Nomination of the Dutch-German Wadden Sea as World Heritage Site

Supplementary Information
February 2009

Colophon

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Contents

Supplementary Information February 2009

Overview of the Appendices

The Supplementary Information on the Nomination of the Dutch-German Wadden Sea as a World Heritage Site, delivered in response to the IUCN requests to the state parties by letters of 25 September and 11 December 2008, encompasses the following Appendices:

Appendix 1: Land and Seascapes of the Nominated Property and the Wadden Sea Area including a Comparative Study of the Outstanding Universal Value (OUV) of the Nominated Property and the Danish Wadden Sea

This appendix encompasses the requested comparative study (point 1, letter of 25 September 2008) within the Wadden Sea itself to enhance the case of OUV of the existing nomination in the broader context of the Wadden Sea. According to the IUCN request it is preceded by the requested extension of Table 2.1 of the nomination document including a comprehensive explanatory note to this table, since this extended table underpins the internal comparative study.

Appendix 2: Landmark Studies on the Significance of the Wadden Sea to Earth Sciences and to Biology and Ecology

This appendix includes information on landmark studies and research projects (point 1, letter of 25 September 2008) that were developed within the Wadden Sea and have influenced further thinking or theoretical and methodological approaches to global concepts on geology and geomorphology. Similar information has been added for biology and ecology to complete the information.

Appendix 3: Images of Key Features of the OUV

This appendix encompasses three sub-appendices (point 1, letter of 25 September 2008):

(A) Images of changes in geomorphology and tidal dynamics in a single area over a certain period of time. The images both include an overview of the development of the German and Dutch Wadden Sea coasts over a longer period as well as specific examples of changes in geomorphology and tidal dynamics in single areas over a shorter period of time.

(B) Images of the most important migratory bird species in their key areas of concentration. For each of the images, the species and location have been indicated.

(C) Collection of all presentations held during the IUCN field mission.

Appendix 4: Map and description of the Dutch part of the nominated property for IUCN categorization

This appendix includes a map of the protection and management of the Dutch part of the nominated property including a brief explanatory note on the specific restrictions and regulations that govern the protection and management of the property to assist the IUCN in ascertaining it in relation to the IUCN protected areas categories (point 3, letter of 25 September 2008 to state party of The Netherlands).

Appendix 5: Integrity

This appendix includes the boundary changes of the nominated property (point 2, letter of 25 September 2008; point 1, letter of 11 December 2008) together with revised maps, figures and tables.

Appendix 6: Coordinated Management Arrangements for the Wadden Sea Property

This appendix includes a clarification of the coordinated management arrangements for the nominated property (point 2, letter of 11 December 2008).

Appendix 1

Land and Seascapes of the Nominated Property and the Wadden Sea Area including a Comparative Study of the OUV of the Nominated Property and the Danish Wadden Sea

M.J. Baptist, N. Dankers (Wageningen IMARES), K. Reise, (AWI Sylt), & CWSS.

The IUCN has requested a comparative study within the Wadden Sea itself to enhance the case of Outstanding Universal Value of the existing nomination in the broader context of the Wadden Sea. Further, an extension of Table 2.1 of the nomination document, which entails major subdivisions of the land- and seascapes of the Wadden Sea Area, has been requested to reflect the major subdivisions of landscapes and seascapes within the nominated property. The extension of Table 2.1 provides a full overview of the division of the land and seascapes for the nominated property, the Danish Wadden Sea Area and the remaining areas, a joint response has been formulated to both.

1. Land and Seascape Types of the Nominated Property

The Wadden Sea Area is the commonly defined management area of the Trilateral Wadden Sea Cooperation for which the Wadden Sea Plan is valid, as outlined in chapters 1.e and 5.e of the nomination document. This is the area referred to in Table 2.1 of the nomination document (page 32). In Table 2.1 *Extended*, the land and seascapes within the nominated property have been calculated in conjunction with a calculation of the land and seascapes in the Danish Wadden Sea Area and areas in the Dutch and German Wadden Sea Area outside the nominated property.

The nominated property "The Wadden Sea" encompasses the areas of the Dutch and German (Schleswig-Holstein and Lower Saxony) Wadden Sea Area under strict legal protection, as outlined in chapter 5b of the nomination document. As can be seen from the table, the large majority of the area of the intertidal sand and mudflats, and the subtidal flats and gullies, and the salt marsh area, are within the nominated property.

As outlined in chapter 3 of the nomination document, the Outstanding Universal Value of the Wadden Sea is particularly connected with the intertidal sand and mudflats and the subtidal flats and gullies of mainly unvegetated shoals divided by an intricate fractal-channel pattern fringed by salt marshes representing all stages of succession and the associated geomorphological processes, intertwined with ecological and biological processes to form the biogeomorphological interactions, which are notably strong and unique at all scales.

The inter-tidal sand and mudflats of the Dutch-German Wadden Sea Area are almost all within the nominated property with the exception of a small portion in the estuaries. The portion of the sub-tidal flats and gullies, not within the nominated property, likewise include the rivers and the outer river estuaries, which do not qualify for nomination. The salt marshes outside the nominated property relate to the Schleswig-Holstein salt marshes on the inhabited halligen and the 150 meter of foreland in front of the seawalls, which are not part of the Schleswig-Holstein Wadden Sea National Park. The majority of the Dutch-German Wadden Sea Area of both these landscape types, which are considered to constitute the Wadden Sea proper and in essence constitute the Outstanding Universal Value, is hence within the nominated property.

The large majority of the area of the islands of the Dutch-German Wadden Sea Area, which qualify for inclusion (beaches, dunes and sandy shoals), are within the nominated property. The area not included concerns the inhabited parts of the islands and those islands which encompass rural areas and do not qualify for nomination. The latter islands are located primarily in the Schleswig-Holstein part.

A very large portion of the offshore belt of the Dutch-German Wadden Sea Area is within the nominated property. The areas of the offshore belt within the nominated property are those which are

Table 2.1 *Extended*: Geomorphological region of the Wadden Sea Area with major subdivisions of the land- and seascape transition (rounded to 5 km²).

Geomorphological region	Wadden Sea Area	Nominated property	Danish Wadden Sea Area	Areas in the German and Dutch Wadden Sea Area outside the nominated property	
Salt marshes	400	280	70	50	Part of Schleswig-Holstein salt marshes
Intertidal sand and mud flats	4,700	4,120	450	130	In the river estuaries
Subtidal flats and gullies	3,700	2,325	245	1,130	River and outer river estuaries
Islands and dry sandy shoals	1,000	240	290 (incl. DK rural mainland)	470	Islands not in the nominated property
Offshore area (to about –15 m-depth-line seaward of the islands)	4,900	2,720	490	1,690	Dutch and part of Lower Saxony offshore
Totals	**14,700**	**9,685**	**1,545**	**3,470**	

of essential ecological importance as (1) calving and nursing area for Harbour Porpoise, (2), being habitats for moulting Common Scoters and (3) hard substrate sublitoral habitat.

The German offshore belt off Sylt and Amrum is within the nominated property for its important calving and nursing habitat of Harbour Porpoises. The Dutch offshore belt is not used as intensively for calving and nursing of Harbour Porpoise. Harbour Porpoise density in summer is lower than in winter and is not concentrated on the relatively shallow (<15 m) waters close to the islands. The Dutch offshore belt has an overall much lower density of porpoises in summer than the offshore zone of Sylt and Amrum, and is as such not so important to the functioning of the Harbour Porpoise.

Furthermore, an important reason to include parts of the offshore zone in the German part of the nominated property is the presence of moulting areas for the sea duck Common Scoter. The importance of the Wadden Sea offshore belt as moulting area for Scoters is decreasing from northeast to southwest. The Dutch offshore belt is irregularly used as a moulting habitat for Common Scoters and contributing a maximum of 2,2% of the total.

Finally, the offshore zone of the nominated property includes the Borkum Reef Ground. This is the only area where geogenic hard substrates form parts of the seafloor and the area has been designated as a mixture of the habitat types reefs and sublitoral sandbanks under the EU Habitat Directive. A comparable area cannot be found in the Dutch offshore zone.

In conclusion, the large majority of the Dutch-German Wadden Sea Area of intertidal sand and mudflats, subtidal flats and gullies and salt marshes, which are considered to constitute the Wadden Sea proper and expresses in particular its Outstanding Universal Value, is hence within the nominated property. The remaining features of the offshore zone and the islands in particular the dry sandy shoals are well represented and support the Outstanding Universal Values of the nominated property.

2. Comparison Nominated Property – Danish Wadden Sea

The Danish Wadden Sea Area is 1,545 km² of which the Conservation Area, the area designated as Nature and Wildlife Reserve by Statutory Order according to the Danish Nature Conservation Act, is 1,250 km². As set out in chapter 1.f of the nomination document, the current Danish Wadden Sea Conservation Area amounts to 12,7% of the total Wadden Sea Conservation Area.

It has recently been decided by the Danish Parliament to designate the Danish Wadden Sea including

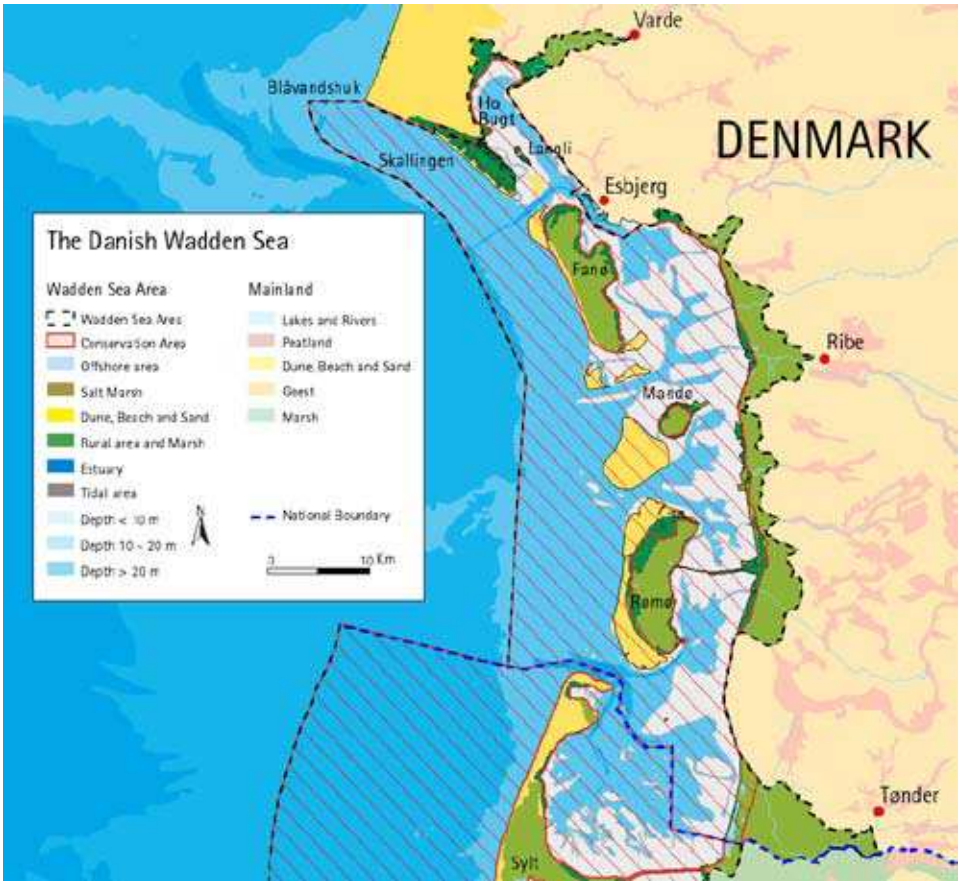

Figure 3: The Danish Wadden Sea Area and Conservation Area.

the islands and adjacent fresh water marshes as a national park in accordance with the Danish National Park Act. It is anticipated that the national park will be established in 2010 after an extended public consultation preceding the designation.

The Danish Wadden Sea is located at the northern end of the Wadden Sea. The most northern part is receiving naturally an ample supply of sediment from the adjacent coast to the north, allowing the area not only to keep up with sea level rise but exhibiting partly a progressive coastal development. As a corollary, strong measures of coastal defence were not necessary.

As outlined in the nomination document, chapter 2.a, page 32f the entire Wadden Sea may be divided geographically into a southern, central and northern sub-region. The Danish part belongs to the northern Wadden Sea with about one third of that sub-region. The Danish Wadden Sea is not a natural physiographic entity. Instead, the border between Denmark and Germany cuts right through a tidal basin, not following a physical divide. The Danish Wadden Sea may be viewed as an extension of the North Frisian Wadden Sea tapering gradually towards its northern end. The total freshwater inflow is low. The main river, Varde Å, has a catchment area of 1,055 km^2 and the total volume of water transported during a half-tidal cycle is 10^6 m^3. This estuary is only slightly modified by coastal engineering.

The Danish Wadden Sea has no features which makes it distinct from the other parts of the Wadden Sea. The barrier along the outer coast is formed by two elongated islands, Rømø and Fanø, and Skallingen peninsula with some high sands in between. Skallingen peninsula in the north is of a rather recent origin but has an eroding beach with high dunes very similar to the long sandy spits on the island of Sylt just south of the Danish border. Rømø and Fanø have wide accreting beaches with low dune ridges, resembling the coastal configuration of the western part of Eiderstedt peninsula at the southern edge of the northern Wadden Sea as well as the barrier island in the southern Wadden Sea. A particularly wide beach has developed at the island of Rømø. This is a result of the southward drift of sediment from eroding moraine deposits (Hornsrev) submerged in the North Sea just north of the Danish Wadden Sea. This sediment drift ends at the island of Rømø and there provides an example for a growing beach and new dune development in spite of sea level rise.

Conspicuous are the dynamic high sands in the Danish part of the Wadden Sea, which again are similar to the ones further south between the German island Amrum and Eiderstedt peninsula. The tidal waters pass through four inlets of which the largest and deepest one, the Lister Dyb, is dissected by the Danish-German border. Tidal range decreases from about 2 m in the south (List tidal basin) to 1.3 m in the north (Ho Bugt). As in all other parts of the Wadden Sea, the tidal flats are mainly sandy. Muddy flats are confined to the most sheltered areas, mostly fringing the salt marshes along the mainland. Similar to the adjacent North Frisian Wadden Sea in Germany, extensive seagrass beds abound, and mussel beds around low tide level are well developed in the Lister Dyb and Grådyb tidal basins.

The Danish Wadden Sea: The barrier islands Fanø, Mandø and Rømø with the high sands and the mainland. In the far distance, the German island Sylt can be distinguished (Photo: Svend Tougaard).

As a special feature of the northern sub-region of the Wadden Sea, the lagoon cockle *Cerastoderma glaucum* occurs in salt marsh creeks and in sheltered seagrass beds with some cover of water throughout low tide period. This sister species to the otherwise wide-spread common cockle *C. edule* on tidal flats occurs in a few 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 probably maintained by migrant birds which carry the adhesive eggs of this bivalve over long distances.

