five years after the restriction or interruption.

(7) The legally protected biotopes shall be registered, and the registration shall be made suitably accessible to the public. Such registration and its accessibility shall be regulated by the laws of the Federal Länder.

(8) Protective regulations that are more stringent, including provisions regarding exceptions and exemptions, shall remain unaffected.

Annex 11

**Act on the National Park
"Niedersächsisches Wattenmeer", amended
February 2010.**

Act on the National Park “Niedersächsisches Wattenmeer” (*NWattNGP*)

of 11 July 2001 (Niedersächsisches Gesetz- und Verordnungsblatt (*Nds. GVBl.*)), page 443, as last amended by Section 3 of the Act on Reforming Nature Legislation (*Gesetz zur Neuordnung des Naturschutzrechts*) of 19 February 2010 (Niedersächsisches Gesetz- und Verordnungsblatt (*NNds. GVBl.*)), page 104)

Annexes 1 to 5

§ 1

National Park National Park “Niedersächsisches Wattenmeer”

(1) The National Park “Niedersächsisches Wattenmeer”, whose scope is specified in the present Act, is located in the Wadden Sea area between the estuaries of the Elbe and Ems rivers.

(2)

¹ This Act adopts arrangements supplementing the Federal Nature Conservation Act (*Bundesnaturschutzgesetz*) of 29 July 2009 (Federal Law Gazette (*BGBl.*) I, page 2542) or derogating from it within the meaning of Article 72 (2) (3) Sentence 1 of the German Basic Law; the derogating arrangements shall not apply in the area of coastal waters (§ 56 (1) Federal Nature Conservation Act).

² In addition to the provisions of this Act, the Niedersachsen Law Implementing the Federal Nature Conservation Act (*Niedersächsisches Ausführungsgesetz zum Bundesnaturschutzgesetz*) shall apply with the exception of § 3 (2), § 4, § 14 (1) to (8) and (10), §§ 15 to 22 (3), §§ 23 and 24 (1), § 25, § 43 (3) (1) No.s (1) to (4) and No.s (7) to (9), and § 45 (1) to (3) and (5) to (9), unless otherwise provided for in this Act.

§ 2

Protective Purpose

(1)

¹ The National Park is intended to preserve the special uniqueness of the natural resources and landscape of the Wadden Sea region off the Niedersachsen coast, including the characteristic appearance of the landscape, and to protect them from potential harm.

² The natural processes in these habitats are to continue to take place.

³ The biological diversity of the fauna and flora species in the area of the National Park is to be preserved.

⁴ The special protective purpose of the individual areas in the Core Zone is described in **Annex 1**.

(2)

¹ The areas of the National Park, except for the Recreation Zone above the mean high-tide line (MHTL), a part of Core Zone I/50 and the areas on the edge of the coastal heathland between Sahlenburg and Berensch, are Special Protection Area under the European Birds Directive.

² The areas specified in Sentence 1 also serve the purpose to ensure the survival and reproduction of the bird species occurring there as stated in Annex I and Article 4 (2) of the Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC) (Official Journal of the European Communities No. L 103 Page 1), as amended; the main bird species and conservation objectives can be seen from **Annex 5**.

(3)

¹ The areas of the National Park constitute a Site of Community Importance, unless otherwise specified in **Annex 4**.

² The areas referred to in Sentence 1 also serve to maintain or restore a favourable conservation status for the main habitat types and fauna and flora species stated in Annex 5; the conservation objectives can be seen from Annex 5.

§ 3 Area of Application

(1)

¹ The boundaries of the National Park can be seen from the attached maps, which are part of this Act:

1. Map on a scale of 1/100000(**Annex 2**),
2. Reduced-size basic topographic maps of Germany (*Deutsche Grundkarten*) on a scale of 1/10000 (**Annex 3**).

² Areas enclosed by the National Park but not assigned to any of the zones listed in § 5 (1) are not part of the National Park.

(2) On the seaward side and in the estuaries of the Ems, Weser and Elbe rivers, as well as in Jade Bay, the line connecting the points shown in Annex 2 and defined by geographic coordinates (GPS – World Geodetic System 84) denotes the boundary of the National Park, unless the Niedersachsen state boundary or a guide wall runs through the estuaries of the Elbe and Weser rivers between two coordinate points, in which case the boundary is formed by the state boundary or by the base of the guide wall facing away from the river.

(3)

¹ The landward boundaries of the National Park are depicted by dotted lines in Annexes 2 and 3.

² In the boundary sections marked by an interrupted dotted line in Annexes 2 and 3, the mean high-tide line shall be definitive.

³ In the sections marked by a red dotted line in Annexes 2 and 3, the seaward boundary of the dike (§4 (3) of the Niedersachsen Dike Act (*Niedersächsisches Deichgesetz*)) shall be definitive.

⁴ With regard to the course of the boundaries marked by a continuous black dotted line in Annexes 2 and 3, the map shall be definitive.

⁵ Where, pursuant to Sentence 3, the seaward boundary of the dike forms the boundary of the National Park, that boundary shall alter with the changes permitted to the existing dike.

⁶ In such case the ministry responsible for nature conservation shall reissue Annexes 2 and 3, if necessary.

§ 4 Exclusion of Areas for Airfields and Landing Sites

(1) The state government shall be authorised, by way of regulation, to exclude areas on the East Frisian islands from the territory of the National Park to permit existing runways to be extended if the approvals required to do so, especially approvals in compliance with aviation legislation, have been obtained and such extension is imperative to fulfil the requirements laid down in § 1 (2) No. 1 of the Regulation on the Operation of Aircraft and Aeronautical Equipment (*Betriebsordnung für Luftfahrtgerät*) of 4 March 1970 (Federal Law Gazette I p. 262), last amended by **Article 3** of the state ordinance dated 3 August 1998 (Federal Law Gazette I pp. 2010, 2669).

(2) Where areas are excluded from the territory of the National Park pursuant to (1), the maps contained in Annexes 2 and 3 shall be modified *mutatis mutandis* within the framework of the state ordinance.

§ 5
Division into Zones

- (1)
- ¹ The National Park is divided into three zones, as shown on the maps referred to in § 3 (1):
 1. Core Zone (Zone I) – red,
 2. Intermediate Zone (Zone II) – green,
 3. Recreation Zone (Zone III) – yellow.
 - ² On the maps of Annexes 2 and 3, the individual areas of Zone I are marked by numbers (Arabic numerals).
- (2) Unless otherwise provided for in Paragraphs 3 and 4, the maps referred to in § 3 (1) shall be definitive regarding the boundaries between the zones.
- (3)
- ¹ The areas of the Core Zone are described in Annex 1.
 - ² The following shall apply to the demarcation of the Core Zone areas:
 1. Permanent boundary points shall be defined by geographic coordinates.
 2. Regarding the course of the Core Zone boundaries marked as permanent by an unbroken line in the maps referred to in § 3 (1), the map shall be definitive.
 3. The course of the Core Zone boundaries marked as subject to change by an interrupted line in the maps referred to in § 3 (1) is given in the information contained in Annex 1 – and, of those at sea, is given in combination with the official nautical chart applicable at the time. Where a Core Zone boundary is formed by the outer side of a sandbank or a sandbar, the chart datum line shall be definitive; where a Core Zone boundary is formed by a tidal inlet, a tidal channel or a narrow passage extending inland from a shore, the chart datum line on the side facing toward the Core Zone shall be definitive. Where the boundary is formed by buoys, by a dune base or by other locally identifiable natural or artificial landmarks, their location shall be definitive.
- (4)
- ¹ The seaward boundary of the Recreation Zone is formed by the mean high-tide line, unless Annex 3 designates lower lying areas as the Recreation Zone.
 - ² In such a case the seaward boundary, marked by an interrupted line, is formed by the chart datum line; the lateral boundary there is formed by the straight line between marking posts which, pursuant to the requirements in Annex 3, are located at the mean high-tide line and above that line, respectively.
 - ³ The demarcation of lower lying areas of the Recreation Zone can, additionally, be deduced from the information provided in Annex 3.

§ 6
Activities Prohibited in the Core Zone

- (1)
- ¹ In the Core Zone, any activities that destroy, damage or alter the National Park or any of its component parts shall be prohibited
 - ² In derogation from Sentence 1, the activities described in §§ 7 to 11 and 16 as well as in Annex 1 shall be permitted.
 - ³ Sentence 2 shall not apply to areas I/7, I/23, I/35, I/37, I/38, I/41, I/42 and I/45 in so far as such activities destroy, damage or alter the soil, its vegetation or **Ross worm (Sabellaria spinulosa)** .
- (2) To avoid posing a nuisance or danger to the protected natural resources of the National Park, it shall be prohibited to
1. disturb the natural quiet of the park through noise or in any other way,

2. disturb wild animals or seek them out, photograph or film them in their nesting, breeding, habitat and refuge areas,
 3. allow dogs to go unleashed, unless this occurs in proper hunting practice,
 4. light or tend fires at places other than those designated for such purpose,
 5. fly kites – even from vehicles – model aircraft or other small aerial vehicles, launch balloons, or operate remote-controlled devices off-trail,
- unless such activities are permitted by or pursuant to the present Act.

§ 7

Agriculture and Grazing in the Core Zone

(1)

¹ Proper agricultural land use in areas protected by a primary dike, overflow dam or protective dunes, including the maintenance and renovation of associated installations, the grazing of horses on inhabited islands, and the erection of conventional pasture fences, livestock watering troughs and milking parlours, shall not be subject to any restriction except as provided for in Sentence 2.

² It shall be prohibited to

1. level surfaces, alter the surface profile existing at the time the present Act entered into force, or carry out excavations or embankment work,
2. convert grassland into arable land,
3. turn over grassland for new planting and seeding, and
4. to use pesticides.

(2) Proper agricultural land use in areas not protected by a primary dike, overflow dam or protective dunes, including the maintenance and renovation of associated installations and the grazing of horses on inhabited islands, shall be permissible in the manner and to the extent previously practiced.

(3) The authority responsible for managing the state-owned areas not protected by a primary dike, overflow dam or protective dunes shall, while paying due regard to Section 2, carry out such management in agreement with the National Park Administration, implementing foreshore management measures in consultation with the dike association concerned.

(4)

¹ The National Park Administration shall reach agreement with the relevant island communities and the demesne administration on the islands of Baltrum, Juist and Spiekeroog regarding a grazing plan for the state-owned salt meadow areas, following coordination with the haulage firm owners concerned.

² The grazing plan shall lay down options for grazing, making particular allowance for the draught horses used for haulage purposes.

³ It shall ensure that the habitat types in the National Park affected by grazing and listed in Annex 5 are not substantially impaired and that avifauna are protected from any significant impairment and disturbance.

⁴ It shall take account of the level of grazing to date.

§ 8

Hunting in the Core Zone

(1) The exercising of hunting rights shall be permitted in accordance with Niedersachsen's Hunting Act (*Niedersächsisches Jagdgesetz*), unless provided for otherwise in (2).

(2)

¹ The hunting of waterfowl shall be permitted only on the inhabited islands and with the consent of the National Park Administration.

² Such consent may be granted for up to ten days per year per island; the days are not required to be consecutive.

³ The owner of the hunting grounds shall submit a request in writing no later than one week prior to the intended hunting date.

⁴ Approval shall be contingent on the hunting activities not significantly compromising the protective purpose of this Act.

⁵ No approval may be granted for the official census days that the relevant authority announces within the scope of the international water and wading bird census.

⁶ If a day approved for hunting is not used due to inclement weather, approval for a substitute day shall, upon request, be granted in accordance with Sentences 3 to 5.

(3) The National Park Administration may initiate measures to control the stock of huntable as well as other animal species, including waterfowl.

§ 9 Fishing in the Core Zone

(1) Professional fishing for fish and crab and professional static net fishing including the use of mud slides shall be permitted in the Core Zone; excepted shall be areas I/8, I/10, I/18, I/24, I/28, I/30, I/32, I/33, I/34 and I/48.

(2)

¹ Professional fishery on blue mussel including by-catches of Pacific oyster and mussel farming shall be permitted in areas I/2, I/4, I/5, I/6, I/13, I/14, I/21, I/22, I/27, I/29, I/31, I/36, I/39 and I/40 of the Core Zone, subject to the restrictions arising from Sentences 2 and 3.

² On-bottom cultivation of blue mussels shall be permitted only within the framework of a management plan issued by the highest fisheries authority together with the highest nature conservation authority and updated every five years, regarding the protective purpose of the present Act; this shall also apply to area I/17 of the Core Zone in so far as the on-bottom cultivation of blue mussels is permissible there in accordance with Annex 1.

³ Fishery on mussels from wild mussel beds for human consumption shall be permitted only if the mussels there are continually covered by water.

(3) Sport and recreational fishing, including manual digging for lugworms from approved trails and areas, shall be permitted.

(4) Exercising of the participatory fishing rights entered in the Water Register for the shore of the River Weser shall be permitted for the inhabitants of the town of Langen, the municipality of Nordholz and the joint municipality of Land Wursten in areas I/44 and I/45 and in the south of the eastern part of area I/47 – bounded to the west by Neueppeler Tief and to the north by Oxstedter Tief – in so far as these areas can be travelled on foot.

§ 10 Further Uses of the Core Zone

The operation of honeybee mating areas on the islands and the removal of mud from approved areas for therapeutic purposes shall be permitted.

§ 11 Entering of the Core Zone

Entering of the Core Zone shall be permitted for the following purposes only:

1. for the uses permitted under §§ 7 to 10,

2. for mudflat walking, hiking, bicycle tours, horse riding, carriage riding, and supply trips along approved trails and routes,
3. for the use of public roads,
4. for the temporary stay of crews of recreational craft left high and dry directly near to fairways crossing the Core Zone as defined by § 2 (1) (1) of the German Traffic Regulations for Navigable Maritime Waterways (*Seeschiffahrtsstrassen-Ordnung*), within a radius of 50 metres around the craft,
5. for the inspection of craft left high and dry at approved locations near the harbour channel.

§ 12

Activities Prohibited in the Intermediate Zone

(1) The activities prohibited under § 6 shall apply mutatis mutandis to the Intermediate Zone, unless otherwise stipulated in the paragraphs below.

(2)

¹ Where consistent with the protective purpose, exceptions from § 6 (1) (1) may be granted in individual cases for

1. measures that result in damage to the vegetation cover,
2. the setting-up of vending facilities, kiosks, temporary structures, tents and wicker beach chairs, and
3. the installation of advertising billboards, posters or inscriptions.

² Under the conditions stated in Sentence 1, exceptions may be granted for

1. the removal of sand or soil material to maintain coastal protection facilities, and
2. the removal of sand to maintain beaches in the Recreation Zone or on the East Frisian islands outside the National Park area.

(3)

¹ The activities prohibited under § 6 (2) (1) shall not apply to events designed to promote traditional customs.

² Exceptions from the activities prohibited under § 6 (2) (2) may be granted in individual cases.

§ 13

Activities Permitted in the Intermediate Zone

(1) §§ 7 to 10 shall apply mutatis mutandis, unless otherwise stipulated in the paragraphs below.

(2) Exceptions from the restrictions laid down in § 7 (1) (2) Nos (3) and (4) may be granted in so far as this is consistent with the protective purpose.

(3) The waterfowl hunting restrictions applicable pursuant to § 8 shall not apply.

(4) The provisions in § 9 (2) shall apply mutatis mutandis throughout the Intermediate Zone.

(5) Sport and recreational fishing including digging for lugworms shall be permitted throughout the Intermediate Zone in accordance with § 14 (2).

(6) The inhabitants of the communities whose territories are located wholly or partly in the National Park (local population) shall be permitted to

1. pick edible mushrooms and berries, and,
2. in the months of May and June, harvest Sea Arrowgrass between the Weser and Elbe rivers for their own consumption.

(7) In the context of land use in privately owned areas for forestry purposes consistent with the principles of good practice, the activities prohibited in § 12 (1) shall not apply with respect to

1. utilising, in small groups, forest stands of oak and aspen trees as well as forest stands of shrubby oak trees and replanting with the same hardwood types, and
2. utilising the other forest stands in the area of the town of Cuxhaven.

§ 14

Entering of the Intermediate Zone

(1)

¹ Except for the purposes referred to in §§ 11, 12 and 13, the Intermediate Zone may be entered only on foot, in wheelchairs or in non-motorised vehicles.

² The parking of caravans shall be prohibited.

³ Overnight stays shall be permitted only on recreational craft lying in approved areas near the ports of the East Frisian Islands, for one night.

⁴ Driving or parking motor vehicles may be permitted in derogation from Sentence 1 in so far as this is consistent with the protective purpose.

(2)

¹ In the period from 1 April to 31 July of each year (birds' breeding and rearing period), grassland areas and associated tidal inlets located between the mean high-tide line and the primary dike, protective dune base facing the tidal flats or seaward base of the coastal heathland boundary may be entered only via the approved areas, roads, trails or routes.

² This restriction shall not apply to the exercising of activities permitted under §§ 7, 8, 9 (1), (2) and (4) and § 13 (6) (2).

³ Exceptions to the prohibition to enter in Sentence 1 may be granted in so far as this is consistent with the protective purpose.

(3)

¹ The right of entry may be restricted by individual order for specific areas that, following the coming into force of this Act, develop into one of the habitat types referred to in Annex 5 or have taken on a significantly greater importance for the conservation of species listed in Annex 5, or in which respect the restriction is necessary to counteract any significant harm to the priority natural habitat types listed in Annex 5.

² Such restrictions shall be limited to a maximum of five years.

³ Upon expiry of this period they may be extended once, by no more than five years, if the reasons for the restrictions still apply.

§ 15

Recreation Zone

(1)

¹ The Recreation Zone may be used for recreation only, in particular for walking, camping, bathing, use of wicker beach chairs, horse riding, angling, collecting shells, kite flying, and sporting activities.

² The use of motorised vehicles and the setting-up of beach shelters, mobile changing rooms, toilets and similar mobile facilities may be permitted in so far as this is necessary to make the activities permitted in Sentence 1 possible.

(2)

It is particularly prohibited

1. to pitch tents or park caravans,
2. to engage in noisy events and activities,
3. to drive dune buggies or similar motorised recreational vehicles on the beach, and
4. to erect any structures, unless permitted under Paragraph 1 Sentence 2.

- (3) Noise-intensive events and activities may, with the exception of motorsport events, be permitted in individual cases in so far as this is consistent with the protective purpose.
- (4) The removal and piling-up of sand for the purpose of beach maintenance shall be permitted in so far as this is consistent with the protective purpose.

§ 16 Exceptions

- ¹ The prohibitions under this Act shall not apply to
1. activities serving to fulfil public functions and responsibilities
 - a) of the National Park Administration,
 - b) in the collection of waste and the cleaning of beaches,
 - c) of the water management administration, with the exception of new dike construction,
 - d) in fisheries and hunting administration,
 - e) relating to hazard prevention, disaster control, explosive ordnance disposal (EOD) and accident prevention including marine rescue,
 - f) of the Niedersachsen State Office for Soil Research (*Niedersächsisches Landesamt für Bodenforschung*) [now: Niedersachsen State Office for Mining, Energy and Geology (*Landesamt für Bergbau, Energie und Geologie*)],
 - g) of the Federal Maritime and Hydrographic Agency (*Bundesamt für Seeschifffahrt und Hydrographie*) (hydrographic surveying),
 - h) of the Federal Waterways and Shipping Administration (*Wasser- und Schifffahrtsverwaltung*) in connection with the performance of its statutory tasks, especially in regard to government-owned shipping facilities and river constructions as well as the island protection installations to be maintained by the Federal Government pursuant to § 8 (5) of the Federal Waterways Act (*Bundeswasserstrassengesetz*), except waterways development,
 2. maintenance measures of the institutions in charge of dike preservation (coastal protection), with the exception of new dike construction,
 3. maintenance and repair measures
 - a) in existing approaches to ports, including associated fairways,
 - b) relating to existing roads and trails including associated wayside areas pursuant to § 2 (2) of the Niedersachsen Road Act (*Niedersächsisches Strassengesetz*),
 - c) on existing overflow dams,
 - d) on the dike foreshore in so far as they are required for dike safety pursuant to §§ 21 and 22 of the Niedersachsen Dike Act,
 4. the operation, maintenance and repair
 - a) of pipe, cable and transmission lines for the supply of energy and water as well as for sanitation services, including associated facilities,
 - b) postal and telecommunications services,
 - c) existing rail and aviation facilities,
 - d) existing water catchment and supply installations,
 5. the use and maintenance of existing, approved structures and associated open spaces in accordance with relevant permits,
 6. the use and maintenance of the camping site located in the Süderdünen district on the island of Spiekeroog, and
 7. navigation of the Federal waterways in water craft in accordance with Federal waterways legislation.
- ² Where measures as referred to in Sentence 1 (1) and (2) are, either individually or in conjunction with other measures, capable of causing significant harm to the conservation resources specified in § 2 (2) and (3), they shall be permissible only if compliant with § 34 of the Federal Nature Conservation Act.

- ³ Deposition of sand, mud and dredged material shall not be excepted, apart from material relocated close to fairways and to parts of receiving water courses on the seaward side of dikes and in the mudflats.
- ⁴ The collection of waste and the cleaning of beaches pursuant to Sentence 1 (1) (b) in the Core Zone shall be excepted only during certain periods on which the authority in charge shall decide in agreement with the National Park Administration, paying due regard to the protective purpose.

§ 17 Exemptions

Where a request for exemption concerns projects or measures that are, individually or in conjunction with other projects or measures, capable of causing significant harm to the conservation resources specified in § 2 (2) and (3), the exemption may be granted only if compliant with § 34 of the Federal Nature Conservation Act.

§ 18 Approval of Trails and Other Parts of the Area

In so far as certain activities are permitted pursuant to §§ 9 to 11 and 14, as well as Annex 1, only on approved trails, routes, areas or other parts of the park, decisions regarding approval shall pay due regard to the protective purpose.

§ 19 *- repealed -*

§ 20 Information Activities

- (1)
- ¹ The National Park Administration shall engage in information and educational activities in so far as this is consistent with the protective purpose pursuant to § 2.
- ² To do this, it shall maintain suitable facilities in the National Park area or have a part in their maintenance.
- (2)
- ¹ Such information and educational activities shall help realise the protective purpose of the National Park and foster appreciation for ecological issues.
- ² They shall call attention to the opportunities for experiencing nature and for recreation in the National Park and communicate the aims of the National Park to the general public.
- ³ The work that takes place in the National Park, including scientific studies and research projects, shall be explained.
- (3)
- ¹ The National Park Administration shall work together with local communities and associations in its information and educational activities, undertaking such public relations work in regard to the National Park particularly through jointly maintained or state-funded facilities.
- ² It may arrange for suitable persons to take part in the information and educational activities.

§ 21
Research

(1)

¹ The National Park Administration shall carry out scientific studies of its own and coordinate external research projects.

² Scientific monitoring and research in the National Park shall require approval by the National Park Administration, which may be granted if the aim of such monitoring and research is to

1. study the structure, development and relationships within natural and semi-natural biocoenoses,
2. gain insights relevant to nature conservation,
3. provide information on human impacts as well as for supra-regional monitoring of environmental changes, or
4. assist the National Park Administration in the fulfilment of its tasks and responsibilities and is consistent with the protective purpose pursuant to § 2.

(2) Approval may be made subject to the requirement that the results of the monitoring and research activities be made available to the National Park Administration.

§ 22
Maintenance, Development and Restoration Measures

(1)

¹ The National Park Administration may order certain measures to be taken for the purpose of maintaining, developing and restoring the National Park.

² § 15 (2) and (3) of the Niedersachsen Law Implementing the Federal Nature Conservation Act shall apply mutatis mutandis.

(2)

¹ Beyond the instances referred to in § 3 (4) of the Federal Nature Conservation Act, associations and other legal entities may, subject to their consent, be revocably entrusted also to

1. look after, maintain, develop and restore parts of the National Park and
2. take on certain responsibilities in regard to species protection

if they offer the guarantee of proper fulfilment of those responsibilities.

² The National Park Administration shall make the decision in this respect.

³ Public authority powers shall be non-transferable.

§ 23
National Park Administration

The “Niedersachsen Wadden Sea” National Park Administration is a state authority based in Wilhelmshaven.

§ 24
Responsibilities

(1) In addition to the functions delegated to it under §§ 7, 8 and 20 to 22, the National Park Administration shall be responsible for

1. preparing concepts for conservation, maintenance, development and restoration measures,

2. coordinating the work of the lower nature conservation authorities active in the National Park area as well as of the authorities and associations that have support, maintenance, development and restoration functions, or are otherwise active, in the National Park,
3. approving exceptions and granting exemptions in the Intermediate Zone and Recreation Zone, except where the lower nature conservation authority according to (2) is responsible, and for granting exemptions in the Core Zone,
4. approving the trails, routes, areas and other parts of the park for certain activities pursuant to § 18 or, in an area overseen by a lower nature conservation authority, with the latter's consent,
5. monitoring the condition of the protected resources specified in § 2 (3) in preparation for reporting to the European Commission,
6. exercising the right of pre-emption in favour of the State,
7. restricting the right of entry pursuant to § 14 (3), except where the lower nature conservation authority according to (2) is responsible,
8. *imposing a limitation on uses, except where the lower nature conservation authority according to (2) is responsible, and [Funktionslos, da § 15 Abs, 5 gestrichen worden ist.]*
9. other tasks including those delegated to the lower nature conservation authorities pursuant to § 32 (1) (1) of the Niedersachsen Law Implementing the Federal Nature Conservation Act, unless otherwise provided for in this Act.

(2)

¹ The lower nature conservation authorities shall be responsible for

1. approving exceptions and granting exemptions in respect of areas of the Recreation Zone and Intermediate Zone lying in their territory,
2. restricting right of entry pursuant to § 14 (3) in respect of areas lying in their territory,
3. imposing a limitation on uses pursuant to § 15 (5) in respect of areas lying in their territory,
4. coordinating the removal of flotsam from the dike foreshore with the dike associations, and
5. deciding on earth removal projects in respect of areas of the Recreation Zone and Intermediate Zone lying in their territory.

² Exceptions, exemptions, approvals and orders pursuant to Sentence 1 shall be issued in consultation with the community on whose territory the activity or measure is to take place.

(3) Where more than one exception or exemption for a project is necessary pursuant both to (1) and (2), the National Park Administration shall decide upon their approval in consultation with the lower nature conservation authority.

(4)

¹ The National Park Administration shall be responsible for measures pursuant to § 3 (2) of the Federal Nature Conservation Act and § 2 (1) and (2) of the Niedersachsen Law Implementing the Federal Nature Conservation Act in the Core Zone and in the unincorporated parts of the Intermediate Zone and Recreation Zone lying below the mean high-tide line.

² In all other respects the lower nature conservation authorities shall be responsible.

(5) The National Park Administration may set up a wardening service consisting of suitable persons to warden the territory of the National Park and ensure species protection.

§ 25 Regional Interests

The authorities responsible shall, when making decisions under this Act, take account of the interests of the local population in safeguarding and developing their living and working conditions and interests in regard to regional development, the business economy and tourism, as far as in accordance with the protection purpose.

§ 26
State-owned Areas

The authorities deciding within the scope of their competence on the use of state-owned areas and on the granting of rights of use shall give special consideration in this regard to the protective purpose of this Act.

§ 27
National Park Advisory Board

(1)

¹ The National Park Administration shall receive advice from an advisory board, which is to assist the National Park Administration in its task of fulfilling the protective purpose while taking due account of other public interests.

² The advisory board shall include

1. two members from the lower nature conservation authorities within whose sphere of responsibility parts of the National Park lie,
2. three members from the municipalities,
3. two members from the environmental associations which are recognised by the State of Niedersachsen pursuant to § 3 of the Environmental Appeals Act (*Umwelt-Rechtsbehelfsgesetz*) and, according to their statute, are active at national level,
4. one member each from the chambers of industry and commerce in whose geographic area parts of the National Park lie, the Chamber of Agriculture Niedersachsen (*Landwirtschaftskammer Niedersachsen*), the dike associations, the tourism associations, and the state athletic federation (*Landessportbund*),
5. two members from the scientific departments for nature protection/countryside conservation and biology at the universities in Niedersachsen,
6. one member from the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*BMU*), and
7. one member from the Weser-Ems Fisheries Association (*Landesfischereiverband Weser-Ems*).

(2)

¹ The members of the advisory board shall be appointed by the highest nature conservation authority for a period of five years.

² The members referred to in (1) Sentence 2 Nos. 1, 3 and 4 shall be appointed by the authorities, associations and bodies sending them, the members in (1) Sentence 2 No. 2 by the working group of the local umbrella organisations of Niedersachsen (*Arbeitsgemeinschaft der kommunalen Spitzenverbände Niedersachsens*), and the members in (1) Sentence 2 No. 5 by the mentioned scientific departments.

³ § 12 (1) of the Niedersachsen Equal Rights Act (*Niedersächsisches Gleichberechtigungsgesetz*) shall apply mutatis mutandis to the appointments.

(3) If, in cases where a right of appointment is to be jointly exercised by more than one association and organisation ((1) Sentence 2 Nos. 1, 3, 4 and 5), an agreement cannot be reached between the relevant associations and organisations within a period of two months after invitation for such appointment, the highest nature conservation authority shall then decide.

(4)

¹ The National Park Administration shall consult with the advisory board

1. when preparing concepts for conservation, maintenance, development and restoration measures,
2. on research projects (in so far as the National Park Administration is involved in them),

3. when preparing information material about the National Park or parts thereof,
 4. when setting up a wardening service, and
 5. on matters of national and international cooperation (research, excursions, etc.).
- ² The advisory board may submit proposals concerning measures in the National Park on which the National Park Administration is required, within the framework of its responsibilities, to state its position.

(5) The business of the advisory board, including representation by the advisory board members, shall be governed by the rules of procedure to be issued by the highest nature conservation authority.

§ 28 Administrative Offences

(1) It is an administrative offence for anyone, intentionally or by negligence, and without being authorised by or pursuant to this Act, to

1. engage in an activity in the Core Zone that, in breach of § 6 (1), will destroy, damage or alter that zone or individual parts thereof,
2. engage in a disruptive or dangerous activity in the CoreZone in breach of § 6 (2),
3. enter the CoreZone for purposes other than those permitted under § 11,
4. engage in an activity in the Intermediate Zone that, in breach of § 12 (1) in conjunction with § 6 (1), would destroy, damage or alter that zone or individual parts thereof,
5. engage in a disruptive or dangerous activity in the Intermediate Zone in breach of § 12 (1) in conjunction with § 6 (2),
6. enter the Intermediate Zone in breach of § 14,
7. in the recreation zone, violates the prohibitions of §15(2) or a restriction pursuant to §15 (5).

(2) An administrative offence under (1) Nos. 2, 3 and 5 to 7 may be penalised with a fine of up to 25,000 euros, and an administrative offence under (1) Nos. 1 and 4 with a fine of up to 50,000 euros.

(3) § 72 of the Federal Nature Conservation Act shall apply *mutatis mutandis* to administrative offences under this Act.

§ 29 - repealed -

§ 30 Transitional Arrangements

(1) Administrative authorisations, permissions, approvals and other administrative acts derogating from the protective measures in Core Zone areas I/51 and I/52 pursuant to §§ 6 to 11 which were in force on 8 November 2007 shall continue to apply.

(2)
¹ In regard to the proceedings pending on 28 February 2010, the following shall continue to apply:

1. in case of Core Zone area I/51, the provisions referred to in §§ 2 to 5 of the Regulation on the Conservation Area “Küstenmeer vor den Ostfriesischen Inseln” (*Verordnung über das Naturschutzgebiet “Küstenmeer vor den Ostfriesischen Inseln”*) in the Niedersachsen 12 nm zone of the North Sea dated 31 October 2007 (Niedersächsisches Ministerialblatt, Page 1241),

2. in case of Core Zone area I/52, the provisions referred to in §§ 2 to 5 of the Regulation on the Conservation Area “Roter Sand” (*Verordnung über das Naturschutzgebiet “Roter Sand”*) in the Niedersachsen 12 nm zone of the North Sea dated 31 October 2007 (Niedersächsisches Ministerialblatt, Page 1243).
- ² Authorisation procedures and preliminary decision procedures pertaining to individual conditions for authorisation shall be considered as one procedure within the meaning of Sentence 1.

(3) The plans and measures laid down as part of spatial planning or set out in the state’s planning programme (*Landes-Raumordnungsprogramm*) prior to 1 March 2010 in which nature conservation concerns have been taken into account in the spatial planning procedures on the basis of the provisions of a regulation referred to in (2) (1) No. 1 or 2, do not, in Core Zone areas I/51 and I/52, require any exemption pursuant to § 67 (1) and (2) (1) of the Federal Nature Conservation Act or § 17 of the present Act.

(4) § 60 (a) to (c) of the Niedersachsen Nature Conservation Act (*Niedersächsisches Naturschutzgesetz*) in the version in force until 31 October 2009 shall apply to the proceedings pending on 28 February 2010.

Annex I

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
I/1	Dollart	Outer dike and mudflats as far as state boundary south of line connecting base of Geisesteert guide wall, in westerly direction, to kink in state boundary, in southerly direction	Typical ecosystem of brackish water bay mudflats and adjoining outer dike areas with typical fauna and flora and special importance as a resting, breeding and foraging area for sea and wading and waterbirds, and offering particular variety of geo-historical and regional cultural phenomena.
I/2	Rysumer Nacken	Outer dike and coastal mudflats between Upleward Recreation Zone and National Park outer boundary west of Rysumer Hammrich	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem with mudflats, sand- and shell banks, and dike foreshore
	Manslagter Nacken	Outer dike and coastal mudflats between dike builder’s monument and Altendeich	

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
I/3	Greetsieler Nacken Outer dike and coastal mudflats between Ley fairway and Pilsum	Important breeding, resting and foraging area for wading and water birds ; important habitat for typical fauna and flora species and communities, and typical ecosystem with mudflats, sandbanks, and dike foreshore	
I/4	Leybucht [Bay] Outer dike and bay coastal mudflats south of Norddeich mudflat fairway as far as former Norddeich radio station	Important resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem with sandbanks, mudflats, and dike foreshore	Operation of drilling rig and conveying pipeline
I/5	Leybucht Sands Mudflat areas of Hamburger Sand, Kopersand, Mittelsand, Itzendorfplate and Branderplate south of Memmert mudflat fairway and north of Ley, Greetsieler Legde, Bantsbalje, Slapersbucht and Norddeich mudflat fairway, as far as Busetief [channel]	Important partial habitat for seals; important resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem with sandbanks as large as small islands and mudflats	
I/6	Randzel and Lütje Hörn Sands south of the Borkum mudflat fairway, excluding Boesgatje	Important partial habitat for seals; important resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem with sandbanks as large as small islands and mudflats	
I/7	Randzel eelgrass communities Area bounded by coordinates, south east of Blindes Randzelgat	Important eelgrass communities	
I/8	Borkum – Ost (east)		

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Waterdelle-Muschelfeld, Ostdünen [dunes in eastern part of island], island polders and dike foreshore, salt meadows, embryonic dunes, beach and island mudflats north of Borkum mudflat fairway, between coordinate-defined line and Ostplate [sandbank on island of Spiekeroog], excluding northern foreshore area and adjoining 50 m beach fringe above mean high-tide line, as far as Hooge Hörn	Important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, wet dune slacks, and fen/marshes; breeding area important for harriers; important partial habitat for seals; important breeding, resting and foraging area for water, wading and meadow birds.	Picking of edible mushrooms and berries by local population for own consumption, ice-skating on Tüskendörsee lake, except in shore areas defined by National Park Administration as particularly sensitive; collection of blue mussels and catching of grey mullet (<i>Mugilidae</i>) in tidal inlets by local population for own consumption.
I/9	Borkum – Nordstrand (north beach) Embryonic shifting dunes north of base of Kobbe and Oldmanns-Olde dunes, as far as 50 m seaward of mean high-tide line	Important habitat for typical fauna and flora species and communities; ecosystem typical of embryonic dunes	Entry on foot, outside of designated pathways, in the period from 16 July to 1 March of every year
I/10	Borkum – Greune Stee and Ronde Plate Dunes, salt meadows and mudflats on southern part of island, bounded by southern and Wolde dunes, railway embankment, port, south beach and salt meadows, north of railway embankment from eastern dike as far as Reededeich [dike]	Important breeding, resting and foraging area for waterand wading birds; breeding area important for harriers; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, wet dune slacks, fens/marshes, dike foreshore and salt meadows, coastal mudflats, and sandbanks	Picking of edible mushrooms and berries, and recreational fishing, by local population for own consumption, excluding on salt meadows north of railway embankment.
I/11	Hohes Riff Sands and mudflats west of Borkum	Important partial habitat for seals; breeding area important for wading birds; typical ecosystem including sandbanks and coastal mudflats	
I/12	Borkum Riff Wadden sea and territorial waters north of Borkum, Kachelotplate [dune island] and island of Juist as far as traffic separation scheme	Specific ecosystem with gravel-to-stony bottoms, and important resting and foraging area for loons, sea ducks, terns and gulls	Skin diving
I/13	Kachelotplate [dune		

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	island]/[island of] Memmert		
	Island mudflats and uninhabited sand islands bounded by Haaksgat fairway, Juister Balje, Nordland fairway, Memmertbalje, and Osterems	Important partial habitat for harbour seals and grey seals; important breeding, resting and foraging area for water and wading birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandy beaches and island dunes with geologically important forms of landscape (island formation)	Access to island of Memmert requires official authorisation.
I/14	Juist – western part and Schillplate [sandbank] Dunes, dike foreshore, and island mudflats east of northern Haaksgat fairway and north of Juister Balje [channel]	Important partial habitat for seals; important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, wet dune slacks, bodies of standing water, dike foreshore, island mudflats, sandbanks, and salt meadows with extensive tidal inlet systems	Picking of edible mushrooms and berries and collection of blue mussels by local population for own consumption; use of Hammersee lake by local population for ice skating and ice sailing; landing and walking at approved location of rock fill on northern edge of Juister Balje, south of trail leading to rescue shelter, including access to walking trail for crews of vessels home-ported in Juist or Norderney
I/15	Juist – Mitte (centre of island) Salt meadows between Juist village and airport	Salt meadow area with extensive tidal inlet systems; important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities; typical ecosystem	
I/16	Juist – eastern part Beach and island mudflats, Kalfamer including eastern end as far as Kalfamergat	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and	

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
I/17	Norderney South beach polders, dike foreshore, salt meadows, dunes, island mudflats, and sandbanks between Norderney town, waterworks and Wichter Ee north of Norderney mudflat fairway	communities, and typical ecosystem including coastal dunes, wet dune slacks, coastal lagoons, island mudflats and sandbanks Important breeding, resting and foraging area for wading and water birds; breeding area important for harriers; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandy beaches, coastal dunes, wet dune slacks, fens/marshes, slack water areas, dike foreshore and salt meadows, island mudflats and sandbanks; area with geoscientifically important forms of landscape (island formation)	Picking of edible mushrooms and berries by local population for own consumption; on-bottom cultivation of blue mussels north of Norderney mudflat fairway as far as straight line passing through points 7° 14' 36'' E/53° 41' 41'' N and 7° 16' 26'' E/53° 41' 42'' N, as well as in area bounded by Norderney mudflat fairway and traverse with following coordinates: 7° 19' 45'' E/53° 42' 13'' N, 7° 19' 31'' E/53° 42' 20'' N, 7° 19' 29'' E/53° 42' 29'' N, 7° 20' 29'' E/53° 42' 42'' N.
I/18	Aussendeich (outer dike) Dike foreshore including offshore land reclamation areas between Finkenheller and Dornumersiel, excluding Münstersommerpolder	Important breeding, resting and foraging area for wading and water birds ; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal mudflats and dike foreshore	
I/19	Baltrum – east Parts of central island dune region including embryonic dunes north of emergency access route	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes and wet dune slacks	Picking of edible mushrooms and berries by local population for own consumption; walking off-trail beyond approved routes in period from 16 July to 1 March of every year
I/20	Baltrum – Osterhook		

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Salt meadows south of emergency access route, Ostplate and eastern Baltrum island mudflats between Accumer Ee and Baltrum mudflat fairway	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including salt meadows and island mudflats	Picking of edible mushrooms and berries and collection of blue mussels by local population for own consumption; skating by locals in areas west of eastern enclosing dike, sporting use of volleyball facility at NTB [Gymnastics Association of Niedersachsen] club house, as previously
I/21	Dornumer Nacken Sandbank between Baltrum mudflat fairway and Accumersieler Balje	Important partial habitat for seals; important breeding, resting and foraging area for water and wading birds	
I/22	Neiderplate, Neiderplate, western Damsumer Sand and Westerburger Watt, as well as dike foreshore including offshore land reclamation areas from Westeraccumersiel as far as Oldendorf	Important resting and foraging area for wading and water birds; typical ecosystem including coastal mudflats and dike foreshore	
I/23	Hungatplate Near-coast section of Hungatplate 100 m east of fairway to Bengersiel and on seaward side of land reclamation areas	Important eelgrass communities	
I/24	Langeoog – Flinthörn Dunes, salt meadows, and tidal flat bay	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandy beaches, coastal dunes, dike foreshore; area with geoscientifically important forms of landscape (island formation)	Picking of edible mushrooms and berries and collection of blue mussels by local population for own consumption.
I/25	Langeoog – south east Osterhook, dunes and salt meadows; Langeoog island mudflats as far as Langeoog mudflat fairway	Important partial habitat for seals; important breeding, resting, foraging and moulting area for wading and water	Picking of edible mushrooms and berries, collection of blue mussels, and fishing for grey mullet (<i>Mugilidae</i>) in tidal

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
		birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, wet dune slacks, standing waters, salt meadows, dike foreshore and island mudflats	inlets by local population for own consumption.
I/26	Langeoog – north east North beach, from access to “Meierei” [restaurant] at eastern end of island, including offshore mudflats and Süderriff from base of dune, as far as Otzumer Balje/Hullbalje fairway	Important partial habitat for seals; important breeding, resting and foraging area for wading and water birds typical ecosystem including embryonic dunes and sandbanks; area with geoscientifically important forms of landscape (island formation)	Walking off-trail in period from 16 July to 1 March of every year
I/27	Janssand, Roggsand and Stüversplate Mudflats between Stüverslegde, Hullbalje, Schillbalje and Baklegde fairways and Neuharlingersiel fairway	Important partial habitat for seals; typical ecosystem including sandbanks and coastal mudflats; area with geoscientifically important forms of landscape	
I/28	Spiekeroog – Westergroen and Ostergroen Western and central parts with dunes and salt meadows between former railway line – excluding camping site area east of railway line at rescue station – and Spiekeroog village, as well as salt meadows of Südergroen (eastern part) and Ostergroen	Important breeding, resting and foraging area for wading and water birds; important habitat for fauna and flora species and communities, and typical ecosystem	Picking of edible mushrooms and berries by local population for own consumption.
I/29	Spiekeroog – Ostplate		

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Spiekeroog island mudflats, Swinnplate and Bakenplate as far as Alte Harle/Muschelbalje fairway	Important breeding, resting and foraging area for wading and water birds ; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, wet dune slacks, coastal mudflats, dike foreshore, sandbanks and sandy beaches; area with geoscientifically important forms of landscape (island formation); important partial habitat for seals	Collection of blue mussels and fishing for grey mullet (<i>Mugilidae</i>) in tidal inlets by local population for own consumption; transport of heavy goods along route from floodgate (<i>Deichtor</i>) to former pier near Hermann-Lietz-Schule (edge of mudflats)
I/30	Schwerinsaussengroden	Poldered marshland (<i>Groden</i>) including offshore land reclamation areas and mudflats between Neuharlingsiel and Harlesiel	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal mudflats and dike foreshore
I/31	Elisabethaussengroden and mudflat area Poldered marshland areas on seaward side of dike (<i>Aussengroden</i>) and eastern Harlesiel mudflats; Langer Jan, Hoher Rücken, Südersand and Neues Brack between Carolinensieler Balje, Telegraphenbalje, Wangerooge mudflat fairway, Minsener Balje and Minsener Oog mudflat fairway	Important partial habitat for seals; important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandy beaches, dike foreshore, and coastal mudflats	
I/32	Wangerooge – west	Poldered marshland areas on landward [Westinnengroden] and seaward [Westaussengroden] side of dike, saline bay (<i>Salinenbucht</i>) and western part of poldered “Mittelaussengroden” marshland area	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including coastal dunes, poldered marshland areas, and island mudflats
I/33	Wangerooge – east		Picking of edible mushrooms and berries by local population for own consumption.