Interspersed in the backbarrier tidal area of the Danish Wadden Sea are the small islets Langli, Mandø and Jordsand. These resemble the halligen of the adjacent North Frisian Wadden Sea, however, Mandø has been protected in part by a dike, while Jordsand gradually eroded away and since 1998 only a bare high sand has taken its place. On the other hand, the high Koresand seaward of Mandø may eventually give rise to a new barrier island, provided this development will not be reversed by the expected acceleration in sea level rise.

At the leeside of Skallingen peninsula, a large and natural salt marsh extends which has been closely studied. 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 edges, leaving a central depression with high salinities during evaporation in summer. Then gradually meandering creeks formed, drained the central area and this allowed for vegetation development there as well. The marsh is partly grazed by domestic sheep but otherwise is in a natural state. At the mainland near the town of Ribe, a different type of natural salt marsh development is ongoing (Råhede). This is an interesting example for alternating effects of erosion and deposition. The edge of the marsh is eroded by the prevailing waves. In front of the emerging cliff of about 0.5 m in height, a runnel parallel to the cliff is developing and creates a sandy ridge on its seaward side. Once this ridge has grown up to high tide level, pioneer vegetation begins to accrete fine material and a new salt marsh is growing up in front of the old one. In the course of time the new marsh merges with the old one and waves create a new cliff on its seaward side. This process repeats and a regular pattern of ridges at distances of about hundred meters emerges at a time scale of a few decades. In the Danish Wadden Sea, such recent and ongoing salt marsh developments can be observed along parts of the mainland coast because land claim operations have been less intensive than in the other regions of the Wadden Sea.

Another feature of the Danish Wadden Sea are two well developed Pleistocene cliffs where moraine deposits of the last but one glacial period are eroding. These provide an interesting glance into the distant past of the North Sea coast. In the central and southern sub-regions, such cliffs are nowadays positioned further inland because of extensive marsh development in front after the rapid postglacial sea level rise had declined to its present rate.

The values that are unique to the Wadden Sea

The Danish Wadden Sea: Knudedyb between the Fanø and Mandø in the direction of Mandø and the mainland (Photo: Svend Tougaard).

and of outstanding universal value are extensively described and justified in the nomination, in particular in chapter 3. As outlined in chapter 3.b (Proposed 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 an outstanding example of the Holocene development of a sandy coast under conditions of rising sea level and is unique in that it is the only extensive tidal flat and barrier island depositional system in the World. Its geological and geomorphological features are closely entwined with biophysical process and provide an invaluable record of the ongoing dynamic adaptation of coastal environments to global change. The high primary and secondary production in the Wadden Sea helps to sustain 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.

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. A biologically outstanding feature are the large intertidal seagrass beds, the largest within Europe, which extend both in the German and the Danish part of the northern Wadden Sea and complement each other. The Danish Wadden Sea is a natural marvel but has no unique attributes setting it apart from the nominated Wadden Sea area or conversely, the nominated area lacks no natural values which are universally outstanding for the entire Wadden Sea region.

In conclusion, all the outstanding universal values that are found within the nominated property are equally found within the Danish Wadden Sea. As set out in the nomination dossier chapter 1.f and further substantiated by the above Table 2.1 *Extended*, the nominated property includes all elements necessary to express its Outstanding Universal Value and is of adequate size to ensure the complete representation of the features and processes which convey the property's significance.

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Appendix 2

Landmark Studies on the Significance of the Wadden Sea to Earth Sciences and to Biology and Ecology

Dr. Albert P. Oost, with comments by Prof. P. de Boer, Prof. P. Hoekstra & Prof B. Flemming

On the Significance of the Wadden Sea to Earth Sciences

The oldest written record with reference to the Wadden Sea dates back to 47 AD when the Roman historian, Pliny the Elder, visited the southern North Sea coast and described it in his epochal work "Naturalis historia" as an "immeasurable expanse", inundated by the sea with forceful currents twice a day. It was uncertain whether it formed part of the land or of the sea. The Wadden Sea (German and Dutch sectors) is an outstanding example of an actively evolving tidal flat depositional system, which has led to the formation of the largest temperate zone tidal-flat expanse in the World. The Wadden Sea is unique in that it consists of bare sandy-muddy tidal flats fringed by salt marshes with only minor river influence located in a temperate –climate.

The Wadden Sea belongs to the salt marsh category of tidal flat and barrier systems. It differs from other systems of this type in that it is the most extensive tidal flat and barrier island depositional system in the World (it is also Europe's largest coastal tidal marsh and, as far as information is available, one of the biggest temperate climate inter-tidal flat areas with little river influence in the World, excluding mangrove areas; Flemming, 2002a, 2003). It is dominated by vast expanses of intertidal sediment flats which are exposed at low tide and display a progressively shoreward-fining grain-size gradient (Flemming & Bartholomä, 1997). Due to this, and since it was described early in the 20th century, it is a world-wide unique geological standard for reference and comparison with other tidal flats in the world. And unique it is indeed: the Wadden Sea is mentioned in most international textbooks as the example "par excellence" of extensive, bare meso to macrotidal flats[1].

1__Zenkovich (1967), Cronin (1975), Machatschek (1973), Reineck & Singh (1980), Reading (1981), Schwarz (1982), Allen (1984), Stanley (1989), Eisma (1998), Reise (2001).

Numerous sedimentological studies have been conducted in the Wadden Sea since the early 1900s[2]. The research has resulted in a number of important discoveries:

1) It was a cradle for research on shallow marine systems (van Straaten, 1951; Postma, 1961; Reineck, 1963). The term "Watt" or "Wad" has become so familiar in scientific papers that it has become a facies term in its own right (especially in French literature) to signify tidal flats (Zenkovich, 1967; Fisher in: Schwartz, 1982).

2) The fact that it was recognized quite early that sediments similar to those of the Wadden Sea are present in the fossil record (van Straaten, 1954) gave a considerable boost to comparative (i.e. recent vs. ancient) sedimentology, slightly after the start of modern sedimentology with the publication of Kuenen and Migliorini's (1950) paper on turbidity currents as a cause of graded bedding.

3) The implication of the Wadden sedimentary environment for the geological record is that extensive mud deposits occur not only at greater water depths far off-shore, but also at shallow depths close to shore (Fisher in: Schwartz, 1982).

4) Contrary to common opinion, it was recognized that the muddy and very fine sandy sediments of the Wadden Sea were not derived from the adjacent land by local river input, but were instead being supplied in form of suspended matter from multiple sources located in the North Sea, thus confirming a theory already proposed by Arends (1833). Several important mechanisms for accumulation and dynamica of sediments were identified, applicable to all tidal flat settings, such as settling lag (van Straaten & Kuenen, 1957), scour lag (Postma, 1961), residual flows (Ridderinkhof, 1988a&b, 1989, 1990; Ridderinkhof & Zimmerman, 1990) and tidal asymmetry (Dronkers, 1986; van der Kreeke & Dunsbergen, 2004). These publications influenced the ideas on sediment transport and modeling World-wide.

5) The development of ebb-tidal delta's and inlets has been studied in great detail (Van Leeuwen, 2002; Elias, 2006)

6) The Wadden Sea area has been accumulating sediments over the past 8,000 years. It thus forms an excellent example of Holocene coastal evolution (Reineck & Singh, 1980; Ehlers, 1988; Streif, 1993). The Wadden Sea represents, in quite a dramatic way, two natural examples of coastal shelf evolution under the influence of the Holocene sea-level rise. The modern Wadden Sea evolved since about 8,000 years BP in the wake of the postglacial sea-level rise (Van der Spek, 1994; Vos & van Kesteren, 2000; Flemming, 2002b). The lower mesotidal West Frisian (Dutch) and the upper mesotidal East Frisian (German) barrier island systems are transgressive systems. Since not enough sediment is imported from external sources, the systems compensate sea-level rise by moving material from their upper shorefaces to the back-barrier basins. As a consequence, the islands migrate shorewards across their own back-barrier flats in a process also know as rollover. The lower macrotidal, non-barred tidal flats of the inner German Bight, which occasionally display ephemeral supratidal shoals, are essentially aggradational systems, sediment influx from external sources in this case compensating sea-level rise. The North Frisian, barred section up to the border of Denmark is once again transgressive. Form, sequence and scale of these subdivisions are unique to the World.

7) Also, the morpho-chronology has relevance for the geological inventory. The long-term depositional history has led to the formation of a series of sedimentary deposits which have recorded the development of the Wadden Sea in response to climate change in great detail. Such datable sediments (e.g. Vlieter deposits; Berger et al., 1989) and landforms (e.g. SW Texel and the German tidal marsh deposits) can be considered a universally important archive of the Holocene history of sea-level rise, climate, and depositional response (Behre, 2003). As stated above, the Wadden Sea represents an outstanding example representing the Holocene development of a sandy coast under conditions of a rising sea level, and, as such, attracted the interest of scientists at an early stage of scientific endeavor. The Wadden Sea is one of the earliest and best studied depositional systems in the world, first systematic scientific investigations dating back to the early years of the last century. Over the years, Dutch, German and Danish geoscientists, in particular, have established large archives of documentary evidence on field measurements of hydrography (Ridderinkhof, 1988a&b, 1989, 1990; Ridderinkhof & Zimmerman, 1990; Ruessink, 1998), sediment transport

2 Lüders (1930), Häntzschel (1938); van Veen (1936), van Straaten (1951, 1961), Van Straaten & Kuenen (1957), Postma (1954, 1961), Reineck (1963), Jakobsen (1964), Reineck & Wunderlich (1969), Reineck (1972), Klein (1976), Nummedal & Penland (1981), FitzGerald, Penland & Nummedal (1984), Ehlers (1988), Dijkema (1989), Sha (1990), Hofstede (1991, 2005), Oost de Boer (1994), Van Leussen (1994), Oost (1995), Eisma (1998), Ruessink (1998), Esselink (2000), Flemming et al. (2000), Houwing (2000), Houwman (2000), Janssen-Stelder (2000), Van der Lee (2000), Van Leeuwen (2002), Grunnet (2004), Elias (2006), van Ledden (2003), Van der Vegt, (2006), Buijsman (2007).

(Tanczos, 1996; Houwman, 2000), morphologic developments (Cleveringa & Oost, 1999), modeling (numerical, idealized and behaviour (Schuttelaars & De Swart, 1996, 2000; Kragtwijk, 2001; Goor et al., 2003; Stive and Wang, 2003; Grunnet, 2004; Hibma, 2004).), historical reconstructions (Oost, 1995; Schoorl, 1999a&b, 2000a&b; Van der Molen, & de Swart, 2001: Van der Molen, J., 2002), stratigraphy, sedimentary structures and sediment distribution patterns (Reineck, 1970; Tanczos, 1996; Koomans, 2000) in the form of numerous publications, data, maps, drawings, photographs, slides, seismic profiles, lacquer peels, resin casts, and core logs (see overview of the most important institutes). Together they form an invaluable and unique inventory of the physical character of the Wadden Sea and its genesis, which is unparalleled in the world. Such archives are accessible at a number of marine research stations lining the Wadden Sea coast. In this context, the geological/geomorphological criterion (viii) favoring a nomination of the Wadden Sea for the World Heritage List not only relates to the theme "coastal systems", but has direct links to other themes such as "stratigraphic sites" and "fossil sites". As indicated above, the stratigraphic and fossil record of the Wadden Sea form part of the overall inventory accumulated in the archives of numerous coastal research institutions (Table 1).

Table 1: Overview of major collections of available data.

Country	Location	Institute	Data
Germany	Wilhelmshaven	Senckenberg Institute	Cores, laquer-peels, grain-size data, side-scan sonar images, seismic profiles, geochemical data, biological data, hydrodynamic data
Germany	List on Sylt	Alfred-Wegener-Institute	Biological data, cores, sediment data
Germany	Büsum	Forschungs- und Technologiezentrum Westküste, University of Kiel	Cores, grain-size data, laquer peels, hydrodynamic data, biological data
Germany	Norderney	NLWK-Forschungsstelle Küste	Historical chart reconstructions, morphological data, hydrodynamic data, biological data
Germany	Hannover	Landesamt für Bergbau, Energie und Geologie	Landscape development, development tidal flats, marshland, sea-level changes
Germany	Husum / Tönning	Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz	Morphological data, hydrodynamic data, biological data
Denmark	Copenhagen	Institute of Geography, University of Copenhagen	Grain-size data, cores, datings, geochemical data
Netherlands	Den Hoorn	Netherlands Institute for Sea Research	Grain-size data, cores, datings, geochemical data, hydrodynamic data
Netherlands	Utrecht	Faculty of Geosciences, Univ. of Utrecht	Laquer peels, reconstructions, cores, sieve data, hydraulic data, hydrodynamic data
Netherlands	Delft	Technical University Delft	Modelling results, hydrodynamic data
Netherlands	Lelystad	Waterdienst, Min. Public Works and Watermanagement	Hydrodynamic data, morphological data, sediment transport data
Netherlands	Delft	Deltares	Modelling results
Netherlands	Utrecht	TNO-Bouw en Ondergrond	Cores, datings, seismic profiles

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Landmark Scientific Contributions from Wadden Sea Research to Biology and Ecology

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The Wadden Sea has been a cradle of ecological research. Its oyster beds gave rise to the community concept with populations interacting in a way to maintain a species assemblage with its habitat (1). Pioneering research on the ecology of intertidal mud flats commenced in the Wadden Sea with a series of monographs describing zoning, succession and species associations in the biota (2-4). Also the concept that near-shore zones serve as nurseries for offshore populations of fish originates from research in the Wadden Sea (5), and Postma (6) identified the tidal transport processes of suspended matter as an explanation for the high productivity of intertidal mudflats. All these were landmarks of ecological science 150 to 50 years ago but are of high relevance even today.

Twenty-five years ago, an overview of the existing knowledge of the coastal system of the Wadden Sea was compiled by Wolff (7). This not only provided a firm basis for environmental management and policies but also served as a most comprehensive compendium for coastal scientists all over the world. The experimental approach to species interactions in tidal flat sediments (8) or the modelling of estuarine processes

(9) was spearheaded by ecological research in the Wadden Sea.

Due to the vicinity of the Wadden Sea to major centres of biological research, various basic studies have been conducted in this coastal region. The microfauna of marine sand has been a special focus, with the description of hundreds of new species and even a novel phylum (10-13). Invertebrates living without oxygen in the depth of intertidal sediments prompted studies on the corresponding physiological mechanisms (14). This is a line of research which has been continued into the physiological responses to global warming in the sea (15). Recent investigations on allelic diversity within the geographic range of species have shown that unexpectedly the North Sea – Wadden Sea region is a high genetic diversity hotspot in Europe, among others exemplified with sea grasses (16).

A methodological breakthrough on the effects of pollution on sea mammals was achieved by experiments with seals from the Wadden Sea (17). Studies on the migration strategies of wading birds between Arctic breeding sites, temperate tidal flat stopovers and tropical wintering sites with respect to their energy budgets are based on research which commenced in the Wadden Sea (18). Investigations on the effects of eutrophication was pioneered by long-term ecological comparisons, and now again the recovery from this world-wide coastal burden is led by researchers from the Wadden Sea (19). The effects of accelerating sea level rise on salt marsh succession and sediment accretion over the last 50 years has been analyzed in detail to provide guidance for coastal protection measures (20).