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Parts of Ostinnengroden poldered marshland area, dune ridge east of third dune overpass beginning at Café Neudeich as well as at salt meadows and mudflat areas between Georgspad and Blauer Balje	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandy beaches, coastal dunes, salt meadows and island mudflats	Landing and walking by crews of recreational craft on approved area between beach marker buoy and old pier, including access to circular track around island, giving special consideration to breeding habitat of little tern (<i>Sterna albifrons</i>),
I/34	Minsener Oog From outer boundary of National Park as far as Minsener Oog fairway, Minsener Balje, and Blauer Balje	Important breeding, resting and foraging area for wading and water birds; typical ecosystems including dry sandbars and coastal mudflats	
I/35	Crildumersiel Dike foreshore and mudflat areas up to 50 m on seaward side of chart datum line between Crildumersiel dike overpass and Wangerland pumping station, as well as channel area between chart datum line and outer boundary of National Park southward in direction of Hooksieler Hafentief [harbour channel]	Foraging area for wading and water birds and waterfowl; eelgrass communities; habitat for typical fauna and flora species and communities, especially of Ross worm (Sabellaria spinulosa)	Swimming by visitors at Hooksiel beach.
I/36	Jadebusen (Jade Bay) Petersaußengroden, Cäcilienaußengroden, Sander Watt and Bordumer Sand north of Dangaster Aussentief, Nordender Aussengroden and Dangaster Aussengroden, Kronshörne, Schweinsrücken, Arngastsand, western Würdelethersand and Vareler Watt between training dam, Varel fairway and Vareler Tief [channel]; Nordschweiburger Groden, Neuer Groden, Neuwapeler Aussengroden, Südender Aussengroden, eastern Würdeleher Sand and Schweiburger Watt between Vareler Tief and Schweiburger Tief; Augustaussengroden, Kleihörne and Sehestedt floating bog, Seefelder and Stollhammer Watt, north of Schweiburger Tief, with	Important partial habitat for seals; important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including bay mudflats, dike foreshore, and floating peat bog; area with geoscientifically important forms of landscape (tidal inlet system, floating peat bog)	

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	exception of Core Zone area I/38		
I/37	Vareler Rinne (Varel Channel)	Habitat for typical fauna and flora species and communities, especially of Ross worm (Sabellaria spinulosa)	
I/38	Seefelder Watt	Important eelgrass communities	
I/39	Hoher Weg	Important partial habitat for seals; important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem including sandbanks, coastal dunes, coastal mudflats, and dike foreshore; area with geoscientifically important forms of landscape (island formation)	Access to island of Memmert requires official authorisation.
I/40	Grosse Plate west of River Weser	Important partial habitat for seals; important resting and foraging area for wading and water birds; important habitat for typical fauna and flora species and communities, and typical ecosystem	
I/41	Burhaver Plate	Important eelgrass communities	
I/42	Waddenser Plate [sandbank]	Important eelgrass communities	
I/43	Grodén [poldered marshland areas]	Important breeding, resting and foraging area for wading and water birds; typical ecosystem including coastal	

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
		mudflats and dike foreshore	
I/44	Rintzeln	Rintzeln dike foreshore and mudflats between Wremer Tief, Wurster Arm and Schmarrener Loch Important resting and foraging area for wading and water birds; typical ecosystem including coastal mudflats and dike foreshore	Harvesting of Sea Arrowgrass in approved areas in months of May and June by local population for own consumption.
I/45	Schmarrener Watt	Mudflats off outer dike, extending over some 500 m in width from Schmarren to Solthörn Important eelgrass communities	
I/45a	Paddingbütteler Aussendeich (outer dike)	Dike foreshore between Paddingbüttel and Dorumer-Neufeld Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species, and typical dike foreshore ecosystem	Harvesting of Sea Arrowgrass in approved areas in months of May and June by local population for own consumption.
I/46	Platen [sandbanks]	Robbenplate, bounded on eastern side by Wurster Arm and Tegeler Plate, between Dwarsgat [buoys] and Tegeler Rinne [channel] Important partial habitat for seals; important resting, moulting and foraging area for wading and water birds; typical ecosystem including sandbanks and coastal mudflats	
I/47	Knechtsand [sandbank]		

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Kleine Knechtsände [sandbanks], Eversand, Schwarze Gründe, Robben-Hohenhörn-Sände, Spiekaer Barre, Neuwerker Watt, Kleinwatt, and eastern Sahlenburger Watt between Spieka-Neufeld and Werner Wald [woods], as well as outer dike at Arenscher Ufer [shore] including offshore mudflats, bounded by Wurster Arm and Tegeler Rinne channels, National Park outer boundary, Robbenloch, Nordertill as far as southern Schaafsand and Hamburg state boundary, excluding south-western Sahlenburger Watt, summer dike near Berensch-Arensch/Spieka Neufeld, Spiekaer Tief [channel] and Weser-Elbe mudflat fairway.	Important partial habitat for seals; important breeding, resting, moulting and foraging area for wading and water birds; typical ecosystem including sandbanks, coastal mudflats, and dike foreshore; area with geoscientifically important forms of landscape (island formation)	Use of swimming area and access routes by visitors to Posterholungsheim [holiday home] and Landschulheim [school hostel]; harvesting of cabbage in approved areas in months of May and June by local population for own consumption.
I/48	Eitzensand Sands west of Weser-Elbe mudflat fairway	Important partial habitat for seals; important resting, moulting and foraging area for wading and water birds; typical ecosystem including coastal mudflats	
I/49	Duhner Anwachs Salt meadows including offshore mudflats	Important breeding, resting and foraging area for wading and water birds; important habitat for typical fauna and flora species	Operation of beach train along route approved by National Park Administration
I/50	Duhner Heide Heath-covered cliff (<i>Geestkliff</i>) and dunes bordering on Core Zone area I/49 to south east	Important habitat for endangered fauna and flora species and communities; maritime dune areas and heath-covered cliff including crowberry vegetation on coastal heath and scattered transition moors	Operation of beach train along route approved by National Park Administration
I/51	Territorial sea off East Frisian Islands From "Borkumriff" [Borkum Reef] maritime area as far as "Mellumplate" [Mellum Flats], interrupted by Intermediate	Important resting, migration and wintering area for seabirds; with depth of 10 to 20 m, important foraging area	Dumping of dredging spoils according to <i>Handlungsanweisung zur Unterbringung von Baggergut</i>

No.	Core Zone area Designation, extent	Special protective purpose	Uses permissible beyond those in §§ 6 to 11 and 16
	Zone projecting northward of island of Baltrum	for breeding birds on East Frisian Islands	<i>im Küstenbereich</i> [Instructions for the Management of dredged material in coastal waters] issued by the Federal Waterways and Shipping Administration. Sport and recreational fishing. Installation of supply and energy lines in so far as consistent with protective purpose. Removal of sand or soil material to preserve island and coast protection installations in so far as consistent with protective purpose.

I/52 Roter Sand

Nordergründe [offshore wind farm] some 20 km north west of island of Mellum as far as Hamburg state boundary, on nautical chart.

Area of influence for estuaries of Elbe and Weser rivers with high level of biological productivity (phyto- and zooplankton), accumulation of food particles, and high density of fish. With depth of 10 to 20 m, important foraging area for seabirds, in particular Sandwich Tern (*Sterna sandvicensis*), Little Gull (*Larus minutus*) and Lesser Black-backed Gull (*Larus fuscus*). Important resting and wintering area for Red-throated Diver (*Gavia stellata*) and Common Gull (*Larus canus*).

Dumping of dredging material according to *Handlungsanweisung zur Unterbringung von Baggergut im Küstenbereich* [Instructions for the management of dredged material in Coastal Areas] issued by the Federal Waterways and Shipping Administration (*HABAK-WSV*).
 Sport and recreational fishing.
 Installation of supply and energy lines in so far as consistent with protective purpose.
 Removal of sand or soil material to preserve island and coast protection installations in so far as consistent with protective purpose.

Annex 2

(Re § 3 (1) Sentence 1 No. 1)

Maps on a scale of 1/100000 (western sheet, eastern sheet)

Not shown here.

Annex 3

(Re § 3 (1) Sentence 1 No. 2)

Maps on a scale of 1/10000 (Sheets 1 to 35)

Not shown here.

Annex 4

(Re § 2 (3) Sentence 1)

Maps of the National Park “Niedersächsisches Wattenmeer” as a Site of Community Importance on a Scale of 1/50000 (Sheets 1 to 4)

Not shown here.

Annex 5

(Re § 2 (2) Sentence 2, and § 3 Sentence 2)

Key habitat types and species as well as conservation objectives of the “Niedersachsen Wadden Sea and adjacent Territorial Sea” (“*Niedersächsisches Wattenmeer und angrenzendes Küstenmeer*”) Special Protection Area (Birds Directive) and of the “Niedersachsen Wadden Sea National Park” (“*Nationalpark Niedersächsisches Wattenmeer*”) as a Site of Community Importance (Habitats Directive)

I. Habitat types according to Annex I of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (FFH Directive) (Official Journal of the European Communities No. L 206 Page 7)

1. Priority natural habitat types

Coastal lagoons (lagoons) (1150)

Fixed coastal dunes with herbaceous vegetation (“grey dunes”) (2130)

Decalcified dunes with *Empetrum nigrum* (2140)

Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150)

2. Other natural habitat types

Sandbanks which are slightly covered by sea water all the time (1110)

Estuaries (1130)

Vegetation-free mudflats and sand flats not covered by seawater at low tide (1140)

Large shallow inlets and bays (areas of shallow water and eelgrass beds) (1160)

Reefs (1170)

Salicornia and other annuals colonising mud and sand (1310)

Spartina swards (*Spartinion maritimae*) (1320)

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)

Embryonic shifting dunes (2110)

Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”) (2120)

Dunes with *Hippophaë rhamnoides* (2160)

Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) (2170)

Wooded dunes of the Atlantic, Continental and Boreal region (2180)

Humid dune slacks (2190)

Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (3130)

Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (3150)

II. Fauna and flora species according to Annex II of Council Directive 92/43/EEC

1. Mammals
 - Grey seal (*Halichoerus grypus*)
 - Harbour porpoise (*Phocoena phocoena*)
 - Common seal (*Phoca vitulina*)
2. Fish
 - Twaite shad (*Alosa fallax*)
 - River lamprey (*Lampetra fluviatilis*)
 - Sea lamprey (*Petromyzon marinus*)
3. Plants
 - Fen orchid (*Liparis loeselii*)

III. Bird species in the European bird sanctuary

1. Bird species according to Annex I of Council Directive 79/409/EEC
 - Sandwich tern (*Sterna sandvicensis*)
 - Common tern (*Sterna hirundo*)
 - Golden plover (*Pluvialis apricaria*)
 - Hen harrier (*Circus cyaneus*)
 - Arctic tern (*Sterna paradisaea*)
 - Spoonbill (*Platalea leucorodia*)

Barnacle goose (*Branta leucopsis*)
Bar-tailed godwit (*Limosa lapponica*)
Bittern (*Botaurus stellaris*)
Marsh harrier (*Circus aeruginosus*)
Avocet (*Recurvirostra avosetta*)
Kentish plover (*Charadrius alexandrinus*)
Short-eared owl (*Asio flammeus*)
Red-throated diver (*Gavia stellata*)
Peregrine (*Falco peregrinus*)
Little gull (*Larus minutus*)
Little tern (*Sterna albifrons*)

2. Migratory bird species within the meaning of Article 4 (2) of Council Directive 79/409/EEC

Dunlin (*Calidris alpina*)
Eurasian Oystercatcher (*Haematopus ostralegus*)
Twite (*Carduelis flavirostris*)
White-fronted goose (*Anser albifrons*)
Common shelduck (*Tadorna tadorna*)
Black-legged kittiwake (*Rissa tridactyla*)
Spotted redshank (*Tringa erythropus*)
Common eider (*Somateria molissima*)
Eurasian skylark (*Alauda arvensis*)
Greylag goose (*Anser anser*)
Eurasian curlew (*Numenius arquata*)
Common greenshank (*Tringa nebularia*)
Lesser black-backed gull (*Larus fuscus*)
Lapwing (*Vanellus vanellus*)
Grey plover (*Pluvialis squatarola*)
Red Knot (*Calidris canutus*)

Great cormorant (*Phalacrocorax carbo*)
Common teal (*Anas crecca*)
Black-headed gull (*Larus ridibundus*)
Northern shoveler (*Anas clypeata*)
Great black-backed gull (*Larus marinus*)
Shorelark (*Eremophila alpestris*)
Wigeon (*Anas penelope*)
Whimbrel (*Numenius phaeopus*)
Brent goose (*Branta bernicla*)
Redshank (*Tringa totanus*)
Sanderling (*Calidris alba*)
Ringed plover (*Charadrius hiaticula*)
Yellow wagtail (*Motacilla flava*)
Curlew sandpiper (*Calidris ferruginea*)
Herring gull (*Larus argentatus*)
Pintail (*Anas acuta*)
Wheatear (*Oenanthe oenanthe*)
Turnstone (*Arenaria interpres*)
Mallard (*Anas platyrhynchos*)
Rock pipit (*Anthus petrosus*)
Common gull (*Larus canus*)
Razorbill (*Alca torda*)
Common scoter (*Melanitta nigra*)
Guillemot (*Uria aalge*)
Black-tailed godwit (*Limosa limosa*)

IV. Description of conservation objectives for the Natura 2000 site

1. General conservation objectives for habitat types according to Annex I of Council Directive 92/43/EEC

- a) stable or increasing (within natural variability) natural range as well as areas,
 - b) suitable structure and functions for the long term,
 - c) favourable conservation status of typical species.
2. General conservation objectives for species according to Annex II of Council Directive 92/43/EEC, including the typical species of the habitat types
- a) populations stable (within natural variability) on a long-term basis as a viable component of their natural habitats,
 - b) no reduction in the natural range,
 - c) suitable habitats of sufficient size for all life cycle stages such as reproduction, breeding, moulting, migration, resting, wintering and searching for food, and the possibility for unimpeded migration and movements between the partial habitats, including in the surroundings of the National Park.
3. Special conservation objectives for habitats and species of the maritime areas
- a) Shallow inlets and bays (1160), sandbanks slightly covered by seawater (1110), and reefs, either of geogenic origin or biogenic concretions (1170), where good water quality, natural structures, natural dynamic processes and persistent populations of typical species are present. This implies:
 - aa) natural hydrodynamic and morphological conditions,
 - bb) natural sandbank structures with ridges and slacks as well as sediment redeposition as a result of wave action and currents,
 - cc) natural sublittoral mussel beds with all life-cycle stages and intact communities,
 - dd) natural distribution of the various coarse and fine substrates of the sea floor,
 - ee) favourable conditions for new European oyster beds, *Sabellaria* reefs and sublittoral eelgrass beds to develop.
 - b) Extensive low-disturbance habitats connected to the surrounding environment for persistent populations of harbour porpoise (*Phocoena phocoena*), grey seal (*Halichoerus grypus*), common seal (*Phoca vitulina*), twaite shad (*Alosa fallax*), sea lamprey (*Petromyzon marinus*), and river lamprey (*Lampetra fluviatilis*).
 - c) Low-disturbance marine environments as foraging, resting and moulting areas for seabird species such as the red-throated diver (*Gavia stellata*), common eider (*Somateria molissima*), common scoter (*Melanitta nigra*), and sandwich tern (*Sterna sandvicensis*).
4. Special conservation objectives for habitats and species of the mudflats including the estuaries
- a) Semi-natural salt- and brackish water mudflats for habitat types 1130, 1140, 1310 and 1320 where good water quality, natural structures, natural dynamic processes and persistent populations of typical species are present. This implies:
 - aa) natural hydrodynamics and an undisturbed sediment supply,

- bb) natural distribution of mudflats and sand flats as well as areas covered with eelgrass common glasswort and spartina vegetation,
 - cc) natural tidal inlet systems,
 - dd) natural eulittoral mussel beds with all life-cycle stages and intact communities,
- b) Extensive low-disturbance habitats connected to the surrounding environment for persistent populations of grey seal (*Halichoerus grypus*), common seal (*Phoca vitulina*), twaite shad (*Alosa fallax*), sea lamprey (*Petromyzon marinus*), and river lamprey (*Lampetra fluviatilis*).
 - c) Low-disturbance foraging, resting and moulting areas for breeding and migrating bird species typical of the mudflats such as the pied avocet (*Recurvirostra avosetta*), dunlin (*Calidris alpina*), bar-tailed godwit (*Limosa lapponica*), eurasian curlew (*Numenius arquata*), and common shelduck (*Tadorna tadorna*).
5. Special conservation objectives for habitats and species of the salt meadows
- a) Natural and semi-natural salt meadows (1330) and lagoons situated in them (1150) with varied structures, natural dynamic processes and persistent populations of typical species. This implies:
 - aa) natural processes of erosion, sedimentation and tidal inlet formation,
 - bb) regular flooding with unpolluted sea water,
 - cc) natural relief, salinity and water regime,
 - dd) natural development of vegetation in most areas,
 - ee) selected partial areas with special communities found on extensively grazed or mown salt meadows.
 - b) Low-disturbance breeding and resting areas for breeding and migrating bird species typical of the salt meadows such as the redshank (*Tringa tetanus*), oystercatcher (*Haematopus ostralegus*), brent goose (*Branta bernicla*), and shorelark (*Eremophila alpestris*). This includes the absence of non-naturally occurring predators.
6. Special conservation objectives for habitats and species of the beaches and dunes
- a) Salicornia and other annuals colonising mud and sand (1310), lagoons (1150), embryonic shifting dunes (2110), shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”) (2120), fixed coastal dunes with herbaceous vegetation (“grey dunes”) (2130), decalcified dunes with *Empetrum nigrum* (2140) and *Calluno-Ulicetea* (2150), dunes with *Hippophaë rhamnoides* (2160), dunes with *Salix repens ssp argentea* (*Salicion arenariae*) (2170), and wooded dunes of the Atlantic, Continental and Boreal region (2180) with varied structures, natural dynamic processes and persistent populations of typical species. This implies:
 - aa) natural processes of calcareous and decalcified sand being swirled up and removed,
 - bb) full zoning of typical vegetation with earlier- and later-life stages including open sandy patches,

- cc) semi-natural lagoons and small pond-like bodies of water temporarily connected to the sea,
 - dd) constant development of new beach, dune and lagoon pioneer phases,
 - ee) balanced distribution of prevailing wood-free stages as well as scrubs and small wooded areas,
 - ff) absence or, at most, minor presence of introduced tree species and other neophytes.
- b) Low-disturbance breeding and resting areas for breeding and migrating bird species typical of the beaches and dunes, such as the Kentish plover (*Charadrius alexandrinus*), little tern (*Sterna albifrons*), Eurasian curlew (*Numenius arquata*), common eider (*Somateria molissima*), common shelduck (*Tadorna tadorna*), and wheatear (*Oenanthe oenanthe*). This includes suitable vegetation and soil structures such as sparsely vegetated shell banks and the absence of non-naturally occurring predators.

7. Special conservation objectives for habitats and species of the wet dune slacks

- a) Humid-to-wet dune slacks (2190) and fringe areas including semi-natural birch and alder forests on these sites (2180), with varied structures, natural dynamic processes and persistent populations of typical species. This implies:
 - aa) sufficient elements of all natural development stages with their characteristic habitat and vegetation types such as saline initial stages, small ponds, calcareous and decalcified small sedge fens, wet heaths rich in peat moss, reeds and willow bushes,
 - bb) constant development of new dune slacks with natural water regime and natural influence of wind and floods,
 - cc) balanced distribution of prevailing wood-free, short grassland and tall-growing stages as well as scrubs and small wooded areas,
 - dd) absence or, at best, minor presence of introduced tree species and other neophytes.
- b) Stable or increasing populations of fen orchid (*Liparis loeselii*) in wet calcareous dune slacks and fringe areas.
- c) Low-disturbance breeding areas for breeding bird species typical of the humid dune slacks such as the short-eared owl (*Asio flammeus*), hen harrier (*Circus cyaneus*) and marsh harrier (*Circus aeruginosus*). This includes suitable vegetation structures such as the common reed (*Phragmites australis*) and the absence of non-naturally occurring predators.

8. Special conservation objectives for habitats and species of the grassland areas

- a) Low-disturbance breeding and resting areas for breeding and migrating bird species typical of the grassland areas, such as the blacktailed godwit (*Limosa limosa*), redshank (*Tringa totanus*) and white-fronted goose (*Anser albifrons*). This implies:

- aa) high water levels on the humid grassland situated on the landward side of the dike,
- bb) varied structures with uneven surfaces and small bodies of water,
- cc) low to medium-level nutrient supply,
- dd) targeted maintenance through extensive grazing or mowing,
- ee) the absence of non-naturally occurring predators,
- ff) suitability as non disturbed, high-tide roosts for wading and water birds.

9. Special conservation objectives for habitats and species of the standing bodies of water

- a) Semi-natural pools, ponds and lakes, especially within the dike-enclosed grassland areas, some featuring mesotrophic waters and vegetation of the *Littorelletea uniflorae* and *Isoeto-Nanojuncetea* (3130), and some with eutrophic waters and ***Magnopotamion* or *Hydrocharition***-type vegetation (3150).
- b) Low-disturbance water and reed areas as habitats for breeding birds such as the bittern (*Botaurus stellaris*), northern shoveler (*Anas clypeata*), marsh harrier (*Circus aeruginosus*), bluethroat (*Luscinia svecica*) and sedge warbler (*Acrocephalus schoenobaenus*) and as resting areas for wading and water birds, especially at high tide.

© juris GmbH

Annex 12

**Danish Nature Protection Act, LBK nr 933
of 24/09/2009.**

The Protection of Nature Act¹

This is an Act to consolidate the Protection of Nature Act, cf. Consolidating Act no. 1042 of 20 October 2008, as amended by section 31 of Act no. 1336 of 19 December 2008 and section 1 of Act no. 514 of 12 June 2009.

Part 1

Purpose

1.-(1) The purpose of this Act shall be to contribute to safeguarding nature and the environment in Denmark, thus ensuring social development on a sustainable basis in respect of human conditions of life and for the conservation of flora and fauna.

(2) The purposes of this Act shall be, in particular

- 1) to protect nature, with its population of wild fauna and flora and their habitats as well as its landscape, heritage, natural-science and educational values,
- 2) to improve, restore or establish areas of significance to wild fauna and flora and for landscape and heritage interests, and
- 3) to provide public access to nature as well as to improve the opportunities for outdoor activities.

(3) In the administration of this Act, importance shall be attached to location when considering the significance of an area to the public.

2. The powers provided by this Act shall also be used to prevent the drifting of sand and increase the forest area, as well as to restore wetlands to contribute to improving the aquatic environment.

Part 2

General protection provisions

Protected natural habitats etc.

Lakes, watercourses, heaths, bogs, salt meadows, swamps, freshwater marshes, grasslands etc.

3.-(1) It shall be prohibited to alter the condition of natural lakes of more than 100 m², or of watercourses or parts of watercourses that have been designated as protected watercourses by the Minister for the Environment on the recommendation of the municipal council. This prohibition, however, shall not apply to any ordinary maintenance work in watercourses.

(2) It shall be prohibited to alter the condition of

- 1) heaths,
- 2) bogs and similar,
- 3) salt meadows and swamps as well as
- 4) freshwater marshes and biological grasslands,

when such natural habitats total more than 2,500 m² either separately, jointly or in connection with the lakes mentioned in subsection (1).

(3) It shall also be prohibited to alter the condition of bogs and similar of less than 2,500 m² when they are an extension of a lake or watercourse protected under subsection (1).

¹ This Act contains provisions implementing parts of Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (Official Journal 1979 no. L 103, p. 1) as most recently amended by Council Directive 2006/105/EC of 20 November 2006, (Official Journal 2006 no. L 363, p. 368), Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the EC Habitats Directive), (Official Journal 1992, no. L 206, p. 7), as most recently amended by Council Directive 2006/105/EC of 20 November 2006, (Official Journal 2006 no. L 363, p. 368) and parts of Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (Official Journal 2004 no. L 143, p. 56).

(4) The Minister for the Environment may lay down regulations on the application of fertilizers on areas protected under subsections (2) and (3), including regulations on the amount of fertilizers that may be applied on such areas, and prohibition of fertilizers.

4. (Repealed).

Other provisions

5.-(1) The Minister for the Environment may lay down regulations to the effect that the provisions in section 3(1)-(3) shall not apply to specific categories of the natural habitats in question.

(2) The Minister for the Environment may lay down regulations to the effect that section 3(1)-(3) shall not apply to dykes, groynes, breakwaters and other structures that require a licence in accordance with the Protection of Coasts Act ("*lov om kystbeskyttelse*").

6. The Minister for the Environment may lay down regulations for the purpose of defining and delimiting the natural habitats mentioned in section 3(1)-(3). The Minister may also lay down regulations on the calculation of area size for the natural habitats mentioned in section 3(1)-(3), and regulations requiring natural lakes, which are wholly or partly owned by the state, or specific types of such lakes, to be covered by the regulations in section 3(1) notwithstanding their size.

7. The Minister for the Environment may lay down regulations on registration of the natural habitats mentioned in section 3(1)-(3).

Dune conservation areas

8.-(1) It shall be prohibited to alter the condition of dune conservation areas. Such areas shall not be fenced and no grazing shall be allowed. It shall also be prohibited to place caravans and similar in such areas. Furthermore, subdivision, land registration or transfer of part of a property whereby new boundaries are established, shall be prohibited.

(2) The following areas shall be designated as dune conservation areas:

- 1) The beach along Skagerrak and the North Sea,
- 2) the area between the sand dune conservation boundary and the beaches mentioned in no. 1,
- 3) sand dune conservation areas pursuant to previous legislation on the prevention of sand drifts, and
- 4) sand dune conservation areas pursuant to a decision by the Minister, cf. section 9.

(3) The sand dune conservation boundary shall be laid down pursuant to provision by the Minister for the Environment according to the regulations hitherto in force.

(4) The sand dune conservation boundary shall be registered in the Cadastre and listed in the Land Registry.

(5) The prohibition referred to in subsection (1) shall not apply to

- 1) measures to prevent sand drifts carried out pursuant to section 53,
- 2) agricultural operations, including grazing, in areas which have been lawfully used previously for agricultural purposes, except for afforestation,
- 3) ordinary fencing of the areas mentioned in no. 2,
- 4) reforestation of forests and planting in existing gardens,
- 5) harbour installations and the land areas designated for harbour purposes in a local development plan,
- 6) minor maintenance work on buildings, including replacing windows and roofs etc., if the height of the building is not increased or is only increased to an insignificant extent, and
- 7) construction work, which is necessary for commercial purposes for the operation of the relevant property as agricultural or forestry property or for fisheries, and which is erected close to existing buildings. However, a licence from the Minister for the Environment shall be required in respect of the specified location and external design of the buildings mentioned.

(6) The Minister for the Environment may lay down regulations to the effect that subsection (1) shall not apply to specific types of structures also extended to the territorial waters. The same shall apply correspondingly to dykes, groynes, breakwaters and other installations that require a licence under the Protection of Coasts Act ("*lov om kystbeskyttelse*").

(7) The Minister for the Environment may lay down regulations on the use of sand dune conservation areas, including a prohibition on certain methods of use.

9.-(1) The Minister for the Environment may include further sand dune conservation areas provided that such areas are located within 500 meters of the innermost boundary of the beaches mentioned in section 8(2), no. 1.

(2) The Minister for the Environment may, upon request by the owner, include other sand dune conservation areas than those mentioned in subsection (1) and in section 8(2), or if the owner fails to comply with an order pursuant to section 53(2) on preventing the drifting of sand or on restrictions in the use of the areas.

(3) The Minister for the Environment may, in special cases, revoke sand dune conservation restrictions.

10. (Repealed).

11.-(1) To prevent the drifting of sand, the Minister for the Environment may issue orders concerning the use of sand dune conservation areas as well as prohibit certain types of use.

(2) The Minister for the Environment may close roads and paths in sand dune conservation areas provided that there is another means of road access to the property concerned.

(3) It shall be prohibited to grant access to new properties by means of roads that cross over sand dune conservation areas.

12.-14a (Repealed).

Protection lines

Protection of coastal areas

15.-(1) It shall be prohibited to alter the condition of beaches or other areas located between the beach and the beach protection line. It shall be prohibited to erect fences and to place caravans or similar in such areas, and subdivision, land registration or transfer of part of a property whereby a boundary is created, shall be prohibited.

(2) The beach protection line shall be laid down by the Minister for the Environment according to the regulations hitherto in force.

(3) The beach protection line shall be registered in the Cadastre and listed in the Land Registry.

(4) The prohibition referred to in subsection (1) shall not apply to

- 1) agricultural operations except for afforestation,
- 2) reforestation of forests and planting in existing gardens,
- 3) traditional fencing on agricultural properties,
- 4) existing military installations for defence purposes,
- 5) harbour installations and the land areas designated for harbour purposes in a local development plan,
- 6) minor maintenance work on buildings, including replacing windows and roofs etc., if the height of the building is not increased or is only increased to an insignificant extent,
- 7) construction work, which is necessary for commercial purposes for the operation of the relevant property as agricultural or forestry property or for fisheries, and which is erected close to existing buildings. However, a licence from the Minister for the Environment shall be required in respect of the specific location and external design of the buildings mentioned, and
- 8) stretches of coast that are dune conservation areas, cf. sections 8 and 9.

(5) The Minister for the Environment may lay down regulations to the effect that subsection (1) shall not apply to specific types of structures also extended to the territorial waters. The same shall apply correspondingly to dykes, groynes, breakwaters and other installations that require a licence under the Protection of Coasts Act ("*lov om kystbeskyttelse*").

15a-d. (Repealed).

Lakes and rivers

16.-(1) It shall be prohibited to place buildings, caravans and similar or to plant or alter the terrain within 150 meters from lakes with a surface area of at least 3 hectares and from the watercourses that are registered as having a protection line in accordance with previous legislation.

(2) The prohibition referred to in subsection (1) shall not apply to

- 1) measures that have been ordered or licensed under the Watercourse Act,

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- 2) reforestation of forests and planting in existing gardens,
- 3) existing military installations,
- 4) harbour installations and the land areas designated for harbour purposes in a local development plan,
- 5) production buildings necessary for agriculture and the fishing industry, and
- 6) other areas which were exempted under previous legislation.

Forests

17.-(1) It shall be prohibited to place buildings, caravans and similar within 300 meters of forests. For privately owned forests, this shall only apply if the area comprises at least 20 hectares of continuous forest.

(2) The prohibition referred to in subsection (1) shall not apply to

- 1) existing military installations,
- 2) harbour installations and the land areas designated for harbour purposes in a local development plan,
- 3) production buildings necessary for agriculture and the fishing industry, and
- 4) other areas which were exempted under previous legislation.

Ancient monuments

18.-(1) It shall be prohibited to alter the condition of the area within 100 meters of an ancient monument protected by the provisions laid down in the Museums Act ("*museumsloven*"). It shall also be prohibited to erect fences, and to place caravans and similar here.

(2) The prohibition referred to in subsection (1) shall not apply to

- 1) agricultural operations, except for afforestation,
- 2) reforestation of forests located outside the area covered by the Museums Act, and planting in existing gardens, and
- 3) traditional fencing on agricultural properties.

(3) Subsection (1) shall not apply to ancient monuments not visible in the terrain, as well as the ancient monuments mentioned in Annex 1 to this Act.

Churches

19. It shall be prohibited to erect buildings more than 8.5 meters tall within 300 meters of a church, unless the church is surrounded by urban settlement in the entire protection zone.

Part 2a

International nature conservation sites

Preservation measures etc.

19a. The municipal council shall initiate the measures laid down in the action plan on implementation of the Natura 2000 plan pursuant to the Environmental Targets etc. Act ("*lov om miljømål m.v.*") for bodies of water and international nature conservation sites.

19b.-(1) In international nature conservation sites, before launching the activities mentioned in Annex 2 to this Act, written notification in this respect shall be provided to the municipal council with a view to assessing the impacts on the area taking into account the conservation goals for the area.

(2) Subsection (1) shall not apply to wooded, forest reserves.

(3) An activity covered by the prohibitions in section 3, section 8, section 15 or section 18, or in section 28 of the Forests Act ("*lov om skove*") shall not be covered by subsection (1). The same shall apply to activities which otherwise require a licence under legislation on nature protection, the environment, or spatial planning, or if the consequences pursuant to this Act are assessed or shall be assessed prior to implementation.

(4) The activity may be initiated if the municipal council no later than four weeks after receipt of notification, has decided to make further assessments of the activity. This decision shall, however, apply for six months as a maximum but may, in special cases, be

prolonged. In respect of timely appeals on a decision under the 1st clause, the time limit in the 2nd clause shall be from the time at which the Nature Protection Board of Appeal has made a decision in the appeals case.

(5) If the activity has not been initiated three years at the latest after the notification, a new notification under subsection (1) shall be given in order to initiate it.

(6) The Minister for the Environment may lay down more detailed regulations on the assessments of the municipal council of notifications under subsection (1).

19c.-(1) The municipal council may enter into agreements with the owner or user of a property in international nature conservation sites on the operation or other measures to realise the Natura 2000 plan.

(2) An agreement pursuant to subsection (1) may be changed if the parties so agree and if the change is not in contravention of the conservation goals laid down in the Natura 2000 plan.

(3) An agreement pursuant to subsection (1) may comprise other areas the use of which may contribute to compliance with the Natura 2000 plan.

19d.-(1) The municipal council shall order the owner of a property in or outside international nature conservation sites to carry out the operation or other measures necessary to realise the Natura 2000 plan, if no agreement on reasonable terms can be made pursuant to section 19c or in the event of failure to comply with an agreement already entered into.

(2) By a decision under subsection (1), the prohibitions in sections 3 and 15-19 may be determined not to apply if the condition is regulated by the decision. Furthermore, in accordance with the Planning Act ("*planloven*") and the Watercourse Act ("*vandløbsloven*"), it may be decided that licences, approvals etc. necessary for implementation of the measures ordered be considered granted in connection with a decision pursuant to subsection (1).

(3) A decision pursuant to subsection (1) shall indicate the extent to which it replaces a licence etc. pursuant to the regulations of this Act, the Planning Act or the Watercourse Act.

19e.-(1) The municipal council shall, in special cases, order the owner of a property in or outside international nature conservation sites to carry out the operation or other measures necessary in order to meet the conservation goal of the Natura 2000 plan, to prevent permanent degradation of natural habitats or habitats for species or significant disruption of species to which the area is designated, if it is not possible to prevent this with measures on the basis of the Natura 2000 plan. The municipal council may also stipulate that appeals made in due time are not to have a stay of execution.

(2) For decisions under subsection (1), the regulations in section 19d(2) and (3) shall apply correspondingly.

(3) A decision under subsection (1) shall apply until replaced by an agreement under section 19c or a decision under 19d, however, for six months as a maximum, but may be extended, in special cases.

19f.-(1) Until a final adopted Natura 2000 plan is available, the municipal council shall order the owner of a property in or outside international nature conservation sites to carry out the operation or other measures necessary to prevent degradation of natural habitats and habitats for species or significant disruption of species for which the area is designated, if adoption of the Natura 2000 plan may not be awaited, and if such degradation or disruption may not be averted through agreement or in any other way.

(2) For decisions under subsection (1), the regulations in section 19d(2) and (3) shall apply correspondingly.

(3) A decision under subsection (1) shall apply until replaced by an agreement under section 19c or a decision under section 19d, however, no later than one year after adoption of the Natura 2000 plan.

Compensation

19g.-(1) For losses inflicted on an owner, user or holder of other rights to the property by a decision under section 19b or sections 19d-19f, compensation shall be awarded.

(2) The issue of any compensation as a consequence of a decision under section 19e shall be determined in connection with an agreement under section 19c or a final decision under section 19d.

(3) For decisions on compensation, the regulations in section 39(1), (2) and (4), section 43, section 44(1), (3) and (4), section 45, section 47 and section 49(2) shall apply correspondingly with the necessary modifications, as the municipal council shall take the place of the Nature Conservancy Board.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

19h.-(1) Within the frameworks of the appropriations allocated in annual finance acts, upon application, a grant may be made to the municipal council from the government to cover expenses, with a deduction of any co-financing by others, as a consequence of the municipal council's conclusion of agreements under section 19c and decisions under section 19b or sections 19d-19f.

(2) If the municipal council concludes agreements or makes decisions as mentioned in subsection (1) without a commitment from the government regarding a grant, the expenses shall be paid by the municipal council.

(3) The Minister for the Environment may lay down more detailed regulations and guidelines on grants.

Part 3

Structures in the countryside

Public structures

20.-(1) Public structures in the countryside shall be located and designed such that, as far as possible, consideration is given to landscape values and the other interests mentioned in section 1.

(2) The Minister for the Environment may lay down regulations to the effect that the Minister for the Environment or the municipal council shall approve the location and design of specific categories of public structures.

Outdoor advertisements

21.-(1) It shall be prohibited to place posters, pictures, free-standing signs, lighting advertising and other arrangements for the purpose of advertising or publicity in the countryside.

(2) The prohibition in subsection (1) shall not apply to:

- 1) enterprise advertisements placed close to the enterprise, if they do not dominate the landscape and if they are not visible over long distances,
- 2) signs for enterprises and for sale of commercial properties etc. erected in an area designated as commercial area in a local development plan, notwithstanding that the area has not been developed. Further regulations in this respect shall be determined by the Minister for the Environment,
- 3) road safety campaigns approved by the Danish Road Safety Council,
- 4) posters put up in connection with an election to the Folketinget (the Danish parliament), or to municipal or other public councils or referenda, and
- 5) small informational signs concerning trade or an enterprise erected on the property concerned or at the driveway to the property concerned from the closest public road or private common road. Further regulations in this respect shall be determined by the Minister for the Environment.

(3) The municipal council may permit advertisements to be erected on sports facilities.

Part 4

Public access to nature

Beaches

22.-(1) Beaches and other stretches of coast between the daily low-water line and areas with continuous land vegetation not dominated by salt bearing plants or other beach vegetation shall be open for passage on foot, brief visits and bathing. Access shall be at people's own risk. It shall be permitted to leave a boat without motor on the beach for a short period of time. Dogs shall be on a leash from 1 April to 30 September. Dogs shall always be on a leash when close to grazing livestock. In the period from 1 September to 31 May horse-back riding shall be permitted on bare beaches and directly down to this beach if there is legal access to the beach.

(2) The regulation in subsection (1) shall not cover areas which, before 1 January 1916 have been designated as garden or included in a commercial enterprise operated on the property. The same shall apply to military installations and harbour installations.

(3) Public access may not be prevented or obstructed.

(4) It shall be prohibited to bathe and be within 50 meters of a residential building on privately owned beaches and stretches of coast.

Forests

23.-(1) Forests shall be open for passage on foot and bicycle and for brief visits if there is a legal means of access thereto. This shall not, however, apply to forests that are sign-posted as military installations. Access shall be at people's own risk. Dogs shall be on a leash.

(2) Public access may not be prevented or obstructed. It shall also be prohibited to erect untraditional fences around forests.

(3) The owner may prohibit access on days at which hunting is taking place, or to areas in which intensive felling is taking place.

(4) Anyone who passes through a forest in another way than permitted shall state their name and address upon request from the owner of the forest or from a representative of the owner.

(5) In privately owned forests, passage on foot or by bike shall only be permitted on paths and roads. Access shall only be permitted between 6 a.m. to sunset, and it shall be prohibited to be within 150 meters of residential and production buildings.

(6) In privately owned forests of less than 5 hectares, the owner may restrict public access by sign-posting in accordance with the restrictions on public access laid down in section 17 of the Regulation of Trespassing Act ("*mark- og vejfredsloven*").

(7) The regulations in subsections (5) and (6) shall not apply to forests owned by public foundations.

(8) The owner may through sign-posting lay down restrictions on cycling on paths where cycling poses special problems. The municipal council, and for state-owned areas the Minister for the Environment, may wholly or partly disregard such prohibition.

(9) Horse-back riding on private common roads passing through forests shall be permitted, unless the owner through sign-posting in accordance with section 17 of the Regulation of Trespassing Act has wholly or partly prohibited horse-back riding. The municipal council, and for state-owned areas the Minister for the Environment, may, in special cases, wholly or partly disregard such prohibition.

(10) The regulations in section 26a shall also apply to roads and paths in forests which provide access to the other road systems in the forest.

Uncultivated areas

24.-(1) Uncultivated areas shall be open for passage on foot and for visits if there is a lawful means of access. Access shall be at people's own risk. Dogs shall be on a leash.

(2) The owner may prohibit access on days at which hunting is taking place, or to areas in which intensive agricultural operations are taking place.

(3) Access to privately owned uncultivated areas shall only be permitted from 6 a.m. to sunset. It shall be prohibited to be within 150 meters of residential and production buildings.

(4) The provision in subsection (1), 1st clause shall not apply to privately owned areas which are properly enclosed as a whole. This provision shall not apply to the protected zones along watercourses and lakes which, under the Watercourse Act, shall remain uncultivated, unless they are adjacent to areas that are open to public access.

(5) There shall, however, be access to enclosed, uncultivated areas with no grazing livestock, through gates and over stiles or similar, if no sign-posts have been erected which wholly or partly prohibit this passage. The owner may erect such sign-posts if the passage disturbs the commercial use of the property, if it is a severe invasion of privacy or if flora and fauna need to be protected. If fencing or sign-posting is not reasonably justified, the municipal council may order the fencing or sign-posting to be removed or order gates, stiles or similar to be installed, or sign-posting about the possibility of access to be installed.

Dune conservation areas

25.-(1) Dune conservation areas, cf. sections 8 and 9, shall be open to passage on foot and brief visits, if there is a lawful means of access. Access shall be at people's own risk. Dogs shall be on a leash. The access to bring unleashed dogs and for horse-back riding pursuant to section 22(1) shall also apply to bare dune conservation beaches.

(2) The provision in subsection (1) shall not apply to areas cultivated for agriculture.

- (3) In privately owned dune conservation areas, it shall be prohibited to be within 50 meters of residential buildings.

Roads and paths

26.-(1) Access to passage on roads and paths in the countryside may, in respect of passage on foot or by bike, be wholly or partly prohibited by the owner, through sign-posting, according to the provisions in section 17 of the Regulation of Trespassing Act ("*mark- og vejfredsloven*"), if such passage disrupts the commercial use of the property, if it is a severe invasion of privacy or if flora and fauna need to be protected. Access shall be at people's own risk.

(2) The owner may also prohibit cycling on paths where cycling poses special problems, and passage on private driveways and paths on days on which hunting is taking place or when passage may be hazardous because of intensive agricultural operations.

(3) The municipal council may wholly or partly disregard a prohibition on passage on foot or by bike, and in special cases, on horse-back riding on private common thoroughfares.

26a.-(1) Closure of thoroughfares and paths, closure of roads and paths which otherwise lead to the natural habitats covered by sections 22-25, and closure of roads and paths leading to special viewpoints, historical monuments and similar, may only take place four weeks after written notification from the owner to the municipal council.

(2) If the municipal council fails to make a decision no later than four weeks after receipt of the notification on whether to make further assessments of the recreational significance of the road or path, the road or path may be closed. This decision shall, however, apply for six months as a maximum but may be prolonged in special cases. In respect of timely appeals on a decision under the 1st clause, the time limit in the 2nd clause shall be from the time at which the Nature Protection Board of Appeal has made a decision in the appeals case.

(3) The municipal council may make a decision to the effect that the road or path shall not be closed if the road or path has significant recreational significance and if no satisfactory alternative access exists or is established.

(4) If closure of the road or path has not been commenced no later than three years after the notification, a new notification under subsection (1) shall be given before the road or path may be closed.

(5) Subsections (1)-(4) shall not apply if the owner can prove that the road or path has been established only as part of an agreement on promoting public access.

Other provisions

27.-(1) In special circumstances, the municipal council, and for state-owned areas the Minister for the Environment, may decide that areas covered by sections 22-26 be wholly or partly closed for public access.

(2) The Minister for the Environment may prohibit public access to dune conservation areas if there is a danger of sand drifts.

(3) The Minister for the Environment may lay down regulations on public access to areas covered by sections 22-26.

(4) The Minister for the Environment may lay down regulations to the effect that the public be entitled to more extensive access to state-owned areas than that mentioned in sections 22-26. The Minister may, furthermore, lay down regulations to the effect that the public shall be entitled to more extensive access to forests owned by municipalities, the Danish church or public foundations than that mentioned in section 23. Regulations may be laid down that make more extensive access contingent on payment of a fee.

(5) The Minister for the Environment may lay down regulations on the liability for damage as a result of public access to private forests, uncultivated areas, roads and paths.

Waste

28.-(1) It shall be prohibited to dump or deposit waste and similar on a property without the owner's permission.

Navigation

29.-(1) The Minister for the Environment may lay down regulations to the effect that non-commercial navigation and other traffic in territorial waters and, at the request of the municipal councils concerned, on watercourses and lakes, shall be prohibited wholly or partly.

(2) The Minister for the Environment may lay down regulations on public navigation and other traffic on lakes owned by the government.

Part 5

Protection of plant and animal species etc.

29a. The animal species mentioned in Annex 3 to this Act may not be intentionally disturbed, with harmful impact on the species or population. This prohibition shall apply to all life stages of the animal species covered.

(2) Breeding or resting areas for the species mentioned in Annex 3 to this Act may not be damaged or destroyed.

29b. The Minister for the Environment may prepare management plans and launch other initiatives, including the provision of grants, with a view to conservation of the species or populations mentioned in Annex 3 to this Act.

30.-(1) The Minister for the Environment shall lay down regulations for the purpose of protecting or regulating the exploitation of wild animal and plant species, including regulations on conservation, registration and marking of such species and parts and products thereof. Regulations may be laid down to the effect that the Minister, without a court order, may have specimen samples of certain wild species taken. The regulations may apply to species from Denmark as well as from abroad.

(2) The Minister for the Environment shall take conservation measures as required to ensure against significant negative impacts in relation to the conservation status of the species mentioned in Annex 3 to this Act if caught or killed unintentionally. The conservation measures shall be taken on the basis of monitoring or further surveys.

(3) The Minister for the Environment shall take the measures necessary to ensure that collection in nature of specimens of the wild animal and plant species mentioned in Annex 4 to this Act, as well as exploitation thereof is compatible with the consideration for conservation of such species.

(4) The Minister for the Environment shall lay down regulations implementing the measures mentioned in subsections (2) and (3).

(5) The Minister for the Environment may determine that anyone who exploits wild animal and plant species for commercial purposes shall have authorisation for this purpose. The Minister for the Environment may lay down regulations on the authorisation scheme, including regulations stipulating that authorisation may be denied or revoked.

(6) The Minister for the Environment may lay down regulations on supervision with or prohibition of import of specific species of animals living in the wild which are of risk to humans.

31.-(1) It shall be prohibited to release animals that do not occur naturally in the wild in Denmark without a permit from the Minister for the Environment. This shall also apply to territorial waters and the fishing zone as laid down by the Fishing Zone of the Kingdom of Denmark Act ("*lov om Danmarks Riges fisketerritorium*").

(2) The Minister for the Environment shall examine the appropriateness of reintroducing the animal and plant species mentioned in Annexes 3 and 5 to this Act, and which are native species, if this contributes to their conservation.

(3) In order to safeguard nature, the Minister for the Environment shall lay down regulations on the release of certain animals which do not occur naturally in Denmark.

(4) In order to safeguard nature the Minister for the Environment shall lay down regulations to the effect that certain plants which do not occur naturally in Denmark be required a special licence to be planted or sown.

32. From 1 March to 31 October, reed cutting may only take place upon licence from the Minister for the Environment.

Part 6

Nature conservation

Overview

33.-(1) With a view to managing the purposes mentioned in section 1, the Nature Conservancy Board may decide to conserve areas of land and fresh waters pursuant to the regulations in this Part.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(2) Pursuant to the regulations in section 43, decisions by the Nature Conservancy Board on conservation orders may be brought before the Nature Protection Board of Appeal. Pursuant to the regulations in section 45, the decision by the Nature Protection Board of Appeal on compensation may be brought before the Valuation Commission.

(3) The Minister for the Environment, the municipal council or the Danish Society for Conservation of Nature may raise conservation orders.

(4) On request, the Minister for the Environment shall assist the nature conservancy board, the Nature Protection Board of Appeal and the Valuation Commission during processing by these authorities of cases pursuant to this Part.

(5) Compensation shall be awarded pursuant to the provisions in section 39 for losses imposed on an owner, user or holder of other rights to a conserved property.

Preliminary prohibition

34.-(1) The Minister for the Environment or the municipal council may prohibit the use of a property, or the establishment, in law or in fact, of conditions in contravention of an intended conservation order.

(2) The prohibition shall be communicated to the affected owners, and registered in the Land Registry for the properties concerned, and it shall be announced publicly.

(3) This prohibition shall apply from its publication and until a proposed conservation order has been announced publicly, cf. section 37, though not for more than one year.

Nature conservancy boards

35.-(1) The Minister for the Environment shall establish two or three nature conservancy boards in each region.

(2) The Minister for the Environment shall determine the geographical area for each nature conservancy board.

(3) A nature conservancy board shall comprise:

- 1) a chairperson, who shall be a judge, and who shall be appointed by the Minister for the Environment,
- 2) a member appointed by the Minister for the Environment, and
- 3) a member elected by the municipal council of the municipality in which the area concerned is located.

(4) In parallel with appointment and election of members, a proxy shall be appointed and elected for each member. The proxy for the chairperson shall be a judge.

(5) The chairperson, the proxy and the member selected by the Minister shall be appointed for a period determined by the Minister for the Environment. The member appointed by the municipal council shall be elected for the municipal election period.

(6) Until such time that a new nature conservancy board has been established after a municipal election, the board shall be maintained with its existing composition. The Minister for the Environment may also permit the board to conclude processing of a pending case.

(7) If a conservation order relates to an area which falls within several nature conservancy boards, the Minister for the Environment shall refer the case to one of the nature conservancy boards. This board shall then be joined by the members appointed by the Minister and members of the other boards appointed by the municipal council.

(8) The Minister for the Environment may determine that the proxy to the chairperson shall exercise the powers conferred on the chairperson during the board's consideration of a proposed conservation order, even though the chairperson is not unable to participate in the case.

(9) The Minister for the Environment may decide that the powers as chairperson during the board's processing of a proposed conservation order shall be exercised by the chairperson of another nature conservancy board in the region or by his proxy, even though the chairperson is not unable to participate in the case.

(10) The Minister for the Environment shall lay down rules of procedure for the nature conservancy boards.

(11) Remuneration etc. for the board chairpersons shall be paid by the state. The state shall pay the expenses related to the secretariats of the nature conservancy boards. Subsistence allowance, compensation for documented loss of income from employment and travel allowances, etc. shall be paid to the members mentioned in subsection (3), nos. 2 and 3, in accordance with

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

the regulations in the Local Government Act ("*lov om kommunernes styrelse*"). The expenses shall be paid by the municipality(ies) for which the conservation order concern(s). The Nature Conservancy Board shall make decisions on distribution of expenses to the member appointed by the Minister.

Processing of conservation orders

36.-(1) A conservation order shall be raised in connection with submission of a proposal for a conservation order to the Nature Conservancy Board. The proposal shall include conservation orders for a specified area, information about the registration designation for the properties covered by the proposal, as well as a report on the basis for the proposal.

(2) Proposals for a conservation order in and outside international nature conservation sites shall contribute to compliance with Denmark's international obligations within these areas.

(3) Proposals for a conservation order covering areas within international nature conservation sites shall include a report on how the conservation order will contribute to compliance with Denmark's international obligations within these areas.

(4) Proposals for a conservation order outside international nature conservation sites shall give an account of how this conservation order will not deteriorate natural habitats and habitats for species, or disrupt species within an international nature conservation site for which the area is designated.

(5) Proposals for a conservation order shall include a budget proposal which accounts for expected costs in connection with implementation of the proposal.

(6) The applicant shall submit the budget proposal for a statement from the authorities which may raise a conservation order, cf. section 33(3). The statements which shall be given no later than four weeks after receipt of the estimate shall be submitted to the Nature Conservancy Board together with the proposal for a conservation order.

37.-(1) The Nature Conservancy Board shall publish the raising of the conservation order and submit the proposal for a conservation order to the owners and users of the properties covered by the proposal, to government and municipal authorities the interests of which are affected by the proposal as well as to organisations etc. which are assumed to have a significant interest in the proposal.

(2) After publication no action in contravention of the proposed conservation order may be taken.

(3) Proposals for conservation orders which involve intervention in current operation or utilisation of a property, shall not take effect, however, until a final decision has been taken to carry out the conservation order, unless the proposed conservation order states that the provisions shall take legal effect whilst the conservation order is pending.

(4) Whilst the conservation order is pending, the Nature Conservancy Board may decide to abolish legal effects of proposals for conservation orders if such are not considered necessary to satisfy the purpose of the conservation.

(5) During processing of a conservation order, the Nature Conservancy Board shall hold at least one public meeting about the case. The Nature Conservancy Board shall announce the meeting in the same way as the raising of the case was announced.

(6) For a meeting as mentioned in subsection (5), the Nature Conservancy Board shall, as a minimum, invite the parties mentioned in subsection (1) as well as the parties who have made a request to the Nature Conservancy Board for an invitation to meetings in the case.

(7) Objections against or amendments to a proposal for a conservation order as well as claims for compensation in the event of conservation shall be submitted during a meeting or in writing to the Nature Conservancy Board.

37a.-(1) A proposal for a conservation order shall lapse if the Nature Conservancy Board has not made a decision pursuant to section 40(1) two years after raising of a conservation order.

(2) A conservation order which has lapsed, may, within two months after its lapse, be reintroduced on an unchanged basis according to the regulations in section 36 and shall then be processed according to the regulations in this Part.

(3) In special cases, the Nature Conservancy Board may, before expiry of the time limit mentioned in subsection (1), decide to extend this time limit for up to two years.

Conservation orders

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

38.-(1) A conservation order shall include a provision on the purpose of the conservation order.

(2) In conservation orders covering areas within international nature conservation sites, the purpose shall clarify that the conservation order is to contribute to ensuring a favourable conservation status for species and natural habitats for which the areas are designated.

(3) A conservation order may involve conservation of the current condition or provision of a certain condition which shall then be preserved, and it may regulate public access to the area.

(4) A conservation order may include the provisions, including orders and prohibitions relating to the use of the areas, considered necessary to achieve the objectives of the conservation order.

(5) A conservation order may stipulate that real property or part of real property shall be surrendered to the public.

(6) A conservation order may determine that the prohibitions in section 3 and sections 15-19 shall not apply to the extent that the matter is regulated by the conservation order.

(7) A conservation order shall specify the extent to which it serves in lieu of a licence etc. pursuant to the regulations laid down in this Act, or to regulations in other legislation.

38a. A conservation order which involves implementation of a nature restoration project may only be carried out, if the authorities responsible for implementing the project and paying the costs in this connection, can recommend the conservation order.

Compensation etc.

39.-(1) The Nature Conservancy Board shall determine the compensation to be awarded to owners, users and other holders of rights in the properties covered by the conservation order, for the loss attributable to the adoption of the conservation order. Compensation may only be awarded to other parties than owners and users if a claim for compensation is submitted in accordance with the regulations in section 37(7). Compensation for a conservation order of publicly owned areas shall not be awarded unless the property conserved is acquired with a view to temporary occupation.

(2) If the conservation orders are imposed on a public authority, the Nature Conservancy Board shall determine whether compensation shall be awarded and, if so, the amount to be awarded.

(3) If the conservation order is not adopted, or the proposal lapses pursuant to section 37a, the nature conservancy board may, upon request, award a private owner or user an indemnification for losses incurred due to not being able to use the property as previously during the time between the publication of the proposal for a conservation order and the decision not to adopt the conservation order.

(4) Interest shall be paid on compensation from the date of a decision by the nature conservancy board, and until the compensation is paid at an annual interest rate equal to the discount rate of Danmarks Nationalbank (the Danish central bank). In special circumstances, the nature conservancy board may determine a different starting date for calculating the interest.

Decisions by the nature conservancy board

40.-(1) Processing by the nature conservancy board of a conservation order shall be concluded in a decision on whether to adopt the conservation order; in affirmative cases, the board shall determine the geographical area to which the conservation order shall apply, make specific conservation provisions for the area concerned, cf. section 38, and decide matters of compensation etc., cf. section 39.

(2) The nature conservancy board shall publish its decision and send notice of the decision to the parties to whom a copy of the proposal for a conservation order was sent, cf. section 37(1), as well as to any person who, during the processing of the case, appeared before the board or submitted a request to be notified of the decision.

(3) The nature conservancy board shall have the conservation order registered in the Land Registry in respect of the properties concerned.

41.-(1) Upon publication pursuant to section 40(2), all persons shall comply with the conservation orders.

(2) If the nature conservancy board decides to reject the conservation order or to restrict the conservation area or conservation orders in respect of the proposal, the legal effect of the proposal shall be sustained in accordance with section 37(2) until the Nature Protection Board of Appeal has made a decision in this matter. If the Nature Protection Board of Appeal is not required under section

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

42 to review the decision of the nature conservancy board, and the decision is not appealed under section 43(1), the proposal shall, however, cease to have legal effect upon expiry of the time limit for appeal under section 43(3).

(3) If property is surrendered as part of the adoption of the conservation order in accordance with section 38(5), all rights to the property surrendered shall lapse, unless otherwise decided by the board. If part of a property is surrendered, the authority to which the area is surrendered shall provide for subdivision or transfer of part of the property and pay the expenses in this connection.

Review by the Nature Protection Board of Appeal

42.-(1) If the total compensation and indemnification due as a result of the adoption of a conservation order exceed DKK 100,000, the Nature Protection Board of Appeal shall review the decision of the nature conservancy board pursuant to section 40(1), regardless of whether the decision is appealed.

Appeal to the Nature Protection Board of Appeal

43.-(1) The decision of the nature conservancy board pursuant to section 37(4), section 37a(3) and section 40 may be appealed to the Nature Protection Board of Appeal.

(2) The following shall have the right to appeal:

- 1) owners and users to whom a copy of the decision shall be sent,
- 2) any person who, during the processing of the case, appeared before the board or submitted a request to be notified of the decision,
- 3) government and municipal authorities the interests of which are affected by the proposal, and
- 4) organisations etc. that are assumed to have a substantial interest in the proposal.

The parts of the decision that concern compensation pursuant to section 39(1), or indemnification pursuant to section 39(3), may, however, only be appealed by a person who considers him/herself entitled to higher compensation or indemnification, or by an authority that shall pay part of the compensation.

(3) The regulation in section 87(1) shall also apply to appeals to the Nature Protection Board of Appeal.

(4) Appeals shall be submitted in writing to the Nature Protection Board of Appeal.

(5) In appeals to a decision made by the nature conservancy board pursuant to section 37(4), and section 37a(3), the Nature Protection Board of Appeal shall make a decision within eight weeks of receipt of the appeal.

43a. The temporary legal effects of a proposal for a conservation order, cf. section 41(2), shall lapse two years after the conservation order has been brought before the Nature Protection Board of Appeal.

Decision by the Nature Protection Board of Appeal

44.-(1) The Nature Protection Board of Appeal may amend the decision of the nature conservancy board, including the geographical scope of the conservation order, the conservation orders and the compensation. This shall apply regardless of who raised the conservation order or appealed the decision of the nature conservancy board, and regardless of the proposal for a conservation order and the proposals and claims submitted to the nature conservancy board and the Nature Protection Board of Appeal.

(2) If, contrary to the nature conservancy board, the Nature Protection Board of Appeal decides that a proposed conservation order should be adopted, the Nature Protection Board of Appeal may order the nature conservancy board to reconsider the case. The Nature Protection Board of Appeal may also determine that any increase in the extent of the protected area that has been decided by the Nature Protection Board of Appeal, shall be considered by the nature conservancy board.

(3) In special cases, the Nature Protection Board of Appeal may, instead of deciding a claim for compensation, refer the matter to the Valuation Commission for decision.

(4) The Nature Protection Board of Appeal shall publish its decision and send a copy of the decision to the owners and users concerned, as well as any other person who has submitted a request to be notified. The board shall have the provision of the conservation order registered in the Land Registry in respect of the properties concerned.

Valuation

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

45.-(1) Decisions by the Nature Protection Board of Appeal on compensation may be appealed to the Valuation Commission mentioned in section 46. Decisions pursuant to section 39(1), 3rd clause, section 39(3) and section 49(3)-(5) may, however, not be appealed to the Valuation Commission.

(2) The following shall have the right to appeal:

- 1) owners and users etc. who have appealed the decision of the nature conservancy board on compensation, to the Nature Protection Board of Appeal, or for whom the Nature Protection Board of Appeal has tightened conservation orders or reduced the amount of compensation, and
- 2) an authority which shall pay part of the compensation.

(3) The regulation in section 87(1) shall also apply to appeals to the Valuation Commission.

(4) Appeals shall be submitted in writing to the Nature Protection Board of Appeal, which shall forward the appeal to the Valuation Commission together with the appealed decision and the material considered in the case.

The Valuation Commission

46.-(1) The Minister for the Environment shall set up a Valuation Commission to consider appeals pursuant to section 45.

(2) The Valuation Commission shall comprise:

- 1) a chairperson who shall be a high court judge and who shall be appointed by the Minister for the Environment, and
- 2) two members who shall be appointed by the Minister for the Environment,

(3) A proxy shall be appointed or elected for each of the members pursuant to the regulations in subsection (2).

(4) All appointments and elections shall apply for four years. New elections during this period, however, shall only apply until the end of this period.

(5) The Minister for the Environment shall lay down rules of procedure for the Valuation Commission.

47. The nature conservancy board, the Nature Protection Board of Appeal and the Valuation Commission may determine that an owner or user be awarded suitable compensation for necessary expenses incurred for obtaining expert advice during the processing of the conservation order. A decision pursuant to the 1st clause may not be appealed.

Reconsideration of a case by the Nature Protection Board of Appeal

48. In special cases, the Nature Protection Board of Appeal may reconsider the decision to adopt a conservation order and its content and the area to which it applies when the Valuation Commission has decided the compensation due or when the matter is decided by a final judgement in a court of law, cf. section 88.

Payment and allocation of compensation

49.-(1) The Minister for the Environment shall ensure payment of compensation and indemnification awarded. Compensation may not be claimed until a final decision has been made to adopt the conservation order, cf. section 48.

(2) If mortgages in property surrendered lapse, cf. section 41(3), compensation for property surrendered may only be paid to the owner with the consent of the mortgagee. This, however, shall not apply in cases where the nature conservancy board, the Nature Protection Board of Appeal or the Valuation Commission deem such property surrender not to reduce the mortgage collateral.

(3) The state shall pay three-quarters of the compensation and indemnification awarded. The last quarter shall be paid by the municipality concerned. If the area covered by the conservation order is located in several municipalities, the nature conservancy board or the Nature Protection Board of Appeal shall determine allocation of the expenditure.

(4) For conservation orders that are mainly of importance to one or more municipalities, the nature conservancy board or Nature Protection Board of Appeal may determine that the municipality(ies) concerned shall, wholly or partly, pay the part of the compensation incumbent on the state pursuant to subsection (3).

(5) For conservation orders of national importance and with expenditure of more than DKK 2 mill., the Nature Protection Board of Appeal may determine that the state shall pay nine-tenths of the compensation etc.

Exemption

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

50.-(1) The Nature Conservancy Board may grant exemption from a proposed or adopted provision of a conservation order if the exemption is not in contravention of the purpose of the conservation order. The regulations in section 66 shall apply correspondingly.

(2) The nature conservancy board may only grant exemption from a conservation order or a proposed conservation order in or outside an international nature conservation site, if the conservation order applied for does not deteriorate natural habitats and habitats for species or significantly disrupts species for which the area is designated.

(3) Unless the conditions in section 65(6) have been complied with, the nature conservancy board may not grant exemption from a conservation order or a proposed conservation order if the conservation order applied for may

- 1) damage or destroy breeding or resting areas for the animal species listed in Annex 3 to this Act in their natural range, or
- 2) destroy the plant species listed in Annex 5 to this Act, in all stages of the biological cycle of the plants.

(4) Decisions pursuant to subsection (1) shall specify that the conditions in subsections (2) and (3) are met.

(5) Further deviations from a conservation order than that mentioned in subsection (1) as well as whole or partial repeal of a conservation order may only take place pursuant to the regulations on implementing conservation orders.

Conservation orders on state-owned areas and in territorial waters etc.

51.-(1) In furtherance of the purpose mentioned in section 1, the Minister for the Environment may adopt conservation orders by statutory order on state-owned areas as well as in territorial waters and the fishing zone as laid down by the Fishing Zone of the Kingdom of Denmark Act ("*lov om Danmarks Riges fisketerritorium*").

(2) In furtherance of the purpose mentioned in section 1, the nature conservancy board may, in connection with decisions on conservation orders onshore, adopt conservation orders governing adjacent low tide parts of the territorial waters, when there is a special interest in including these areas in the conservation order. The provisions in section 33(2)-(4), sections 35-38, sections 40-44 and section 50 shall also apply to conservation orders in territorial waters.

Part 7

Nature conservation and arresting sand-drifts

52.-(1) Municipalities which own areas not covered by a conservation order but which are covered by the provisions in section 3, shall conserve these. This shall not apply to watercourses and lakes.

(2) Municipalities which own areas in international nature conservation sites shall conserve such areas in accordance with the provisions laid down in the Natura 2000 plan.

(3) The Minister for the Environment may lay down regulations on conservation of areas which are covered by a conservation order to supplement the conservation orders laid down. The Minister may also lay down regulations on conservation of areas for which a decision pursuant to section 19d, section 19e or section 19f has been made.

53.-(1) The Minister for the Environment shall initiate the measures necessary to reduce sand drift in the dune conservation areas mentioned in section 8 and section 9.

(2) The Minister for the Environment may order the owner of an area, which is not a dune conservation area pursuant to section 8 or section 9, to carry out and pay for the measures necessary to reduce sand drift. The Minister for the Environment may order that the owner's use of the area be restricted.

(3) If an order is not complied with in due time, the Minister for the Environment may have the work done immediately at the owner's expense. The same shall apply if the work cannot be delayed until an order is processed.

(4) The decision of the Minister for the Environment on whether to launch sand-drift arresting measures shall be made on the basis of consideration about nature, including international nature protection interests, the landscape and expenses for preventing sand drifts compared with other societal values concerned. If the Minister decides not to carry out sand-drift arresting measures on a property which is significantly threatened by sand drifts, the Minister may permit the owner to carry out and pay for the measures necessary if this can be done in compliance with the considerations mentioned above.

54. Expenses to reduce sand drifts on dune conservation areas shall be paid as five-sixths by the state and one-sixths by the municipality. Expenses to reduce sand drifts on the areas of the state shall, however, only be paid by the state.

Part 8

Management of nature

Acquisition, loans and grants etc.

- 55.-(1)** The annual finance acts shall lay down an allocation within which the Minister for the Environment may
- 1) acquire real property and pay for operating and construction expenses on real property acquired, including for afforestation,
 - 2) provide loans to municipalities or non-profit associations, foundations, institutions, etc. to enable these to acquire real property and
 - 3) provide loans and grants to municipalities, non-profit associations, foundations, institutions etc. as well as private property owners, to enable them to conserve, preserve and restore natural areas, and to improve the opportunities for outdoor activities.

(2) The Minister for the Environment may sell real property.

(3) Grants made in accordance with subsection (1), no. 3 may be made subject to the conclusion of an agreement on nature conservation, nature restoration and public access. Such agreements may be registered in the Land Registry in respect of the property concerned. Registered agreements shall be binding upon the owners and holders of rights to the properties regardless of when these rights were established.

(4) The Minister for the Environment may compensate for damage that might occur as a result of agreed public access to a private property.

(5) The Minister for the Environment may lay down more detailed regulations on the administration of subsections (1) and (4).

55a. The Regional Council may allocate time-limited grants for projects contributing to the realisation of visions and objectives in the regional development plan within the purpose of this Act.

56.-(1) The Minister for Finance shall lay down the terms of loans granted pursuant to section 55(1), nos. 2 and 3.

(2) After consultation with the Minister for Finance, the Minister for the Environment may accept donations made in furtherance of the purpose of this Act.

56a. An action for recovery of payment made by mistake in connection with grants financed through national funds as well as EU funds, shall be subject to a limitation period as a whole according to the regulations laid down in existing regulations.

Right of pre-emption

57.-(1) The Minister for the Environment may determine that the state shall have a right of pre-emption on properties located in rural zones or summer cottage areas which are particularly well suited to fulfil the purpose of this Act.

(2) The owner of the property concerned shall be notified of this right of pre-emption, which shall be registered in the Land Registry for the property.

(3) This right of pre-emption shall respect private agreements on rights of pre-emption and options to purchase that were registered in the Land Registry before 17 November 1988, but otherwise shall have first priority over other rights to the property, regardless of when these rights were established.

58. The right of pre-emption shall apply to each acquisition of the property or parts of the property. Nevertheless, the right of pre-emption shall not apply

- 1) when the state or municipality acquires the property for other purposes than those laid down by this Act,
- 2) when the property is acquired by a person by inheritance, by taking over to retain undivided possession of an estate or by dividing common property, or
- 3) when the acquirer is the previous owner's spouse or is related by blood or by marriage to the previous owner in the direct line of ascent or descent or collaterally as close as siblings or their children.

59.-(1) The regulations in sections 13-17 of the Act on State Procurement of Land and Loans for Agricultural and Forestry Purposes etc. ("*jordfordelingsloven*") shall apply correspondingly when the right of pre-emption has been imposed pursuant to section 57, to the effect that the Minister for the Environment shall take the place of the Minister for Food, Agriculture and Fisheries, and to the effect that the Valuation Commission, cf. section 46 shall take the place of the road valuation authorities.

(2) The time limit for establishing the right of pre-emption shall, however, be eight weeks for cases in pursuance of this Act.

Expropriation

60.-(1) The Minister for the Environment may expropriate property in a rural zone or in a summer cottage area if it is vitally important to have rights to the property in order to implement measures based on planning to promote the purpose of this Act, including restoration of wetlands, which shall contribute to improving the aquatic environment.

(2) Expropriation pursuant to subsection (1) may, however, not be applied to promote state afforestation.

(3) The municipal council may expropriate property if it is vitally important to have rights to the property to realise the Natura 2000 plan.

(4) In connection with the expropriation the regulations in section 39(1), (2) and (4), section 43, section 44(1), (3) and (4), section 45, section 47 and section 49(2) shall apply correspondingly with the modifications necessary because, in connection with expropriation pursuant to subsection (1), the Minister for the Environment takes the place of the nature conservancy board. In connection with expropriation pursuant to subsection (3) the municipal council shall take the place of the nature conservancy board.

Restoration of wetlands to improve the aquatic environment

60a.-(1) For restoration of wetlands which shall contribute to improving the aquatic environment, the Minister for the Environment may authorise the municipal council to exercise the powers incumbent on the Minister for the Environment pursuant to section 55(1), no. 1, section 55(2) and (3), section 57(1), section 59(1), and section 60(1) and (4) as well as pursuant to section 55(1), no. 3, but only in relation to the provision of grants.

(2) The Minister for the Environment may lay down regulations and guidelines on the exercise of the powers of the municipal council.

(3) The Minister for the Environment may lay down regulations on the access to appeal decisions made in accordance with the authority pursuant to subsection (1), including that it shall not be possible to appeal the decision to another administrative authority, cf. however, section 60(4).

Information and involvement of the public

60b.-(1) In connection with cases of major importance pursuant to section 55(1) and (2), section 57(1) and section 60(1), the affected authority shall be informed and included in the decision-making process.

(2) The Minister for the Environment shall lay down further regulations on how the information and involvement of the public pursuant to subsection (1) shall take place.

The Nature Management Committee

61.-(1) The Minister for the Environment shall set up a committee to advise the Minister in cases of major importance pursuant to section 55(1) and (2), section 57(1) and section 60(1).

(2) Upon recommendation, the Minister for the Environment shall appoint a member from the Ministry of Finance, the Ministry of Food, Agriculture and Fisheries of Denmark, Local Government Denmark, the Danish Society for Conservation of Nature, the Danish Outdoor Council, the Danish Farmers' Union, the Danish Family Farmers' Association, the National Federation of Large Farmers' Unions, the Danish Hunters' Association, the Danish Forest Association, the Danish Ornithological Society - BirdLife Denmark and the Danish Association of Anglers.

(3) The Minister for the Environment shall also appoint two members with expertise in the natural sciences and heritage, respectively, one member representing tourism in Denmark as well as the chairperson of the Committee and a number of members from the Ministry of the Environment.

(4) The Minister for the Environment shall lay down the rules of procedure for the Committee.

Part 9

Monitoring nature, advisory services etc.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

62.-(1) The Minister for the Environment shall monitor the condition of nature in Denmark in cooperation with the public authorities and institutions affected.

(2) The Minister for the Environment may lay down further regulations stipulating how the monitoring shall be carried out.

63.-(1) The Minister for the Environment shall be responsible for advising, guiding and informing other authorities and individuals about national and international issues related to the protection of nature.

(2) The Minister for the Environment may establish guidelines for the nature awareness work of the municipal councils.

64. The Minister for the Environment may establish councils of experts to advise the authorities on issues within the scope of this Act.

Part 10

Administration

Exemptions etc.

65.-(1) In special cases, the Minister for the Environment may grant exemptions from the provisions in section 8(1), section 11(3) and section 15(1).

(2) The municipal council may grant exemptions from the provisions in section 16(1), section 17(1) and section 19. The forest owner concerned shall be notified before making a decision about granting exemption from section 17(1).

(3) The municipal council may, in special cases, grant exemption from the provisions in section 3(1)-(3) and section 18(1). The Minister for the Environment may determine that the municipal council shall obtain a statement from the Minister before making a decision related to section 18(1).