In conclusion, the Wadden Sea has been since the very beginning of research in coastal biology and ecology a region of crucial importance for science. Innumerable scientific publications have been generated by Dutch, German and Danish researchers. Particularly the role of intertidal sediment flats for the ecology of the coastal ocean has been highlighted. Ongoing research on the consequences of climate change and sea level rise as well as on the biological globalization caused by species introductions will play a role of global significance in ecological science.

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Appendix 3

Images of Key Features of the OUV

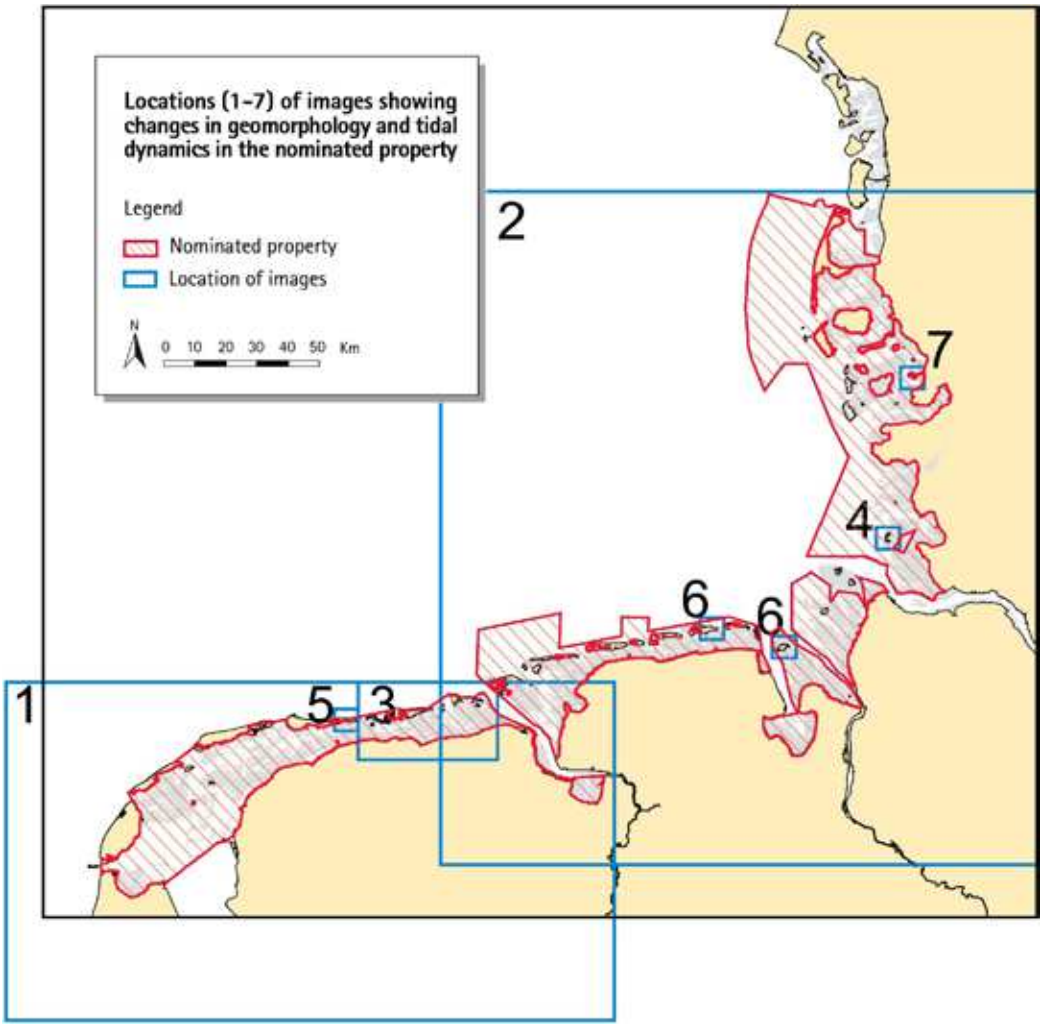
A. Images of Changes in Geomorphology and Tidal Dynamics

B. Images of the Most Important Migratory Bird Species in their Key Areas of Concentration

C. Presentations made during the Field Mission (01.-11.09. 2008) and Address List of Field Mission Participants

A. Images of Changes in Geomorphology and Tidal Dynamics

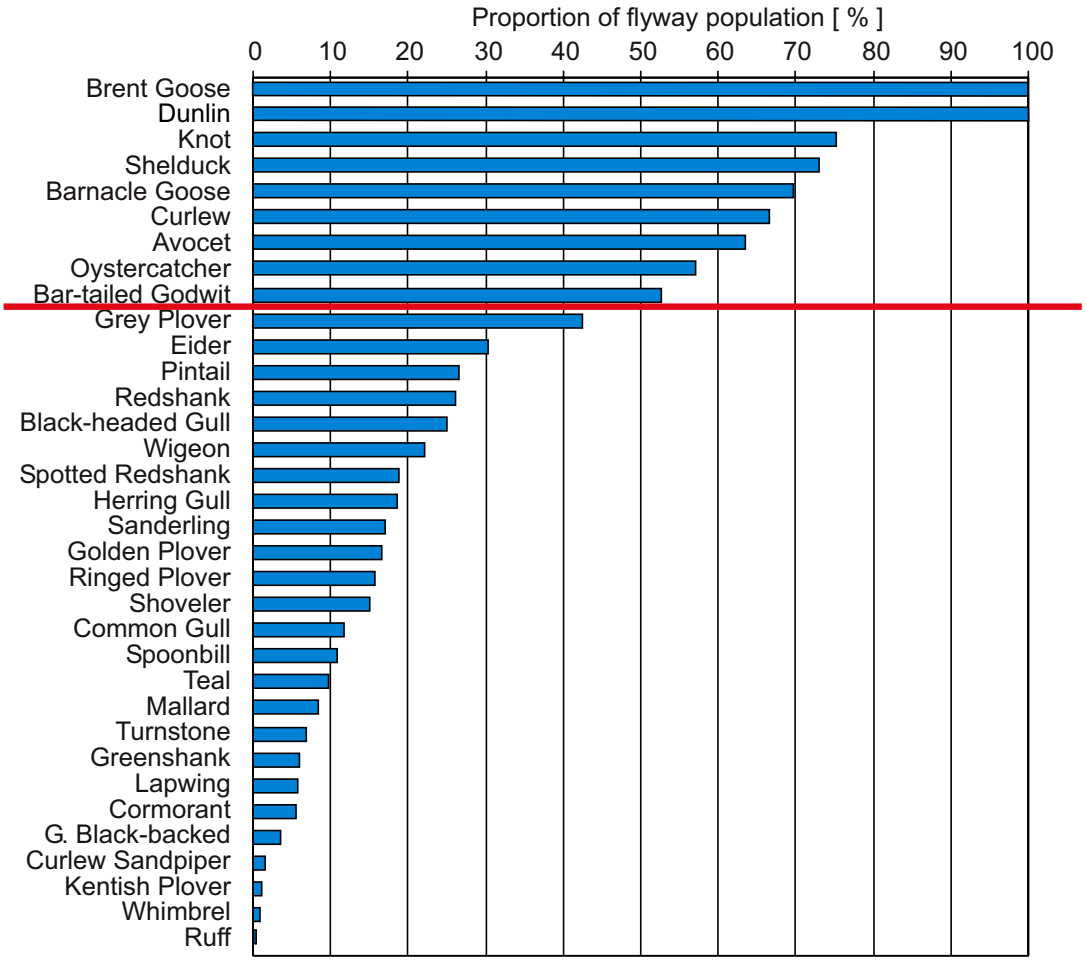
File name	Period	Location	Author or source	Format
1 Reconstruction Dutch Wadden Sea coast from 5500 BC to 2000 AD.ppt	5500 BC - 2000 AD	Dutch Wadden Sea	Albert Oost Deltares	MS PowerPoint
2 Historic Wadden Sea Coastline.jpg	0AD - 1500AD	German Wadden Sea	Karl-Ernst Behre Niedersächsisches Institut für historische Küstenforschung	JPG
3 The Wadden Sea - A unique dynamical tidal flat system.ppt	1500 - 1976	Backbarrier area of island Schiermonnikoog	Albert Oost Deltares	MS PowerPoint
4 Island Trischen - changes in geomorphology and tidal dynamics.pdf	1885 - 2002	Dithmarscher Wadden Sea, Schleswig-Holstein	National Park Authority (NPA) Schleswig-Holstein	PDF
5 Changes in geomorphology, Ameland.ppt	1900-2008	Ameland East	Jaap de Vlas Ministry of Water Affairs and Public Transport	MS PowerPoint
6 Change of islands Mellum and Spiekeroog.ppt	1968 - 1999 1968 - 1997	Mellum, Spiekeroog Wadden Sea Niedersachsen	National Park Administration Lower Saxony	MS PowerPoint
7 Monthly view of the Wadden Sea.ppt	2002	Tidal flat near Nordstrandischmoor	Martin Stock National Park Authority (NPA) Schleswig-Holstein	MS PowerPoint



B. Images of the Most Important Migratory Bird Species in their Key Areas of Concentration

To show images on key areas of concentration for migratory birds, all 9 species for which the proportion of flyway population for the entire Wadden Sea is higher than 50% and which are known to use high tide roosts, and feed at the intertidal mudflats during low tide were selected[1]. The bird images illustrate key areas of high tide roosting sites with the highest or very high density of the selected migratory bird species [2].

*) The Barnacle Goose is not covered in the high tide roosts report[2], as they mainly rely on salt marsh vegetation and do not show tidal movements.



1) Nomination document Figure 2.12 from: Blew, J. and Südbeck, P. (Eds.) 2005. Migratory Waterbirds in the Wadden Sea 1980 – 2000. Wadden Sea Ecosystem No. 20. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Joint Monitoring Group of Migratory Birds in the Wadden Sea, Wilhelmshaven, Germany. [page 107]

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Table: Images on key areas of concentration for migratory birds

No	Form	File name format [# bird species – location – author year.jpg]	Location	Year of photo	Photographer (Abbreviation see below)	Copyright owner (Abbre-viation see below)	Contact details of copyright owner: Address list below table	Non exclusive cession of rights
01	jpg	01 Brent goose - Halligen - KG(1).jpg	Halligen	2002	KG	KG	KG	yes
02	jpg	02 Brent goose - Halligen - KG(2).jpg	Halligen	2002	KG	KG	KG	yes
03	jpg	03 Dunlin - Minsener Oog - MH 2008.jpg	Minsener Oog	2008	MH	MH	MH	yes
04	jpg	04 Dunlin - Griend - JK.jpg	Griend	unknown	JK	JK	JK	yes
05	jpg	05 Dunlin - St. Peter Ording - MS 2008.jpg	St. Peter Ording	2008	MS	MS	MS	yes
06	jpg	06 Red Knot - Griend JK.jpg	Griend	unknown	JK	JK	JK	yes
07	jpg	07 Red Knot - Süderoog - KG.jpg	Süderoog	2006	KG	KG	KG	yes
08	jpg	08 Shelduck and Oystercatcher - Trischen -MS 2008.jpg	Trischen	2008	MS	MS	MS	yes
09	jpg	09 Shelduck - Dithmarschen - NK 2008.jpg	Dithmarschen	2008	NK	NK	NK	yes
10	jpg	10 Barnacle Goose - Hamburger Hallig - MS 2006.jpg	Hamburger Hallig	2006	MS	MS	MS	yes
11	jpg	11 Barnacle Goose - Tümlauer Bucht - MS 2007.jpg	Tümlauer Bucht	2007	MS	MS	MS	yes
12	jpg	12 Curlew - Minsener Oog - MH 2008.jpg	Minsener Oog	2008	MH	MH	MH	yes
13	jpg	13 Avocet - Dollard - JK.jpg	Dollard	unknown	JK	JK	JK	yes
14	jpg	14 Oystercatcher - Westerhever - JK.jpg	Westerhever	unknown	JK	JK	JK	yes
15	jpg	15 Oystercatcher - Trischen - MS 2008.jpg	Trischen	2008	MS	MS	MS	yes
16	jpg	16 Bar tailed gotwid - Griend - JK.jpg	Griend	unknown	JK	JK	JK	yes
17	jpg	17 Bar tailed gotwid - Wangerooge - RL.jpg	Griend	unknown	RL	RL	RL	yes

JK: Jan van de Kam, Deurneseweg 1, 5766 PH Griendtsveen, The Netherlands, phone +31(0)493 529306, e-mail: JK@worldonline.de

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C. Presentations made during the Field Mission (01.–11.09.2008)

#	File name format:[date time title (author).format]	Date	Author
01	01-09 0930-1100 IUCN field mission travel route.ppt	01-09 2008	CWSS
02	01-09 0930-1100 Geomorphological region of the Wadden Sea Area (Table 2.1).ppt	01-09 2008	CWSS
03	01-09 1100-1230 Trilateral Cooperation (CWSS staff).ppt	01-09 2008	CWSS
04	01-09 1400-1500 Introduction Lower Saxony (Südbeck).ppt	01-09 2008	Südbeck
05	01-09 1500-1900 General introduction (Farke).ppt	01-09 2008	Farke
06	02-09 1830-2100 Greetings (Birkner).pdf	02-09 2008	Birkner
07	02-09 1830-2100 Gruesse (Birkner) german.pdf	02-09 2008	Birkner
08	03-09 0830-1300 ComCoast (Ahlhorn).pdf	03-09 2008	Ahlhorn
09	03-09 0830-1300 Biosphere Reserve (Fasting).pdf	03-09 2008	Fasting
10	03-09 0830-1300 The Leybucht (Meyer Vosgerau).ppt	03-09 2008	Meyer-Vosgerau
11	03-09 0830-1300 The Leybucht.pdf	03-09 2008	NLPV
12	03-09 1600-1700 Trilateral Bird Monitoring (Südbeck).ppt	03-09 2008	Südbeck
13	03-09 2000-2200 Licence instrument Nature Conservation Act in practice (Vermeulen).pdf	03-09 2008	Vermeulen
14	04-09 1000-1200 Natuurcentrum Ameland (Krol).ppt	04-09 2008	Krol
15	04-09 1200-1530 EHS legislation and permit requirements (Marquenie).ppt	04-09 2008	Marquenie
16	04-09 1200-1530 Monitoring subsidence Ameland (de Vlas).ppt	04-09 2008	de Vlaas
17	04-09 1630-1930 The Wadden Sea A unique dynamical tidal-flat system (Oost).ppt	04-09 2008	Oost
18	04-09 1630-1930 Wadden maps confidential (Oost).ppt	04-09 2008	Oost
19	05-09 1230-1430 Contingency planning Waddensea (RWS).ppt	05-09 2008	RWS
20	06-09 1430-1600 Ecomare towards 2012 and World Heritage(van den Broek).ppt	06-09 2008	v. den Broek
21	07-09 1330-1845 Tourism and Nature (Höfinghoff; Gätje).ppt	07-09 2008	Höfinghoff; Gätje
22	07-09 1330-1845 Wardening SH 07-09-2008.ppt	07-09 2008	National Park Authority (NPA)
23	08-09 0830-1030 International Wadden Sea School (Szczesinski).ppt	08-09 2008	Szczesinski
24	08-09 1315-1800 Biosphere Reserve Wadden Sea and Halligen.ppt	08-09 2008	National Park Authority (NPA)
25	08-09 1315-1800 Handout Monitoring of Birds in SH WS.pdf	08-09 2008	Günther
26	08-09 2000-2230 The National Park Advisory Boards.ppt	08-09 2008	National Park Authority (NPA)
27	09-09 0845-1150 Seals in the Wadden Sea (Borchardt; Siebert).ppt	09-09 2008	Borchardt; Siebert
28	09-09 1500-2000 Coast-Guard.ppt	09-09 2008	Waterway police Husum
29	09-09 1500-2000 RWE-Dea-Activities 09-09-2008.pdf	09-09 2008	RWE-Dea
30	09-09 1500-2000 RWE-Dea-Mittelplate.pdf	09-09 2008	RWE-Dea
31	09-09 1500-2000 RWE-Dea-Planned Exploration Drilling.pdf	09-09 2008	RWE-Dea