(4) In connection with decisions pursuant to subsection (1) on commercial planting of bacciferous scrubs or fruit trees within the extended beach protection line, the Minister for the Environment shall grant an exemption from section 15(1), even though it is not a special circumstance, unless the planting conflicts with substantive considerations relating to the coastal landscape.

(5) The Minister for the Environment may grant exemption from the provisions in sections 8 and 15 if this is necessary to realise a local development plan on expansion with wind turbines in conformity with the municipal planning.

(6) The Minister for the Environment may, if no satisfactory alternative exists, grant exemption from the prohibition in section 29a. The exemption may not prevent maintenance of the relevant population's conservation status in its natural range and shall aim at

- 1) protecting wild fauna and flora and conserving natural habitats,
- 2) preventing serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property,
- 3) ensuring the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment,
- 4) promoting research and learning,
- 5) restoring a population, release or breed species, including artificial propagation of plant species, or
- 6) allowing taking or storing specimens of the species mentioned in Annex 3 to this Act, in limited and specified numbers and under strictly controlled conditions.

(7) Decisions according to legislation or regulations laid down in pursuance thereof which deviate from the protection under section 29a, shall replace exemptions under subsection (6) if the decision is made under conditions corresponding to subsection (6) and laid down by legislation.

66.-(1) Conditions linked to a licence shall be binding on owners and holders of other rights in the property regardless of when the rights were established. The authority shall have conditions of permanent interest registered in the Land Registry in respect of the property concerned at the expense of the applicant.

(2) A licence shall lapse if it is not exploited within three years after having been granted, or if it has not been exploited for three consecutive years.

66a. The municipal council may have an agreement pursuant to section 19c or a decision pursuant to section 19d, section 19e or section 19f registered in the Land Registry.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Other administrative provisions

67.-(1) The Minister for the Environment may decide to assume the powers of the municipal council in accordance with this Act in cases that affect the statutory tasks of other authorities or in cases that are of major importance.

(2) The Minister for the Environment may lay down regulations on the administration of the municipal council of section 21(3), section 27(1) and section 65(2) and (3),

68.-(1) The Minister for the Environment may order the municipal councils to produce information, including maps, to be used in the assessment of matters covered by this Act. This information may be required to be provided in a specific format.

(2) The Minister for the Environment may prepare nationwide surveys of areas of conservation interest.

69.-(1) The Minister for the Environment may determine that the regulations in sections 8 and 15-18 shall not apply to specified areas, cf. subsection (2). The Minister for the Environment may alter the limits for the protection under section 18 if the area protected is not subsequently increased.

(2) A decision pursuant to subsection (1) relating to section 8 on the sand dune conservation boundary may only be taken, if it will not increase the risk of sand drift or in other ways contravene the sand dune conservation order.

(3) In a decision pursuant to subsections (1) and (2) it may be determined that cancellation or alteration of a protection line shall only apply for a further described local development plan. The decision shall stipulate re-entry into force of the protection line, if the local development plan is changed or repealed.

(4) Changes to the beach protection line and the sand dune conservation boundary shall be registered in the Cadastre, and entry in the Land Registry shall be made on the basis of information from the cadastral authority.

(5) The Minister for the Environment may lay down regulations on publication by the municipal council of the Minister's decision pursuant to subsection (1).

69a.-(1) The Minister for the Environment may revise the boundaries for sand dune conservation mentioned in section 8(2) and (3) in the event of significant recession or accretion of the coast, or if necessary to prevent the risk of sand drifts.

(2) The Minister for the Environment may revise the beach protection line, cf. section 15 in the event of significant recession or accretion of the coast.

(3) In connection with revision of the sand dune conservation and beach protection line, the course of lines shall be established according to the same criteria as have been used to establish the existing lines. The sand dune conservation boundary shall thus be established 300 meters from the inner border of the beach, and the beach protection line shall be established 300 meters from the beginning of the continuous land vegetation. In areas designated as summer cottage areas, the protection lines shall be 100 meters. The protection lines shall be established at a shorter distance from the coast in areas affected by building development and similar. The sand dune conservation boundary, however, may not be established closer to the coast than 100 meters if dunes are formed in the area. In stretches with a risk of sand drifts, the provision in section 9 shall apply.

(4) By a revision, areas in urban zones which were not previously covered by the sand dune conservation and beach protection line may not be covered by the provision.

(5) The Minister for the Environment shall undertake to ensure that the sand dune conservation boundary is marked by stakes or similar if located in urban zones or summer cottage areas. The borders for sand dune conservation of areas protected under the previous Prevention of Sand Drift Act may also be marked.

(6) The Minister for the Environment may correct minor errors in connection with establishing the sand dune conservation boundary and the beach protection line.

(7) Changes to the beach protection line and the sand dune conservation boundary shall be registered in the Cadastre, and entry in the Land Registry shall be made on the basis of information from the cadastral authority.

70.-(1) The Minister for the Environment may authorise a government authority set up under the auspices of the Ministry or other government authorities after consultation with the relevant minister, to exercise the powers vested in the Minister pursuant to this Act.

(2) The Minister for the Environment may lay down regulations on access to appeal decisions made in accordance with the authority pursuant to subsection (1), including that it shall not be possible to appeal the decision.

(3) Furthermore, the Minister may lay down regulations on the exercise of authority which another government authority after consultation with the relevant minister becomes authorised to exercise under subsection (1).

70a. The Minister for the Environment may lay down regulations on the possibility of using digital communication within the scope of this Act, as well as further conditions in this respect.

International obligations

71.-(1) The Danish Government may conclude agreements with foreign states on common measures to fulfil the purpose of this Act or to attend to nature protection-related interests outside Denmark.

(2) The Minister for the Environment shall lay down regulations to fulfil the international agreements concluded in accordance with subsection (1).

(3) The Minister for the Environment may lay down regulations necessary for the application in Denmark of regulations of the European Communities concerning matters covered by this Act.

(4) For the implementation of the directives and decisions of the European Community in the area of nature conservation, the Minister for the Environment shall lay down the following regulations on the circumstances and terms under which

- 1) licences may be granted pursuant to section 8(5), no. 7, section 15(4), no. 7, section 31(1) and section 32,
- 2) sand dune conservation may be repealed pursuant to section 9(3),
- 3) orders and prohibitions may be notified pursuant to section 11(1) and (2), section 26(3) and section 26a(3),
- 4) exemptions may be granted from section 3(1)-(3), section 8(1), section 11(3), section 15(1) and sections 16-19, cf. section 65.
- 5) exemptions may be granted from regulations issued pursuant to section 8(7), section 51(1) or from regulations laid down by virtue of section 101(1),
- 6) approval may be granted pursuant to regulations issued according to section 20(2), and
- 7) construction or protection lines may be repealed wholly or partly pursuant to section 8 and sections 15-18, cf. section 69(1).

(5) Implementation of directives and decisions of the European Community is also in regulations laid down by the Minister for the Environment pursuant to section 8(6) and (7), section 27(1)-(4), section 29(1) and (2), section 30(1)-(3) and section 31(2) and (3).

(6) The Minister for the Environment shall take appropriate steps to protect, maintain or restore sufficiently varied and extensive habitats for wild bird species.

71a. The Minister for the Environment may change Annexes 3-5 of this Act to comply with Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the EC Habitats Directive).

71b. The Minister for Defence shall lay down regulations or provisions on defence activities with a view to implementing the directives and decisions of the European Community in the nature area.

Fees

72. The Minister for the Environment may lay down regulations on fees to wholly or partly cover the expenses of the authorities in the administration of this Act.

Part 11

Supervision

73.-(1) The municipal council shall ensure compliance with this Act, the regulations issued in accordance with this Act, as well as provisions of conservation orders.

(2) The Minister for the Environment shall ensure compliance with the regulations in sections 8 and 9 on sand dune conservation, section 15 on the beach protection line and the regulations in Part 5 on protection of plant and animal species, etc.

(3) The Minister for the Environment may determine that such supervision shall be carried out by another authority.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(4) The supervising authority shall ensure compliance with the orders and prohibitions pursuant to this Act as well as with the terms laid down in licences.

(5) The supervising authority shall ensure rectification of a situation in violation of legislation, unless the situation is of minor importance.

(6) The municipal council shall inform the Minister for the Environment if it learns of an illegal situation which is not governed by the supervision of the municipal council pursuant to subsection (1). Similarly, the Minister for the Environment shall inform the municipal council if the Minister learns of an illegal situation which is not governed by the supervision of the Minister pursuant to subsection (2).

(7) The Minister for the Environment may lay down regulations relating to the execution of these supervision activities.

74.-(1) The owner or user of a property shall be responsible for rectifying an illegal situation, unless otherwise stipulated in Part 11a.

(2) The supervising authority, cf. section 73, may have an order to rectify an illegal situation registered in the Land Registry at the owner's expense. When the situation has been rectified, the authority shall have the order deleted from the Land Registry.

(3) If an order served by judgement in a court of law to rectify an illegal situation is not complied with in due time and the imposition of penalty fines cannot be expected to lead to compliance with the order, the supervising authority may take the necessary measures to rectify the illegal situation at the expense of the person obligated.

(4) If an illegal situation constitutes a danger to the maintenance of the condition of an area or to animals and plants protected pursuant to this Act, and an order to rectify the situation is not complied with in due time, the supervising authority may have the necessary work carried out immediately at the expense of the person obligated. The police shall provide the necessary assistance in this respect.

(5) If an order to rectify an illegal situation covered by section 21(1) or by regulations issued under section 21(2), nos. 2 and 5 is not complied with in due time, the supervising authority may have the necessary work carried out immediately at the expense of the person obligated.

75. (Repealed).

76.-(1) The authorities pursuant to this Act or persons empowered by these authorities shall have the right of access, without a court order, to public and private property to exercise the powers provided by this Act, including the conduct of investigations of importance for the purpose of this Act. The same shall apply correspondingly to premises that are used wholly or partly for commercial purposes. Proof of identity shall be presented on request.

(2) The police shall provide the necessary assistance in exercising the right of access provided in subsection (1).

(3) In inspections of enterprises, the owner and employees shall, on request, provide the necessary guidance and help to the authorities.

Part 11a

Environmental damage to protected species or international nature conservation sites

77. Environmental damage or imminent danger of environmental damage shall be construed in accordance with sections 7, 10 and 11 of the Environmental Damage Act ("*miljøskadeloven*").

77a.-(1) The person responsible for operation shall mean anyone operating or controlling the commercial activity concerned.

(2) The person responsible for environmental damage or imminent danger of environmental damage shall mean anyone responsible for operation if the damage or imminent danger of damage is due to reckless behaviour exercised by the person concerned.

77b.-(1) The person responsible for operation shall, in the event of environmental damage or imminent danger of environmental damage immediately notify the supervising authority, cf. section 73(1) and (2) about all relevant aspects of the situation.

(2) The person responsible for operation shall immediately take the steps necessary to prevent imminent danger of environmental damage. The person responsible for operation shall, if environmental damage has occurred, immediately take every practicable step to limit the extent of the damage and to prevent further damage.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(3) The supervising authority shall ensure that the obligation under subsections (1) and (2) is complied with even if no decision under section 77e has been taken.

77c. The supervising authority may order the person responsible for operation to provide information of importance to the assessment of whether environmental damage or imminent danger of environmental damage exists. The person responsible for operation may also be ordered to carry out investigations, analyses, measurements of substances and similar at own expense, in order to identify the reason and effects of impacts on nature or the environment which have occurred.

77d. Orders under section 77c may be issued, regardless of whether the person responsible for the operation has rights to the property where impacts on nature or the environment have been demonstrated. The order shall establish a duty to re-establish the property.

(2) If the person responsible for the operation does not have rights to the property, the supervising authority may inform the person who has rights to the property an order to accept that investigations etc. be carried out by the person responsible for the operation. The order shall be binding on the person who, at any time, has rights to the property.

77e.-(1) In the event of environmental damage or an imminent danger of environmental damage to be dealt with according to the Environmental Damage Act, the supervising authority shall make a decision in this respect.

(2) The Minister for the Environment may lay down regulations to the effect that the municipal council shall present a draft decision pursuant to subsection (1) to obtain a binding statement from the Minister for the Environment as to whether environmental damage or imminent danger of environmental damage to be dealt with under the Environmental Damage Act exists. The Minister for the Environment may also lay down regulations to the effect that the binding statement may first be appealed as part of an appeal of a decision under Part 2 or 3 of the Environmental Damage Act.

77f. In the event of environmental damage which affects or may affect another EU country, the supervising authority shall take a decision in this respect, regardless of whether a decision can be made under section 77e on who is responsible for the environmental damage.

77g.-(1) In cases where the municipal council is the supervising authority, the supervising authority shall submit the decision on whether environmental damage or imminent danger of environmental damage exists, as well as the material heard in the assessment of the case, to the Minister for the Environment. Submission shall take place simultaneously with notification to the person responsible.

(2) The municipal council shall publish the decision.

(3) The Minister for the Environment may lay down regulations on the publication.

(4) A decision that environmental damage or imminent danger of environmental damage exists to be dealt with pursuant to the Environmental Damage Act, may first be appealed as part of an appeal against a decision according to Part 2 or 3 of the Environmental Damage Act. The time limit for appeal shall be the same period as the time limit for appeal for the decision according to the Environmental Damage Act, and the appeal shall be filed in accordance with section 52 of the Environmental Damage Act.

77h.-(1) Upon request of the person(s) entitled to appeal pursuant to section 86(1), nos. 4-6 and subsection (2), the supervising authority shall make a decision pursuant to section 77e or section 77f.

(2) The request shall be accompanied by relevant information about the presumed environmental damage or imminent danger of environmental damage.

(3) The supervising authority may refuse to make a decision about whether there is environmental damage or imminent danger of environmental damage, if the request is not accompanied by information as mentioned in subsection (2).

Part 12

Appeals and legal proceedings

Appeals

78.-(1) The decisions made by the municipal council according to this Act or the regulations issued pursuant to this Act may be appealed to the Nature Protection Board of Appeal according to the provisions in this Part. Decisions pursuant to section 73(5) however, may not be appealed.

(2) The Minister for the Environment may determine that decisions made by the municipal council according to the regulations issued pursuant to section 20(2) may not be appealed.

(3) Decisions made by the nature conservancy board pursuant to section 50(1) may be appealed to the Nature Protection Board of Appeal according to the provisions laid down in this Part. In relation to appeals on the other decisions made by the nature conservancy board, section 43 shall apply.

(4) Decisions made by the Minister for the Environment pursuant to section 9, section 11(1) and (2), section 27(1) and (2), section 53(1), (2) and (4), section 65(1) and Part 11a may be appealed to the Nature Protection Board of Appeal pursuant to the provisions laid down in this Part. Other decisions pursuant to this Act may not be appealed to another administrative authority, cf. however, section 60(4).

(5) The Minister for the Environment may lay down provisions on appeals on decisions made by the Minister according to the regulations issued in pursuance of this Act. The Minister for the Environment may determine that such decisions may be appealed to the Nature Protection Board of Appeal, or that such decisions may not be appealed to another administrative authority.

(6) The Minister for the Environment may lay down provisions on appeals to decisions made by an authority, which, according to the decision of the Minister for the Environment in section 73(3) shall supervise compliance with this Act. The Minister for the Environment may determine that such decisions may be appealed to the Nature Protection Board of Appeal, or that such decisions may not be appealed to another administrative authority.

79.-(1) The Minister for the Environment shall set up a Nature Protection Board of Appeal as the appeals body for administrative decisions according to the regulations laid down in this Part, and to the extent otherwise stipulated by legislation.

(2) The board and its members shall be independent of instructions on processing and decision of the individual case.

80.-(1) The board shall comprise:

- 1) a chairperson,
- 2) two members appointed by the Supreme Court among members of the Court, and
- 3) seven members appointed by the Folketinget (the Danish Parliament).

(2) A vice-chairperson may serve as a proxy to the chairperson. The chairperson and the vice-chairpersons shall be graduates in law.

(3) The chairperson shall ensure that the board is assisted by experts to the extent necessary.

(4) Together with appointment of members pursuant to subsection 1, nos. 2 and 3, a proxy for each member shall be appointed. The proxy may participate in the processing and decision of a case if the relevant member is prevented from participating.

(5) The appointments made by the Folketinget (the Danish Parliament) and the Supreme Court shall apply for four years. In the event of resignation, a new member or a new proxy for the remaining part of the period shall be appointed, cf. subsection (1), nos. 2 and 3.

81.-(1) The board shall have a quorum when no less than one-half of the members, including the chairperson or a vice-chairperson, is present.

(2) The decision by the board in individual cases shall be resolved by a simple majority. In the event of parity of votes, the chairperson or the vice-chairperson, respectively shall have the casting vote.

(3) The chairperson of the Nature Protection Board of Appeal may, on behalf of the board, make a decision in the case of appeals according to this Act, if the appeal is deemed to contain issues which are of significant importance in relation to the purpose of this Act.

82. The decisions of the board may not be brought before another administrative authority. This, however, shall not apply to compensation awarded on the basis of a decision under section 19g, a conservation order or an expropriation.

83. The Minister for the Environment shall lay down the rules of procedure of the board.

84. Administration of the board shall be managed by a secretariat which shall also assist in the preparation and execution of the decisions of the board. The board may also obtain guidance statements from experts.

85. (Repealed).

86.-(1) The following shall have the right to appeal:

- 1) the addressee of the decision,
- 2) the owner of the property affected by the decision,
- 3) public authorities,
- 4) an affected national park fund established according to the National Parks Act,
- 5) local associations and organisations with significant interest in the decision,
- 6) national associations and organisations the main purpose of which is protection of nature and the environment, and
- 7) national associations and organisations which, according to their purpose, manage significant recreational interests if the decision affects such interests.

(2) Decisions pursuant to Part 11a may be appealed by

- 1) any person holding an individual, significant interest in the case, and
- 2) the persons, organisations etc. mentioned in subsection (1), nos. 1 and 2 and nos. 5-7.

(3) In connection with appeals pursuant to subsection (1), nos. 6 and 7, cf. subsection (2), no. 2, the Nature Protection Board of Appeal may demand that the associations or organisations document their right to appeal by submitting their articles of association or in any other way.

87.-(1) The time limit for appeal shall be four weeks from the date of issuing the decision. If the decision is published, however, the time limit for appeal shall always be calculated from publication. If the time limit for appeal expires on a Saturday or public holiday, the time limit for appeal shall be extended to the following business day.

(2) Appeals shall be submitted in writing to the authority that made the decision. The authority shall send the appeal to the Nature Protection Board of Appeal accompanied by the appealed decision and the material that formed the basis for the decision.

(3) Licences may not be exploited until expiry of the time limit for appeal. Appeals made in due time shall stay the appealed decision, unless the appellate authority decides otherwise. This, however, shall not apply to appeals against decisions pursuant to section 27(1) and (2).

(4) Appeals against decisions pursuant to Part 11a shall have a stay of execution, unless the Nature Protection Board of Appeal decides otherwise.

(5) The Minister for the Environment may lay down regulations on notifying the person(s) entitled to appeal.

Legal proceedings

88.-(1) Legal proceedings to challenge decisions made in accordance with this Act or the regulations issued pursuant to this Act, shall be filed within six months after the decision is communicated to the person concerned. If the decision is published, however, the deadline shall always be calculated from publication.

(2) Issues for review by the Valuation Commission, cf. section 45, may not be brought before the courts of law until the Commission has rendered a decision.

Part 13

Penalties etc.

Penalties and confiscation

89.-(1) Unless more severe punishment is incurred under other legislation, anyone who:

- 1) violates section 3(1), (2) and (3), section 8(1), section 15(1), section 16(1), section 17(1), section 18(1), section 19, section 21(1), section 28, section 29a, section 31(1), section 32, section 37(2), section 41(1) and (2), or section 74(1),
- 2) acts in contravention of a decision made under section 19d, section 19e or section 19f,
- 3) omits to give notification as mentioned in section 19b(1) and (4), and section 26a(1) and (4),
- 4) passes through or stays in a natural area in another way than allowed in accordance with the regulations in Part 4,
- 5) prevents or hinders public access to nature in contravention of the regulations in Part 4,
- 6) fails to comply with a prohibition or order issued in accordance with section 11(1), section 23(8), section 24(5), section 26(3), section 27(1) and (2), section 34(1), section 53(2), section 73(5), section 75(2), section 77c or section 77d,

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- 7) in contravention of section 76(1), obstructs access to a property or fails to comply with a request made in accordance with section 76(3),
- 8) fails to notify or take the steps mentioned in section 77b,
- 9) fails to comply with a prohibition or order issued in accordance with the regulations laid down in pursuance of this Act,
- 10) acts in contravention of a provision of a conservation order, a conservation order or an agreement on a conservation order concluded for the nature conservancy board, or disregards rules issued in pursuance hereof,
- 11) disregards conditions laid down in a licence or approval in accordance with this Act or in accordance with regulations issued in pursuance of this Act.

(2) The penalty may increase to imprisonment of up to one year, if the violation is committed intentionally or by gross negligence and if through this violation

- 1) the interests that this Act strives to protect are harmed or endangered, cf. sections 1 and 2, or
- 2) a financial advantage is achieved or strived towards by the person concerned or others, including reductions in expenses.

(3) Regulations issued in accordance with this Act may determine that a fine shall be imposed on anyone who violates the provisions of these regulations or violates the provisions of regulations covered by section 71(3). It may further be established that the penalty may be increased to imprisonment of up to one year in the circumstances described in subsection (2).

(4) Companies etc. (legal persons) may incur criminal liability according to the regulations in chapter 5 of the Criminal Code.

(5) If the benefits acquired through the contravention are not to be confiscated, fines and supplementary fines shall be set which take special account of the size of the benefits which were acquired or which were intended to be acquired, cf. subsection (2), no. 2.

(6) If the violation is committed using a motor vehicle and the operator is domiciled in and the vehicle registered outside Denmark, the police may sequester the vehicle until fines, the cost of proceedings and compensation for damage are paid or a guarantee is presented. If the amount is not paid within two months after the final decision in the case, the vehicle may be distrained.

(7) The regulations of the Administration of Justice Act on detaining items that should be confiscated shall apply correspondingly to the initiation of sequestration in accordance with subsection (6). Sequestration may only be effected if it is necessary to ensure payment of the amount. If the operator was not authorised to be in possession of the vehicle, it shall not be sequestered.

(8) The regulations of subsections (6) and (7) shall not apply to vehicle operators domiciled in Finland, Iceland, Norway or Sweden.

(9) The period of limitation for criminal liability shall be five years for the violations, etc. described in subsection (1), and for violations of the provisions of regulations issued in accordance with this Act.

(10) Cases shall be treated as police cases. The remedies laid down in Part 73 of the Administration of Justice Act may be used to the same extent as in cases involving the state prosecutor.

90. The Minister for the Environment shall determine the action to be taken with regard to animals and plants and parts and products thereof confiscated in connection with violation of this Act or of regulations issued in accordance with this Act.

91. If wild animals or plants or products thereof are imported in violation of the regulations issued in accordance with section 30, the expenses incurred for storage etc. and for the transport of the goods back to the country of origin or to the country from which the goods were dispatched shall, by order of the Minister for the Environment, be paid by the person who transported them to Denmark or by the person for whom the goods were imported or for whom the goods were intended. The same shall apply if the goods arrive in Denmark and the conditions for granting an import licence in accordance with the regulation in the 1st clause have not been complied with.

Statutory debt collection, etc.

92. If the fees described in section 72 and expenses for which the authorities are entitled to obtain coverage in accordance with section 53(3), section 66(1), section 74(2)-(4), section 75(2) and (3) and section 91, are not paid in due time, the authorities may collect default interest of 1.3% per month for each full month elapsing from the due date.

Part 14

Entry into force and transitional provisions

93.-(1) This Act shall enter into force on 1 July 1992.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(2) The following acts shall be repealed:

- 1) the Conservation of Nature Act ("*lov om naturfredning*"), cf. Consolidating Act no. 530 of 10 October 1984,
- 2) the Prevention of Sand Drift Act ("*lov om sandflugtens bekæmpelse*"), cf. Consolidating Act no. 168 of 28 April 1982,
- 3) Act no. 339 of 24 May 1989 on management of nature,
- 4) Act no 595 of 13 November 1940 on the construction of paths, etc. in the green areas of Greater Copenhagen,
- 5) Act of 30 January 1861 prohibiting taking unleashed dogs into Jægersborg Dyrehave, etc.

(3) The provisions on approval of location plans, architectural drawings, materials and choice of colours, etc. in the declarations registered in the Land Registry by the Beach Conservation Commission in accordance with section 25(1), last clause, in Statutory Order no. 194 of 16 June 1961 on the Conservation of Nature Act, shall be repealed.

94.-100. (Omitted)

101.-(1) Regulations issued in accordance with the provisions described in section 93(2) shall remain in force until replaced by regulations issued according to this Act. Violation of the regulations shall be punishable according to the regulations hitherto in force.

(2) The Minister for the Environment may, however, determine that the appeals upheld according to subsection (1) on preparation and content of conservation plans shall be derogated from in special cases.

(3) The statutory orders on scientific reserves issued in accordance with previous legislation, shall remain in force until they are repealed or lapse. The statutory orders may be extended.

(4) (Omitted)

102.-(1) Decisions according to the regulations mentioned in section 93(2) and section 101 shall remain valid until new decisions are taken in accordance with this Act or regulations issued according to this Act. Violations of the decisions shall be punishable according to the regulations hitherto in force.

(2) Orders on restrictions in public access to the beach made according to section 23(3) of Statutory Order no. 194 of 16 June 1961 on the Conservation of Nature Act, shall maintain validity until new decisions are made according to this Act or according to regulations in this Act.

103.-(1) The right to take proceedings, which in registered construction and conservation easements pursuant to Act no. 595 of 13 November 1940 on paths, etc. in the green areas of Greater Copenhagen which falls to the public authorities, shall fall to the municipal council. The same shall apply to the powers, which according to declarations and agreements under this Act and mentioned in subsection (1), fall to the government authorities.

(2) The powers, which fall to the Nature Conservancy Council pursuant to legislation, preservation orders etc., shall fall to the Minister for the Environment. The Minister for the Environment may, however, determine that the powers or certain types of powers shall be exercised by other authorities or institutions, including the council established according to section 64(1).

(3) The powers, which fall to the nature conservancy boards in previous decisions on construction and protection lines, public access and outdoor advertisements, shall fall to the municipal council. The powers concerning the beach protection line shall, however, fall to the Minister for the Environment. The powers, which fall to the National Trust, shall fall to the Nature Protection Board of Appeal.

104.-(1) The previous nature conservancy boards and the National Trust shall be maintained for up to one year after the entry into force of this Act to finish hearing pending cases according to the regulations hitherto in force. If such a case has not been decided by the board during that time, the case shall be transferred to the authority which should make a decision on the case if it had been commenced after the entry into force of this Act. The case shall be heard and decided according to this in conformity with the regulations of this Act and with regulations issued according to this Act.

(2) If one of the previous nature conservancy boards or the National Trust is unable to decide a pending case within one year after entry into force of this Act, the board may immediately transfer the case to the authority mentioned in subsection (1), 2nd clause. Subsection (1), 3rd clause shall then apply.

(3) The decision of the nature conservancy board in a case covered by subsection (1), 1st clause may be appealed according to the provisions laid down in this Act.

(4) The decision of the National Trust on compensation issues in a case covered by subsection (1), 1st clause, may be appealed to the Valuation Commission according to the provisions laid down in this Act.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(5) The Minister for the Environment may also lay down further regulations of transfer for hearing pending cases.

105. This Act shall not apply to the Faeroe Islands and Greenland.

Act no. 269 of 6 May 1993 on hunting and wildlife management, which amends section 30(1) and (2) shall include the following commencement provision:

58. This Act shall enter into force on 1 April 1994.

(2)-(4) (Omitted)

Act no. 439 of 1 June 1994 amending the Planning Act and the Protection of Nature Act (protection of coastal areas) amending sections 8, 15, 25, 65 and 69 and inserting new sections 15a-d shall include the following commencement provision:

3.

(1) This Act shall enter into force on 1 August 1994, cf. however, subsection (2).

(2) ²The Minister for the Environment shall lay down the time of entry into force of section 2, nos. 1, 2 and 4 and may determine that the entry into force shall be at different dates in the individual counties.

(3) In provisions laid down in pursuance of subsection (2), the Minister for the Environment shall determine that areas which at the time of entry into force are covered by a local development plan may be utilised in accordance with the provisions of the local development plan regardless of the provisions in section 2, nos. 1 and 2. This, however, shall not apply to areas with dune formations within 100 meters from the beaches mentioned in section 8(2), no. 1 of the Protection of Nature Act, in the wording of section 2, no. 1 of this Act.

(4) After the entry into force of section 2, nos. 1 and 2, no reforestation of areas may take place where planting that was not part of the previous operations has been carried out after 1 August 1994.

(5) Statutory Order no. 547 of 22 June 1992 on construction and protection lines as well as statutory order no. 552 of 22 June 1992 on sand dune conservation shall remain in force until replaced by the provisions issued in pursuance of this Act.

Act no. 19 of 13 January 1997 amending the Protection of Nature Act and the Mineral Resources Act (amendment of rules of appeal) amending sections 78 and 81 and repealing section 83(2) and section 85 shall include the following commencement provision:

3.

(1) This Act shall enter into force on 1 July 1997.

(2) Decisions which have been appealed before the entry into force of this Act shall be finally heard according to the rules of appeal hitherto applicable.

Act no. 478 of 1 July 1998 amending the Environmental Protection Act, the Protection of Nature Act, the Watercourse Act and the Planning Act (adjusting the harmonisation requirements and restoration of wetlands in accordance with the agreement on the Action Plan for the Aquatic Environment II) amending section 2 and section 60(1) and inserting a new section 60a shall include the following commencement provision:

5.

This Act shall enter into force on 15 July 1998.

² As worded in Act no. 282 of 12 May 1999.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Act no. 282 of 12 May 1999 amending the Protection of Nature Act and the Act amending the Planning Act and the Protection of Nature Act (amending the regulations on entry into force etc. of the extended sand dune conservation and beach protection line as well as establishment hereof in urban zones) amending sections 8, 10, 15, 15a, 15b, 15d, 65, 67 and 69, and amending section 3(2) of Act no. 439 of 1 June 1994 shall include the following commencement provision:

3.

(1) This Act shall enter into force after publication in the Danish Law Gazette.³

(2) Section 1, nos. 1, 8 and 9 shall, however, not enter into force in the individual counties until the Minister for the Environment determines the entry into force of extended protection lines in the individual counties.

Act no. 447 of 31 May 2000 amending certain environmental acts (implementation of the Aarhus Convention etc.) which inserts a new section 60b and amends section 86 shall include the following commencement provision:

14.

(1) This Act shall enter into force on 15 September 2000, cf. however subsections (2)-(4).

(2) Regulations of this Act on access to appeal decisions shall apply to cases which are decided in the first instance after entry into force of this Act. (2nd clause omitted)

(3)-(4) (Omitted).

The Museums Act, Act no. 473 of 7 June 2001 amending sections 14, 65, 78 and 89 and inserting a new section 14a shall include the following commencement provision:

41.-(1) This Act shall enter into force on 1 January 2002. At the same time, the Museums Act etc., cf. Consolidating Act no. 739 of 17 July 2000 shall be repealed. Section 27(4)-(7) of this Act shall be effective from 1 January 2003. Until 1 January 2003 the previous financing principles for the archaeological survey activities, cf. section 26(3) of the Museums Act etc., cf. Consolidating Act no. 739 of 17 July 2000 shall be maintained.

Act no. 145 of 25 March 2002 amending various acts as a consequence of the merging of municipalities on Bornholm, amending sections 35, 46, 49 and 77, shall include the following commencement provision:

78.

(1) This Act shall enter into force on 1 January 2003, (2nd indent omitted).

(2) (Omitted)

Act no. 454 of 9 June 2004 amending the Protection of Nature Act, the Planning Act, the Watercourse Act and the Museums Act amending sections 3, 4, 5, 6, 7, 8, 12, 13, 14, 14a, 15, 15a-d, 18, 21, 22, 23, 24, 25, 26, 36, 37, 38, 39, 41, 43, 45, 50, 52, 53, 60, 60a, 64, 65, 66, 66a, 69, 72, 74, 75, 78, 82, 87 and 89 and inserting a new Part 2a (sections 19a-h) as well as inserting new sections 26a, 37a, 38a, 43a, 69a and 70a shall include the following commencement provision:

5.

(1) This Act shall enter into force on 1 October 2004.

(2) Section 1, no. 47 shall, however, not enter into force until 1 August 2006.

³ This Act was published in the Danish Law Gazette on 14 May 1999.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(3) Statutory orders on the beach protection line and the sand dune conservation boundary and on various provisions in the Protection of Nature Act issued according to the regulations described in section 1, no. 7 (sections 15a-15d of the Protection of Nature Act) shall remain in force.

(4) Conservation orders pending before nature conservancy boards or the Nature Protection Board of Appeal at the entry into force of this Act shall be covered by the provisions in section 1, nos. 22 and 33 (section 37a and section 43a of the Protection of Nature Act) to the effect that the time limit is calculated from the entry into force of this Act.

(5) (Omitted)

Act no. 431 of 6 June 2005 amending various acts (simplification, harmonisation and objectification of the regulations on collecting debt to the public sector, etc. as well as possibility of using digital payslips) amending section 92, shall include the following commencement provision:

85.

(1) This Act shall enter into force on 1 November 2005, cf. however subsection (2).

(2) (Omitted)

Act no. 535 of 24 June 2005 on state procurement of land and loans for agricultural and forestry purposes amending section 59, shall include the following commencement and transitional provisions:

28.-(1) This Act shall enter into force on 1 July 2005, cf. however, subsection (2).

(2)-(3) (Omitted)

Act no. 567 of 24 June 2005 amending the Protection of Nature Act (implementation of the municipal reform), amending sections 3, 8, 15, 19a-h, 20, 21, 23, 24, 26, 26a, 29, 33, 34, 35, 46, 49, 52, 55, 58, 60, 60a, 61, 62, 63, 65, 66a, 67, 68, 73, 78, 89 and 103, and repealing section 77 and inserting a new section 55a, shall include the following transitional and commencement provisions:

(2)

(1) This Act shall enter into force on 1 January 2007.

(2) Cases which at the date of entry into force of this Act have not been finalised by the county council shall be passed to the authority competent to hear the case in accordance with section 1.

(3) The watercourses which at the date of entry into force of this Act have been designated as protected according to the regulations in section 3(1) of the Protection of Nature Act shall remain protected.

(4) Cases which according to Part 6 of the Protection of Nature Act on conservation orders, and which at the date of entry into force of this Act, have not been finalised by the nature conservancy board, shall be finalised according to the provisions in section 1.

(5) The Minister for the Environment may lay down regulations on hearing cases according to Part 6 of the Protection of Nature Act on conservation orders, pending before the Nature Protection Board of Appeal or the Valuation Commission at the date of entry into force of this Act.

(6) The Minister for the Environment may lay down more detailed regulations on future exercise of the powers and obligations which fall to the county council in decisions on conservation orders, preservation orders, agreements, declarations and similar.

(7) The Minister for the Environment may also lay down more detailed transitional regulations.

Act no. 538 of 8 June 2006 amending the Administration of Justice Act and various other acts (reform on the police and courts of law) amending section 88(3), shall include the following transitional and commencement provisions:

105.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- (1) This Act shall enter into force on 1 January 2007, cf. however subsections (2)-(22) and section 106.
(
2)-(22) (Omitted)
-

Act no. 571 of 9 June 2006 amending the Protection of Nature Act, the Environmental Protection Act and various other acts (amendment of the appeals board and provisions regarding appeals in a number of acts in the environmental area) amending section 80, shall include the following transitional and commencement provisions:

12.

- (1) This Act shall enter into force on 1 January 2007, cf. however, subsection (2).
(2) (Omitted)
(3) Cases which are brought before the Danish Environmental Board of Appeal as at 1 January 2007 shall be finalised according to the regulations hitherto in force.
-

Act no. 1571 of 20 December 2006 amending the Environmental Protection Act, the Protection of the Marine Environment Act ("*lov om beskyttelse af havmiljøet*") and various other acts (repeal of access to transfer authority to municipal communities and amendment of provisions concerning delegations etc. in a number of acts in the area of nature and the environment) amending section 65 and section 70, shall include the following transitional and commencement provisions:

23.

- (1) This Act shall enter into force on 1 January 2007, cf. however, subsection (2).
(2) (Omitted)
-

Act no. 523 of 6 June 2007 amending various legal provisions on limitation periods for claims, etc. (Amendments consequential upon a new act on limitation periods on claims, repeal of the deadline for complaints under the Danish Sale of Goods Act for certain purchases etc.) inserting section 55a, shall have the following commencement provision:

47.

This Act shall enter into force on 1 January 2008.

Act no. 533 of 6 June 2007 on national parks amending section 86 shall have the following commencement provision:

- 37.-(1)** This Act shall enter into force on 1 July 2007.
-

Act no. 507 of 17 June 2008 amending the Environmental Protection Act and various other acts (implementing the environmental responsibility directive) amending sections 74, 78, 86, 87 and 89 and inserting a new Part 11a (sections 77-77h) shall include the following commencement provision:

15.

- (1) This Act shall enter into force on 1 July 2008, cf. however, subsection (3).
(2)-(4) (Omitted)
-

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 933 of 24 September 2009. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Act no. 508 of 17 June 2008 amending the Protection of Nature Act, the Hunting and Wildlife Management Act and various other acts (implementing directives on protection of nature) amending sections 30, 31, 50, 71 and 73 and repealing section 55a and inserting new sections 55a, 56a and Annexes 3-5, shall include the following commencement provision:

16.

This Act shall enter into force on 1 July 2008.

Act no. 1336 of 19 December 2008 amending the Taxation at the Source Act ("*kildeskatteloven*"), the Collection of Taxes Act ("*opkrævningsloven*"), the Statutory Debt Collection Act ("*udpantningsloven*") and various other acts (amendments as a consequence of the Act on Collection of Debt Payable to the Public Sector ("*lov om inddrivelse af gæld til det offentlige*"), repealing section 92(1), (3) and (4) and amending section 92(2) shall include the following commencement provision:

167.

(1) This Act shall enter into force on 1 January 2009, cf. however, subsection (2). Section 11 shall only apply to decisions on withholding of wages made after the entry into force of this Act.

(2) (Omitted)

Act no. 514 of 12 June 2009 amending the Protection of Nature Act, the Hunting and Wildlife Management Act and various other acts (protection of certain animal species etc.) repealing footnotes 1 and 2 to the title of this Act and section 50(3)-(5), inserting footnote 1 to the title of this Act, section 29a, section 29b, section 65(6) and (7), section 71a and section 71b, and amending section 31(2), section 50(6), section 71(4) and (5), section 89(1), no. 1 and Annexes 3 and 4, shall include the following commencement provision:

13.

This Act shall enter into force on 1 October 2009.

Ministry of the Environment, 24 September 2009

Troels Lund Poulsen

/ Niels Christensen

Annex 13

Danish Statutory Order on Nature Conservation and a Nature Reserve in the Wadden Sea, Statutory Order BEK nr 867 of 21/06/2007.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Statutory Order on Conservation and a Wildlife Reserve in the Wadden Sea 1)¹⁾

The following shall be laid down pursuant to section 51(1), section 70, section 73(3) and section 89(3) of the Protection of Nature Act, cf. Consolidating Act no. 749 of 21 June 2007, as well as section 33, section 49(1) and (3) and section 54(3) of the Hunting and Wildlife Management Act ("*lov om jagt og vildtforvaltning*"), cf. Consolidating Act no. 747 of 21 June 2007:

Part 1

Purpose and scope

1. The purpose of this Statutory Order shall be

- 1) to promote sustainable management of the Wadden Sea,
 - a) in order to conserve the Wadden Sea as an overall natural area of national and international importance as habitat for seals as well as breeding, resting and wintering populations of water birds,
 - b) where protection of the nature of the area, ecology and the environment, as well as cultural historical values are balanced against the use of the area for commercial and recreational purposes taking into account the infrastructure and safety of the local population, and
 - c) where the natural dynamics of landscape development are not affected unnecessarily, and where no other steps are taken to permanently destroy or alter the natural environment, as well as
- 2) to ensure compliance with Denmark's international obligations pursuant to
 - a) the declaration of 9 December 1982 on protection of the Wadden Sea, signed by the governments of Denmark, Germany and the Netherlands,
 - b) Council Directive of 2 April 1979 (79/409/EEC) with later amendments on the conservation of wild birds (the EC Birds Directive),
 - c) Council Directive of 21 May 1992 (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora (the EC Habitats Directive), and
 - d) convention of 2 February 1971 on Wetlands of International Importance, especially as Waterfowl Habitat (the Ramsar Convention).

2.-(1) As described in Annex 1, point 1, cf. map sheet 1, this Statutory Order shall include the territorial waters of the Wadden Sea and parts of the North Sea, as well as adjacent areas of land, hereinafter referred to as "the reserve". The territorial waters shall, where nothing else is specified, be delineated to land by the highest daily water level and include sand banks and shoals as well as state-owned islands, tidal trenches and areas with vegetation of reeds.

(2) The reserve shall be delineated to the North by Ho Bugt, the northern border for the state areas of Skallingen and by a line from Blåvand Fyr to the border of the territorial waters true west (270 degrees) of the lighthouse.

(3) The reserve shall be delineated to the west by the border of territorial waters located 3 nautical miles west of the coastline from Blåvandshuk to Skalling Ende and from there, 3 nautical miles west of the ground line, cf. Royal Decree no. 437 of 21 December 1966, between Skalling Ende and the Danish-German border.

(4) The reserve shall be delineated to the south by the Danish-German border through the tidal area of Lister Dyb as well as the border dam south of Margrethe-Kog.

(5) The reserve shall be bounded along the coasts of Jutland, Fanø, Mandø and Rømø by the top of the current sea wall, and, if there are no sea walls, by the highest daily water level. On Fanø and Rømø, certain areas owned by the state shall be included in the reserve, cf. Annex 1, point 1.1 and map sheet 1.

(6) This Statutory Order shall not lay down provisions for the parts of the territorial waters which, on approval by the Ministry of Transport, are subject to the territory of a harbour.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Part 2

Passage

3.-(1) Passage shall be prohibited in the following places:

- 1) the area between Skallingen and Langli, and in the period from 16 September to 15 July on Langli, as well as in an area north, east and south of Langli, cf. Annex 1, point 2.1 and map sheet 2,
- 2) areas of land at Albuebugten on Fanø, cf. Annex 1, point 2.2,
- 3) Trinden and Keldsand east of Sønderho, Fanø, cf. Annex 1, point 2.3,
- 4) the area around Ebbevejen and Låningsvejen to Mandø, cf. Annex 1, point 2.4,
- 5) the areas north and south of the Rømø embankment, cf. Annex 1, point 2.5 and map sheet 5,
- 6) Helmsodde south of Havneby on Rømø in the period 1 April to 31 August, cf. Annex 1, point 2.6,
- 7) an area of Kore Sand, cf. Annex 1, point 2.7,
- 8) Lammelæger and other sand banks in the western part of Lister Dyb, cf. Annex 1, point 2.8,
- 9) Jordsand and Jordsand Flak as well as tidal flats west of the protruding dyke at Højer, cf. Annex 1, point 2.9, and
- 10) Margrethe-Kog south of Højer Kanal, cf. Annex 1, point 2.10.

(2) In the areas mentioned in subsection (1), nos. 1 and 6 as well as on Skallingen, dogs shall not be allowed.

4.-(1) Passage of motor vehicles and use of wind-powered vehicles shall be prohibited.

(2) The Danish Forest and Nature Agency may, after consultation with the relevant municipal council, lay down regulations on kite-flying, and may, within designated areas, allow the use of wind-powered vehicles.

(3) The provision in subsection (1) shall not apply to passage of motor vehicles

- 1) on public roads, on Mandø Ebbevej and Låningsvejen as well as the roads leading to parking areas on Skallingen or Højeknolde and Vogterhuset, respectively, in accordance with other relevant rules of access,
- 2) on beach areas at the western side of Fanø and Rømø in accordance with further provisions by the authorities, and
- 3) in connection with authorised activities in the area, cf. sections 6, 11 and 12.

5.-(1) Navigation east of the ground line mentioned in section 2(3) at higher speeds than 10 knots shall be prohibited outside the beacons in the following depths:

- 1) through Grådyb to and from Esbjerg,
- 2) through Fanø Lo and Slunden in connection with ferry navigation between Esbjerg and Fanø,
- 3) through Knudedyb to and from Kammerslusen, and
- 4) through Lister Dyb to and from Havneby on Rømø and the westernmost point of Jordsand Flak, respectively.

(2) Navigation with water scooters, jet skis, water skis, multi-hull dinghies and vessels powered by air screws, as well as board sailing shall be prohibited in the reserve.

(3) The provisions in subsection (2) shall not apply to board sailing and sailing with multi-hull dinghies within the following demarcated areas:

- 1) along the coast south-east of Blåvandshuk from Hvidbjerg Strand to Højeknolde on Skallingen and on the western side of Fanø and Rømø, and
- 2) in the Grådyb tidal area off Hjerting east of Hjerting Løb in the period from 1 March to 30 September.

(4) The provisions of subsection (2) shall also not apply to the use of water skis and multi-hull dinghies in demarcated deep from Havneby to Lister Dyb.

(5) Within a distance of 300 meters from the coast between Blåvandshuk and Skalling Ende and on the western side of Fanø and Rømø, navigation with motor-powered vessels may only take place perpendicular to the coastline.

6. The provisions in section 3, section 4(1) and section 5(1), (2) and (5) shall not apply to

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- 1) owners and users. Unleashed dogs may only be used for hunting and driving livestock,
- 2) collection of driftwood and flotsam, cf. statutory law,
- 3) removal of sand by owners and users for own use as near as possible to their property,
- 4) passage on Langli as well as an area north, east and south of the island at a distance of 300 meters off the coast (highest daily water level) in the period 16 July to 15 September,
- 5) visits to Nordby Fuglekøje and Sønderho old Fuglekøje at Albuebugten on Fanø when these are open for business,
- 6) fishing activities for permanent residents on Mandø and Fanø,
- 7) navigation in connection with commercial fisheries, cf. however, sections 8-10,
- 8) navigation at higher speeds than 10 knots in connection with commercial operation of Esbjerg Havn,
- 9) landing exercises held by the Danish defence in an area of 300 meters on the coast of Musholm Enge north of Bredmose in Ho Bugt as well as in an area of 5,000 meters along the coast from Blåvandshuk to Skallingen,
- 10) shooting at earth targets by the Danish defence at the ranges at the northern part of Rømø including associated restricted areas in the territorial waters west and north of there, and
- 11) performance of tasks by the public authorities, including operation of installations, coastal protection and dyke work, arresting sand-drifts, rescue operations, necessary marking for navigation, fisheries control as well as supervision.

Part 3

Hunting

7.-(1) Hunting or other ways of killing, capturing or driving away web-footed birds and wading birds shall be prohibited.

(2) Hunting or other ways of killing, capturing or driving away mammals and birds in Margrethe-Kog, including the protruding dyke with sediment roads and berms, shall be prohibited.

(3) The provision in subsection (1) shall not apply to

- 12) hunting on certain foreland areas, cf. Annex 2 and map sheets 3-5 (the stretch from Tjæreborg to Ballum) as well as on certain foreland areas on Mandø and Rømø, cf. Annex 2,
- 13) hunting on the part of Skallingen which is located south-west of the concrete road and west of the eastern boundary of cadastral numbers 99b and 71a Ho, Ho at Svenskekholde, cf. map sheet 2,
- 14) hunting from vessel at anchor as well as hunting by wading west of a line from the southern point of Skallingen to the northern point of Fanø, a line from the southern point of Fanø to the north-eastern point of Rømø and a line from the two boundary beacons at Havsand on Rømø to the break point of the Danish-German border east of Ellenbogenspitze on Sild in the period 1 October to 31 January, cf. map sheet 1, and
- 15) retrieval of killed game from motor-driven vehicle, including searching and killing in connection with the types of hunting mentioned in no. 3.

(4) The provision in subsection (2) shall not apply to hunting of mammals and birds in the part of Margrethe-Kog located north of Højer Kanal:

- 1) north of a zone of 150 meters along the north side of the road between Højer Sluse and the earth road located about 475 meters west of Højer Sluse, as well as north and east of the two southernmost lots between the road mentioned and the earth road to Emmerlev (at the pumping station),
- 2) east of the earth road to Emmerlev located at a distance of 150-350 meters from the protruding dyke, as well as
- 3) south of a ditch running in an east-west direction at the end point of the earth road mentioned above. The ditch is located 1,000 meters south of the northernmost point of the protruding dyke.

(5) In the part of Margrethe-Kog, and in the part of the protruding dyke, including sediment roads and berms located south of Højer Kanal, passage with weapons shall be prohibited.

(6) In the part of the territorial waters of the reserve located east of the line mentioned in subsection (3), no. 3 between the islands, passage with loaded weapons shall be prohibited.

Part 4

Removal of organisms on and in the seabed

8. Mechanical removal of mussels, lugworms and other organisms on and in the seabed shall be prohibited.

9.-(1) The provision in section 8 shall not apply to removal of common mussels by authority of the Ministry of Food, Agriculture and Fisheries of Denmark outside the following areas:

- 1) Ho Bugt excluding Hjerting Løb, cf. Annex 1, point 3.1,

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- 2) Juvre Dyb tidal area, cf. Annex 1, point 3.2, and
- 3) the southern part of Lister Dyb tidal area, cf. Annex 1, point 3.3.

(2) In connection with navigation through the areas mentioned in subsection (1), the trawl warp shall be disconnected from musseling equipment.

10.-(1) The provision in section 8 shall not apply to removal of cockles by authority of the Ministry of Food, Agriculture and Fisheries of Denmark in three areas in the Grådyb tidal area: Langli Sand, Hamborg Dyb and Fanø Sandende, cf. Annex 1, point 4 and map sheet 6.

(2) Demarcation of the areas in subsection (1) may, at the request of the Ministry of Transport, be adjusted if it is deemed necessary for navigation to and from Esbjerg Havn.

(3) The Ministry of Food, Agriculture and Fisheries of Denmark shall, after consultation with the Danish Forest and Nature Agency, lay down a maximum quota for every season based on a biological assessment of the spreading and size of the mussels.

(4) Fishing for cockles may only take place during daytime from sunrise to sunset and only in the periods 1 August to 31 August and 1 November to 29 February.

Part 5

Various measures in territorial waters

11.-(1) A licence to the following work in territorial waters shall be granted by the Ministry of Transport after consultation with the Danish Forest and Nature Agency:

- 1) construction work, including changes in terrain, establishment of buildings, channels, dams, harbours or other fixed structures, and
- 2) new coastal protection and expansion or significant reinforcement of existing coastal protection.

(2) Establishment of dredging sites and dredging of decontaminated and dredged materials shall be subject to a licence from the Danish Ministry of the Environment.

12.-(1) Removal of sea materials, drilling or firing in the seabed shall be prohibited.

(2) Notwithstanding the provision in subsection (1), the following shall be permitted:

- 1) dredging within existing harbour works as well as dredging in harbours, entrances, navigation channels, watercourses and the courses of such in the Wadden Sea, and
- 2) establishment of drainage ditches from foreland and coastal protection fields.

(3) Notwithstanding the provision in subsection (1), the Danish Forest and Nature Agency may, pursuant to the Mineral Resources Act, allow removal of sea materials for construction, repairs and reinforcement of dykes and adjacent foreland, if it is not possible to find suitable materials within the dykes, or to procure in connection with cleaning out or dredging of channels etc., cf. subsection (2), no. 1.

(4) Notwithstanding the provision in subsection (1), the Ministry of Transport may, after consultation with the Danish Forest and Nature Agency, grant a licence to expand or change harbours as well as dredge, expand or redirect entrances, navigation channels, canals, watercourses and the mouths of such into the Wadden Sea.

13.-(1) In territorial waters there shall be no

- 1) sowing and planting if this is not for the purpose of coastal protection,
- 2) release of live wild animals and plants foreign to the area,
- 3) tipping or depositing of waste,
- 4) establishment of aerial cables with accompanying masts and wind turbines, and
- 5) release or discharge of waste materials from non-land-based installations.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(2) Notwithstanding the provision in subsection (1), materials used in connection with securing of dykes and licensed construction work, cf. section 11(1) and section 12(2) and (4), shall be dredged at approved dredging sites.

Part 6

Administrative provisions, penalties and entry into force

14.-(1) The Danish Forest and Nature Agency may, under exceptional circumstances, grant exemptions from the provisions in section 3, section 4(1), section 5(1), (2) and (5), section 7(1), (2), (5) and (6), section 8, section 10(4), section 12(1) and section 13(1). Exemptions from the provisions shall take place after consultation with relevant authorities and landowners.

(2) Decisions made by the Danish Forest and Nature Agency pursuant to subsection (1) may not be brought before other administrative authorities.

(3) The Danish Forest and Nature Agency may, after consultation with the owner, lay down guidelines for public passage on the protruding dyke with associated sediment roads in Margrethe-Kog.

15.-(1) The Danish Forest and Nature Agency shall supervise compliance with this Statutory Order, cf. however, subsection (2).

(2) Supervision of compliance with the regulations mentioned in sections 8-10 shall be carried out by the Ministry of Food, Agriculture and Fisheries of Denmark. Supervision of compliance with the regulations mentioned in section 11 shall be carried out by the approving authority in collaboration with the Danish Forest and Nature Agency.

(3) The Danish Forest and Nature Agency may enter into an agreement with the municipal councils as well as other authorities to the effect that tasks in connection with the supervision mentioned in subsection (1) is to be managed by these.

16.-(1) The following shall be punishable by fine:

- 1) violation of section 3, section 4(1), section 5(1), (2) and (5), section 7(1), (2), (5) and (6), section 8, section 9(2), section 10(3) and (4), section 12(1) or section 13(1),
- 2) violation of provisions in regulations laid down pursuant to section 4(2) on kite-flying as well as use of vehicles driven by wind power, or
- 3) failure to comply with the conditions of an exemption under section 14.
- 4) has achieved or strived for a financial advantage for the person in question or for others.

(2) Companies etc. (legal persons) may incur criminal liability according to the regulations in chapter 5 of the Criminal Code.

17.-(1) This Statutory Order shall enter into force on 1 August 2007.

(2) Statutory Order no. 1326 of 20 November 2006 of the Danish Ministry of the Environment on conservation and a wildlife reserve in the Wadden Sea shall be repealed.

Danish Ministry of the Environment, 21 June 2007

Connie Hedegaard

/Anne-Marie Rasmussen

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Annex 1

Specification of borders to land for the reserve and areas within the reserve where passage and fisheries are prohibited.

1. The reserve is delineated to land in the following way:

1.1. Along the coast of Jutland north of Emmerlev Klev as well as Fanø, Mandø and Rømø, the border of the reserve follows the top of the sea wall facing towards the Wadden Sea, and where there is no sea wall, the highest daily water level. On Fanø the sea shore areas owned by the state on Søren Jessens Sand, cadastral number 509 Odden By, Nordby and on Rømø, cadastral number 142 Juvre, Rømø as well as cadastral number 90 Kongsmark, Rømø are included in the reserve.

1.2. Above Varde Å's outflow to Ho Bugt, the border merges with the eastern border of the fish conservation belt at the estuary of the stream, cf. Statutory Order no. 259 of 22 June 1965 of the Ministry of Fisheries. The border is a straight line between three points; Billum Kirke and two beacons south of the outflow.

1.3. At Astrup Banke, the reserve boundary is a straight line between the southernmost point of Rejsby Dige and the northernmost point of Ballum Dige, respectively.

1.4. Between Emmerlev Klev and the Danish-German border (the border dam), the reserve boundary follows the western side of Emmerlev and the top of dyke of Højer, and where there are no dyke off Højer, a straight line between the end points of the dykes.

2. Demarcation of areas where passage is prohibited:

2.1. The area between Skallingen and Langli, including Langli Sand, bounded by Ebbevejen, and from here by a straight line (160 degrees) to a position in Grådyb (55 degrees 28'617N.8 degrees 20'850E), from here by a straight line towards the south point of Skallingen to Hobo Dyb, and onwards along the east side of Hobo Dyb over the outer point of Spundsen to Skallingen. Passage on Langli as well as in a zone of 300 metres calculated from the highest daily water level, east and south of Langli is prohibited in the period 16 September to 15 July, cf. map sheet 2.

2.2. Areas of land at Albuebugten: Towards the north bounded by the boundary between cadastral number 190 a and 57 k, Rindby By, Nordby. Towards the south bounded by the boundary between cadastral numbers 9 c and 12 a Sønderho By, Sønderho. Towards the west by the eastern side of the earth road running along the coast of Albuebugten. 2.3. Nordby Fuglekøje and Sønderho old Fuglekøje are thus located within this area.

2.3. Trinden and Keldsand, cadastral number 309 Sønderho, Sønderho located east of Sønderho, Fanø as well as growth areas covered with rice grass and other marsh plants.

2.4. Tidal flats and growth areas at Låningsvejen from Vester Vedsted to Mandø, except for two tidal flats north and south of the start of the marked watershed road, respectively, at Vester Vedsted and the tidal trench, which is located where Ebbevejen leads up to Låningsvejen at Mandø.

2.5. Areas north and south of the Rømø embankment including: A zone along a stretch of 3,500 meters going west up to the dam calculated from the top of Ballum Diget with a width of 2,100 meters north of and 2,300 meters south of the dam, calculated from the foot of the dam. After this, a zone along the remaining part of the Rømø dam going west with a width of 1,000 meters on both sides of the dam, calculated from the foot of the dam, until the foreland edge on Rømø. An area north and south of the Rømø embankment off Rejsby Dige and Ballum Dige comprising areas owned by the state as well as a zone of 1,500 meters wide west of the north-south fascine fence between the outflow of Brøns Å and Ballum Sluse (the above mentioned fascine fence flows from the Rømø dam 900 meters west of the top of Ballum Dige).

2.6. Helmsodde on Rømø which covers foreland areas east of the top of the dyke of Havneby, north of the south-easternmost break point of the dyke, cadastral number 531 and part of cadastral number 241, Kirkeby, Rømø in the period 1 April to 31 August. Passage on the summit of dyke is allowed.

2.7. An area on Kore Sand south of 55 degrees 14'N which is marked every year by the Danish Forest and Nature Agency before 1 April as a seal reserve.

2.8. The Lammelæger sand bank located south-west of Havsand on Rømø in Lister Dyb (55 degrees 04'833N.08 degrees 27'E as well as other sand banks in Lister Dyb west of the line above the boundary beacons on Havsand and the territorial waters surrounding these sand banks at a distance of 300 meters calculated from the highest daily water level.

2.9. Jordsand and Jordsand Flak within a distance of 800 meters from the trigonometrical point of Jordsand as well as tidal areas drained at low tide, tidal canals and outflows south of the entrance to Vidåslusen.

2.10. Margrethe-kog south of Højer Kanal, including the reservoir area, the protruding dyke south of Vidåslusen with sediment roads and berms as well as tidal trenches south of Højer Kanal and west of the protruding dyke, except for passage on foot along two paths from Højer Dige heading west, cf. decision of the National Trust of 12 November 1985 on conservation of Margrethe-Kog.

3. Demarcation of areas where removal of common mussels is prohibited:

3.1. The part of Ho Bugt located outside an area to the south-west by Grådyb from Esbjerg Havn to the entrance to Hjerting Løb, limited to the west by a line across the red marking buoys in Hjerting Løb, true 325 degrees (the two northernmost red markings in line) and towards north by 55 degrees 33'250N (Ho Kirke true 270 degrees).

3.2. The tidal area of Juvre Dyb between Låningsvejen to Mandø and the Rømø dam to the west delineated by a straight line between the westernmost point at the north-east point of Mandø and Rømø.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

3.3 The tidal area of Lister Dyb south of a straight line from the north-westernmost break point of the Danish-German border in Lister Dyb between Rømø and Sild to a point on the west coast of Jutland, where the beacon off Hjerpsted Kirke and the church tower of such is in line.

4. Demarcation of areas in the Grådyb tidal area, where fishing of cockles is permitted, cf. map sheet 6:

4.1 Langli Sand bounded by the coordinates

55 degrees 28'617N.8 degrees 20'850E

55 degrees 30'000N.8 degrees 20'850E

55 degrees 30'000N.8 degrees 21'317E

55 degrees 29'850N.8 degrees 21'533E

55 degrees 29'583N.8 degrees 21'733E

55 degrees 29'100N.8 degrees 21'833E.

4.2 Hamborg Dyb bounded by the coordinates

55 degrees 28'433N.8 degrees 21'083E

55 degrees 28'817N.8 degrees 22'100E

55 degrees 28'133N.8 degrees 22'100E

55 degrees 27'450N.8 degrees 20'600E.

4.3 Fanø Sandende bounded by the coordinates

55 degrees 28'817N.8 degrees 22'100E

55 degrees 28'983N.8 degrees 22'533E

55 degrees 28'833N.8 degrees 23'633E

55 degrees 28'133N.8 degrees 22'100E.

The coordinates used show geographical positions in accordance with the Mercator Projection ED 50.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Annex 2

Determination of boundaries for areas in the forelands between Tjæreborg and Ballum as well as on Mandø and Rømø, where hunting is permitted, cf. section 7(3), no. 1.

Knudedyb tidal area

1. Darum-Tjæreborg Dige (map sheet 3):

1.1 Cadastral number 149 Tjæreborg By, Tjæreborg as well as 24 k, 151, 16 k and 152 in the same place, as well as the part of cadastral numbers 66 and 67 Allerup By, Sneum, located north of a straight line perpendicular from the coast to the easternmost point of the summit of the dyke 285 meters from the northern wall of the lock house.

1.2 Cadastral number 157, St. Darum By, Darum as well as 56 x, 147 b, 192, 25 u, 158 b as well as the part of 184 in the same place, located within the foreland edge.

1.3 The part of Darum-Tjæreborg Dige (cadastral number 158 a St. Darum By, Darum) until the summit of the dyke located east of the demarcation of the above areas.

2. Ribe Dige (map sheet 3):

2.1 The part of cadastral number 184 St. Darum By, Darum located within a distance of 150 meters west of the summit of the dyke between Ribe Dige's northern groyne and a point 400 meters (measured along the summit of the dyke) north of Darum Bæk and from there in a straight line to the easternmost break point on the road located in the area between two rows of fascines on the north side of the outflow of Darum Bæk.

2.2 The part of cadastral number 178, Vilslev By, Vilslev, located east of a straight line from the break point mentioned above to a point 180 meters (measured along the summit of the dyke) south of the outflow of Darum Bæk at a distance of 150 meters from the summit of the dyke and from there at the same distance from the summit of the dyke until a line perpendicular to the dyke at Vilslev Søndre Rampe at Udgrøftvej (municipal road 207).

2.3 The part of cadastral numbers 130 a and 132 Vilslev By, Vilslev, located within a distance of 150 meters from the summit of the dyke (the boundary between the cadastral numbers mentioned above and cadastral number 178 in the same place is marked in the terrain by a ditch).

2.4 The part of cadastral number 99 Jedsted By, Vilslev located south of a line perpendicular to the summit of the dyke at Jedsted Engevej (municipal road 204) and within a distance of 220 meters west of the summit of the dyke until 430 meters south of the ramp at Jedsted Engevej. From there the border is a straight line to the north easternmost point on the northernmost plot of land of cadastral number 53 Hillerup By, Farup.

2.5 The part of cadastral number 53 Hillerup By, Farup which is located south of the latter point, cadastral number 59 Kirkeby By, Farup as well as the part of cadastral number 191, Nr. Farup By, Farup, which is located north of a straight line perpendicular on the dyke to the boundary between cadastral numbers 4 e and 124 n, Nr. Farup By, Farup (the western border of the cadastral number mentioned above is marked in the terrain as a ditch/earth road 150 meters west of the summit of the dyke).

2.6 The parts of Ribe Dige until the summit of the dyke located east of the demarcation of the areas mentioned above.

The tidal area of Juvre Dyb

3. Rejsby Dige (map sheet 4)

3.1 The parts of cadastral number 123, V. Vedsted By, V. Vedsted as well as 11 af, 23 a, 12 e, 53 b, 122, 121, 75 g and 2 m in the same place located between the summit of the dyke and the foreland edge.

3.2 Cadastral number 335, Hviding Ejlerlav, Hviding as well as 268, 1080, 332, 1054, 34, 36, 2, 102, 1079, 26, 1078, 267, 1077, 438 in the same place, the part of cadastral number 603 in the same place located south of a straight line in continuation of the boundary between cadastral numbers 267 and 1077 in the same place, as well as parts of cadastral number 429, part of the southernmost plot of land of 430 and the part of the southern plot of land of 106 in the same place located within the foreland edge.

3.3 Cadastral number 115, Rejsby Ejlerlav, Rejsby and the northern plot of land of cadastral number 217, Brøns Ejlerlav, Brøns as well as a zone along the dyke between Kærbølling Klint and the outflow from Åbølling Bæk which is bounded by a ditch located at a distance of 150 meters west of the summit of the dyke, and from the southernmost point of the ditch to the easternmost point on the area between two rows of fascines located 170 meters north west of the summit of the dyke at the ramp south of Åbølling Bæk.

3.4 A zone between the summit of the dyke and the foreland edge from the latter point until a point at the second break of the dyke on Rejsby Dige 930 meters south of the latter ramp and 60 meters west of the summit of the dyke, and from there between the summit of the dyke and a straight line to the northernmost point on the earth road between the land reclamation areas 6 and 7, from where the border runs along the north-south ditch until this is cut off by a straight line perpendicular to the dyke along the south boundary of the northern plot of land of cadastral number 217, Brøns Ejlerlav, Brøns.

3.5 The part of Rejsby Dige until the summit of the dyke located east of the demarcation of the areas mentioned above.

4. Rejsby Dige, Astrup Banke and Ballum Dige between Brøns Å and the Rømø dam (map sheets 4 and 5):

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

4.1 Cadastral number 11, Astrup, Brøns as well as 150, 38, 5, 177, 294, 276, 18, 187, 19, 199, 10, 304, 185, 295, 14, 314, 9, 157 in the same place, the parts of cadastral numbers 17, 29, 126 in the same place located west of a straight line between the end of Rejsby Dige and Ballum Dige, respectively, as well as the eastern parts of cadastral number 70 in the same place, which towards the west are bounded by tidal canals running east of the north westernmost plot of land of this cadastral number, and onwards through the southern plot of land of the same cadastral number to the boundary between the parishes of Astrup and Skærbæk.

4.2 Cadastral number 555, Skærbæk Ejerlav, Skærbæk as well as the part of cadastral number 185 in the same place located north and north-east of the old outflow of Brede Å.

4.3 The parts of Rejsby Dige and Ballum Dige until the summit of the dyke located east of the demarcation of the areas mentioned above.

5. Mandø (map sheet 1):

5.1 Cadastral number 111 a Mandø By, Mandø as well as 11 a, 24 a, 13 m, 8 g, 12 a, 50 a, 20 c, 40 a, 43 a, 42 a, 41 a, 39 a, 114 in the same place as well as the part of Mandø Dige cadastral number 105 in the same place located west of the south westernmost point of cadastral number 111 a in the same place.

6. Juvre Dige on Rømø (map sheet 1):

6.1 Cadastral number 2, Juvre, Rømø as well as 20, 8, 7, 798, 288, 25, 17, 50, 363, 6, 23, 162, 831, 50, 348, 183 in the same place as well as the plots of land of cadastral number 241 in the same place located north of the Rømø dam.

The tidal area of Lister Dyb

7. Kongsmark Dige on Rømø (map sheet 1):

7.1 Cadastral number 268 Juvre, Rømø as well as 255, 254 in the same place and cadastral number 10, Kongsmark, Rømø as well as 572, 598, 584 and 616 in the same place.

8. Ballum Dige south of the Rømø dam (map sheet 5):

8.1 Second plot of land of cadastral number 297, Østerende-Ballum, Ballum south of the Rømø dam as well as the part of the plot of land of cadastral number 311 in the same place located between the latter plot of land and a straight line perpendicular to the summit of the dyke 450 meters north of Ballum Sluse.

8.2 The plots of land of cadastral number 311, Østerende-Ballum, Ballum located on the stretch south of the area between two rows of fascines at the northern ramp of Barakvej to the southernmost point of Ballum Diget in the boundary between cadastral numbers 22 and 173 in the same place, as well as cadastral numbers 319, 343, 293, 56, 168, 309 and 173 in the same place.

Rømø

9. Areas owned by the state on the west coast of Rømø (map sheet 1):

9.1 The part of cadastral number 142, Juvre, Rømø located south of the range and south east and east of the border between the sea shore and permanent, coherent vegetation.

Map sheet 1

Overview map



Map sheet 2

The area between Skallingen and Langli



While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 867 of 21 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Map sheet 3

Tjæreborg - Ribe

The stretch between Tjæreborg and Kammerslusen



Map sheet 4

Rejseby

The stretch between Vester Vedsted Sluse and Brøns Å



Map sheet 5

Ballum

The stretch between Brøns Å and Vesterende Ballum



Map sheet 6

**The area designated for cockle fishing
(extract of navigational chart no. 95 Grådyb)**



Official notes

¹⁾ This Statutory Order shall include provisions implementing parts of Council Directive no. 79/409/EEC of 2 April 1979 on the conservation of wild birds (the EC Birds Directive) (Official Journal 1979 no. L 103, p. 1) as last amended by Council Regulation (EC) no. 807/2003 of 14 April 2003 (Official Journal 2003 no. L 122, p. 36), and parts of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the EC Habitats Directive) (Official Journal 1992 no. L 206, p. 7) as last amended by Regulation (EC) no. 1882/2003 of 29 September 2003 of the European Parliament and of the Council (Official Journal 2003 no. L 284, p. 1).

Annex14

**Danish Act on National Parks, LOV nr 533
of 06/06/2007.**

National Parks Act

We Margrethe the Second, by the grace of God Queen of Denmark hereby witness:
Folketinget (the Danish Parliament) has adopted and We with Our consent hereby enact the following Act:

Part 1

Purpose

1. In connection with establishment of national parks, the purpose of this Act shall be to:

- 1) create and ensure larger coherent natural areas and landscapes of national and international importance,
- 2) conserve and strengthen the quality and diversity of nature,
- 3) ensure continuity and opportunities for free dynamics in nature,
- 4) conserve and strengthen landscape and geological values,
- 5) conserve and make visible the heritage values and the diversity of the cultural landscape,
- 6) support research and teaching in the values of the areas,
- 7) promote the possibilities of the population to use and experience nature and the landscape,
- 8) strengthen dissemination of knowledge about the values and development of the areas,
- 9) support developments benefiting the local community, including the business community with respect for conservation interests and
- 10) enhance awareness about the values of the areas by involving the population in the establishment and development of the national parks.

2.-(1) The Minister for the Environment may establish a national park if the area has national or international importance because of nature and landscape values in the area, and if such establishment enables compliance with the purpose of this Act in the shorter or longer term.

(2) Together with other Danish national parks, the national park shall be able to represent the most important Danish natural habitats.

(3) The establishment of the national park shall improve and strengthen the possibilities for coordinated and long-term developments of nature, landscape, geological, heritage and recreational values in synergy with national interests, the local population and industry.

(4) National parks may be established on dry land, fresh waters and offshore.

3. After implementation of the procedure in sections 4-7, the Minister for the Environment may lay down regulations on the purpose of the national park, the objectives for development hereof and delimitation of the national park. This Statutory Order may also comprise regulations on restricting the authority to plan according to the regulations laid down in the Planning Act within the national park.

Part 2

National park proposals

4.-(1) The Minister for the Environment may prepare proposals for national parks on the basis of surveys which describe the area and show that the establishment of a national park can comply with the purposes of this Act. The surveys shall have been subject to public involvement.

(2) Proposals by the Minister which could affect municipal councils shall be subject to their consent.

5.-(1) Prior to the issue by the Minister for the Environment of regulations on establishing a national park, a proposal shall be published and submitted for public debate.

(2) The Minister for the Environment shall stipulate a time limit of at least 16 weeks for submission of comments on the proposal.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 533 of 6 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(3) A proposal for a national park shall be submitted to the landowners concerned, as well as local and government authorities the interests of which are influenced by the proposal, and to the organisations etc. which are assumed to have vested a significant interest herein.

(4) The proposal shall be accompanied by supplementary information on the main purpose of the national park proposed, overall conservation interests and development opportunities for the national park, the composition of the board of the national park and the financial basis on which the establishment and operation of the national park are based.

6.-(1) If, following expiry of the time limit pursuant to section 5(2), significant amendments to the proposal for a national park are made, the amended proposal shall be published with a new time limit.

(2) The Minister shall set the time limit for publication at eight weeks as a minimum for presentation of comments on the proposal.

7.-(1) The Minister for the Environment may only change the regulations for a national park after having implemented the procedure in sections 4-6.

(2) If the landowners concerned have requested a moderate expansion, and if the area may contribute to meeting the purpose of the national park, the Minister may, however, change the regulations on delimitation of a national park without following the procedure in sections 4-6.

Part 3

National park funds

8.-(1) The Minister for the Environment shall set up a national park fund for each national park.

(2) The fund shall be an independent body within the government administration.

9. The purpose of the fund shall be to establish and develop the national park within the framework determined on establishment.

10.-(1) The fund shall prepare and revise the national park plan and the fund shall be instrumental in implementing the plan.

(2) The fund shall ensure provision of information about the national park and involvement of the population in decisions pertaining to the development and operation of the national park.

11.-(1) The resources of the fund shall be made up of appropriations established in annual finance acts, as well as contributions from municipalities and other contributors.

(2) The fund may receive inheritances, gifts etc. and grants.

(3) The fund shall present financial statements and be audited pursuant to regulations applicable for the government.

Management and secretariat

12.-(1) The fund shall be managed by a board (the board of the national park) appointed by the Minister for the Environment.

(2) The board shall comprise one chairperson and 6-12 members, appointed upon the recommendation of the organisations concerned, municipalities and the government. When the national park council has been set up, the board shall be augmented by 1 or 2 members appointed by the Minister for the Environment upon the recommendation of the national park council.

(3) The board shall be appointed for 4 years. Reappointment may only take place once. If the chairperson or a member resigns prematurely, the replacement shall be appointed for the remainder of the year.

(4) With the assistance of the Minister for the Environment, the board shall establish rules of procedure for the fund.

13.-(1) The fund shall pay the expenses for the secretariat, to pay the members of the board who are entitled to emoluments, as well as to pay for other administration.

(2) Subject to further specification, the board may authorise the chairperson and the secretariat to make decisions on behalf of the board.

Instruments

14.-(1) In order to realise the national park plan, the fund may, within the purposes of the national park:

- 1) enter into voluntary agreements on nature conservation, nature preservation, operation, nature restoration, strengthening heritage values and public access,
- 2) purchase, manage and sell real property,
- 3) pay operating expenses and construction costs,
- 4) pay costs for research, information and communication activities in relation to the national park and
- 5) provide loans and grants for municipalities, associations, foundations, institutions etc. and private property owners.

(2) The fund may acquire lands designated for agricultural purposes pursuant to the regulations on funds laid down in section 24 of the Agricultural Properties Act ("*lov om landbrugsejendomme*").

(3) Grants according to subsection (1), no. 5 may be made conditional on the conclusion of agreements as mentioned in subsection (1), no.1.

(4) Agreements pursuant to subsection (1), no. 1 may be registered on the property. Registered agreements shall be binding for the owners and holders of rights to the property regardless of when such rights are constituted.

(5) Payments made by the fund in connection with the conclusion of agreements pursuant to subsection (1), no. 1, cf. no. 5, shall, as a rule, be calculated in the same way as in connection with conclusion of agreements to comply with the Natura 2000 plan under the Protection of Nature Act, i.e. corresponding to the loss inflicted by the agreement on the landowner.

(6) The Minister for the Environment may lay down regulations on the fund's administration of its resources, including general conditions for giving grants and on changes and cancellations of grants.

15.-(1) When the fund has carried out a nature management project in an area acquired by the fund, this area shall be transferred to the Minister for the Environment for further operation as an agreement on operation shall be concluded in accordance with the national park plan. Similarly an area shall be transferred to the municipal council if this is associated with other land operations of the municipality.

(2) The requirement for transfer shall not apply to areas at which installations have been erected or where building facilities serving purposes relating to information, dissemination, teaching or research have been erected.

Part 4

The national park council

16.-(1) A local national park council shall be established for each national park. The national park council shall act as consultative body for the board of the national park in matters of significant importance and in questions of principle.

(2) The board of the national park shall decide the composition of the council and shall set it up for a period corresponding to the tenure of the board.

(3) Members of the council shall be designated upon the recommendation of the authorities concerned and recommendation from interest groups and trade organisations, the business community and associations with interest in the national park. Furthermore, expert members etc. may be appointed.

(4) The council shall elect a chairperson and a vice-chairperson from among its members.

Part 5

National park plan

17. The national park fund shall, within a time limit set by the Minister for the Environment, prepare a plan to establish and develop the national park as a whole and the individual parts of the park.

18.-(1) The national park plan shall, in relation to the national park, report on the current and potential

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 533 of 6 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

- 1) natural values, including significant natural habitats and species, and
- 2) landscape and heritage values.

(2) The plan shall describe

- 1) how to strengthen the quality of nature, including by expanding natural areas and ensuring continuity and free dynamics in nature,
- 2) the opportunity for creating connections between the natural areas,
- 3) possibilities for development in outdoor activities,
- 4) possibilities for industry and business development, and
- 5) how to disseminate knowledge about the values of the area.

(3) On the basis of the report, the plan shall set objectives for the development of the national park in relation to the points mentioned in subsection (2).

(4) The national park plan shall describe how the objectives laid down may be achieved, how the expected activities shall be prioritised during the planning period, and how the public will be involved.

(5) The national park plan shall be accompanied by a report on whether realisation of the plan shall depend on licences or exemptions from other legislation.

19. The national park plan may not conflict with the following planning:

- 1) water plans, Natura 2000 plans, and action plans for the realisation of such plans according to the Environmental Targets etc. Act ("*miljømålsloven*") for bodies of water and international nature conservation sites,
- 2) Natura 2000 forestry plans according to the Danish Forest Act ("*Skovloven*").
- 3) regional development plans, municipal plans and local development plans pursuant to the Danish Planning Act and
- 4) mineral resources plans pursuant to the Mineral Resources Act.

Preparation and revision etc. of the national park plan

20.-(1) Prior to drawing up a proposal for a national park plan, the national park fund shall make a request for ideas, proposals etc.

(2) The request shall include a brief report on the purpose of the national park as well as the basis for establishment. Furthermore, the main issues in connection with planning the work shall be reported.

(3) The request shall take place through public announcement indicating a time limit of at least 12 weeks for submission of ideas and proposals etc.