Address List of Participants

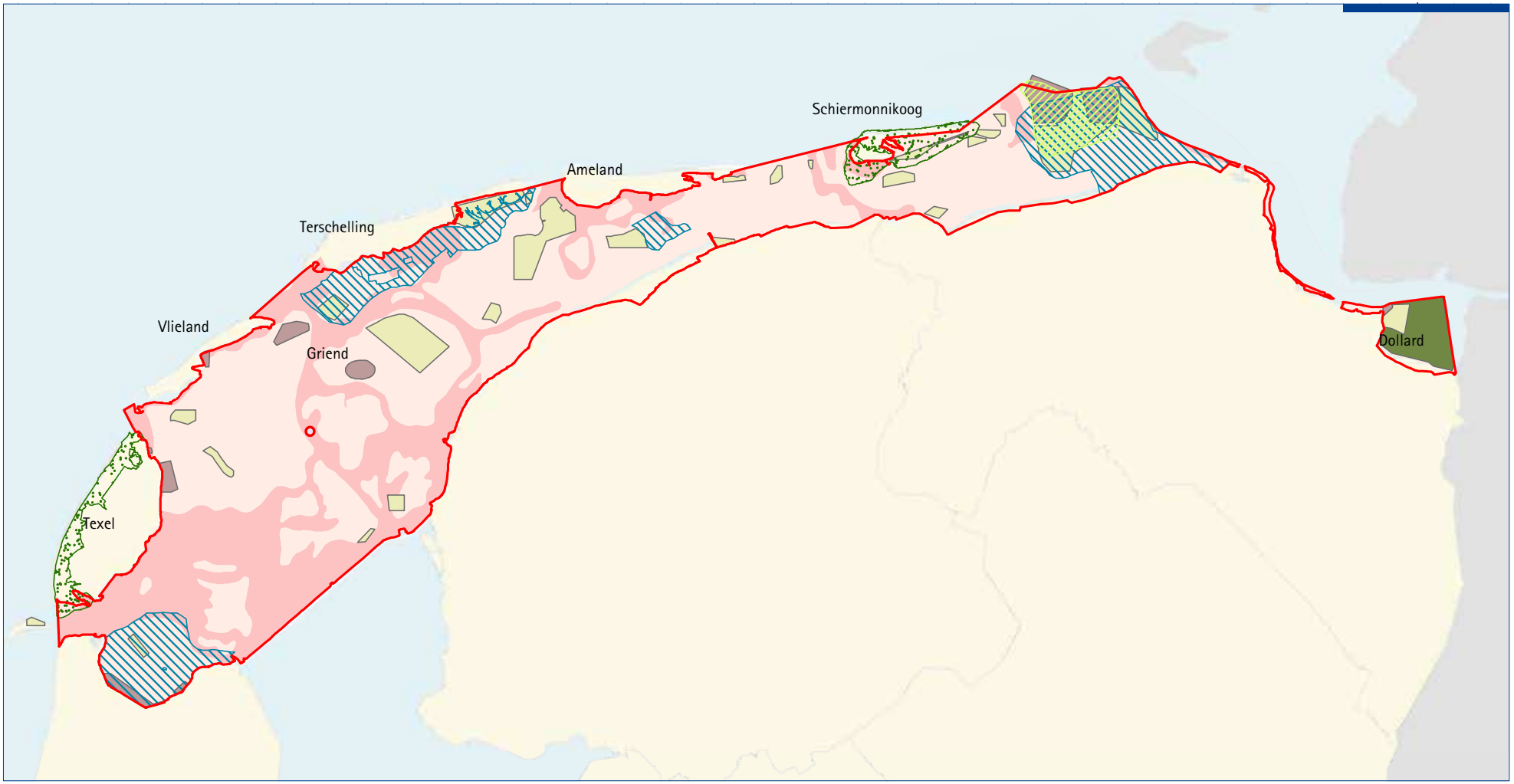
32	Field Mission Address List(27-08-08).doc	27-08 2008	

Attachment 1(DVD)

Images of the OUV and Presentations made during the Field Mission: Extra supplement I

Appendix 4

Map and Description of the Dutch Part of the Nominated Property for IUCN Categorization



Vicinity map Waddensea

12 November 2008

scale 1:450.000

DLG realiseert groene plannen
voor 16 miljoen Nederlanders!

Legend

- World Heritage Area (Dutch Part)
- National Parks
- Reference area
- Areas permanently closed to bottom-contacting fishery and shrimpfishery
- Area permanently closed (Art. 20 Nature Conservation Act)
- Area closed part of the year (Art. 20 Nature Conservation Act)
- Area closed for shrimpfishery (1-1-2009)
- Limited recreational use
- Recreational use

dienst landelijk gebied
voor ontwikkeling en beheer

The IUCN (by letter to Mr. Barend Ter Haar, PD UNESCO, 25 Sept. 2008) has requested the State Party of The Netherlands to provide a map showing areas under international designations (such as Ramsar and N2000) as well as any other federal/state/local protected areas that are included in this nomination. Such a map should be supported by brief summary information on specific restrictions and regulations that govern the protection and management of these areas. This information would assist IUCN in making the case on how these different protected areas fit into the IUCN System of Protected Areas Management Categories.

International and national classifications

Since 1980, the national policy for the protection of the Wadden Sea has been laid down in the Key National Spatial Planning Decisions (PKB). The main objective (the 3rd PKB, 2007) is 'the sustainable protection and development of the Wadden Sea as a nature reserve and the conservation of the unique open landscape'. The policy with regard to nature is aimed at ensuring that the ecosystem develops in a manner as natural as possible.

Based on this ecosystem approach, with due observance of this main objective, the PKB allows for human activities. With the description of an assessment frame weighing human activities against the protected natural values, the PKB is directly linked to the application of the Nature Conservation Act in the Wadden Sea. This formal link to the application of the Nature Conservation Act was laid down in the 2nd PKB (1993).

In 1981, large parts of the Wadden Sea were already designated under the Nature Conservation Act as 'State Nature Monument'. With the formally required legal implementation of the EU-Birds Directive in the Nature Conservation Act (amended version 2005), from 2005 onwards the whole PKB area has now also been designated under the Nature Conservation Act. See also chapter 5b, 5c and 5e of the nomination dossier.

The nominated part of the Netherlands encompasses the Dutch Wadden Sea Conservation Area, subject to the Key National Spatial Planning Decision (PKB) Third Policy Document on the Wadden Sea, with the exclusion of the so-called disputed area in the Ems-Dollard Estuary.

The PKB, within the meaning of the Dutch Town and Country Act, contains objectives and conditions, binding for all state, regional and local authorities specifically defining and regulating measures directed at nature and at human activities, whether existing or new, or beforehand prohibiting certain human activities. The legal enforcement is realized by transferring the relevant decisions into regional environment plans of provincial authorities as well as into the zoning plans at the municipal level.

The Nature Conservation Act 1998, the legal framework for protection of nature reserves, is applied to the Wadden Sea by using three types of instruments: the licensing procedure for testing any human activity with possible effects on the natural values to be protected, the development of management plans, and the enforcement of the Article 20 instrument by closing off areas.

Having a special conservation status based on the Nature Conservation Act 1998 and being a Ramsar site (1984), the property is also designated as Environmental Protection Area in accordance with the Environmental Management Act. The provincial government is in charge of issuing the Environmental Decree.

When assessing activities on their possible effects on nature, the licensing procedure of the Nature Conservation Act 1998 - for which the provinces are in charge, with certain exceptions allocated to the state level - , which incorporates the assessment framework of N2000, takes into account, if relevant, the testing of activities under the Environmental Management Act and the Act on the Contamination of Surface Waters.

In the interest of species protection, the assessment framework, laid down in the Flora and Fauna Act, is also applicable. This Act implements the species protection component of the Birds and Habitats Directives.

This PKB area has been designated completely as a Ramsar site and Special Protection Areas according to the Birds Directive (European Council) and will be completely designated (end of 2008) as Special Areas of Conservation according to the Habitats Directive (European Council). From an international perspective, this PKB area is a Ramsar site, a MAB site (1986), a PSSA site (2002), falls under the AEWA (1999), and will be completely a NATURA 2000 site (end of 2008).

General rules

The safeguarding of this property by the Nature Conservation Act as well as the Flora and Fauna Act is based on the general responsibility for everyone to maintain the natural values, by indicating that it is not allowed to disturb, catch or kill certain habitats and bird species and habitat species. In general terms: 'nature should not be disturbed'. More specifically, this means among other things that it is not allowed to disturb resting seals and resting or feeding birds. In general, resting seals

should not be approached closer than 1500 metres and groups of birds not closer than 500 metres. Dogs must be kept on the lead.

Users of the Dutch Wadden Sea must abide by a code of honour bearing the motto 'I Love the Wadden Sea'. In this code of honour several specific rules of behaviour are given for not disturbing birds and seals, and under which safety measures and good seamanship are required to respect the natural assets.

Specific (spatial) regulations

Certain smaller parts of this property have been closed to the public, in virtue of the Nature Conservation Act, Art. 20 (11 % of the total area).

The chart shows which parts are permanently closed and which parts are only closed during certain months in spring and summer, to provide protection during the nursing season of seals or the breeding season of birds. It is not permitted to enter these areas without licence on the basis of the Nature Conservation Act 1998.

The areas concerned are updated annually, when relevant, pursuant to Section 20 of the 1998 Nature Conservation Act.

Twenty-six per cent of the littoral zone in the Wadden Sea (corresponding with about 15% of the total area) is permanently closed to bottom-contacting fishing methods (seed mussel fishery, cockle fishing and fishing using bottom-contacting fishing gear with tickler chains).

Shrimp fishery is not permitted on the tidal flats (the littoral zone) in the areas that have been closed to bottom-contacting fishing methods. Fishing with other types of trawl net (with or without tickler chains) is not permitted on the tidal flats (the littoral zone) anywhere in the PKB area. From the 1st of January 2009 onwards, an additional area of about 2.2% of the total area will be closed for shrimp fishery in the Dollard (South-eastern part), based on Article 20 of the Fishery regulations.

Following trilateral agreements, an area has been designated in the eastern part of the Wadden Sea within which exploitation of resources, either from biotic origin (like fish and shrimps etc) or abiotic origin (sand, shells, etc), is prohibited. By monitoring the undisturbed development of nature in this area, it serves as a reference area for scientific research (3% of the total area).

The recreational exploitation is governed by a zoning system which spares the areas that are susceptible to disturbance, taking as its basic premise the natural resilience of the area. This leads to the broadly considered recreational zoning system as depicted.

The most susceptible areas are closed, based on Article 20 of the NCA.

The zones with limited recreational use are the areas with important natural values, like most of the littoral zone and foraging places of birds. As a protection measure, outside the 200 meter beaconing, it was not allowed to stand clear of the water. In 2003, a covenant has been signed between the governmental parties and the recreational users to give the latter the opportunity to go beyond the 200 m line, under the condition of obeying the rules of conduct. This covenant will be evaluated after 4 years.

The zones with recreational use are the areas where certain recreational activities are allowed without jeopardising the ecological functions.

Noting that especially the regional governments considered it desirable to develop an integrated quality-based regulatory policy that is not based on maximising the number of mooring spaces in harbours, a Wadden Sea recreational boating covenant was signed (2007) between the different governmental layers and parties representing the recreational users. In the covenant, agreements are laid down in order to establish and maintain a manageable shared recreational use and the development of sustainable forms of recreational boating, based on the natural capacity of the area. Relevant aspects of this covenant are the establishment of a monitoring scheme as well as launching a communication project in order to achieve the overall acceptance of the specific rules of behaviour, as depicted in the Code of Honour (see under general rules).

For the enforcement, it is referred to the nomination dossier, chapter 5c and 5j.

Finally, two National Parks, Schiermonnikoog and Dunes of Texel, are partly located in the nominated area (1.7% of total area). National Parks are established by the Ministry of Agriculture, Nature and Food Quality with four main objectives in mind: protection and development of characteristic landscapes and special plants and species, outdoor recreation, education and extension and research. Landowners, site managers and other stakeholders are jointly responsible for the conservation and development of the quality of these nature areas. Information about accessibility, approachability, and park's rules is given to the public by different means.

During the breeding season of birds (15 April – 15 July) certain areas in the National Park are closed for the public.

Appendix 5

Integrity

The IUCN has suggested a number of boundary changes of the nominated property with regard to oil and gas and military activities, as discussed during the field mission. In response to this suggestion the boundaries of the nominated property have been revised to exclude such activities as follows.

The three production sites for oil and gas, as described in chapter 2.a, page 71ff of the nomination document, together with an area in which the concessionaire intends to carry out exploration drillings have been excluded from the nominated property. The three exploitation sites have been operational according to mining rights before the nomination of the property for inscription into the World Heritage List.

"Zuidwal" is an unmanned gas exploitation platform in the western part of the nominated property. The area excluded from the nominated property encompasses a circle around the platform with a radius of 500 meters where the immediate physical impact ensuing from the maintenance and later decommissioning of the platform occur.

"Leybucht Z1" is an unmanned gas exploitation site located on land in the Leybucht with a small, irregular production of natural gas. The area excluded encompasses the gas production installation.

"Mittelplate A" is a manned oil production platform in the Schleswig-Holstein Wadden Sea, visited during the field mission. An area around "Mittelplate A", within which the oil exploitation occurs, is excluded from the nominated property together with two smaller boundary adjustments in the Elbe estuary and the Knechtsand area. In these excluded areas, the planned oil exploration drillings will take place pending licensing under the legal regime, outlined in chapter 5 of the nomination document, in particular assessment and permission according to Article 6 of the EC Habitats Directive and national laws.