(4) The national park fund shall be responsible for providing information for use in a public debate about the national park plan.

21.-(1) On expiry of the time limit pursuant to section 20(3) the national park fund may adopt a proposal for a national park plan.

(2) The proposal shall be published stating a time limit for submission of objections etc. of at least 12 weeks.

22.-(1) At the time of publication of a proposal for a national park plan this shall be submitted to the Minister for the Environment and other governmental, regional and municipal authorities the interests of which are affected by the proposal.

(2) The proposal shall also be submitted to

- 1) owners of properties who are affected by the proposal, and
- 2) the associations and organisations mentioned in section 30, which have asked the fund to be notified.

23.-(1) On expiry of the time limit in section 21(2), the national park fund may finally adopt the plan.

(2) If significant changes are made to the proposal for a national park plan after expiry of the time limit in section 21(2), the amended proposal shall be submitted for public debate for at least 8 weeks before the proposal can be finally adopted.

24.-(1) The national park fund shall publicly announce the national park plan as finally adopted. At the publication, appeals instructions and information on time limit for appeal shall be provided. The plan shall be made publicly available.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 533 of 6 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

(2) At the time of publication, the Minister for the Environment and the authorities mentioned in section 22(1), and objections made pursuant to section 21(2) against the national park plan shall be informed.

25.-(1) The national park fund shall revise the national park plan every six years. The time of revision shall be adjusted to the Natura 2000 planning under the Environmental Targets etc. Act to the effect that national park plans are revised no later than two years after adoption or revision of the Natura 2000 plan.

(2) As basis for the revision, the fund shall prepare and publish a report on the development of the national park, including an evaluation of results achieved in the previous planning period.

(3) In connection with revisions of national park plans, the regulation in this Part on preparation of national park plans shall apply.

(4) Where necessary, minor changes in the planning period may be established. In connection with minor changes, the fund may omit to follow the regulations laid down in section 20 on requesting ideas and proposals etc.

(5) If necessary, the fund may prepare an addendum to the national park plan in the planning period. The regulations on preparation of national park plans in this Part shall apply.

Part 6

Administrative provisions

26. The Minister for the Environment may decide or determine regulations on marketing of the national parks.

27.-(1) After consultation with the relevant minister, the Minister for the Environment may authorise a government authority set up under the auspices of the Ministry or other government authorities to exercise the powers vested in the Minister pursuant to this Act.

(2) The Minister for the Environment may lay down regulations on access to making appeals against decisions made pursuant to authorisation, including regulations that appeals may not be made.

(3) Furthermore, the Minister may lay down regulations on the exercise of such authorities that another government authority after consultation with the relevant minister has been authorised to exercise under subsection (1).

28. The Minister for the Environment may lay down regulations on the possibility of using digital communication within the scope of this Act, as well as further conditions in this respect.

Appeals etc.

29.-(1) Adoption of a national park plan by the national park fund may be appealed to the Nature Protection Board of Appeal in the event of issues of law.

(2) The other decisions of the national park fund may not be brought before another administrative authority.

(3) The Minister for the Environment may lay down regulations that appeals of issues of law in connection with decisions as mentioned in subsection (2) may be brought before the Nature Protection Board of Appeal, including regulations on granting a stay of execution of appeals as well as rights to appeal.

30.-(1) The Minister for the Environment and any other person(s) with legal interest in the decision shall have a right to appeal in decisions mentioned in section 29(1).

(2) The following shall also have a right to appeal

- 1) public authorities the interests of which are affected by the decision,
- 2) local and national associations and organisations with significant interest in the development and operation of the national park, and
- 3) national associations and organisations which, according to their purpose, manage significant recreational interests if the decision affects such interests.

(3) The Nature Protection Board of Appeal may stipulate that associations or organisations document their right to appeal by submitting their articles of association.

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 533 of 6 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

31.-(1) Appeals under section 29(1) shall be submitted in writing within 4 weeks after publication of the plan. Appeals against a decision as mentioned in section 29(3) shall be submitted no later than 4 weeks after notification of the decision. If the time limit for appeal expires on a Saturday or public holiday, the time limit shall be extended to the next business day.

(2) An appeal shall be submitted to the national park fund which shall forward the appeal to the Nature Protection Board of Appeal accompanied by the appealed decision and the material included in the assessment of the case.

32. An appeal shall not have a stay of execution unless otherwise determined by the Nature Protection Board of Appeal.

33. The Minister for the Environment may lay down regulations on appeal fees.

Repayments and cancellation etc.

34.-(1) The national park fund may decide that commitments of grants be wholly or partly cancelled, that a grant shall be repaid or that a loan shall be cancelled if the grant conditions or terms are not complied with.

(2) The same shall apply correspondingly in the event of any false or misleading information provided, or if the grant recipient has omitted to provide information of importance to the fund's decision.

35.-(1) The authority responsible for collection of outstanding amounts may collect the fund's outstanding amounts pursuant to section 34 plus interests and costs, cf. subsection (2). Amounts payable may be collected by means of statutory debt collection and by withholding the grant recipient's wages etc. Collection shall take place according to the regulations laid down in the Taxation at the Source Act ("*Kildeskatteloven*") on collection of personal taxes.

(2) If the amounts mentioned in section 34 are not paid in due time, default interests of 1.3% may be charged per month from the due date. A lien shall be granted on interests accrued pursuant to the 1st clause.

Part 7

Closing down a national park fund

36. If a national park fund is closed down, the areas, buildings and installations and other assets of the fund shall be transferred to the state which shall subrogate to the rights and obligations of the fund.

Part 8

Entry into force and transitional provisions

37. This Act shall enter into force on 1 July 2007.

38. The following amendments shall be made to the Protection of Nature Act, cf. Consolidating Act no. 884 of 18 August 2004, as amended most recently by section 7 of Act no. 1571 of 20 December 2006:

1. In section 86(1), the following shall be inserted after no. 3 as a new number:
»4) an affected national park fund established according to the National Parks Act,«
Nos. 4-6 shall hereafter become nos. 5-7.

2. In section 86(2), »nos. 5 and 6« shall be changed to: »nos. 6 and 7«.

39. The following amendments shall be made to the Planning Act, cf. Consolidating Act no. 883 of 18 August 2004, as amended most recently by section 9 of Act no. 1587 of 20 December 2006:

1. In section 25(1), », and to the affected national park fund established according to the National Parks Act« shall be inserted after »the proposal«.

2. In section 28 the following shall be inserted as subsection (4):
»(4). The provisions laid down in subsections (1)-(3) shall apply correspondingly in the event of objections from the affected national park fund under the regulations in section 29c.«

3. The following shall be inserted after section 29b:

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Act no. 533 of 6 June 2007. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

»29c. The affected national park fund may make an objection pursuant to section 28 against a planning proposal, if such proposal has significant importance to the development of the national park.«

4. In section 59(1) », including a national park fund established pursuant to the National Parks Act« shall be inserted after »outcome«.

40. The following amendments shall be made to the Watercourses Act ("*lov om vandløb*"), cf. Consolidating Act no. 882 of 18 August 2004, as amended most recently by section 8 of Act no. 1571 of 20 December 2006:

1. In section 84(1), no. 2 »outcome of the case.« shall be changed to »outcome of the case and«.

2. In section 84(1) the following shall be inserted as no. 3:
»3) an affected national park fund established according to the National Parks Act.«

41. The following amendments shall be made to the Mineral Resources Act, cf. Consolidating Act no. 886 of 18 August 2004, as amended most recently by section 10 of Act no. 1571 of 20 December 2006:

1. In section 12(2) »nos. 3-6« shall be changed to »nos. 4-7«.

2. Section 15(1) shall be worded as follows:

»Those with a right to appeal shall be

- 1) the receiver of the decision,
- 2) public authorities,
- 3) an affected national park fund established according to the National Parks Act,
- 4) local associations and organisations with significant interest in the decision,
- 5) national associations and organisations the main purpose of which is protection of nature and the environment,
- 6) national associations and organisations which, according to their purpose, manage significant recreational interests if the decision affects such interests.
- 7) any person(s) with individual significant interest in the decision.«

3. In section 15(2), »nos. 4 and 5« shall be changed to: »nos. 5 and 6«.

4. In section 26a(1) the following shall be inserted after no. 2 as a new number:
»3) an affected national park fund established pursuant to the National Parks Act,«
Nos. 3-8 shall hereafter become nos. 4-9.

5. In section 26a(3), »nos. 4 and 5« shall be changed to: »nos. 5 and 6«.

42. The following amendments shall be made to Act no. 453 of 9 June 2004 on forestry, as amended most recently by section 14 of Act no. 1571 of 20 December 2006:

1. In section 62(2) the following shall be inserted as a new number:
»1) an affected national park fund established pursuant to the National Parks Act,«
Nos. 1-3 shall hereafter become nos. 2-4.

2. In section 62(3) »nos. 1 and 2,« shall be changed to »nos. 2 and 3,«.

3. In section 62(3) »etc.« shall be inserted after »the organisations«.

43. This Act shall not apply to Greenland and the Faeroe Islands.

Christiansborg Slot, 6 June 2007

Under our Royal Hand and Seal

MARGRETHE R.

/Connie Hedegaard

Annex 15

**Danish Statutory Order on National Park
Wadden Sea, BEK nr 1159
of 30/09/.**

Statutory Order on the Wadden Sea National Park

The following shall be laid down pursuant to section 3, section 7, section 8, section 14(6) and section 29(3) of Act no. 533 of 6 June 2007 on national parks:

Part 1

Purpose and scope

1.-(1) This Statutory Order shall establish the Wadden Sea National Park to strengthen and develop nature and includes regulations on the Wadden Sea National Park Fund.

(2) This Statutory Order comprises the areas shown in map sheet 1.

2. The purposes of establishing the Wadden Sea National Park are

- 1) to conserve, strengthen and develop nature, its diversity, cohesion and dynamics, particularly for shallow waters of international significance, tidal waters, salt meadows and other coastal nature areas,
- 2) to conserve and strengthen landscape and geological values in the unique Wadden Sea landscape,
- 3) to conserve and strengthen heritage values of the national park,
- 4) to improve the opportunities for exceptional nature and heritage experiences and outdoor activities in the Wadden Sea landscape,
- 5) to strengthen research, learning, nature awareness guidance as well as dissemination of the values of the Wadden Sea landscape,
- 6) to support developments benefiting local communities, including the business community, with respect for protective interests, and leaving room for continued operation and development of agriculture and fisheries and
- 7) to contribute to a coordinated development of the Danish/German/Dutch Wadden Sea area.

Part 2

Objectives for development of the national park

3. The Wadden Sea National Park shall be developed taking into consideration the safety of the local population and applying the following overall objectives:

- 1) The most important natural habitats, such as shallow waters, tideways, tidal waters, sand banks, small mouth rivers, salt meadows, sea shores and sand dunes shall be preserved, and their quality and diversity strengthened. Such natural habitats shall be protected against nutrient loads, invasive species, disturbance of fauna etc. and preserved as sustainable and dynamic eco-systems with natural dynamics, as far as possible by avoiding interventions in the natural dynamics of tidal waters.
- 2) Heritage nature areas, such as freshwater marshes and clay pits shall be preserved, and their quality and diversity strengthened, and agricultural operations which ensure the cultural landscape and the characteristic species of the area should be preserved and promoted.
- 3) The characteristic landscape elements and geological formations of the national park shall be preserved and made visible, and the dynamic landscape formation of sand dune and marshland areas shall be promoted.
- 4) Cultural environments and heritage elements and single sub-elements telling stories about the Wadden Sea shall be preserved, made visible and accessible, including coastal projection installations, drainage and irrigation systems, agriculture and buildings on mounds, marshland and geestland, hunting, fisheries and shipping, the history and of the border region and recreation.
- 5) The opportunities for outdoor activities, enjoyment of nature and heritage experiences shall be strengthened.
- 6) The development of outdoor activities and tourism shall be on a sustainable basis and in collaboration with the local population, the tourist industry and institutions providing information about the area.
- 7) Particularly vulnerable natural areas shall be protected against overuse and disruption by providing information and planning zones, tracks etc.
- 8) Nature awareness guidance and information about the landscape of the national park, values relating to nature and heritage as well as recreational opportunities shall be strengthened and developed in collaboration with local players through expansion and coordination of activities, establishment of service functions and facilities.
- 9) Research shall be supported and teaching shall be strengthened by establishing facilities and teaching programmes, including programmes promoting the awareness of children and young persons of nature, culture and the environment.
- 10) The development of the national park shall be in synergy with the surroundings.
- 11) The national park shall be developed in collaboration with the Trilateral Wadden Sea Cooperation.
- 12) The development of the national park shall be monitored and evaluated.

Part 3

The Wadden Sea National Park Fund

4. The objective of the Wadden Sea National Park Fund shall be to establish and develop the Wadden Sea National Park.

5.-(1) The Wadden Sea National Park Fund shall be managed by a widely composed board appointed by the Minister for the Environment. As far as possible, the members shall have local attachment.

(2) The Fund shall bear the costs for a secretariat, which assists the board in its work and carries out tasks in connection with the administration of the resources of the fund, planning and information etc.

6.-(1) The Wadden Sea National Park Fund shall prepare a national park plan for establishment and development of the national park, and the fund shall be instrumental in implementing this plan.

(2) The national park plan shall be adopted no later than 31 December 2012.

(3) The national park plan may not conflict with:

- 1) The Protection of the Outer Areas in Tønder Marsh Act ("*Lov om beskyttelse af de ydre koge i Tøndermarsken*").
- 2) The Statutory Order on Conservation and a Wildlife Reserve in the Wadden Sea ("*Bekendtgørelse om fredning og vildtreservat i Vadehavet*").
- 3) The Statutory Order on Identification and Management of International Nature Conservation Areas as well as Conservation of Certain Species (*Natura 2000*) ("*Bekendtgørelse om udpegning og administration af internationale naturbeskyttelsesområder samt beskyttelse af visse arter*").

(4) The fund shall ensure provision of information about the national park and involvement of the population in decisions pertaining to the planning, development and operation of the national park.

(5) The fund shall also carry out the other tasks of funds laid down in the National Parks Act.

7.-(1) The Wadden Sea National Park Fund shall set up a national park council for the Wadden Sea National Park which is to advise the board of the national park in matters of great significance and on questions of principle.

(2) The national park council shall be set up for a period corresponding to the tenure of the board.

8. In order to realise the national park plan mentioned in section 6, the Wadden Sea National Park Fund may, within the objectives of the national park, apply the instruments prescribed in section 14(1)-(5) of the National Parks Act.

Part 4

Administrative provisions and entry into force

9.-(1) The Wadden Sea National Park Fund may stipulate terms when entering into agreements on the provision of loans and grants etc. pursuant to section 14 of the National Parks Act.

(2) The fund shall ensure that grants and loans etc. be applied in accordance with the terms of the grant or loan.

(3) The fund may decide that commitments of grants be wholly or partly cancelled, that a grant shall be repaid or that a loan shall be cancelled if the grant conditions or terms are not complied with.

(4) The same shall apply where incorrect or misleading information has been provided, or where the recipient has withheld information of importance to the decision of the fund.

10. Adoption by the national park fund of a national park plan may, regarding legal questions, be appealed according to the regulations laid down in Part 6 of the National Parks Act.

11. This Statutory Order shall enter into force on 16 October 2010.

Ministry of the Environment, 30 September 2010

Karen Ellemann

/ Agnete Thomsen

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 1159 of 30 September 2010. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations

Map sheet 1

While this translation was carried out by a professional translation agency, the text is to be regarded as an unofficial translation based on the latest official Statutory Order no. 1159 of 30 September 2010. Only the Danish document has legal validity.

December 2012, GlobalDenmark Translations



Annex 16

**Danish National Park Plan Wadden Sea
2013 – 2018
(only on DVD)**

Annex 17

**Designation of the Wadden Sea as
Particularly Sensitive Sea Area (PSSA) by
the International Maritime Organization,
2002.**

INTERNATIONAL MARITIME ORGANIZATION



IMO

E

MARINE ENVIRONMENT PROTECTION
COMMITTEE
48th session
Agenda item 21

MEPC 48/21
24 October 2002
Original: ENGLISH

**REPORT OF THE MARINE ENVIRONMENT PROTECTION COMMITTEE ON
ITS FORTY-EIGHTH SESSION**

Section	Paragraph Nos.	Page No.
1 INTRODUCTION	1.1 - 1.18	4
2 HARMFUL AQUATIC ORGANISMS IN BALLAST WATER	2.1 - 2.39	8
3 RECYCLING OF SHIPS	3.1 - 3.28	16
4 PREVENTION OF AIR POLLUTION FROM SHIPS	4.1 - 4.31	22
5 CONSIDERATION AND ADOPTION OF AMENDMENTS TO MANDATORY INSTRUMENTS	5.1 - 5.12	26
6 IMPLEMENTATION OF THE OPRC CONVENTION AND THE OPRC-HNS PROTOCOL AND RELEVANT CONFERENCE RESOLUTIONS	6.1 - 6.29	28
7 IDENTIFICATION AND PROTECTION OF SPECIAL AREAS AND PARTICULARLY SENSITIVE SEA AREAS	7.1 - 7.9	33
8 INADEQUACY OF RECEPTION FACILITIES	8.1 - 8.12	36
9 REPORTS OF SUB-COMMITTEES	9.1 - 9.5.29	38
10 WORK OF OTHER BODIES	10.1 - 10.6.5	48
11 STATUS OF CONVENTIONS	11.1 - 11.4	53
12 PROMOTION OF IMPLEMENTATION AND ENFORCEMENT OF MARPOL 73/78 AND RELATED INSTRUMENTS	12.1 - 12.7.3	54
13 TECHNICAL CO-OPERATION PROGRAMME	13.1 - 13.13	57

Section	Paragraph Nos.	Page No.
14 INTERPRETATIONS AND AMENDMENTS OF MARPOL 73/78 AND RELATED INSTRUMENTS	14.1 - 14.13	60
15 HARMFUL EFFECTS OF THE USE OF ANTI-FOULING SYSTEMS FOR SHIPS	15.1 - 15.20	61
16 FUTURE ROLE OF FORMAL SAFETY ASSESSMENT AND HUMAN ELEMENT ISSUES	16.1	65
17 APPLICATION OF THE COMMITTEES' GUIDELINES	17.1	65
18 WORK PROGRAMME OF THE COMMITTEE AND SUBSIDIARY BODIES	18.1 - 18.22	65
19 ELECTION OF THE CHAIRMAN AND VICE CHAIRMAN FOR 2003	19.1 - 19.4	69
20 ANY OTHER BUSINESS	20.1 - 20.7	69

ANNEXES

ANNEX 1	AGENDA FOR THE FORTY-EIGHTH SESSION INCLUDING LIST OF DOCUMENTS
ANNEX 2	DRAFT INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER AND SEDIMENTS
ANNEX 3	RESOLUTION MEPC.99(48) – AMENDMENTS TO THE CONDITION ASSESSMENT SCHEME
ANNEX 4	RESOLUTION MEPC.100(48) – REVISION OF THE LIST OF SUBSTANCES ANNEXED TO THE PROTOCOL RELATING TO THE INTERVENTION ON THE HIGH SEAS IN CASES OF POLLUTION BY SUBSTANCES OTHER THAN OIL, 1973
ANNEX 5	RESOLUTION MEPC.101(48) – IDENTIFICATION OF THE WADDEN SEA AS A PARTICULARLY SENSITIVE SEA AREA
ANNEX 6	PROPOSED AMENDMENTS TO ANNEX I OF MARPOL 73/78
ANNEX 7	CRITERIA FOR ASSIGNING CARRIAGE REQUIREMENTS FOR PRODUCTS SUBJECT TO THE IBC CODE
ANNEX 8	RESOLUTION MEPC.102(48) – GUIDELINES FOR SURVEY AND CERTIFICATION OF ANTI-FOULING SYSTEMS ON SHIPS

- ANNEX 9 WORK PROGRAMMES OF THE FSI AND BLG SUB-COMMITTEES AND PROVISIONAL AGENDAS FOR THEIR FORTHCOMING SESSIONS
- ANNEX 10 ITEMS OF THE WORK PROGRAMMES OF THE DSC, NAV, DE, SLF AND STW SUB-COMMITTEES WHICH RELATE TO ENVIRONMENTAL ISSUES
- ANNEX 11 PROPOSED WORK PROGRAMMES OF THE OPRC CONVENTION AND THE OPRC-HNS PROTOCOL
- ANNEX 12 SUBSTANTIVE ITEMS TO BE INCLUDED IN THE AGENDAS FOR MEPC 49, MEPC 50 AND MEPC 51
- ANNEX 13 TERMS OF REFERENCE FOR CORRESPONDENCE GROUPS AND THE INTERSESSIONAL MEETING OF THE BALLAST WATER WORKING GROUP
- ANNEX 14 STATEMENTS MADE BY THE DELEGATIONS OF TURKEY AND CYPRUS

7 IDENTIFICATION AND PROTECTION OF SPECIAL AREAS AND PARTICULARLY SENSITIVE SEA AREAS

Draft Guidance document for submission of PSSA proposals

7.1 The Committee recalled that, at MEPC 45, when developing the Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas, it agreed that some guidance on how to select the most appropriate regime for a given area of sea to be protected could be included in a supplementary document to the Guidelines.

7.2 The Committee also recalled that MEPC 47, in considering a document by the United States (MEPC 47/8/1) providing guidance to Member States, supported it in principle. However, MEPC 47 agreed that certain modifications should be made to it and the Secretariat was instructed to prepare a draft MEPC circular, based on the United States document for approval by the Committee at this session.

7.3 The Committee, having noted that the Secretariat had made changes to the draft MEPC circular “Guidance Document for Submission of PSSA Proposals to IMO” (MEPC 48/7/1) as instructed by MEPC 47 (MEPC 47/20, paragraph 8.18), agreed that it would be useful to appendix to the document a framework of what needs to be included in a proposal. The Committee requested the Secretariat to prepare the text of the appendix, using the headings and sub-headings of the Florida Key PSSA proposal submission (MEPC 46/6/2), which MEPC 46 agreed should serve as a model by Member States when proposing their PSSAs. Reference of the original document should be given.

7.4 In considering the draft MEPC Circular (MEPC 48/7/1), the Committee agreed to issue the Guidance Document with its appendix to be prepared by the Secretariat as MEPC/Circ.398.

Establishment of an Informal Group for reviewing PSSA and Special Area proposals

7.5 The Committee noted that there is a need for a mechanism to review PSSA and Special Area proposals to ensure that they meet the requirements of the Guidelines for identifying and designating PSSAs and for designating Special Areas (resolution A.927(22)).

7.6 The Committee recognized that, with the expected increase of new PSSA proposals being put forward to this Committee and given the limitation in the number of working groups allowed during any MEPC session, it is unrealistic to establish a MEPC working group every time when a new PSSA or a Special Area proposal is submitted.

7.7 The Committee agreed with the Chairman’s proposal to establish an Informal Group under the chairmanship of Mr. Paul Nelson (Australia) to:

.1 review the proposals for the marine area of the Paracas National Reserve and for the Wadden Sea to be designated as Particularly Sensitive Sea Areas (PSSAs) (MEPC 48/7 and MEPC 48/7/2), to determine whether they meet the provisions of the Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas (Annex 2 of resolution A.927(22));

.2 review the proposal to extend the “Gulfs area” as a Special Area under Annexes I and V of MARPOL 73/78, (MEPC 48/7/3 and MEPC 48/7/3/Corr.1), to

determine whether it meets the provisions of the Guidelines for the Designation of Special Areas under MARPOL 73/78 (Annex 1 of resolution A.927(22)); and

.3 provide a written report to the plenary outlining its findings.

Report of the Informal Working Group

7.8 The Committee, having received the report of the Group (MEPC 48/WP.14), noted the following:

.1 the Group examined each proposal against a checklist with 46 questions for PSSAs and 18 questions for Special Areas, covering all the criteria set out in resolution A.927(22);

.2 the Group reviewed the joint submission by Denmark, Germany and the Netherlands for the Wadden Sea to be designated as a PSSA (MEPC 48/7/2), and agreed that the submission included information on all applicable criteria, and that this information satisfied the requirements of those criteria. The Group recommended that, as IMO measures already exist to protect this area and there are no new measures requiring referral to any other Committee or Sub-Committee, MEPC take appropriate steps to designate the area as a PSSA;

.3 the Group reviewed the proposal by Peru for the Paracas National Reserve to be designated as a PSSA (MEPC 48/7) and agreed that all environmental criteria were satisfied. In response to concerns expressed by the Group regarding the need for more information on some criteria, in particular on the volume of traffic and hazardous cargoes, Peru provided additional information (annex 2 of MEPC 48/WP.14). The Group determined that this information satisfied the relevant criteria;

.4 the Group in considering the two associated protective measures proposed by Peru, namely an Area to be Avoided and a "no discharge" area, recommended that the Area to be Avoided should be referred to the NAV Sub-Committee for review. As regards the proposed "no discharge" area, prohibiting any kind of discharge from ships, the Group determined that the information provided was not sufficient to justify the approval of such an area at this session of the Committee;

.5 accordingly, in accordance with the Guidelines, the Group recommended that the Committee approve the Paracas National Reserve PSSA, in principle, pending consideration of the proposal for an Area to be Avoided by the NAV Sub-Committee on the basis of a separate submission by Peru;

.6 the Group noted the submission by Oman for the extension of the "Gulfs area" as a Special Area under Annexes I and V of MARPOL 73/78. Additional information on proposed amendments to MARPOL 73/78 and a chart, which are attached at annex 3 to MEPC 48/WP.14, as well as information provided orally to the Group, was provided by the delegation of Oman; and

.7 the Group agreed that further information was required to show that the discharge of garbage from ships, when operating in accordance with MARPOL 73/78, was a particular threat. Accordingly, the Group determined that the submission satisfies the requirements for Special Area status in respect of Annex I, but not Annex V of

MARPOL 73/78. The Group therefore recommended that the Oman Area of the Arabian Sea be designated as a Special Area under Annex I of MARPOL 73/78, as defined in the submission and annex 3 to document MEPC 48/WP.14, and that such Special Area would be distinct from the "Gulfs area" Special Area since it is in the Arabian Sea and outside the "Gulfs area".

Report of the Informal Working Group

7.9 Having considered the report of the Informal Working Group (MEPC 48/WP.14), the Committee:

- .1 designated the Wadden Sea as a PSSA through the adoption of resolution MEPC.101(48), as attached at annex 5;
- .2 referred the proposal for an Area to be avoided in the Paracas National Reserve to the NAV Sub-Committee for consideration;
- .3 approved, in principle, the designation of Paracas National Reserve as a PSSA, pending consideration of the proposal for an Area to be Avoided by the NAV Sub-Committee; and
- .4 approved the proposed amendments to MARPOL Annex I, with a view to designating the Oman area of the Arabian Sea as a Special Area under MARPOL Annex I, as set out in annex 6 and requested the Secretary-General to circulate the proposed amendments for adoption at MEPC 49.

ANNEX 5**RESOLUTION MEPC.101 (48)****Adopted on 11 October 2002****IDENTIFICATION OF THE WADDEN SEA
AS A PARTICULARLY SENSITIVE SEA AREA**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

BEING AWARE of the ecological, social, economic, cultural, scientific and educational value of the Wadden Sea, as well as its vulnerability to damage by international shipping traffic and activities in the area and the steps taken by Denmark, Germany and the Netherlands to address that vulnerability,

NOTING that the Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas adopted under resolution A.927(22) set out procedures for the designation of particularly sensitive sea areas,

HAVING CONSIDERED the proposal from Denmark, Germany and the Netherlands to designate the Wadden Sea as a Particularly Sensitive Sea Area,

HAVING AGREED that criteria for identification of a Particularly Sensitive Sea Area provided in resolution A.927(22) are fulfilled for the Wadden Sea,

1. DESIGNATES the Wadden Sea as defined in Annexes 1, 2 and 3 to this resolution as a Particularly Sensitive Sea Area.

ANNEX 1

**DESCRIPTION OF THE PARTICULARLY SENSITIVE SEA AREA
WADDEN SEA CO-ORDINATES**

a. Description

In order to avoid the risk of pollution and damage to this exceptional, highly dynamic tidal ecosystem of world importance, mariners should exercise extreme care when navigating in the area bounded by a line connecting the following geographical positions which is designated as a Particularly Sensitive Sea Area and in the adjacent area:

The PSSA Wadden Sea is bordered:

Seawards: by an offshore line defined by a set of geographical co-ordinates (see co-ordinates listed under c.),

Landwards: by the main dikes, or where the main dikes are absent, by the spring-high-tide-water line, and in the rivers, by the brackish-water limit.

The inhabited islands are excluded from the PSSA. These islands are in:

Denmark: Rømø, Mandø, Fanø

Germany:

Schleswig-Holstein: Pellworm, Nordstrandischmoor, Hooge, Gröde, Langeneß-Oland, Föhr, Amrum, Sylt, Norderoog, Habel, Süderoog

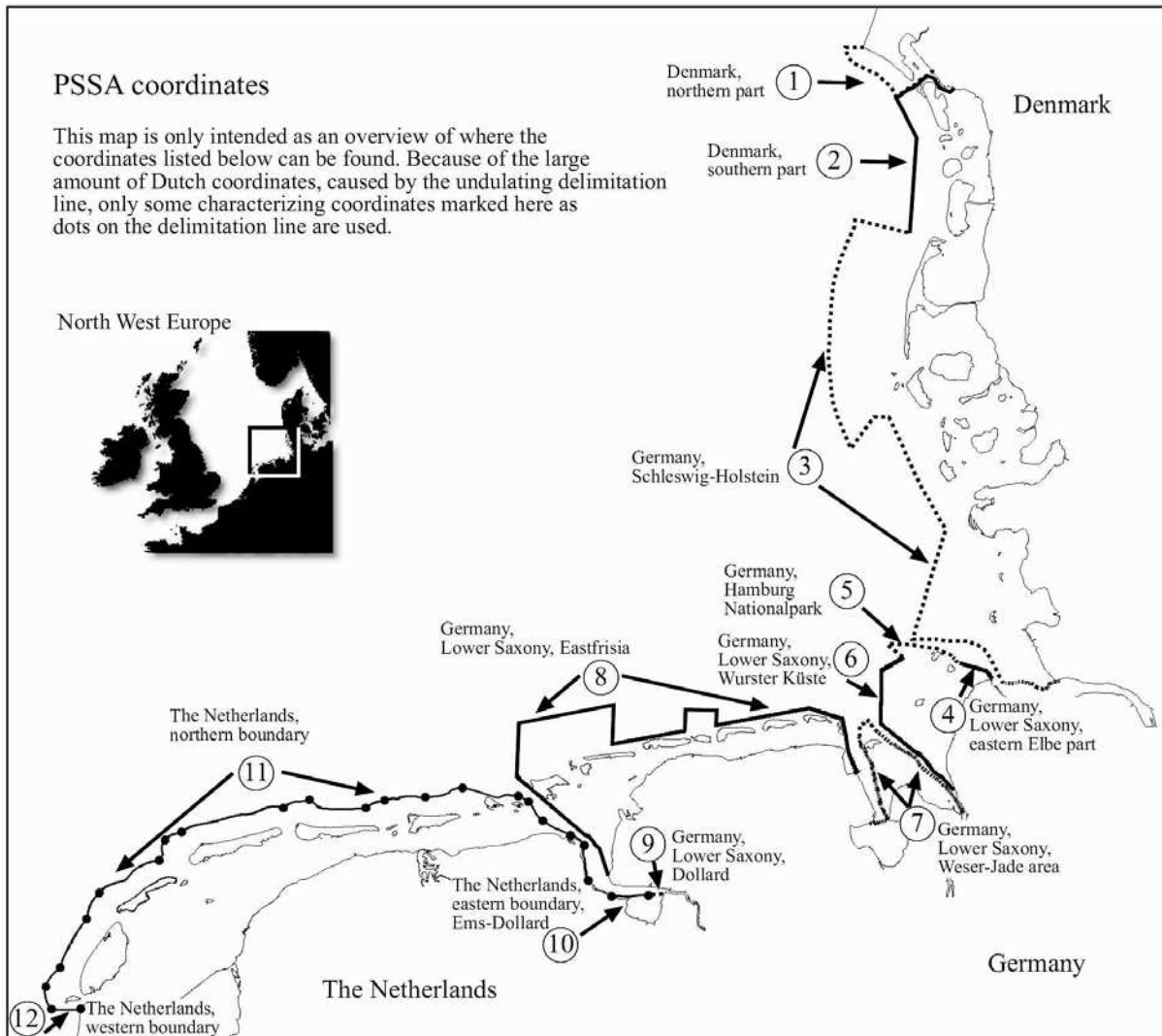
Hamburg: Neuwerk

Lower Saxony: Borkum, Juist, Norderney, Baltrum, Langeoog, Spiekeroog, Wangerooge

The Netherlands: Texel, Vlieland, Terschelling, Ameland, Schiermonnikoog

b. Illustrative overview

The illustrative overview shows the different parts (1-12) of the offshore line of the proposed PSSA Wadden Sea. The numbers and names pointing to the different parts refer to the list of co-ordinates given in the tables under c.



c. List of geographical co-ordinates (projection WGS84) for the bordering offshore line of the proposed PSSA Wadden Sea

Denmark

The proposed PSSA in the Danish Wadden Sea is divided into a northern part and a southern part by the Esbjerg Harbour shipping lane and the outer area of Esbjerg Harbour.

Northern part (1)

The PSSA delimitation consists of 28 points with the following coordinates from Blaavandshuk to the shore north of Esbjerg Harbour.

Southern part (2)

The PSSA delimitation consists of 17 points with the following coordinates, from the shore south of Esbjerg Harbour to the borderline between Denmark and Germany territorial waters.

1 Denmark, northern part

No.	East	North
1	8° 04,516'	55° 33,463'
2	7° 59,00'	55° 33,48'
3	7° 59,02'	55° 33,21'
4	7° 59,06'	55° 32,99'
5	7° 59,16'	55° 32,74'
6	7° 59,28'	55° 32,50'
7	7° 59,45'	55° 32,28'
8	7° 59,67'	55° 32,04'
9	7° 59,89'	55° 31,83'
10	8° 00,15'	55° 31,62'
11	8° 00,47'	55° 31,43'
12	8° 00,82'	55° 31,26'
13	8° 01,21'	55° 31,10'
14	8° 01,57'	55° 30,95'
15	8° 01,94'	55° 30,82'
16	8° 02,34'	55° 30,71'
17	8° 08,12'	55° 29,23'
18	8° 10,46'	55° 28,14'
19	8° 11,96'	55° 27,38'
20	8° 13,716'	55° 25,593'
21	8° 16,879'	55° 26,916'
22	8° 18,104'	55° 27,228'
23	8° 19,357'	55° 27,873'
24	8° 20,793'	55° 28,608'
25	8° 21,791'	55° 29,056'
26	8° 21,915'	55° 29,109'
27	8° 22,724'	55° 29,467'
28	8° 23,635'	55° 29,866'

2 Denmark, southern part

No.	East	North
29	8° 30,157'	55° 27,166'
30	8° 28,490'	55° 26,420'
31	8° 25,620'	55° 27,160'
32	8° 24,904'	55° 27,866'
33	8° 24,574'	55° 28,273'
34	8° 24,151'	55° 28,614'
35	8° 22,436'	55° 28,975'
36	8° 21,929'	55° 28,776'
37	8° 21,043'	55° 28,452'
38	8° 19,581'	55° 27,724'
39	8° 18,195'	55° 27,046'
40	8° 17,016'	55° 26,805'
41	8° 13,825'	55° 25,470'
42	8° 14,080'	55° 25,220'
43	8° 19,543'	55° 19,100'
44	8° 18,900'	55° 12,300'
45	8° 18,040'	55° 03,795'

Germany

Below are the coordinates for the seven parts (3-9) representing the delimitation of the proposed PSSA for Germany.

3 Germany, Schleswig-Holstein

No.	East	North
46	8° 18,040'	55° 03,795'
47	8° 02,716'	55° 06,053'
48	8° 02,618'	55° 05,647'
49	8° 02,547'	55° 05,239'
50	8° 02,395'	55° 05,011'
51	8° 01,635'	55° 03,814'
52	8° 00,960'	55° 02,982'
53	8° 00,708'	55° 02,659'
54	8° 00,471'	55° 02,332'
55	7° 59,598'	55° 01,064'
56	7° 59,354'	55° 00,692'
57	7° 59,133'	55° 00,319'
58	7° 58,572'	54° 59,317'
59	7° 58,493'	54° 59,170'
60	7° 57,853'	54° 57,968'
61	7° 57,640'	54° 57,540'
62	7° 57,451'	54° 57,102'
63	7° 57,292'	54° 56,660'
64	7° 57,032'	54° 55,858'
65	7° 56,876'	54° 55,303'
66	7° 56,765'	54° 54,745'
67	7° 56,591'	54° 53,645'
68	7° 56,531'	54° 53,169'
69	7° 56,429'	54° 52,013'
70	7° 56,279'	54° 50,539'
71	7° 56,253'	54° 50,166'
72	7° 56,209'	54° 49,265'
73	7° 56,203'	54° 48,945'
74	7° 56,209'	54° 48,625'
75	7° 56,234'	54° 48,095'
76	7° 56,218'	54° 47,848'
77	7° 55,986'	54° 46,380'
78	7° 55,921'	54° 45,823'
79	7° 55,899'	54° 45,265'
80	7° 55,925'	54° 44,707'
81	7° 55,995'	54° 44,148'
82	7° 56,732'	54° 39,682'
83	7° 56,800'	54° 39,104'
84	7° 56,918'	54° 38,529'
85	7° 57,083'	54° 37,957'
86	7° 57,295'	54° 37,390'
87	7° 57,556'	54° 36,830'
88	7° 57,674'	54° 36,597'
89	7° 57,920'	54° 36,145'
90	7° 58,197'	54° 35,697'
91	7° 58,505'	54° 35,257'
92	8° 02,338'	54° 30,063'
93	8° 08,522'	54° 35,126'
94	8° 15,406'	54° 35,126'
95	8° 17,071'	54° 32,932'
96	8° 18,308'	54° 31,208'
97	8° 19,144'	54° 30,053'
98	8° 19,462'	54° 29,614'
99	8° 20,191'	54° 28,596'

3 Germany, Schleswig-Holstein

No.	East	North
100	8° 20,996'	54° 27,489'
101	8° 21,858'	54° 26,289'
102	8° 22,692'	54° 25,140'
103	8° 22,956'	54° 24,747'
104	8° 23,091'	54° 24,545'
105	8° 23,624'	54° 23,878'
106	8° 25,125'	54° 22,186'
107	8° 26,205'	54° 20,980'
108	8° 28,843'	54° 18,099'
109	8° 25,467'	54° 13,309'
110	8° 23,782'	54° 10,917'
111	8° 20,322'	54° 06,008'
112	8° 20,305'	54° 05,983'
113	8° 17,718'	54° 02,317'
114	8° 17,689'	54° 02,275'
115	8° 16,859'	54° 01,099'
116	8° 16,056'	53° 59,960'
117	8° 28,660'	53° 59,936'
118	8° 28,725'	53° 59,940'
119	8° 28,826'	53° 59,940'
120	8° 28,937'	53° 59,937'
121	8° 29,048'	53° 59,941'
122	8° 29,133'	53° 59,942'
123	8° 29,221'	53° 59,948'
124	8° 29,344'	53° 59,954'
125	8° 29,410'	53° 59,952'
126	8° 29,486'	53° 59,947'
127	8° 29,584'	53° 59,938'
128	8° 29,691'	53° 59,930'
129	8° 29,788'	53° 59,923'
130	8° 29,871'	53° 59,911'
131	8° 29,965'	53° 59,905'
132	8° 30,068'	53° 59,907'
133	8° 30,156'	53° 59,905'
134	8° 30,252'	53° 59,910'
135	8° 30,337'	53° 59,910'
136	8° 30,393'	53° 59,912'
137	8° 30,457'	53° 59,913'
138	8° 30,523'	53° 59,917'
139	8° 30,585'	53° 59,921'
140	8° 30,658'	53° 59,924'
141	8° 30,725'	53° 59,930'
142	8° 30,779'	53° 59,932'
143	8° 30,837'	53° 59,929'
144	8° 30,946'	53° 59,930'
145	8° 31,057'	53° 59,942'
146	8° 31,148'	53° 59,953'
147	8° 31,276'	53° 59,965'
148	8° 31,372'	53° 59,969'
149	8° 31,475'	53° 59,972'
150	8° 31,559'	53° 59,977'
151	8° 31,638'	53° 59,982'
152	8° 31,691'	53° 59,990'
153	8° 31,759'	54° 00,005'

3 Germany, Schleswig-Holstein

No.	East	North
154	8° 31,833'	54° 00,008'
155	8° 31,951'	54° 00,016'
156	8° 32,046'	54° 00,021'
157	8° 32,156'	54° 00,021'
158	8° 32,250'	54° 00,021'
159	8° 32,348'	54° 00,021'
160	8° 32,441'	54° 00,024'
161	8° 32,528'	54° 00,023'
162	8° 32,613'	54° 00,016'
163	8° 32,694'	54° 00,013'
164	8° 32,750'	54° 00,013'
165	8° 32,817'	54° 00,014'
166	8° 32,869'	54° 00,013'
167	8° 32,988'	54° 00,016'
168	8° 33,090'	54° 00,022'
169	8° 33,183'	54° 00,022'
170	8° 33,280'	54° 00,021'
171	8° 33,402'	54° 00,022'
172	8° 33,502'	54° 00,019'
173	8° 33,608'	54° 00,013'
174	8° 33,680'	54° 00,005'
175	8° 33,764'	53° 60,000'
176	8° 33,856'	53° 59,994'
177	8° 33,916'	53° 59,990'
178	8° 34,007'	53° 59,985'
179	8° 34,090'	53° 59,977'
180	8° 34,167'	53° 59,968'
181	8° 34,249'	53° 59,965'
182	8° 34,389'	53° 59,948'
183	8° 34,470'	53° 59,937'
184	8° 34,580'	53° 59,913'
185	8° 34,648'	53° 59,903'
186	8° 34,717'	53° 59,885'
187	8° 34,872'	53° 59,827'
188	8° 34,980'	53° 59,793'
189	8° 35,105'	53° 59,764'
190	8° 35,179'	53° 59,746'
191	8° 35,253'	53° 59,729'
192	8° 35,329'	53° 59,709'
193	8° 35,404'	53° 59,690'
194	8° 35,465'	53° 59,677'
195	8° 35,534'	53° 59,667'
196	8° 35,699'	53° 59,630'
197	8° 35,767'	53° 59,611'
198	8° 35,919'	53° 59,580'
199	8° 36,115'	53° 59,535'
200	8° 36,254'	53° 59,504'
201	8° 36,361'	53° 59,480'
202	8° 36,443'	53° 59,460'
203	8° 36,574'	53° 59,431'
204	8° 36,741'	53° 59,391'
205	8° 36,879'	53° 59,354'
206	8° 37,001'	53° 59,324'
207	8° 37,095'	53° 59,306'

3 Germany, Schleswig-Holstein

No.	East	North
208	8° 37,171'	53° 59,289'
209	8° 37,319'	53° 59,250'
210	8° 37,403'	53° 59,226'
211	8° 37,546'	53° 59,189'
212	8° 37,657'	53° 59,160'
213	8° 37,780'	53° 59,111'
214	8° 37,947'	53° 59,046'
215	8° 38,173'	53° 58,964'
216	8° 38,333'	53° 58,907'
217	8° 38,496'	53° 58,850'
218	8° 38,868'	53° 58,691'
219	8° 39,105'	53° 58,442'
220	8° 39,598'	53° 57,962'
221	8° 40,199'	53° 57,371'
222	8° 40,267'	53° 57,299'
223	8° 40,749'	53° 56,812'
224	8° 41,362'	53° 56,204'
225	8° 41,924'	53° 55,648'
226	8° 42,487'	53° 55,094'
227	8° 42,595'	53° 54,996'
228	8° 42,861'	53° 54,745'
229	8° 43,118'	53° 54,445'
230	8° 43,361'	53° 54,164'
231	8° 43,529'	53° 53,970'
232	8° 43,634'	53° 53,859'
233	8° 44,022'	53° 53,402'
234	8° 44,096'	53° 53,300'
235	8° 44,185'	53° 53,302'
236	8° 44,265'	53° 53,313'
237	8° 44,347'	53° 53,318'
238	8° 44,443'	53° 53,318'
239	8° 44,514'	53° 53,316'
240	8° 44,591'	53° 53,312'
241	8° 44,681'	53° 53,308'
242	8° 44,744'	53° 53,305'
243	8° 44,818'	53° 53,293'
244	8° 44,898'	53° 53,278'
245	8° 44,962'	53° 53,271'
246	8° 45,039'	53° 53,264'
247	8° 45,121'	53° 53,247'
248	8° 45,196'	53° 53,241'
249	8° 45,272'	53° 53,235'
250	8° 45,356'	53° 53,231'
251	8° 45,475'	53° 53,235'
252	8° 45,570'	53° 53,239'
253	8° 45,699'	53° 53,250'
254	8° 45,789'	53° 53,252'
255	8° 45,896'	53° 53,255'
256	8° 45,984'	53° 53,270'
257	8° 46,057'	53° 53,286'
258	8° 46,142'	53° 53,297'
259	8° 46,226'	53° 53,297'
260	8° 46,292'	53° 53,297'
261	8° 46,348'	53° 53,292'

3 Germany, Schleswig-Holstein

No.	East	North
262	8° 46,487'	53° 53,315'
263	8° 46,591'	53° 53,333'
264	8° 46,675'	53° 53,340'
265	8° 46,792'	53° 53,363'
266	8° 46,886'	53° 53,386'
267	8° 46,950'	53° 53,397'
268	8° 47,009'	53° 53,412'
269	8° 47,071'	53° 53,415'
270	8° 47,158'	53° 53,421'
271	8° 47,267'	53° 53,430'
272	8° 47,354'	53° 53,433'
273	8° 47,428'	53° 53,442'
274	8° 47,509'	53° 53,461'
275	8° 47,608'	53° 53,474'
276	8° 47,675'	53° 53,478'
277	8° 47,796'	53° 53,481'
278	8° 47,884'	53° 53,483'
279	8° 47,954'	53° 53,493'
280	8° 48,013'	53° 53,505'
281	8° 48,075'	53° 53,523'
282	8° 48,124'	53° 53,535'
283	8° 48,197'	53° 53,538'
284	8° 48,284'	53° 53,538'
285	8° 48,367'	53° 53,542'
286	8° 48,438'	53° 53,543'
287	8° 48,474'	53° 53,542'
288	8° 48,554'	53° 53,545'
289	8° 48,613'	53° 53,548'
290	8° 48,688'	53° 53,550'
291	8° 48,775'	53° 53,546'
292	8° 48,893'	53° 53,531'
293	8° 48,987'	53° 53,515'
294	8° 49,064'	53° 53,501'
295	8° 49,153'	53° 53,484'
296	8° 49,260'	53° 53,470'
297	8° 49,326'	53° 53,468'
298	8° 49,399'	53° 53,465'
299	8° 49,472'	53° 53,464'
300	8° 49,552'	53° 53,454'
301	8° 49,653'	53° 53,442'
302	8° 49,741'	53° 53,419'
303	8° 49,784'	53° 53,406'
304	8° 49,890'	53° 53,375'
305	8° 49,942'	53° 53,366'
306	8° 50,017'	53° 53,355'
307	8° 50,107'	53° 53,338'
308	8° 50,172'	53° 53,318'
309	8° 50,287'	53° 53,308'
310	8° 50,382'	53° 53,302'
311	8° 50,449'	53° 53,306'
312	8° 50,553'	53° 53,314'
313	8° 50,617'	53° 53,316'
314	8° 50,684'	53° 53,313'
315	8° 50,776'	53° 53,302'

3 Germany, Schleswig-Holstein

No.	East	North
316	8° 50,831'	53° 53,298'
317	8° 50,914'	53° 53,288'
318	8° 50,994'	53° 53,278'
319	8° 51,087'	53° 53,269'
320	8° 51,167'	53° 53,263'
321	8° 51,271'	53° 53,253'
322	8° 51,350'	53° 53,236'
323	8° 51,433'	53° 53,218'
324	8° 51,484'	53° 53,209'
325	8° 51,584'	53° 53,184'
326	8° 51,659'	53° 53,164'
327	8° 51,753'	53° 53,137'
328	8° 51,831'	53° 53,119'
329	8° 51,910'	53° 53,105'
330	8° 51,976'	53° 53,085'
331	8° 52,042'	53° 53,066'
332	8° 52,133'	53° 53,035'
333	8° 52,201'	53° 52,992'
334	8° 52,241'	53° 52,963'
335	8° 52,273'	53° 52,942'
336	8° 52,317'	53° 52,921'
337	8° 52,412'	53° 52,884'
338	8° 52,478'	53° 52,852'
339	8° 52,557'	53° 52,821'
340	8° 52,646'	53° 52,792'
341	8° 52,711'	53° 52,767'
342	8° 52,792'	53° 52,737'
343	8° 52,868'	53° 52,716'
344	8° 52,987'	53° 52,670'
345	8° 53,078'	53° 52,645'
346	8° 53,161'	53° 52,623'
347	8° 53,276'	53° 52,591'
348	8° 53,366'	53° 52,564'
349	8° 53,482'	53° 52,524'
350	8° 53,544'	53° 52,498'
351	8° 53,660'	53° 52,459'
352	8° 53,736'	53° 52,440'
353	8° 53,813'	53° 52,410'
354	8° 53,901'	53° 52,377'
355	8° 53,937'	53° 52,364'
356	8° 54,071'	53° 52,327'
357	8° 54,156'	53° 52,311'
358	8° 54,231'	53° 52,283'
359	8° 54,333'	53° 52,256'
360	8° 54,430'	53° 52,233'
361	8° 54,506'	53° 52,207'
362	8° 54,587'	53° 52,182'
363	8° 54,629'	53° 52,162'
364	8° 54,719'	53° 52,142'
365	8° 54,787'	53° 52,144'
366	8° 54,923'	53° 52,111'
367	8° 55,032'	53° 52,091'
368	8° 55,127'	53° 52,067'
369	8° 55,256'	53° 52,034'

3 Germany, Schleswig-Holstein

No.	East	North
370	8° 55,373'	53° 52,008'
371	8° 55,476'	53° 51,989'
372	8° 55,543'	53° 52,011'
373	8° 55,599'	53° 52,035'
374	8° 55,641'	53° 52,062'

4 Germany, Lower Saxony, eastern Elbe part

No.	East	North
375	8° 41,200'	53° 53,533'
376	8° 39,550'	53° 54,917'
377	8° 32,150'	53° 56,167'

5 Germany, Hamburg National park

No.	East	North
378	8°30,25'	53°57,42'
379	8°26,31'	53°58,36'
380	8°21,93'	53°58,76'
381	8°18,90'	53°59,02'
382	8°13,17'	53°59,02'
383	8°12,77'	53°58,88'
384	8°17,43'	53°56,99'

6 Germany, Lower Saxony, Wurster Küste

No.	East	North
385	8° 11,533'	53° 54,900'
386	8° 11,533'	53° 53,200'
387	8° 11,533'	53° 46,417'
388	8° 20,150'	53° 42,333'
389	8° 23,583'	53° 40,683'
390	8° 27,683'	53° 38,133'
391	8° 30,683'	53° 36,300'

7 Germany, Lower Saxony, Weser-Jade area

No.	East	North
392	8° 32,883'	53° 32,317'
393	8° 33,317'	53° 32,400'
394	8° 28,667'	53° 36,750'
395	8° 20,617'	53° 41,183'
396	8° 14,433'	53° 43,317'
397	8° 09,917'	53° 45,483'
398	8° 07,950'	53° 46,967'
399	8° 05,583'	53° 45,933'
400	8° 05,583'	53° 43,717'
401	8° 09,050'	53° 40,217'
402	8° 11,817'	53° 33,283'
403	8° 13,600'	53° 31,217'
404	8° 09,950'	53° 30,717'
405	8° 08,717'	53° 30,650'

8 Germany, Lower Saxony, Eastfrisia

No.	East	North
406	8° 05,100'	53° 38,667'
407	8° 05,483'	53° 38,783'
408	8° 04,583'	53° 39,850'
409	8° 02,817'	53° 41,900'
410	8° 01,850'	53° 45,383'
411	8° 01,067'	53° 47,133'
412	7° 52,350'	53° 48,700'
413	7° 27,383'	53° 45,800'
414	7° 27,383'	53° 48,217'
415	7° 19,083'	53° 48,217'
416	7° 19,083'	53° 44,750'
417	7° 00,000'	53° 42,300'
418	7° 00,000'	53° 45,400'
419	7° 00,000'	53° 48,733'
420	6° 34,850'	53° 45,183'
421	6° 34,850'	53° 41,900'
422	6° 34,850'	53° 38,000'
423	6° 34,850'	53° 37,050'
424	6° 35,750'	53° 36,350'
425	6° 42,850'	53° 33,033'
426	6° 52,817'	53° 28,167'
427	6° 54,917'	53° 27,583'
428	6° 56,117'	53° 26,567'
429	6° 57,633'	53° 25,900'
430	6° 59,450'	53° 22,800'

9 Germany, Lower Saxony, Dollard

No.	East	North
431	7° 14,910'	53° 19,087'
432	7° 11,513'	53° 18,863'

The Netherlands

Below are the co-ordinates representing the delimitation of the proposed PSSA for the Netherlands.

- Point 433 until 440 represent the eastern boundary, Ems Dollard, of the area (part 10).
- Point 441 until 453 represent the delimitation of the northern part of the area. It consists of the three nautical miles line from the baseline. Because this is a curved line, there are at least 1900 coordinates, but only some characterizing coordinates have been listed below. The map in annex 2 has been compiled on the basis of detailed information on the 3 nautical miles line (available from the *Dienst der Hydrografie*, the Hydrographical Service in the Hague, Netherlands) (part 11).
- Point 454 and 455 represent the western boundary of the area. It is the line from Den Helder towards the West, crossing the three nautical miles line (part 12).

10 The Netherlands, eastern boundary, Ems-Dollard

No.	East	North
433	7° 11,605'	53° 18,882'
434	7° 00,666'	53° 18,655'
435	6° 54,414'	53° 20,860'
436	6° 53,420'	53° 26,439'
437	6° 50,010'	53° 27,797'
438	6° 41,803'	53° 30,069'
439	6° 37,214'	53° 33,289'
440	6° 35,685'	53° 33,688'

11 The Netherlands, northern boundary

No.	East	North
441	6° 20,487'	53° 34,798'
442	6° 14,347'	53° 33,356'
443	6° 00,295'	53° 32,295'
444	5° 55,497'	53° 31,964'
445	5° 40,285'	53° 31,769'
446	5° 33,542'	53° 30,412'
447	5° 06,734'	53° 25,551'
448	5° 02,336'	53° 24,218'
449	5° 01,358'	53° 21,138'
450	4° 45,087'	53° 14,785'
451	4° 43,325'	53° 11,133'
452	4° 37,086'	53° 03,145'
453	4° 33,291'	52° 59,296'

12 The Netherlands, western boundary

No.	East	North
454	4° 43,056'	52° 56,841'
455	4° 35,221'	52° 56,564'

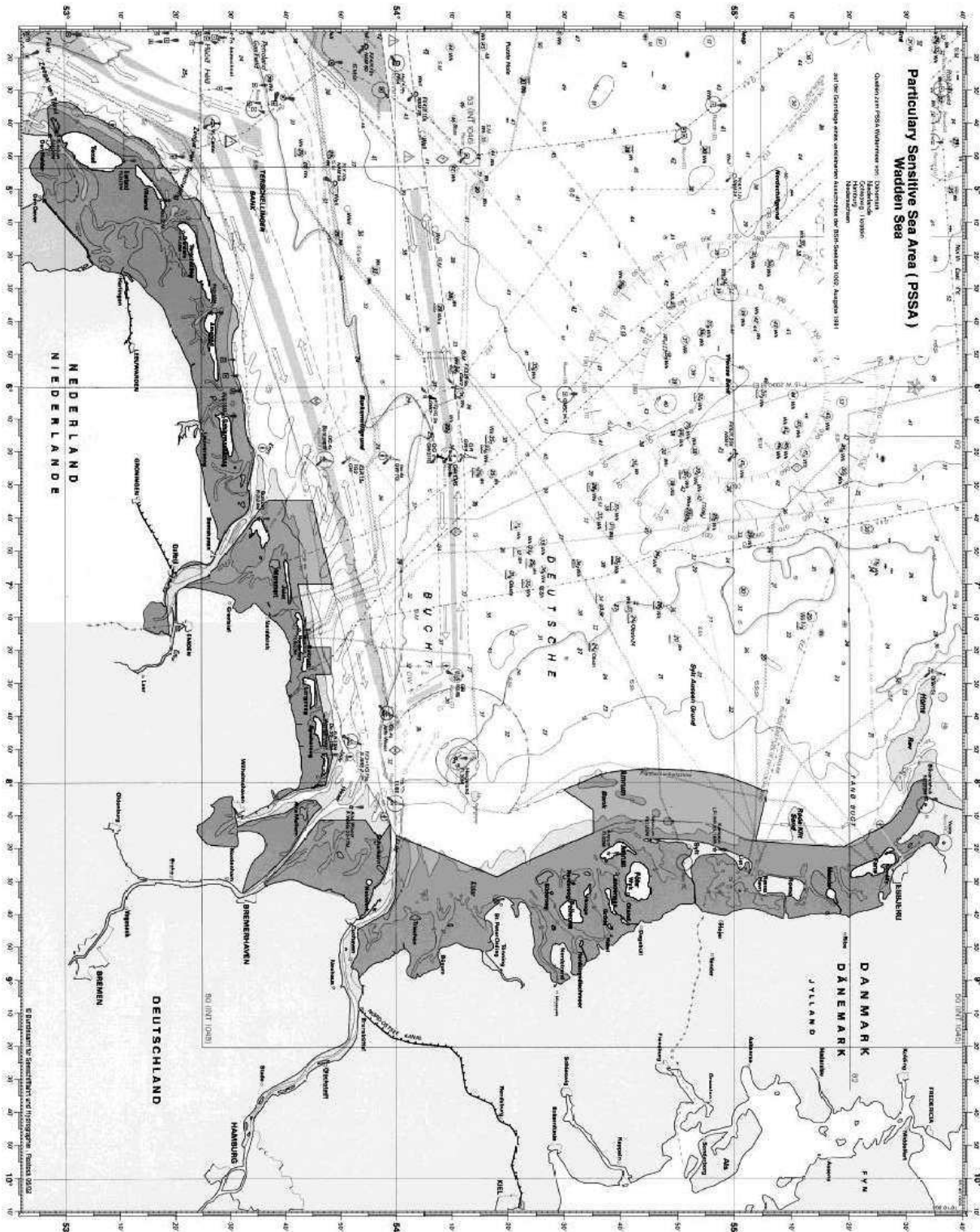
ANNEX 2

PSSA CHART
PROPOSED PARTICULARLY SENSITIVE SEA AREA

WADDEN SEA BOUNDARY

Reference: Nautical chart from Bundesamt für Seeschifffahrt und Hydrographie, BSH, Germany.
Nautical chart 1002, Edition 1991

[Coloured copies of the chart will be distributed at the meeting.]



ANNEX 3

EXISTING MEASURES**Measures adopted by IMO and at the national and EC levels****I General measures****IMO measures**

The IMO has issued numerous conventions to improve maritime safety and prevent pollution from ships, for example the International Regulations for Preventing Collisions at Sea, 1972 (as amended by Resolutions A.464 (XII), A.626 (15), A.678 (16) and A.736 (18)), COLREGs and SOLAS V.

EC measures

Also the European Union has already issued numerous Directives corresponding to IMO measures, including e.g. directives on port State control, marine equipment, notification obligations, and on the management of ship generated waste and cargo residues. These are continually being updated and implemented into national legislation.

According to the EC Habitat Directive (Council Directive 92/43/EEC) and the EC Bird Directive (Council Directive 79/409/EEC) Member States shall list areas of Community Interest respectively Special Protection Areas. These areas constitute the Natura 2000 network. Basically, the Wadden Sea, until 3 sea miles offshore except for the main shipping routes, has been listed as habitat areas according to the Habitat Directive and as Special Protection Areas according to the Bird Directive.

Other regional measures

Radio navigational warnings contain information that directly affects safety of life at sea and the protection of the environment. They are issued by NAVTEX, MRCC's, VTS centers or other services.

Bilateral (NL & D) Local Rules and Traffic Regulations for the Ems estuary.

NATIONAL MEASURES

Denmark	Germany	Netherlands
<ul style="list-style-type: none"> ◆ Ministerial order on transfer of bunkers in the Danish territorial sea. 	<ul style="list-style-type: none"> ◆ Regulations on the navigation of Federal waterways in national parks in the North Sea area. ◆ Navigable Waterways Ordinance ◆ VTS available in certain areas. ◆ Pilotage services and Deep Sea Pilotage Services available for various ports and areas. ◆ Modern aids to navigation (AIS, GPS, buoyage, lighthouses). ◆ SAR and MRCC services available. ◆ Emergency towing capacity available. ◆ Deep Sea Pilotage Services available. ◆ Agreement with private companies on keeping helicopter capacity in reserve to permit action to be taken swiftly in the case of emergencies and accidents at sea. 	<ul style="list-style-type: none"> ◆ Additional Local Rules and Regulations (BPR, “Scheepvaartreglement Territoriale Zee” (STZ)). ◆ VTS available in certain areas. ◆ Pilotage services available for various ports. ◆ Communication facilities available. ◆ Differential GPS available. ◆ Buoyage available in entire area. ◆ Lighthouses available on all major islands and along the mainland coastline. ◆ SAR services available. ◆ Salvage tugs available. Powerful salvage tug (m.s. “WAKER”) stand-by. ◆ Deep Sea Pilotage Services available. ◆ Numerous RACONs are available on (offshore) platforms and buoys.

II Collision avoidance, navigation, routing measures

IMO measures

IMO routing schemes are in place in the North Sea to simplify traffic flows to reduce the collision hazard and to keep ships carrying certain dangerous or polluting goods away from the Wadden Sea coast. Traffic Separation Schemes in the concerned area adopted by the IMO are:

- At West Hinder
- Off Botney Ground
- East Friesland
- North Hinder
- Off Texel
- Jade Approach
- Terschelling-German Bight
- Off Brown Ridge
- West Friesland
- Off Friesland
- Off Vlieland, Vlieland North and Friesland Junction
- In the approaches to Hook of Holland
- German Bight Western Approach
- In the approaches to river Elbe

The Deep-Water Route and Traffic Separation Scheme (TSS) from North Hinder to the German Bight via the Frisian Junction, is mandatory for the following classes of ships:

- ◆ Tankers of 10,000 GT + carrying oils as defined under Annex 1 of MARPOL 73/78;
- ◆ Ships of 5,000 GT+ carrying noxious liquid substances in bulk categories A or B of Annex II of MARPOL 73/78;
- ◆ Ships of 10,000 GT+ carrying noxious liquid substances in bulk categories C or D of Annex II of MARPOL 73/78; and
- ◆ Ships of 10,000 GT + carrying liquefied gases in bulk.

EC measures

Reference to paragraph V.

Other regional measures

None.

National measures

None.

III Pilotage, port entry and departure

IMO measures

Ships using the mandatory route for tankers from the North Hinder to the German Bight are recommended to use adequately qualified deep-sea pilots in the North Sea.

EC measures

European Directive 93/75/EEC requires the Master and Operator of vessels carrying dangerous or polluting goods to report cargo details entering or leaving EC ports.

Dangerous goods are defined in:

- ◆ *The International Maritime Dangerous Goods (IMDG) Code*
- ◆ *The International Gas Carrier (IGC) Code*
- ◆ *The International Bulk Carrier (IBC) Code*

Polluting goods are defined in MARPOL Annexes I, II & III.

European Directive 95/21/EEC (Port State Control)

Other regional measures

None.

NATIONAL MEASURES

Denmark	Germany	Netherlands
<ul style="list-style-type: none"> ◆ Pilotage is compulsory for the following: <ul style="list-style-type: none"> - Loaded oil tankers >1500 DWT; - Loaded chemical tankers carrying dangerous liquid chemicals covered by the IMO Chemical Code; - Gas carriers; - Vessels carrying radioactive cargoes; - Towing vessels of 150GRT+ navigating in dredged channels or marked navigation channels, into or past harbours or pilot stations (excluding harbour maneuvers); and - Tankers with uncleaned tanks not secured by inert gas. ◆ Ships sailing to and from Danish ports shall comply with the rules laid down in the "Den danske havnelods" (The Danish Harbor Pilot book). ◆ Tankers have to take a pilot when entering certain ports, terminals etc. 	<ul style="list-style-type: none"> ◆ Compulsory district pilotage for: <ul style="list-style-type: none"> - Vessels with a length of 90 m or a breadth of 13 m and more - Tankers carrying gas/chemicals/petroleum/petroleum products in bulk, or unloaded tankers if not cleaned, degassed or completely inerted ◆ Additional shore based pilotage: <ul style="list-style-type: none"> - if visibility is reduced - if pilot cutter is in a sheltered position - if light buoys are withdrawn due to ice - if requested by the master - if ordered by the VTS-authority ◆ Voluntary Deep sea pilotage available 	<ul style="list-style-type: none"> ◆ Radar surveillance at Den Helder, Terschelling and Schiermonnikoog (for port entry and departure and Wadden Sea traffic only). ◆ Harbour pilotage is compulsory for ships over 60m in length and for all vessels carrying oil, gas or chemicals. Voluntary deep-sea pilotage is available for ships required to use the North Hinder-German Bight mandatory route for tankers. Communications are normally carried out via VHF radio and ships are required to maintain a listening watch on VHF. Radar assistance is available on request in some ports. Pilotage is compulsory for Harlingen and other ports in the Wadden Sea.

IV Vessel traffic services (VTS)

IMO measures

None.

EC measures

None.

Other regional measures

None.

NATIONAL MEASURES

Denmark	Germany	Netherlands
No VTS arrangement in the area.	<ul style="list-style-type: none"> ◆ VTS with permanent radar surveillance in following districts: <ul style="list-style-type: none"> - VTS German Bight - VTS Ems - VTS Jade - VTS Weser - VTS Elbe ◆ Services offered: <ul style="list-style-type: none"> - Information Service - Navigational Assistance Service - Traffic Organisation Service ◆ Mandatory for all vessels exceeding 50 m. of length (river Ems 40 m) and all vessels carrying certain dangerous goods 	<ul style="list-style-type: none"> ◆ VTS Den Helder: All vessels equipped with VHF are requested to participate in this system. Vessels within the area should report when entering and leaving the VTS area. Traffic surveillance is provided; ◆ VTS Terschelling: Reporting is mandatory for all vessels entering or leaving the VTS area; ◆ Wadden Sea Central Reporting Station: Is responsible for co-ordinating the relevant maritime authorities with regard to all incidents within the Wadden Sea area; ◆ VTS Schiermannikoog: Provides radar surveillance services for the Terschelling-German Bight TSS with range up to 48 miles; and ◆ VTS Delfzijl: VTS is mandatory for all vessels, which includes an information service.

V Environmental protection measures intended to reduce or combat pollution

IMO measures

Denmark, Germany and the Netherlands are Parties to MARPOL 73/78.

The designation of the North Sea and its coastal waters west of Great Britain and Ireland (North West European Waters) as a Special Area under MARPOL Annex I. This was implemented on a national level and entered into force in all three concerned countries.

The designation of the North Sea as a special area under MARPOL Annex V. Annex V entered into force in all three States concerned.

The designation of the North Sea as a Sox Emission Control Area under Annex VI of MARPOL 73/78 (not yet in force).

The 1990 London International Convention on Pollution Preparedness, Response and Co-operation (OPRC) promotes international co-operation in the event of a major oil pollution threat between all North Sea countries. The OPRC-HNS Protocol (not yet in force) establishes a framework for international co-operation in the event of incidents involving hazardous and noxious substances.

EC measures

Council Directive 93/75/ECC of 13 September 1993 concerning minimum requirements for vessels bound for or leaving Community ports and carrying dangerous or polluting goods (known as the HAZMAT Directive) has been in force since 1995.

The EC Directive 2000/59/EEC on port reception facilities for ship-generated waste and cargo residues, which entered into force in 2000, should be implemented by the concerned States by the end of 2002. It is the aim of the Directive to reduce the discharges of ship-generated waste and cargo residue into the sea, especially discharges, from ships using ports in the Community, by improving the availability and use of port reception facilities for ship-generated waste and cargo residues.

The EC Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels.

As a follow up to the Erika incident, two other packages of measures are in the legislative procedure. Package 'Erika I' is completed and contains the following elements:

- further development of Port State Control;
- strengthening of provisions for and the control of Classification Societies;
- initiative for early phasing out of single hull tankers, mentioned in paragraph 8 above and being implemented in the EU by a regulation.

The proposals concerning package 'Erika II', passed on to the Council on 8 December 2000, consist of the following elements:

- setting up a common monitoring and information system for maritime traffic, which will in due course replace EC-directive 93/75/EEC;

- initiative for an additional compensation fund for damage by oil pollution;
- establishment of the European Maritime Safety Agency (EMSA).

Other regional measures

Bonn Agreement: basic agreement for co-operation in dealing with Pollution of the North Sea by Oil and other Harmful Substances. Close co-operation between B, DK, F, D, NL, N, S and UK. Zones of responsibility are established under the Bonn Agreement, for co-operation in terms of aerial surveillance and dealing with pollution of the North Sea by oil and other harmful substances.

Joint Maritime Contingency Plans on Combating Oil and Other Harmful Substances agreed between D and DK resp. NL (DANGER- resp. NETHGER-Plans), concerning bilateral co-operation especially in defined exterior and quick Response Zones.

Bilateral Administrative Agreements between D and DK resp. NL on co-operation in the field of aerial surveillance (coordination of flight times and corridors, joint flights, mutual assistance by aircraft of the other party).

Bilateral arrangements also apply between the Wadden Sea states in terms of Joint Maritime Contingency Plans.

D-NL-Memorandum of Understanding on Mutual Support in the Field of North Sea Emergency Towing Capacity (March 2000): mutual assistance by emergency towing vessels in an area between the outer limitation of the VTS-schemes and the coastline, incl. approaches to the seaports.

National measures

There are lots of different national measures regarding preventing and combating marine pollution.

Annex 18

Regional declarations supporting the nomination.



Miljøministeren



Fælleserklæring om proces for ansøgning om optagelse af Vadehavet på UNESCOs liste over Verdensarv

Miljøministeren, byrådene i Esbjerg, Fanø og Varde og bestyrelsen for Nationalpark Vadehavet er enige om at anmode kulturministeren om at indstille Vadehavet til optagelse på UNESCOs liste over verdensarv.

Parterne anerkender Vadehavets enestående universelle betydning, og den beskyttelse, der gælder for Vadehavet. Parterne anerkender samtidig, at udpegning sker som en udvidelse af den eksisterende udpegning af det tyske og hollandske Vadehav som verdensarv, og som sådan anerkender de principper, der er grundlaget for denne udpegning.

Idet der henvises til miljøministerens brev af 20. september 2012 til kommunerne og landbrugets organisationer gentages, at der med en udpegning ikke bliver ændret på de restriktioner, der kendes i dag. F.eks. vil opretholdelse af digesikkerhed, regulering af vandstanden bag digerne og/eller nødvendige foranstaltninger for opretholdelse af havneindløb og sejlrender kunne gennemføres som hidtil. UNESCOs opgave er alene at godkende, at det nuværende beskyttelsesniveau opfylder de krav, de stiller til en optagelse på verdensarvslisten. UNESCO har ikke myndighed til at stille krav om nye reguleringer. Det betyder, at evt. fremtidige ændringer i beskyttelsen af den danske del af Vadehavet, alene er et dansk anliggende.

// Verdensarvsområdet følger den grænse som afgrænser det eksisterende beskyttelsesområde, Natur og Vildtreservat Vadehavet, og som er det beskyttelsesområde der indgår i det Trilaterale Vadehavssamarbejde, dog med visse undtagelser som fremgår af nedenstående bilag og kort.

Ida Auken
Miljøminister

Johnny Søtrup
Borgmester
Esbjerg Kommune

Erik Nørreby
Borgmester
Fanø Kommune

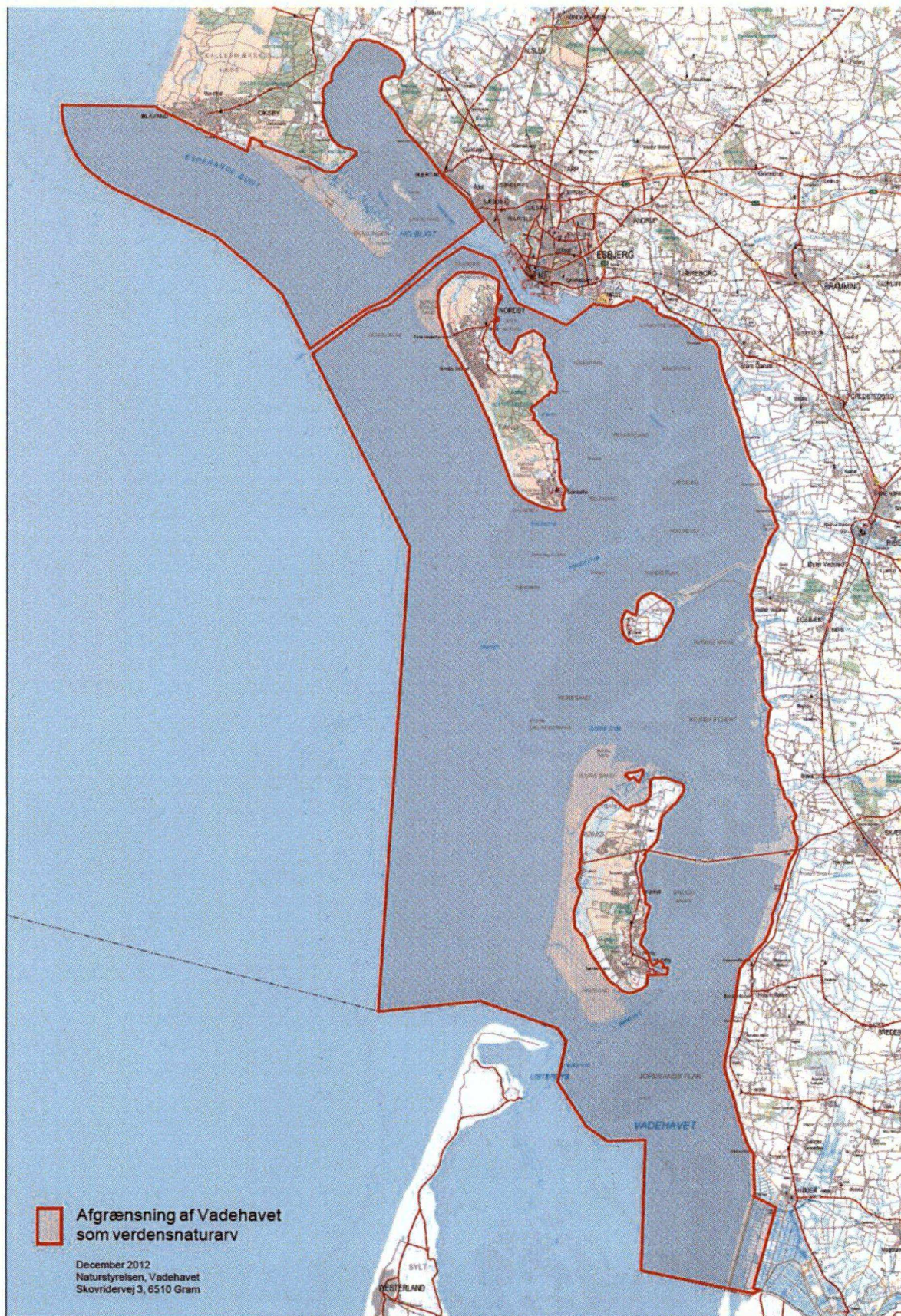
Gylling Haahr
Borgmester
Varde Kommune

Bent Poulsen
Formand
Nationalpark Vadehavet

Bilag til Fælleserklæring

Undtagelser for afgrænsningen, hvor denne ikke følger Natur- og Vildtreservatet:

- Indsejlingen til Esbjerg Havn, idet indsejlingen ikke i lighed med resten af beskyttelsesområdet er udpeget som Natura 2000 område. Den sydlige afgrænsning af området ved Esbjerg Havn følger også Natura 2000 grænsen.
- Et ca. 20 ha stort område ved Rømø Havn, hvortil Tønder Kommune har en eksisterende planlægningsstilladelse til en udvidelse af havnen. Tilladelsen er givet på vilkår om, der etableres erstatningsnatur.
- Landbrugsområdet Margrethe Kog nord for slusevejen, i alt 266 ha, fordi områdets anvendelse anses for uforenelig med den nødvendige beskyttelse.
- Det militære skydeterræn på Rømøs nordspids på 43 ha. Undtagelsen dækker kun det egentlige øvelsesområde, og ikke den omkringliggende sikkerhedszone.



Declaration of support for the application for nomination of the Danish Wadden Sea for the UNESCO list of World Heritage

The Minister for the Environment, the municipality councils in Esbjerg, Fanø and Varde, and the Wadden Sea National Park agree to request the Minister of Culture to nominate the Danish part of the Wadden Sea for designation as UNESCO World Heritage Site.

The parties recognise the outstanding universal value of the Wadden Sea and also recognise the protection measures that are effective in the Wadden Sea. The parties at the same time acknowledge that the application for nomination is an extension of the Dutch and German inscription as world heritage and as such acknowledge the principles that form the basis for the nomination.

With reference to letter from the Minister for the Environment by the 20 September 2012 to the municipalities and the agriculture organisations it is reiterated that the nomination will not entail any changes to the current restrictions on utilization of the area. For example remains the conditions unchanged under which preservation of the dykes, regulation of the water level behind the dykes and requisite measures for the maintenance of channels to the harbours are possible. The objective of UNESCO is to approve that the current protection measures comply with the requirements of UNESCO for nomination as world heritage. UNESCO does not represent an additional level of administration with the authority to demand additional regulations. This means that future regulations of the protection measures in the Danish part of the Wadden Sea remains a matter for the Danish authorities.

The delimitation of the nominated property follows the delimitation of the existing protection area under the Statutory Order on Conservation and a Wildlife Reserve in the Wadden Sea. This area is also the Trilateral Conservation Area, yet with minor exceptions listed in the annex and the enclosed map.