As soon as the exploration drillings have been concluded the area, in which the activity has been carried out, will be added to the property at an appropriate occasion in accordance with para. 164 of the Operational Guidelines. In case resources are found it is agreed, as stated in the nomination document, that exploitation will only take place from outside the nominated property or the existing platform respectively. Likewise, on termination of the exploitation of the existing sites and the

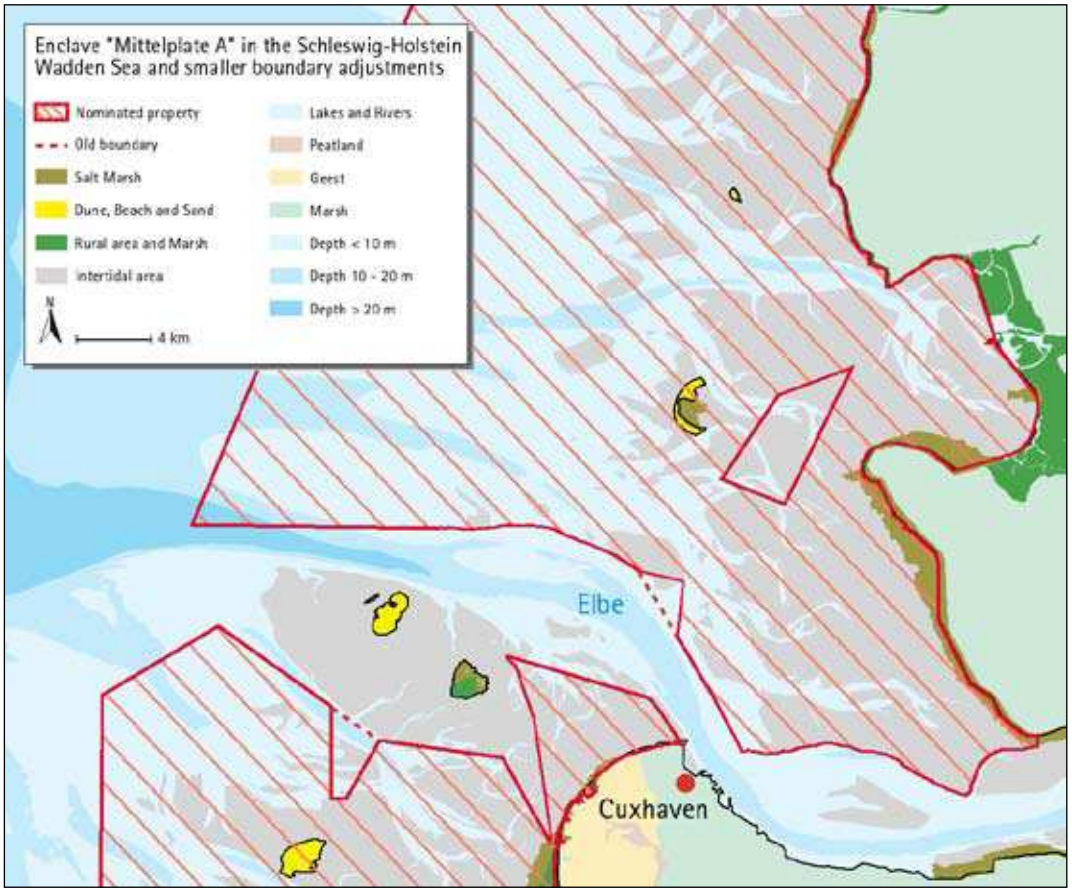


Figure 1: Enclave "Mittelplate A" in the Schleswig-Holstein Wadden Sea and boundary adjustments.

decommissioning of the installations, it is intended to add these to the property in accordance with para. 164 of the Operational Guidelines.

The state parties confirm 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.

There are three sites which entail military activities within the originally nominated property. The Meldorfer Bucht location in Germany has been a ballistic testing site for new weapons of the German Ministry of Defence since the early 1980s. However, over the last ten years the range has been used on average on 0.5 days per year only. In several years there were no tests at all. Tests are undertaken from platforms on the seawall outside the nominated property, however the target area stretches into the nominated property in the Meldorfer Bucht.

An impact assessment study conducted in 2001 has shown that the overall impact on birds, seals and macrobenthos was very small.[1] Disturbances of birds due to the helicopter flights have since then been further minimized. In combination with the very low frequency of testing activities 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. The site was visited during the field mission and its natural values recognized. No boundary changes to the nominated property have therefore been made in this case.

The two military exercise areas, the "Vliehors" and the "Mokbaai" in the Dutch Wadden Sea area have been excluded from the nominated property. The areas which are excluded encompass the areas which are closed for the public during the period when military exercises take place which sometimes involve explosives.

1 Cor J. Smit & Martin L. de Jong, 2002: Effects of a missile launching on waders and other waterbirds in the Meldorfer Bucht, Germany. Wageningen, Alterra, Green World Research. Alterra-rapport 497. 42 pp, 8 figs.; 6 tables; 52 refs

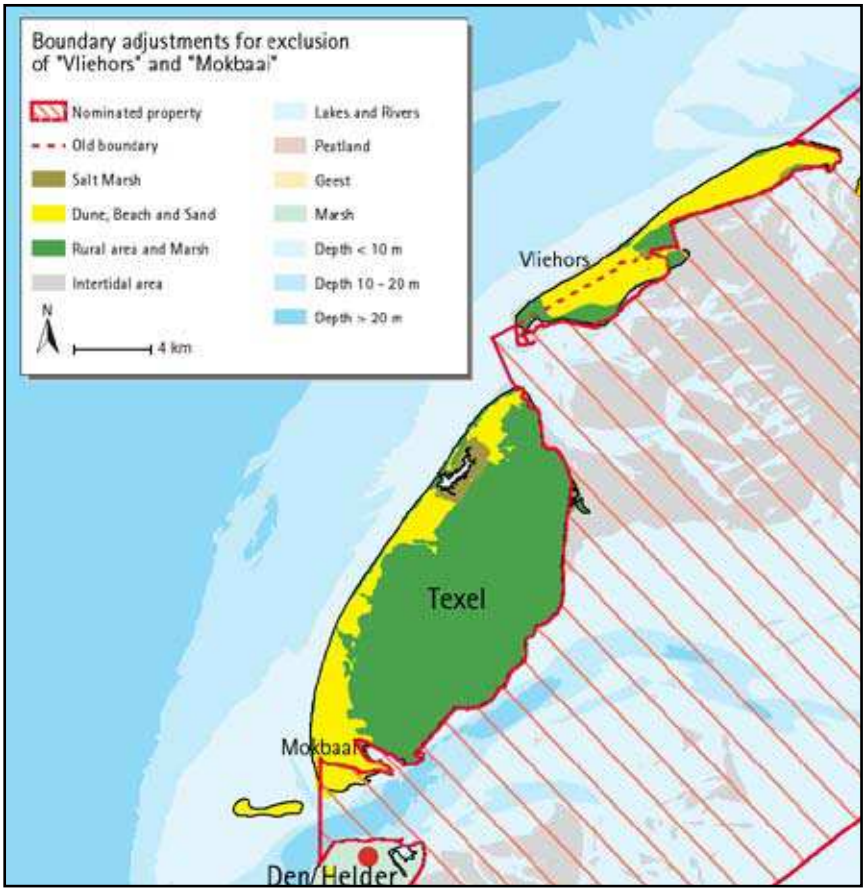


Figure 2: Boundary adjustments for exclusion of "Vliehors" and "Mokbaai"

The Dutch island of Griend (permanently closed area) (Photo: J. v. d. Kam).

Attachment 1

Revised Maps, Tables and Figures

(with reference to the nomination dossier)

Site Element	Name	Coordinates of Centre Points	Size in Hectare	Size in km²	Map No. 1:50,000
001	Key Planning Decision (PKB) Wadden Sea, part I	53° 23' 27" N 05° 39' 57" E	247,386	2,473.9	NL2/18 - NL18/18
002	Key Planning Decision (PKB) Wadden Sea, part II	53° 22' 00" N 06° 53' 47" E	790	7.9	NL1/18 - NL3/18
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	53° 16' 31" N 07° 09' 49" E	8,931	89.3	NL1/18 D 17/19
004	National Park Wadden Sea Niedersachsen, part II	53° 41' 44" N 07° 19' 57" E	166,648	1,666.5	D15/19 - D19/19
005	National Park Wadden Sea Niedersachsen, part III	53° 37' 40" N 08° 15' 50" E	49,134	491.3	D13/19 - D14/19
006	National Park Wadden Sea Niedersachsen, part IV	53° 50' 48" N 08° 26' 01" E	58,806	588.1	D11/19 - D13/19
007	National Park Wadden Sea Schleswig-Holstein	54° 31' 43" N 08° 33' 22" E	436,698	4,367.0	D1/19 -D10/19
	Total Property		**968,393**	**9,683.9**	

Table S1 Rev.: Coordinates of the centre points of the site elements of the nominated property (Volume One, page 7).

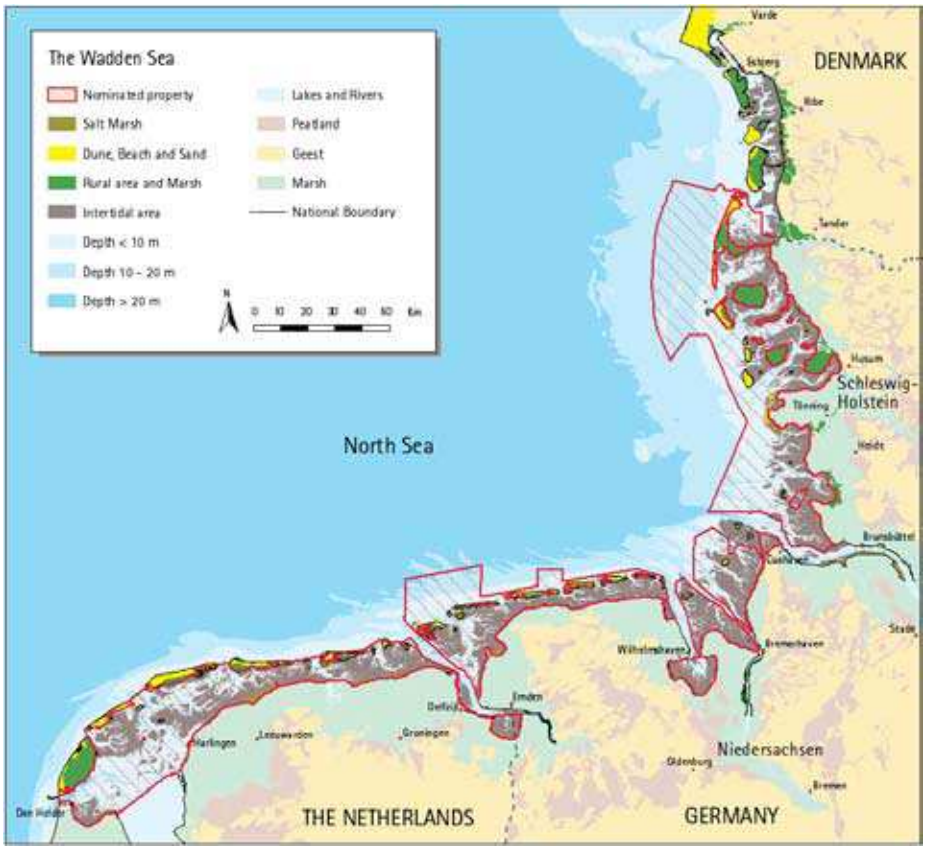


Figure S1 Rev.: Map of the nominated property (A3 map see chapter 1) (Volume One, page 8).

Table 1.1 Rev.: Coordinates of the centre points of the site elements of the nominated property (Volume One, page 13).

Site Element	Name	Coordinates of Centre Points	Size in Hectare	Size in km²	Map No. 1:50,000
001	Key Planning Decision (PKB) Wadden Sea, part I	53° 23' 27'' N 05° 39' 57'' E	247,386	2,473.9	NL2/18 - NL18/18
002	Key Planning Decision (PKB) Wadden Sea, part II	53° 22' 00'' N 06° 53' 47'' E	790	7.9	NL1/18 - NL3/18
003	Key Planning Decision (PKB) Wadden Sea, part III / National Park Wadden Sea Niedersachsen, part I	53° 16' 31'' N 07° 09' 49'' E	8,931	89.3	NL1/18 D 17/19
004	National Park Wadden Sea Niedersachsen, part II	53° 41' 44'' N 07° 19' 57'' E	166,648	1,666.5	D15/19 - D19/19
005	National Park Wadden Sea Niedersachsen, part III	53° 37' 40'' N 08° 15' 50'' E	49,134	491.3	D13/19 - D14/19
006	National Park Wadden Sea Niedersachsen, part IV	53° 50' 48'' N 08° 26' 01'' E	58,806	588.1	D11/19 - D13/19
007	National Park Wadden Sea Schleswig-Holstein	54° 31' 43'' N 08° 33' 22'' E	436,698	4,367.0	D1/19 -D10/19
	Total Property		**968,393**	**9,683.9**	

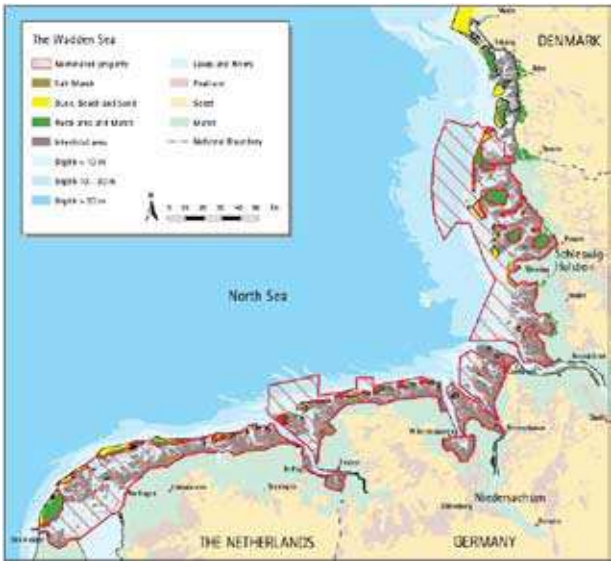


Figure 1.2 (right) Rev.: The Wadden Sea (Volume One, page 14).