[Signed by the Minister of the Environment, Majors of Esbjerg, Fanø and Varde Municipalities and the chair of the National Park Wadden Sea]

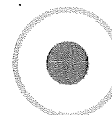
Annex to the Declaration of support

Exceptions from the delimitation of the Statutory Order on Conservation and a Wildlife Reserve in the Wadden Sea:

- The channel to Esbjerg Harbour, which is not designated as Natura 2000 like the rest of the area. The southern delimitation of the area close to Esbjerg Harbour also follows the Natura2000 designation.
- An approx. 20 ha. area connected to Rømø Harbour. Tønder municipality holds a planning permit for extension of the harbour activities. The planning permit is given under the condition that nature restoration will be established.
- A rural area with agriculture production in Margrethe Kog north of Slusevej, in total 266 ha. The utilization of the area is considered to be incompatible with the required protection for nomination as world heritage.
- The military exercise area of 43 ha. on the northern part of Rømø. The exception is only the exercise area, and does not include the surrounding security zone.

Der Vorsitzende
des
Nationalpark-Beirates

Nationalpark
Wattenmeer



NIEDERSACHSEN

Nationalparkverwaltung Niedersächsisches Wattenmeer
Virchowstraße 1 • 26382 Wilhelmshaven

Herrn Minister
Dr. Stefan Birkner
Niedersächsisches Ministerium
für Umwelt, Energie und Klimaschutz
Archivstr. 2

30169 Hannover

MU Büro des Ministers	
Eing. 7. DEZ 2012	
<input checked="" type="checkbox"/> Herr Minister z. K. <input checked="" type="checkbox"/> Frau Staatssekretärin z. K. <i>Wa 7/12</i>	
Tgb. Nr.	Termin:
<input type="checkbox"/> Eingangsbestätigung	
An Abt. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> E <input type="checkbox"/> Presse mit der Bitte um <input type="checkbox"/> Bibliothek	
<input type="checkbox"/> Antwort-Entwurf	<input type="checkbox"/> Kennzn. v. Abg.
<input type="checkbox"/> Rückruf/-sprache	<input type="checkbox"/> Kennzn. n. Abg.
<input type="checkbox"/> Stellungnahme	<input type="checkbox"/> weitere Verant.
<input checked="" type="checkbox"/> Kenntnisnahme/ zum Verbleib	<input type="checkbox"/>

*copy an RW
al. 7/12*

Bearbeitet von
Herrn Gayk
Andre.Gayk@nlpv-wattenmeer.niedersachsen.de
Durchwahl (04421) 911 - 275
Wilhelmshaven,
06.12.2012

Ihr Zeichen, Ihre Nachricht vom Mein Zeichen (Bitte bei Antwort angeben)
01.2-22242

Erweiterung des UNESCO-Weltnaturerbes Wattenmeer in Niedersachsen

Sehr geehrter Herr Minister Dr. Birkner,

die von Ihnen geplante seewärtige Erweiterung des UNESCO-Weltnaturerbes Wattenmeer in Niedersachsen wird vom Beirat des Nationalparks Niedersächsisches Wattenmeer ausdrücklich begrüßt. Dieses Vorhaben ist ein weiterer konsequenter Schritt, das einzigartige Wattenmeer für die zukünftigen Generationen zu sichern.

Mit der Anerkennung des Wattenmeeres als UNESCO-Weltnaturerbe 2009 haben die Aufmerksamkeit und das Interesse für diesen Lebensraum spürbar zugenommen. Hier von profitieren nicht nur die Natur im Wattenmeer sondern auch die heimische Wirtschaft und somit auch die Menschen, die in der Region leben und arbeiten.

Die jetzige Erweiterung und die damit verbundene Abgrenzung ist ein gelungenes Beispiel für eine verantwortungsvolle Zusammenarbeit von Naturschutz und wirtschaftlichen Interessen, welche dem herausragenden universellen Wert (Outstanding Universal Value) des Gebietes gerecht wird.

Mit freundlichen Grüßen

Bielefeld

Nationalparkverwaltung „Niedersächsisches
Wattenmeer“
Tel.: (04421) 911-0 Fax.: (04421) 911-280

poststelle@nlpv-wattenmeer.niedersachsen.de
www.nationalpark-wattenmeer.niedersachsen.de

Virchowstr. 1, 26382 Wilhelmshaven

Bankverbindung (NordLB):
Konto-Nr. 0106036510 BLZ 250 500 00



Niedersachsen

Annex 19

Image inventory list.

Annex 19 Photo list Denmark and Niedersachsen

No of photo	Form	Caption	Date of photo (month/year)	photographer (abbreviation see below)	Copyright owner (abbreviation see below)	Contact details of copyright owner: Address list below table	Non exclusive cession of rights
AERIAL PHOTOS							
001	jpg	Varde Å, Ho Bugt	10/1995	JOFRI	JOFRI	JOFRI	yes
002	jpg	Skallingen and Ho Bugt	10/2012	JOFRI	JOFRI	JOFRI	yes
003	jpg	Skallingen, gullies in saltmarsh	08/2006	JOFRI	JOFRI	JOFRI	yes
004	jpg	Skallingen, salt marsh and dunes	05/2006	JOFRI	JOFRI	JOFRI	yes
005	jpg	Skallingen, south tip	12/2001	JOFRI	JOFRI	JOFRI	yes
006	jpg	Sønderho, Fanø	08/2006	JOFRI	JOFRI	JOFRI	yes
007	jpg	Keldsand, South Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
008	jpg	Sandbanks south of Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
009	jpg	Mandø Flak	08/2008	JOFRI	JOFRI	JOFRI	yes
010	jpg	Mandø from west	08/2008	JOFRI	JOFRI	JOFRI	yes
011	jpg	Mandø, Koresand	08/2008	JOFRI	JOFRI	JOFRI	yes
012	jpg	Rømø North	10/2010	JOFRI	JOFRI	JOFRI	yes
013	jpg	Rømø Havsand	10/2010	JOFRI	JOFRI	JOFRI	yes
014	jpg	Salt marshes, North Rømø	10/2010	JOFRI	JOFRI	JOFRI	yes
015	jpg	Rømø Southwest	10/2010	JOFRI	JOFRI	JOFRI	yes
016	jpg	Rømø from South	10/2010	JOFRI	JOFRI	JOFRI	yes
017	jpg	Jordsand Flak	10/2010	JOFRI	JOFRI	JOFRI	yes
018	jpg	Eelgrass, Koldby Leje	10/2010	JOFRI	JOFRI	JOFRI	yes
019	jpg	Ballum Forland and Marsh	10/2010	JOFRI	JOFRI	JOFRI	yes
020	jpg	Ballum Forland, man made salt marsh	10/2010	JOFRI	JOFRI	JOFRI	yes
021	jpg	Ballum Sluse and Rømø Barrage	10/2010	JOFRI	JOFRI	JOFRI	yes
022	jpg	Rejsby Forland	10/2010	JOFRI	JOFRI	JOFRI	yes
023	jpg	Ebbroad to Mandø	10/2010	JOFRI	JOFRI	JOFRI	yes
024	jpg	Ribe Å, River Ribe and Kammerlusen	10/2010	JOFRI	JOFRI	JOFRI	yes
025	jpg	Knudedyb North, Esbjerg and Fanø	10/2010	JOFRI	JOFRI	JOFRI	yes

ANIMALS							
		Birds and other animals					
026	jpg	Mussel and oyster bank, Juvre Dyb	02/2005	JOFRI	JOFRI	JOFRI	yes
027	jpg	Blue Mussels and Pacific Oyster	02/2005	JOFRI	JOFRI	JOFRI	yes
028	jpg	Pacific Oyster	02/2005	JOFRI	JOFRI	JOFRI	yes
029	jpg	Razor Mussels, Skallingen	11/2002	JOFRI	JOFRI	JOFRI	yes
030	jpg	Beached Jellyfish	04/2011	NST	NST	NST	yes
031	jpg	Harbour Seals, Langjord	08/2012	JOFRI	JOFRI	JOFRI	yes
032	jpg	Harbour Seals, Langjord	09/2010	JOFRI	JOFRI	JOFRI	yes
033	jpg	Harbour Seals, Langli Sand	06/2011	JOFRI	JOFRI	JOFRI	yes
034	jpg	Harbour Seal, juvenile, Fanø	08/2012	JOFRI	JOFRI	JOFRI	yes
035	jpg	Whooper Swans, Farup	02/2010	BLC	BLC	BLC	yes
036	jpg	Barnacle Goose, Ballum	05/2010	BLC	BLC	BLC	yes
037	jpg	Barnacle Goose, Ballum Forland	04/2010	BLC	BLC	BLC	yes
038	jpg	Barnacle Goose, Ballum Forland	05/2010	BLC	BLC	BLC	yes
039	jpg	Barnacle Goose, Margrethekog	04/2008	JOFRI	JOFRI	JOFRI	yes
040	jpg	Barnacle Goose, Sneum Forland	03/2011	JOFRI	JOFRI	JOFRI	yes
041	jpg	Barnacle Geese, Ballum Forland	11/2010	NST	NST	NST	yes
042	jpg	Brent Geese, Sneum Forland	04/2009	JOFRI	JOFRI	JOFRI	yes
043	jpg	Wigeons, Ballum Forland	04/2010	BLC	BLC	BLC	yes
044	jpg	Teals, Ballum Forland	04/2010	BLC	BLC	BLC	yes
045	jpg	Teals, Ballum Forland	04/2010	BLC	BLC	BLC	yes
046	jpg	Eider Ducks	05/2010	BLC	BLC	BLC	yes
047	jpg	Eider Ducks in ice, Knudedyb	12/1987	JOFRI	JOFRI	JOFRI	yes
048	jpg	Oystercatcher, breeding bird, Mandø	06/2011	JOFRI	JOFRI	JOFRI	Yes
049	jpg	Oystercatchers, wintering, Esbjerg	01/2010	BLC	BLC	BLC	Yes
050	jpg	Avocets, Ballum Forland	09/2010	BLC	BLC	BLC	yes
051	jpg	Avocets, Ballum Forland	09/2010	BLC	BLC	BLC	yes
052	jpg	Avocets, Rømø Barrage	09/2010	BLC	BLC	BLC	yes
053	jpg	Dunlins, Ballum Forland	09/2010	BLC	BLC	BLC	yes
054	jpg	Knots, juveniles, Skallingen	09/1990	JOFRI	JOFRI	JOFRI	yes
055	jpg	Knots, Mandø	02/2011	JOFRI	JOFRI	JOFRI	yes
056	jpg	Knots, Mandø	04/2012	JOFRI	JOFRI	JOFRI	yes
057	jpg	Knots, Mandø	04/2012	JOFRI	JOFRI	JOFRI	yes
058	jpg	Knots, from airplane, Jordsand Flak	04/1986	JOFRI	JOFRI	JOFRI	yes

059	jpg	Greenshank, Brøns Forland	08/2010	BLC	BLC	BLC	yes
060	jpg	Bar-tailed Godwits, Skallingen	08/2010	BLC	BLC	BLC	yes
061	jpg	Curlew, Ballum Forland	09/2010	BLC	BLC	BLC	yes
062	jpg	Black-tailed Godwit, breeding bird, Rømø	05/2005	NST	NST	NST	yes
063	jpg	Arctic Tern, breeding bird, Fanø	06/2010	JOFRI	JOFRI	JOFRI	yes
064	jpg	Sandwich Tern, breeding colony, Langli	05/2002	JOFRI	JOFRI	JOFRI	yes
065	jpg	Common Gulls, breeding, Mandø	05/2011	JOFRI	JOFRI	JOFRI	yes
066	jpg	Herring Gulls, wintering, Blåvand	03/2010	BLC	BLC	BLC	yes
067	jpg	Harbour Porpoise (<i>Phocoena phocoena</i>)	04/2009	RC	RC	RC	yes
068	jpg	Grey Seal (<i>Halichoerus grypus</i>)	10/2011	GR	GR	GR	yes
069	jpg	Flock of Common Eider (<i>Somateria mollissima</i>)	05/2007	RL	RL	RL	yes
070	jpg	Flock of gulls following shrimp fishing vessel	06/2007	CS	CS	CS	yes
071	jpg	Common Gull (<i>Larus canus</i>)	10/2008	IZ	IZ	IZ	yes
072	jpg	Lesser Black-backed Gulls (<i>Larus fuscus</i>)	06/2010	JD	JD	JD	yes
073	jpg	Species portrait of Sole (<i>Solea solea</i>)	07/2008	IZ	IZ	IZ	yes
074	jpg	Species Portrait of Brown Shrimp (<i>Crangon crangon</i>)	07/2008	IZ	IZ	IZ	yes
FLORA							
Plants							
075	jpg	Eelgrass, Langli Flak	09/2011	JOFRI	JOFRI	JOFRI	yes
076	jpg	Seeweed, Langli Flak	09/2011	JOFRI	JOFRI	JOFRI	yes
077	jpg	Glassworth, Fanø	08/2007	NST	NST	NST	yes
078	jpg	Laevender, Skallingen	08/2001	JOFRI	JOFRI	JOFRI	yes
079	jpg	Laevender, Mandø	08/2002	NST	NST	NST	yes
080	jpg	Beach Wormwood, Langli	09/2012	JOFRI	JOFRI	JOFRI	yes
081	jpg	English Grass, Langli	09/2012	JOFRI	JOFRI	JOFRI	yes
082	jpg	Halimione Triglochin, Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
083	jpg	Centaurium, Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
084	jpg	Odontites, Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
HABITATS							
Coastlines and dunes							
086	jpg	Skallingen West	10/2010	NST	NST	NST	yes
087	jpg	Skallingen West	03/2005	JOFRI	JOFRI	JOFRI	yes
088	jpg	Rømø West	10/2011	NST	NST	NST	yes

089	jpg	Rømø West	10/2011	NST	NST	NST	yes
090	jpg	Hvidbjerg Strand	09/2010	JOFRI	JOFRI	JOFRI	yes
091	jpg	Hvidbjerg Strand	09/2010	JOFRI	JOFRI	JOFRI	yes
092	jpg	Degradated dunes, Skallingen	11/2005	NST	NST	NST	yes
093	jpg	Dunes and sand drift, Skallingen	11/2005	NST	NST	NST	yes
094	jpg	Dune landscape, Fanø	08/2008	JOFRI	JOFRI	JOFRI	yes
095	jpg	Vegetated dunes, Langli	08/2012	JOFRI	JOFRI	JOFRI	yes
096	jpg	Moraine coast, Ho Bay	03/2001	JOFRI	JOFRI	JOFRI	yes
097	jpg	Ungrazed salt marsh, Ho Bay	06/1999	JOFRI	JOFRI	JOFRI	yes
098	jpg	Degradated coast, Langli	09/2012	JOFRI	JOFRI	JOFRI	yes
099	jpg	Sneum Sluse, low tide	02/2012	JOFRI	JOFRI	JOFRI	yes
100	jpg	Sneum Sluse, storm surge	11/2004	JOFRI	JOFRI	JOFRI	yes
101	jpg	Darum Dike, storm surge	11/2004	JOFRI	JOFRI	JOFRI	yes
102	jpg	Roborghus, Tjæreborg, storm surge	10/2007	JOFRI	JOFRI	JOFRI	yes
		Salt marshes					
103	jpg	Salt marsh, pioneer zone, Råhede	11/2012	JOFRI	JOFRI	JOFRI	yes
104	jpg	Salt marsh, pioneer zone, Rejsby	11/2012	JOFRI	JOFRI	JOFRI	yes
105	jpg	Salt marsh, Spartina, Råhede	11/2012	JOFRI	JOFRI	JOFRI	yes
106	jpg	Low salt marsh, Råhede	11/2012	JOFRI	JOFRI	JOFRI	yes
107	jpg	Salt marsh, old Spartina, Rømødæmningen	10/2012	JOFRI	JOFRI	JOFRI	yes
108	jpg	Salt marsh, old Spartina, Mandø	04/2011	JOFRI	JOFRI	JOFRI	yes
109	jpg	Salt marsh, degraded edge, Fanø	05/2007	NST	NST	NST	yes
110	jpg	Natural salt marsh, Skallingen	11/2004	NST	NST	NST	yes
111	jpg	Natural salt marsh, gullies, Skallingen	11/2004	NST	NST	NST	yes
112	jpg	Sandy salt marsh, Skallingen	11/2004	NST	NST	NST	yes
113	jpg	Mature natural salt marsh, Skallingen	08/2010	JOFRI	JOFRI	JOFRI	yes
114	jpg	Gully in mature natural salt marsh, Skallingen	08/2010	JOFRI	JOFRI	JOFRI	yes
115	jpg	Gully in mature natural salt marsh, Fanø	05/2007	NST	NST	NST	yes
116	jpg	Grazing cattle, salt marsh, Jedsted Forland	06/2008	JOFRI	JOFRI	JOFRI	yes
117	jpg	High salt marsh, Langli	08/2009	JOFRI	JOFRI	JOFRI	yes
118	jpg	High salt marsh, Mandø	07/2008	JOFRI	JOFRI	JOFRI	yes
119	jpg	Low salt marsh, Råhede	11/2012	JOFRI	JOFRI	JOFRI	yes
120	jpg	Salt marsh in front of dike, Rejsby	11/2012	JOFRI	JOFRI	JOFRI	yes
121	jpg	Grazing geese in artificial salt marsh, Rømødæmningen	11/2004	JOFRI	JOFRI	JOFRI	yes

		Tidal flats					
122	jpg	Tidal gully, Farup Forland	09/2004	NST	NST	NST	yes
123	jpg	Mudflats at low tide, Mandø	04/2007	NST	NST	NST	yes
124	jpg	Tidal flats, Mandø	04/2007	NST	NST	NST	yes
125	jpg	Low tide, Hjerpsted	04/2003	NST	NST	NST	yes
126	jpg	Tidal flat in front of geest, Hjerpsted	04/2003	NST	NST	NST	yes
127	jpg	Tidal flat near saltmarsh, Råhede Vade	11/2012	JOFRI	JOFRI	JOFRI	yes
128	jpg	Tidal flat, Råhed Vade	11/2012	JOFRI	JOFRI	JOFRI	yes
129	jpg	Tidal flat in sedimentation field, Mandø	06/2005	JOFRI	JOFRI	JOFRI	yes
130	jpg	Sand flat with Lugworms, Hviding	02/2008	JOFRI	JOFRI	JOFRI	yes
131	jpg	Sand flat with Lugworms, Hviding	02/2008	JOFRI	JOFRI	JOFRI	yes
132	jpg	Sand flat with Lugworms, Hviding	02/2008	JOFRI	JOFRI	JOFRI	yes
133	jpg	Sand flat with Lugworms, Hviding	02/2008	JOFRI	JOFRI	JOFRI	yes
134	jpg	Tidal flat, Snails	09/2012	JOFRI	JOFRI	JOFRI	yes
135	jpg	Tidal flat with Blue Mussel banks, Sædding Strand	11/2010	NST	NST	NST	yes
136	jpg	Jordsand Flak	06/2010	JOFRI	JOFRI	JOFRI	yes
137	jpg	Jordsand Flak, alga	06/2010	JOFRI	JOFRI	JOFRI	yes
138	jpg	Jordsand Flak, alga, Lugworms	06/2010	JOFRI	JOFRI	JOFRI	yes
139	jpg	Jordsand Flak, alga, Lugworms	06/2010	JOFRI	JOFRI	JOFRI	yes
140	jpg	Jordsand Flak, Eelgrass	06/2010	JOFRI	JOFRI	JOFRI	yes
141	jpg	Muddy sediments, Ho Bugt	06/2004	JOFRI	JOFRI	JOFRI	yes
142	jpg	Dry tidal mud, Ho Bugt	05/2003	JOFRI	JOFRI	JOFRI	yes
143	jpg	Tidal mud with "birdprints"	05/2003	JOFRI	JOFRI	JOFRI	yes
144	jpg	Tidal sand, "duckprints", Vilslev Vade	10/2007	JOFRI	JOFRI	JOFRI	yes
		Sands					
145	jpg	Rømø Flak	05/2009	NST	NST	NST	yes
146	jpg	Koresand	07/2010	NST	NST	NST	yes
147	jpg	Koresand	08/2011	NST	NST	NST	yes
148	jpg	Koresand	08/2011	NST	NST	NST	yes
149	jpg	Koresand	06/2000	JOFRI	JOFRI	JOFRI	yes
150	jpg	Mandø Flak	08/2011	NST	NST	NST	yes
151	jpg	Langli Sand	05/2009	JOFRI	JOFRI	JOFRI	yes
IMPRESSIONS							

152	jpg	Cockles	03/1995	JOFRI	JOFRI	JOFRI	yes
153	jpg	Icy Wadden Sea, Ho Bugt	12/2010	NST	NST	NST	yes
154	jpg	Frosen ebbroad, Mandø	02/2012	NST	NST	NST	yes
155	jpg	Mandø East	02/2012	NST	NST	NST	yes
156	jpg	Juvre Gully, Rømø	02/2012	NST	NST	NST	yes
157	jpg	Skallingen	11/2012	NST	NST	NST	yes
158	jpg	Low tide, Fanø East	01/2006	NST	NST	NST	yes
159	jpg	Low tide, Skallingen	09/2007	NST	NST	NST	yes
160	jpg	Oyster-catchers, Østerdyb	04/2004	NST	NST	NST	yes
161	jpg	Low tide, Fanø North	01/2006	NST	NST	NST	yes
162	jpg	Sneum Forland	04/2006	JOFRI	JOFRI	JOFRI	yes
163	jpg	Sneum Forland, Esbjerg	10/2009	JOFRI	JOFRI	JOFRI	yes
164	jpg	Råhede Vade	02/2008	JOFRI	JOFRI	JOFRI	yes
165	jpg	Langli to Skallingen	08/2008	JOFRI	JOFRI	JOFRI	yes
166	jpg	Grådyb	03/2010	JOFRI	JOFRI	JOFRI	yes
167	jpg	Ribe Å, Kammerslusen	01/2010	JOFRI	JOFRI	JOFRI	yes
168	jpg	Sneum Forland	04/2010	JOFRI	JOFRI	JOFRI	yes
169	jpg	Råhede Vade	11/2012	JOFRI	JOFRI	JOFRI	yes
170	jpg	Dry mud, Ho Bugt	06/1995	JOFRI	JOFRI	JOFRI	yes
MAN AND WADDEN SEA							
171	jpg	Walking to Langli	09/2008	JOFRI	JOFRI	JOFRI	yes
172	jpg	Walking to Langli	09/2008	JOFRI	JOFRI	JOFRI	yes
173	jpg	People on Langli Ebbroad	07/1999	JOFRI	JOFRI	JOFRI	yes
174	jpg	Fisher, sedimentation field, Jordsand	04/1988	JOFRI	JOFRI	JOFRI	yes
175	jpg	Guided tour on tidal flat, V. Vedsted	02/2009	JOFRI	JOFRI	JOFRI	yes
176	jpg	Tractor trip to Koresand	08/2011	NST	NST	NST	yes
177	jpg	Footprint, Langli Sand	09/2008	JOFRI	JOFRI	JOFRI	yes
178	jpg	Tractor bus to Mandø, Mandø Ebbroad	03/2007	NST	NST	NST	yes
179	jpg	Biking on Skallingen	04/2010	NST	NST	NST	yes
180	jpg	Horseriding to Mandø	05/2011	NST	NST	NST	yes
181	jpg	Rømø Barrage Road	12/2006	JOFRI	JOFRI	JOFRI	yes
182	jpg	Esbjerg in the haze	10/2012	JOFRI	JOFRI	JOFRI	yes
183	jpg	Esbjerg Harbour from Fanø	08/2010	JOFRI	JOFRI	JOFRI	yes
184	jpg	Esbjerg Harbour from Fanø North	08/2010	JOFRI	JOFRI	JOFRI	yes
185	jpg	Ferry from England, Grådyb	08/2010	JOFRI	JOFRI	JOFRI	yes
186	jpg	Old summer cottage, scientific station, Langli	08/2007	NST	NST	NST	yes














187	jpg	Sculpture, "People at sea", Esbjerg	01/2009	JOFRI	JOFRI	JOFRI	yes
188	jpg	Observing birds from the dike, Sneum Sluse	05/2009	JOFRI	JOFRI	JOFRI	yes
189	jpg	National Park flag	07/2011	NST	NST	NST	yes
190	jpg	Fishing children, westcoast of SKallingen	07/2010	JOFRI	JOFRI	JOFRI	yes
191	jpg	Gigas oyster collecting, Østerdyb	02/2009	JOFRI	JOFRI	JOFRI	yes
192	jpg	Eating oyster, Østerdyb	02/2009	JOFRI	JOFRI	JOFRI	yes
193	jpg	Sluse at Kammerlusen, Ribe River	09/2009	JOFRI	JOFRI	JOFRI	yes
194	jpg	Shrimp boats, Havneby, Rømø	09/2001	JOFRI	JOFRI	JOFRI	yes
195	jpg	Leisure boat, Knudedyb, Ribe	07/2011	NST	NST	NST	yes
196	jpg	Shrimp fishing vessel	06/2007	CS	CS	CS	yes
197	jpg	Catch of Brown Shrimp (Crangon crangon)	06/2007	CS	CS	CS	yes


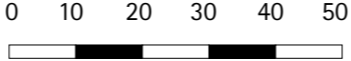
Abbreviations and contact details of copyright owners (name, address, phone, fax and e-mail):

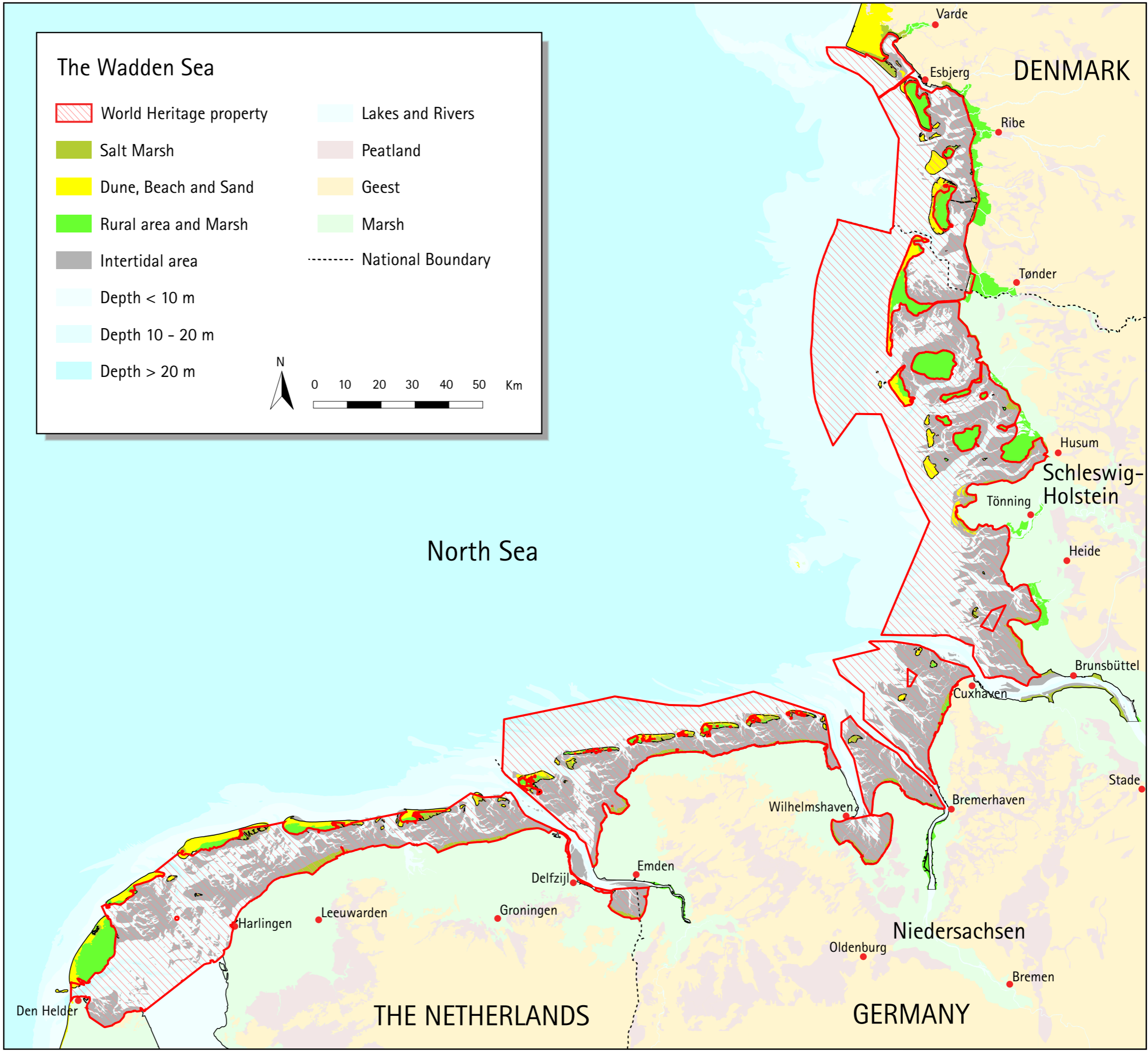
- CS Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Claus Schulz, e-mail: claus.schulz@nlpv-wattenmeer.niedersachsen.de
- BLC Bo Lassen Christiansen, Valdemarsgade 6 2.tv., 6700 Esbjerg, Denmark, phones: +45 75 12 14 99 / +45 28 83 39 48, e-mail: forlagetcrex@gmail.com
- GR Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Gundolf Reichert, e-mail: gundolf.reichert@nlpv-wattenmeer.niedersachsen.de
- IZ Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Imke Zwoch, e-mail: imke.zwoch@nlpv-wattenmeer.niedersachsen.de
- JD Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Jochen Dierschke, e-mail: jochen.dierschke@ifv-vogelwarte.de
- JOFRI John Frikke, The Danish Ministry of the Environment, National Nature Agency Vadehavet, Skovridervej 3, 6510 Gram, Denmark / Private: Østertoften 81, St. Darum, 6740 Bramming, Denmark. Phone +45 72 54 34 05 / +45 22 86 05 19, e-mail: jofri@nst.dk / john.frikke@mail.dk
- NST A selection of pictures taken by a number of people, rights administrated by The National Nature Agency Vadehavet, Skovridervej 3, 6510 Gram, Denmark, phone: +45 72 54 30 00, e-mail: raf@nst.dk
- RC Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Richard Czeck, e-mail: richard.czeck@nlpv-wattenmeer.niedersachsen.de
- RL Nationalparkverwaltung Niedersächsisches Wattenmeer, Virchowstr.1, D-26382 Wilhelmshaven, Germany, phone +49(0)4421 911281, fax +49(0)4421 911280, e-mail: poststelle@nlpv-wattenmeer.niedersachsen.de. Photographer: Reno Lottmann, e-mail: reno-lottmann@gmx.de

The „Nationalparkverwaltung Niedersächsisches Wattenmeer“ (Administration of the National Park Wadden Sea Niedersachsen) is the copyright owner of the photos taken by CS, GR, IZ, JD, RC and RL.

The Wadden Sea

 World Heritage property	 Lakes and Rivers
 Salt Marsh	 Peatland
 Dune, Beach and Sand	 Geest
 Rural area and Marsh	 Marsh
 Intertidal area	 National Boundary
 Depth < 10 m	
 Depth 10 - 20 m	
 Depth > 20 m	

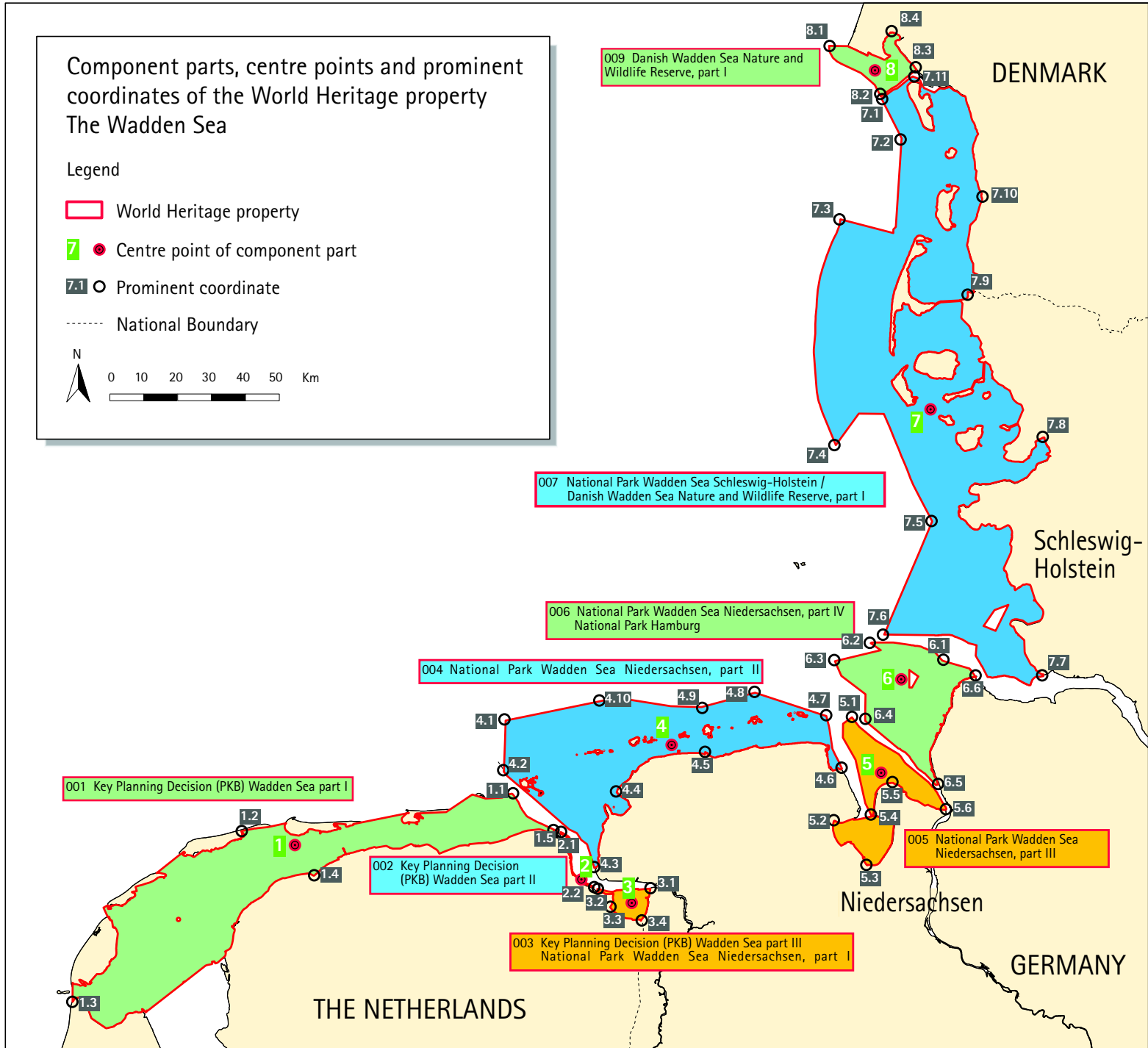
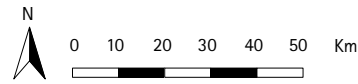


The Wadden Sea
(Volume One, A3 folded map).

Component parts, centre points and prominent coordinates of the World Heritage property The Wadden Sea

Legend

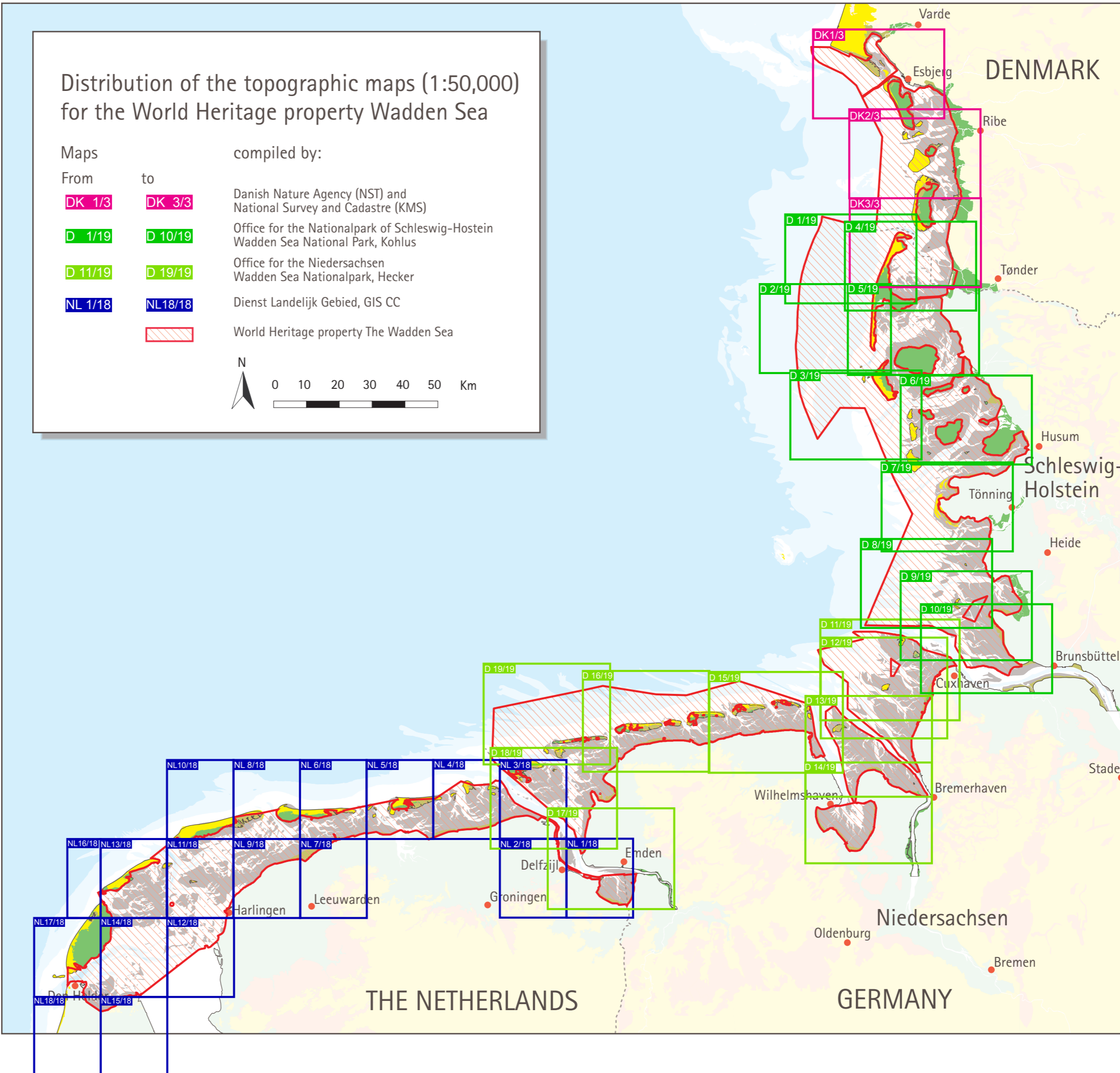
- World Heritage property
- Centre point of component part
- Prominent coordinate
- National Boundary



Component parts of the World Heritage property (Volume One, A3 folded map).

Distribution of the topographic maps (1:50,000) for the World Heritage property Wadden Sea

Maps	compiled by:	
From	to	
DK 1/3	DK 3/3	Danish Nature Agency (NST) and National Survey and Cadastre (KMS)
D 1/19	D 10/19	Office for the Nationalpark of Schleswig-Holstein Wadden Sea National Park, Kohlus
D 11/19	D 19/19	Office for the Niedersachsen Wadden Sea Nationalpark, Hecker
NL 1/18	NL18/18	Dienst Landelijk Gebied, GIS CC
		World Heritage property The Wadden Sea



Distribution of the topographic maps for the World Heritage property (Volume One, A3 folded map).