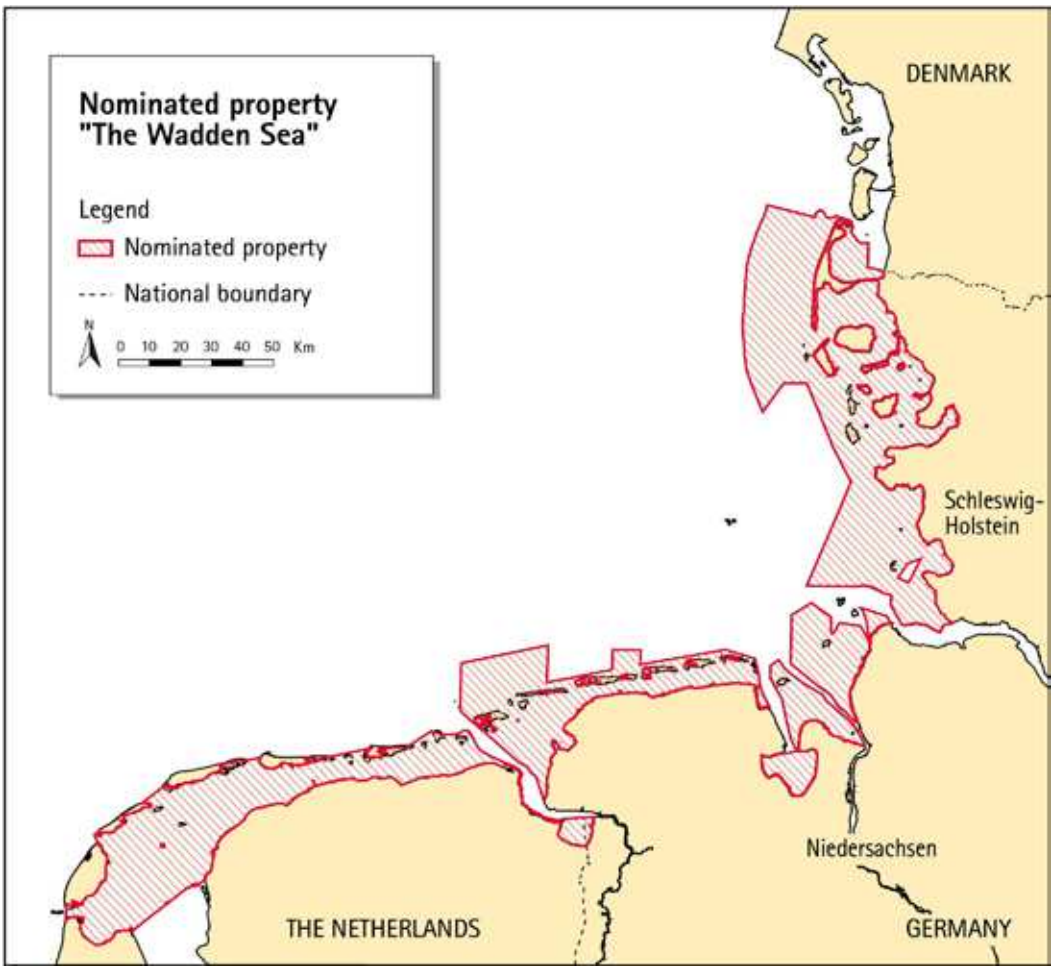
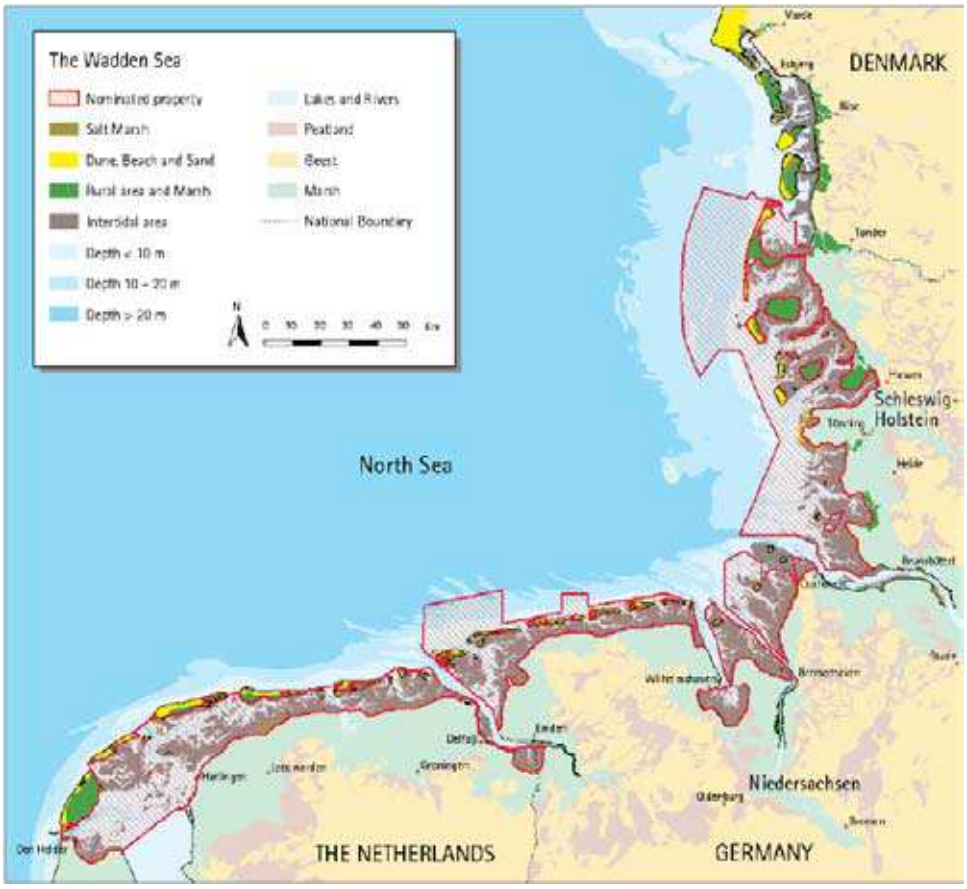
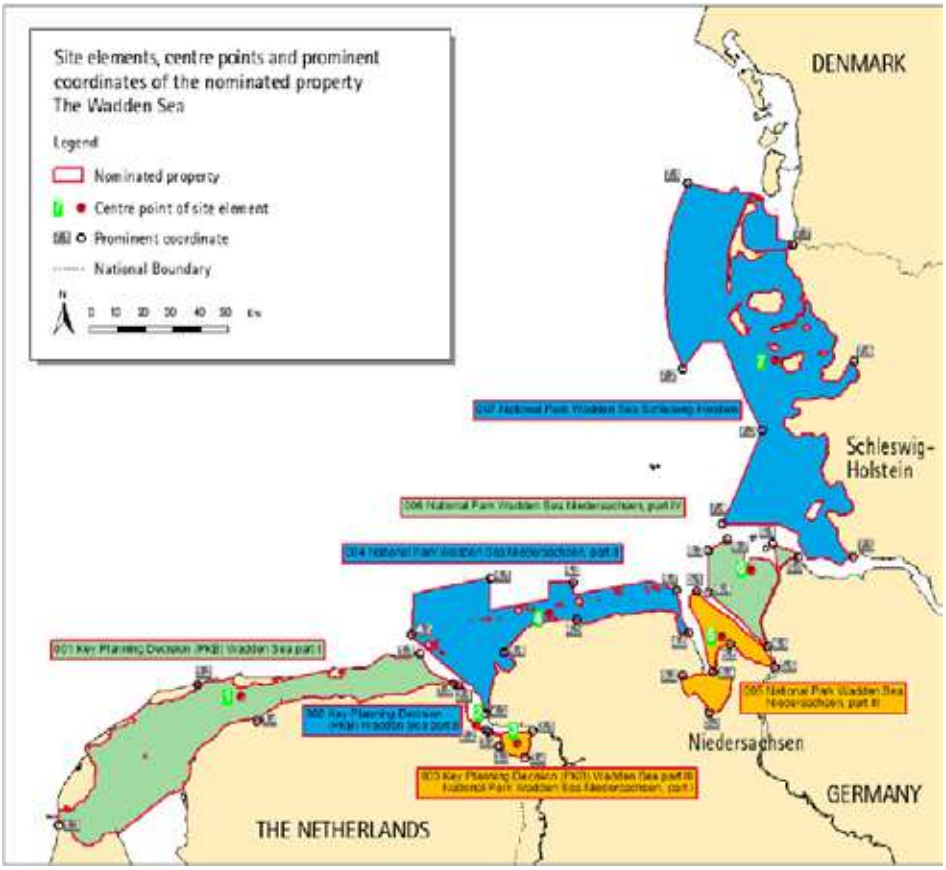


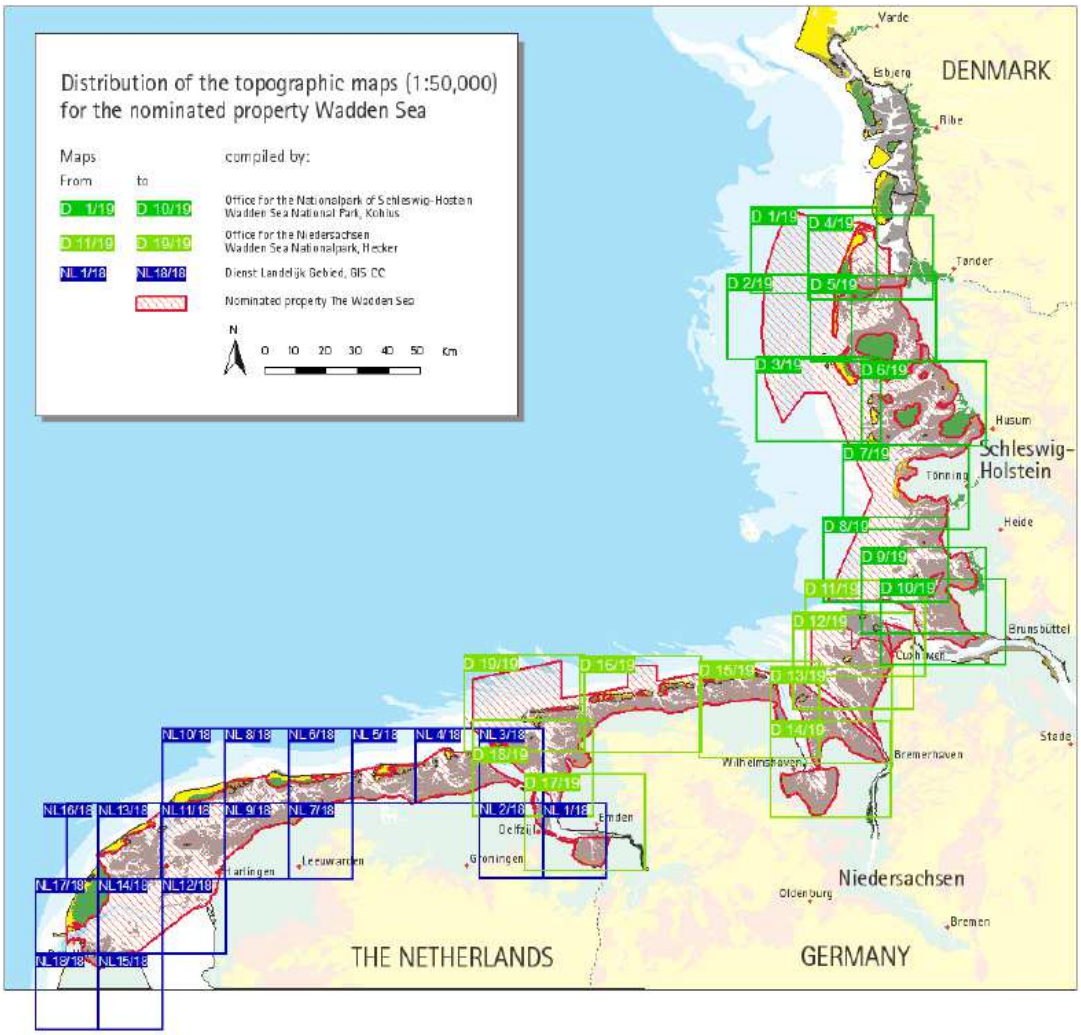
Figure 1.3 Rev.: Nominated property "The Wadden Sea" (Volume One, page 14).

Rev.: The Wadden Sea (Volume One, A3 folded map).



Rev.: Different site elements of the nominated property (Volume One, A3 folded map).



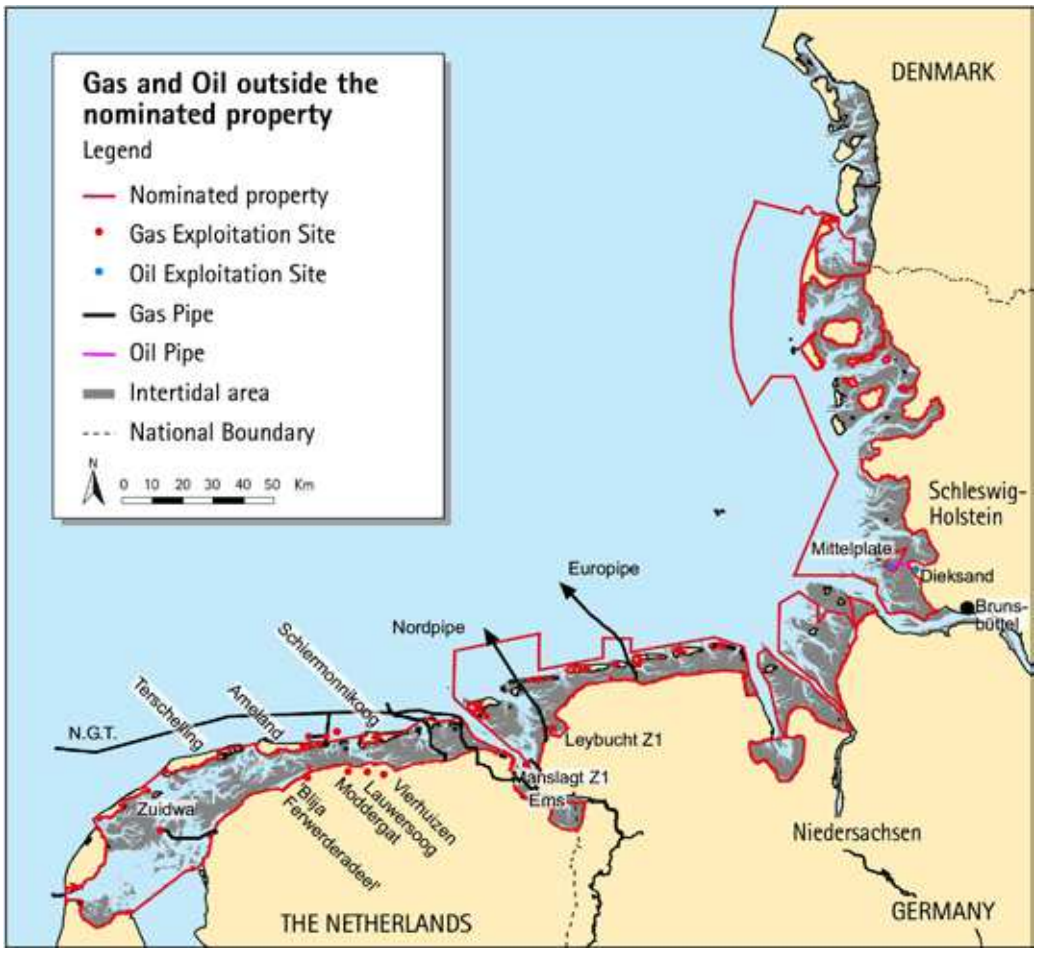


Rev.: Distribution of the topographic maps for the nominated property (Volume One, A3 folded map).

Table 1.3 Rev.: Size and distribution of the nominated property (Volume One, page 16).

Site Element	Name	Size in Hectare	Size in km²
001	Key Planning Decision (PKB) Wadden Sea, part I	247,386	2,473.9
002	Key Planning Decision (PKB) Wadden Sea, part II	790	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	166,648	1,666.5
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	58,806	588.1
007	National Park Wadden Sea Schleswig-Holstein	436,698	4,367.0
	Total Property	**968,393**	**9,683.9**

Figure 2.13 Rev.: Gas and oil outside the Wadden Sea (on basis of the QSR 2004) (Volume One, page 62).



Area	ha	km²	%	Ownership
Key Planning Decision Area (PKB) Wadden Sea	255,031	2,550.3	93.8 % 1.7 % 0.05 % 4.2 % 0.3 %	state owned "Groninger Landschap" "Noord-Hollands Landschap" "Natuurmonumenten" "Wetterskip Fryslan"
Wadden Sea National Park Niedersachsen	276,664	2,766.6	92.5% 6% 1% 0.5%	federally owned state owned owned by municipalities private property
Wadden Sea National Park Schleswig-Holstein	436,698	4,367.0	98.3% 1.6% 0.1%	federally owned state owned private property
Total Property	**968,393**	**9,683.9**		

Table 5.1 Rev.: Overview of land ownership in the nominated property (Volume One, page 115).

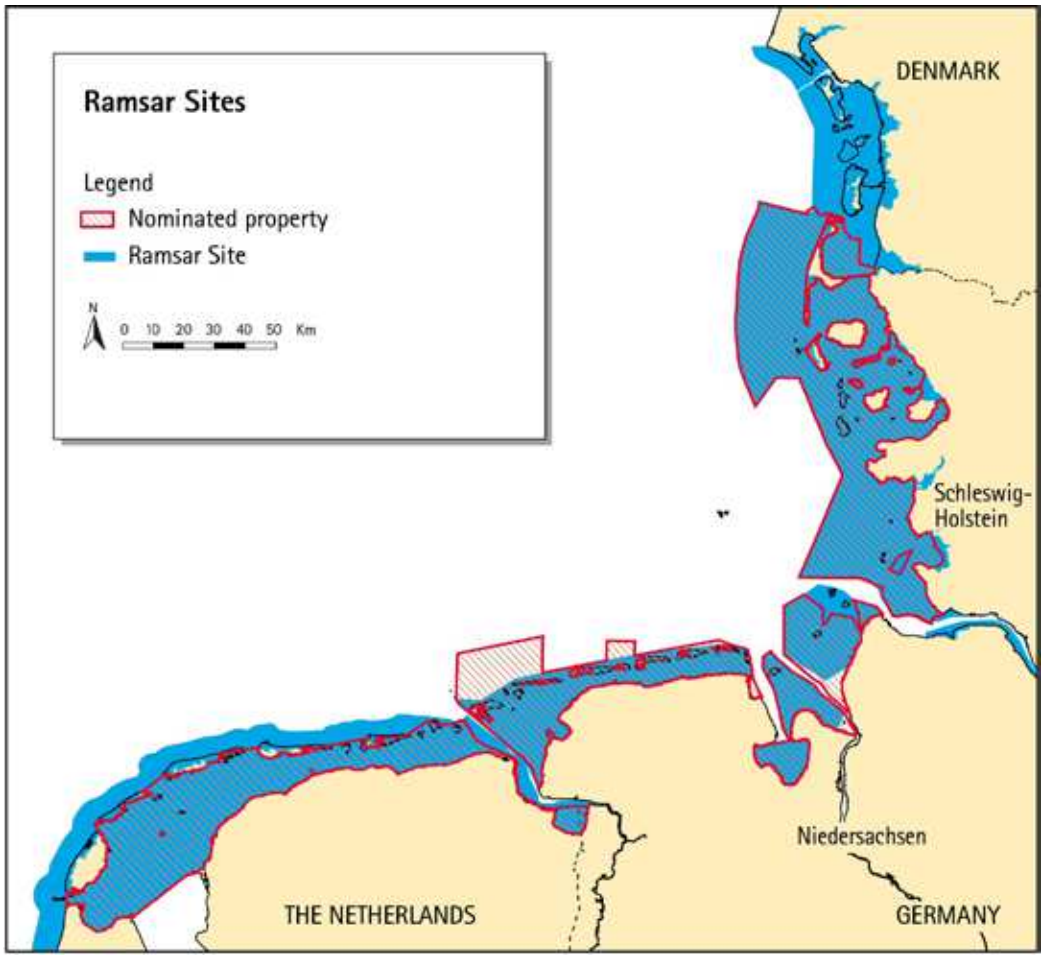


Figure 5.1 Rev.: Map of Ramsar sites within and adjacent to the nominated property (Volume One, page 120).

Figure 5.2 Rev.: Map of the Particularly Sensitive Sea Area (PSSA) Wadden Sea (Volume One, page 121).

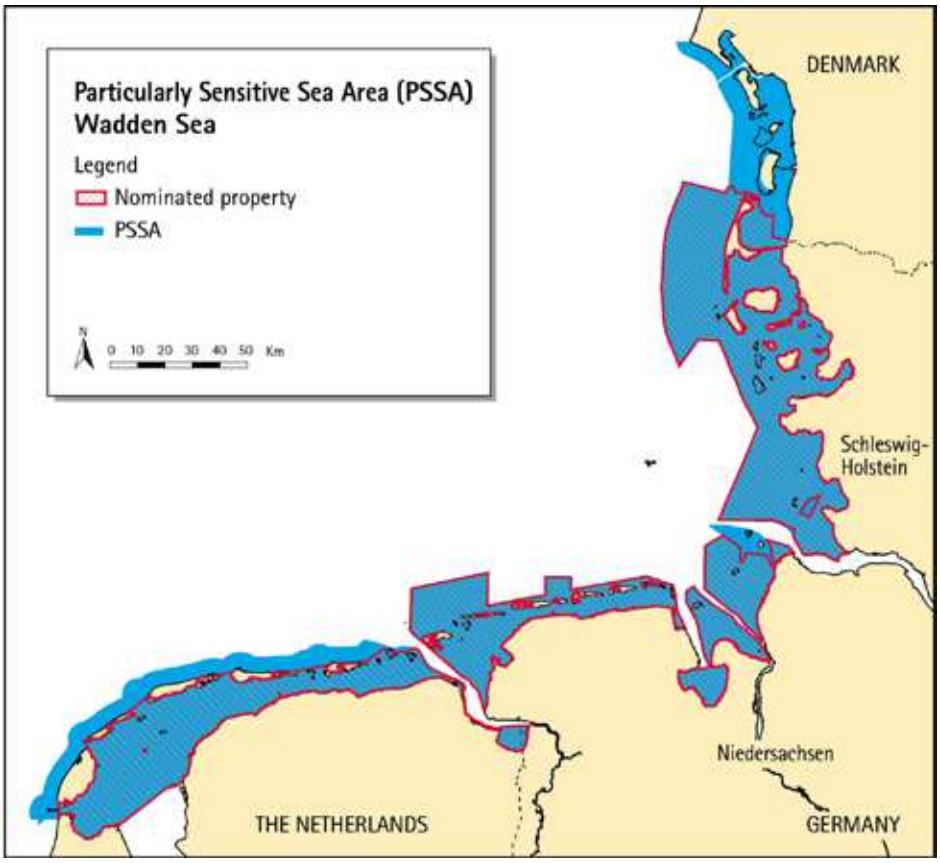
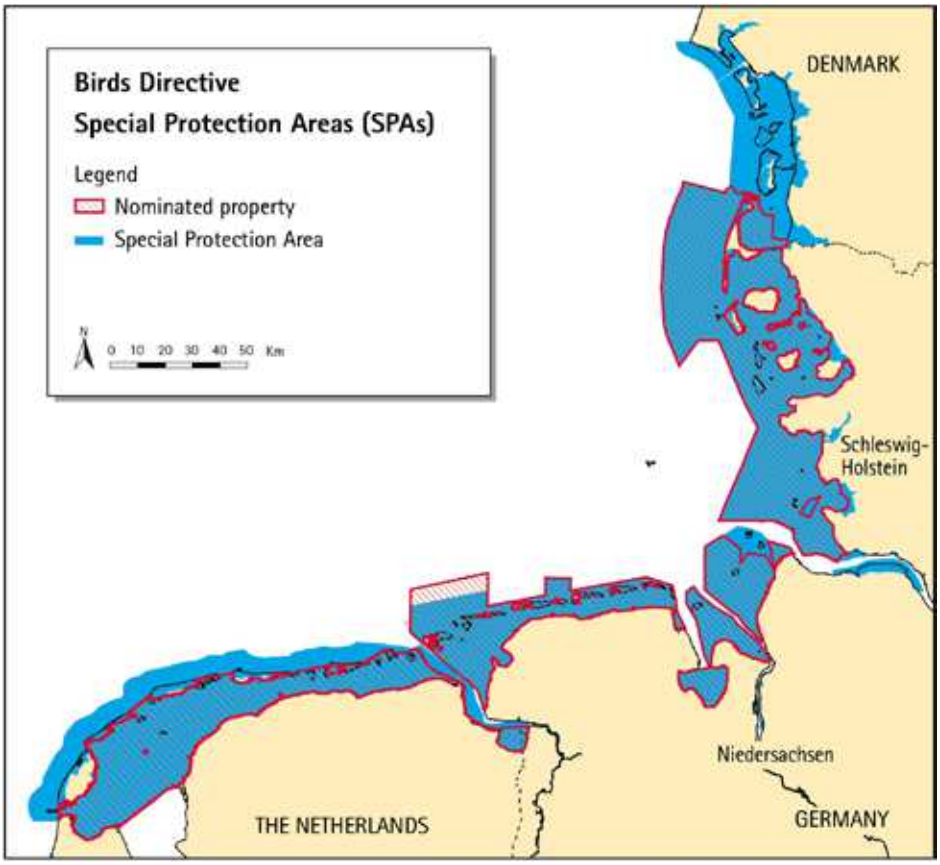


Figure 5.3 Rev.: Map of the Special Protection Areas (SPAs) within and adjacent to the nominated property (Volume One, page 122).



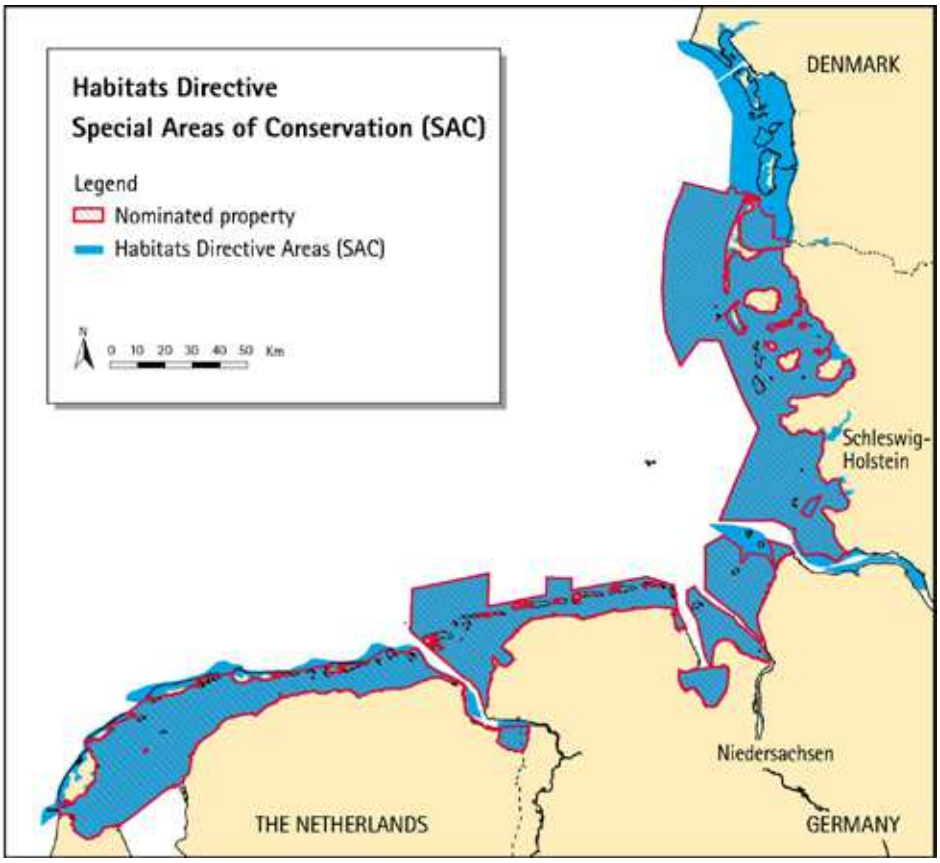


Figure 5.4 Rev.: Map of the Special Areas of Conservation (SAC) within and adjacent to the nominated property (Volume One, page 123).

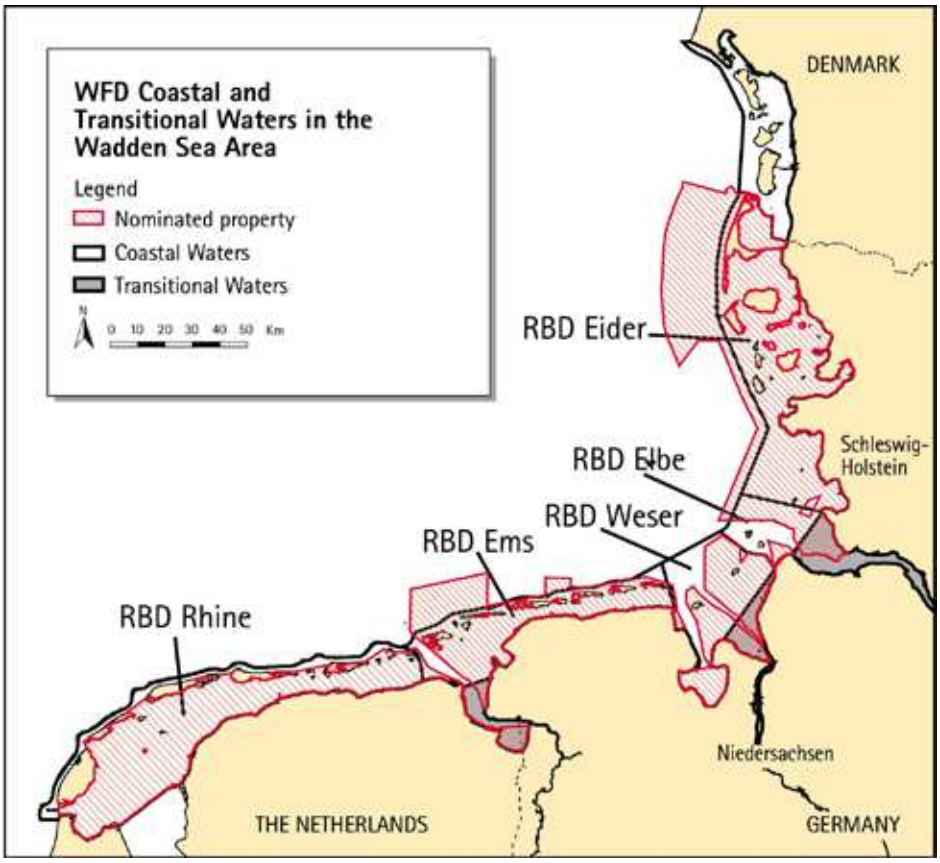


Figure 5.5 Rev.: Map of the Water Framework Directive Coastal and Transitional Waters within and adjacent to the nominated property (Volume One, page 124).

Figure 5.6 Rev.: Map of the Visitor centres within and adjacent to the nominated property (Volume One, page 141).

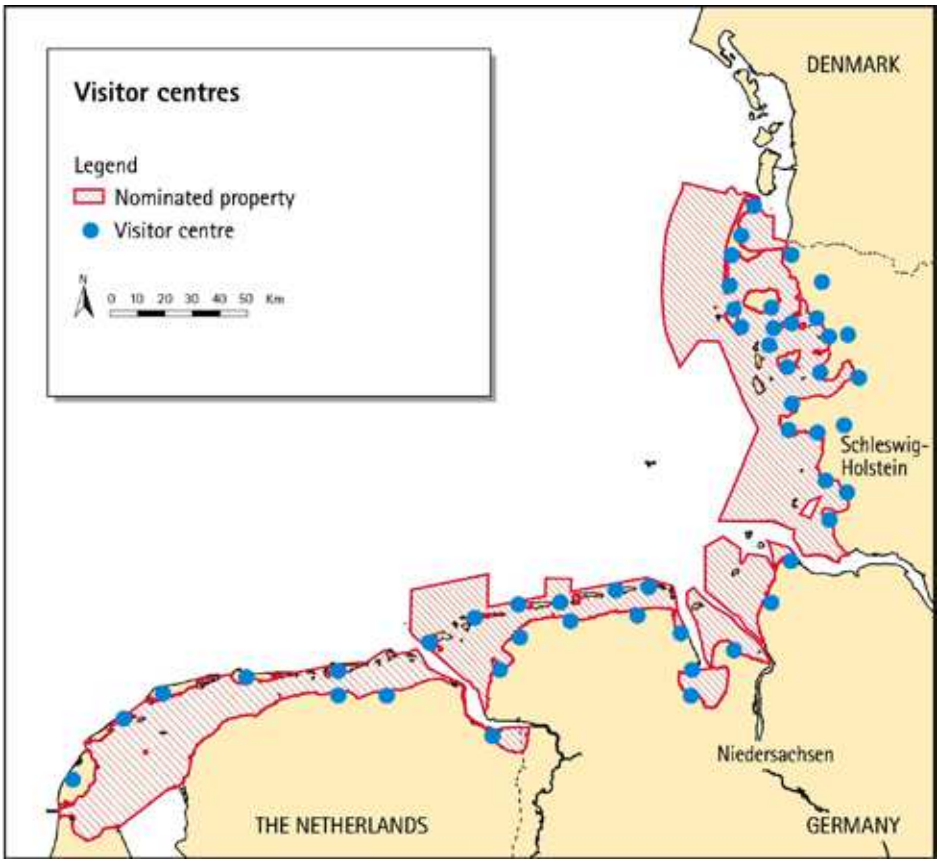
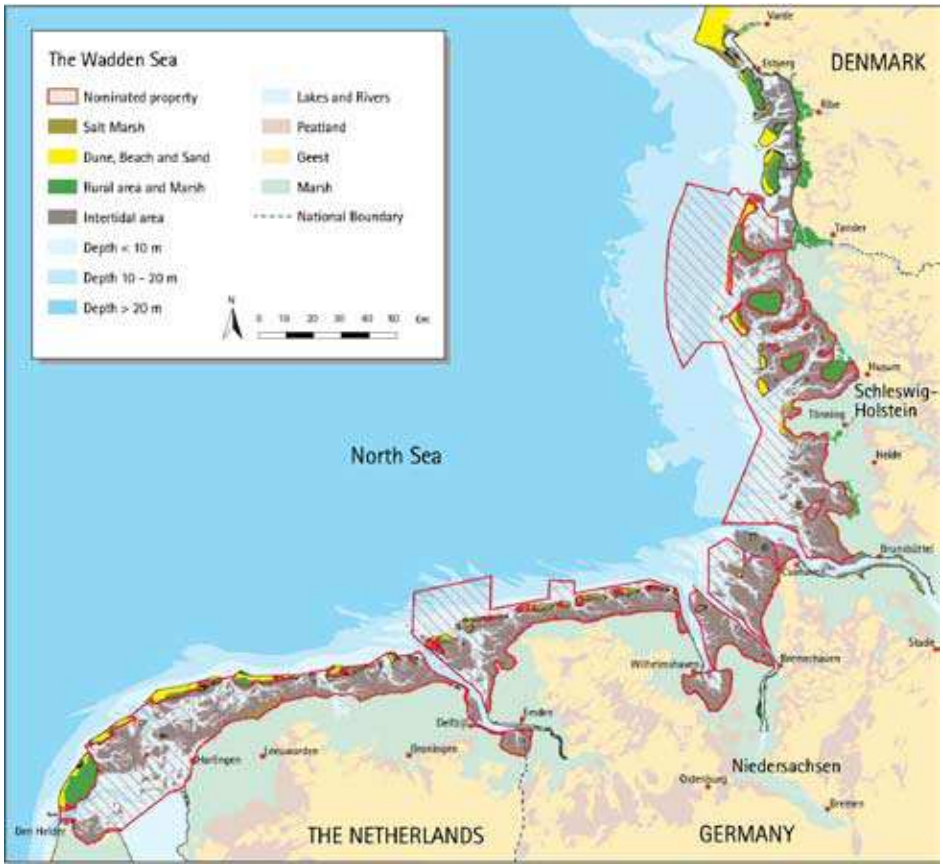


Figure 2 Rev.: Map of the Wadden Sea and the nominated property (Volume Two, page 9/390).



Attachment 2

37 Topographical maps, scale 1:50,000: Extra supplement II

Attachment 3 (DVD)

GIS data, topographical maps and all data of Appendix 1-6 stored: Extra supplement I

Appendix 6

Coordinated Management Arrangements for the Wadden Sea Property

The IUCN has required the state parties to clarify that, in Germany and the Netherlands, coordinated management arrangements are in place for the nominated property.

As outlined in particular in chapter 5.e of the nomination document, the Wadden Sea Plan (WSP) was officially adopted after an extensive public consultation at the 8th Governmental Wadden Sea Conference, 1997. The WSP is the coordinated management plan for the Wadden Sea Area. It consolidates the coordinated and harmonized management for the nominated property including its separate components which can only be protected and managed within an overarching ecosystem approach such as the WSP. The seven site elements of the nominated property are all part of the national protection and management schemes and as such managed coherently within the WSP and the national schemes. Site elements 1-3 are within the Dutch Key Planning Decision Wadden Sea, site elements 3-6 within the Lower Saxon Wadden Sea National Park, and site element 7 is within the Schleswig-Holstein National Park.

The management system for the nominated property is hence a combination of the national management systems and the trilateral WSP, implemented by the responsible authorities. The WSP and its implementation are reviewed at each Governmental Wadden Sea Conference and additional decisions have been taken at subsequent ministerial conferences to support and extend the common management of the Wadden Sea Area.

The WSP 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 quality (natural dynamics, 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 six habitat types. Targets on the quality of water and sediment are valid for all habitats. Supplementary Targets on birds and marine mammals have been adopted as well. As outlined in chapter 6 of the nomination document, the management system is associated with the Trilateral Monitoring and Assessment Program (TMAP) which regularly reviews the state of conservation of the nominated property and serves as an indicator and controlling instrument for management.

The Targets on Habitats and Species are listed in chapter 5.e of the nomination document. The Targets are in line with the criteria viii – x, under which the property has been nominated. For each of the habitats, joint policies and management initiatives and measures have been agreed upon. The WSP entails almost 100 joint policies and management initiatives and measures. The separate components of the property are managed within the WSP and the policies and management initiatives to ensure coherency and consistency. The table below describes the relationship between the criteria, the Targets, and the policies and management measures as examples of some of the agreed policies and management statements entailed in the WSP.

At the last Governmental Wadden Sea Conference, 2005, it was agreed to further develop the WSP to be adopted at the 2010 Governmental Wadden Sea Conference. It is intended to include

Patrol boat of the Dutch Ministry of Agriculture, Nature and Food quality (Photo: J. Enemark).

Table: Relationship between the criteria for the nominated property, the Targets, policies and management.

Criterion	Targets WSP	Implementation Policies and Management WSP (No. refer to WSP)
Geological Processes (viii)	• an increased area of natural salt marsh • a natural dynamic situation in the tidal area • increased natural dynamics of beaches, primary dunes, beach planes and primary dune valleys in connection with the offshore zone • an increased natural morphology, including the outer deltas between the islands	3.1.7 As a principle, it is prohibited to embank salt marshes and loss of biotopes through sea defence measures will be minimized. Reinforcement of existing dikes will be carried out on the location of existing dikes and, preferably, on the land side. 4.1.1 Because the natural dynamics in the tidal area are directly related to coastal defense activities on the mainland coast, the islands and the offshore zone, future coastal protection policies will, as a principle, be based on these interrelationships. 4.1.2 Embankments of tidal areas will, as a principle, be prohibited and the loss of biotopes through sea defense measures minimized. Reinforcement of existing dikes will be carried out on the location of existing dikes and, preferably, on the land side. 7.1.3 Sand extraction will only be carried out from outside the Wadden Sea Area. Exemptions for local coastal protection measures may be granted, provided it is the Best Environmental Practice for coastal protection.
Ecological and biological processes (ix)	• an increased natural morphology and dynamics, including natural drainage patterns, of artificial salt marshes • an increased area of geomorphologically and biologically undisturbed tidal flats and subtidal areas • an increased area of, and a more natural distribution and development of natural mussel beds, *Sabellaria* reefs and *Zostera* fields • an increased presence of a complete natural vegetation succession	3.1.10 The natural drainage of salt marshes will be increased by reducing drainage works where possible and practicable and by introducing more environmentally friendly digging methods. 4.1.18 Mussel fishery will, in principle, be limited to the subtidal area. Based on national management plans, which are documented in the Progress Report, fishery on the tidal flats may be granted. The fishery sector is called upon to exchange information on the existing practices and to investigate possibilities for minimizing impacts of mussel fishery, in general and seed mussel fishery, in particular. (Identical with 9.1.5). 4.1.19 The current area of mussel culture lots will not be enlarged. 4.1.21 The recreational values of the Wadden Sea will be maintained and to this end, - 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.
Biological diversity (x)	• viable stocks and a natural reproduction capacity, including juvenile survival, of common seal and grey seal • favourable conditions for migrating and breeding birds • a favourable food availability for birds	The implementation of the Targets for the Common and the Grey Seal, is covered by the Seal Management Plan as part of the Seal Agreement between the Wadden Sea states as defined in Article 4 of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention). 9.1.2 It is the aim to improve the conditions for migratory birds during roosting and feeding, as well as, for seaducks in the offshore area during moulting, through integrated management. 9.1.6 Disturbance in significant breeding areas will be reduced and access to these areas will be made more predictable for birds, i.e. using only certain footpaths on salt marshes, beaches and dunes (information system for visitors) 9.1.11 Hunting of migratory species has been, or will be, progressively phased out in the Conservation Area or in an ecologically and quantitatively corresponding area in the Wadden Sea Area.

an update of policies and management measures that are further necessary to maintain the Outstanding Universal Values of the property in the WSP.

The WSP is overseen by the standing bodies of the Trilateral Wadden Sea Cooperation, Following an evaluation of the Cooperation in 2007/08 a new Wadden Sea Board will be installed as the governing body of the Cooperation. It prepares and implements the Strategy for the Cooperation, oversees the operational and advisory bodies, and secures relations with key stakeholders to ensure the effective coordination of the different tiers of management. The Common Wadden Sea Secretariat (CWSS) is tasked with the daily implementation of the WSP, coordination of the activities in the framework of the WSP and a regular (compliance) review.

The WSP and its implementation is discussed at the regular meetings of the Trilateral Policy Working Group (TWG) which usually meets twice a year. The TWG includes representatives of governments and, in order to ensure stakeholder involvement in the process, observers representing trilaterally organized stakeholders, such as observers from conservation, fisheries and tourism organizations. The Trilateral Monitoring and Assessment Working Group (TMAG) is tasked with preparing and coordinating the execution of the TMAP, and the assessment of the Wadden Sea ecosystem through the regular Quality Status Reports including the assessment of the progress in management. A number of other technical working groups have been established which also discuss policy and management aspects and advise the cooperation:

- Trilateral Data Handling Group (5 members, 1-2 meetings per annum).
- Joint Monitoring Group for Breeding Birds (JMBB) (6 members, 2 meetings per annum (combined with JMMB)).
- Joint Monitoring Group for Migratory Birds (JMMB) (6 members, 2 meetings per annum (combined with JMBB)).
- Ad hoc Trilateral Beached Bird Group (4 members, no regular meetings).
- Working Group Landscape and Cultural Heritage Wadden Sea (WADCULT) (10 members, 1-2 meetings per annum)
- Trilateral Coastal Protection and Sea Level Rise Group (CPSL) (9 members, 2 meetings per annum)
- Trilateral Seal Expert Group (TSEG) (6 members, 2 meetings per annum) including meetings of TSEG-Plus-managers (TSEG-members and 4 policy managers meeting every 2 years) for the Seal Management Plan

There are further a number of additional groups installed under the TMAG. They are tasked with specific ecosystem management and monitoring, such as the Salt Marsh Working Group, Shellfish Working Group, Fish Expert Working Group etc.

In addition conferences, workshops and expert meetings are held on a regular basis in the framework of the Cooperation to broaden the knowledge on the Wadden Sea including the status on the regional level, and to discuss the common management in the framework of the WSP and the relevant EU directives. Since 2006 conferences and workshops have been held on causes of declining trends of migratory birds, spreading of pacific oysters, blue mussel fishery, adaptation to climate change, dune management, geese management and agriculture, the implementation of the EC Water Framework Directive and sub-tidal habitats. The outcome of the conferences and workshops is documented at http://www.waddensea-secretariat.org/.

The outcome of these conferences, expert meetings and workshops are used in daily management for the nominated property. Based on recommendations of the migratory birds workshop, projects have recently started to investigate the reasons behind declining trends on the regional level in conjunction with a flyway perspective, and possible management options are tuned which may help to mitigate negative impacts. As a result of the pacific oyster workshop, regional projects have started to investigate possible management options if and to what extent the impact and the spread can be mitigated. The workshop on dune management has developed proposals to support natural dune dynamics and resulted in a more intensive cooperation between site managers across the regions and in an adaptation of the daily management to a more natural one. The recent workshop on sub-tidal habitats confirmed that there is generally a lack of knowledge of this habitat type. It is intended to increase the cooperation in this field to enable a better management of sub-tidal habitats. Overall, the results of the workshops and conferences will inform the process of updating the WSP.

In March/April 2009, the 12th International Scientific Wadden Sea Symposium is held. The symposium will focus on how research and monitoring can provide input to conservation

and management, by developing new methods and assessment tools, especially with regard to the implementation of the EU Directives including the new Marine Strategy Directive. The program encompasses 70 contributions and the number of participants is estimated at 150 – 200 scientists, policy workers and representatives of NGOs making this a central forum for discussing the research needs and the future protection and management of the Wadden Sea. The outcome of the Scientific Symposium will be another essential element to inform the WSP updating process. At the Symposium, the potential inscription of the Dutch-German Wadden Sea will therefore have a prominent place in the discussions.

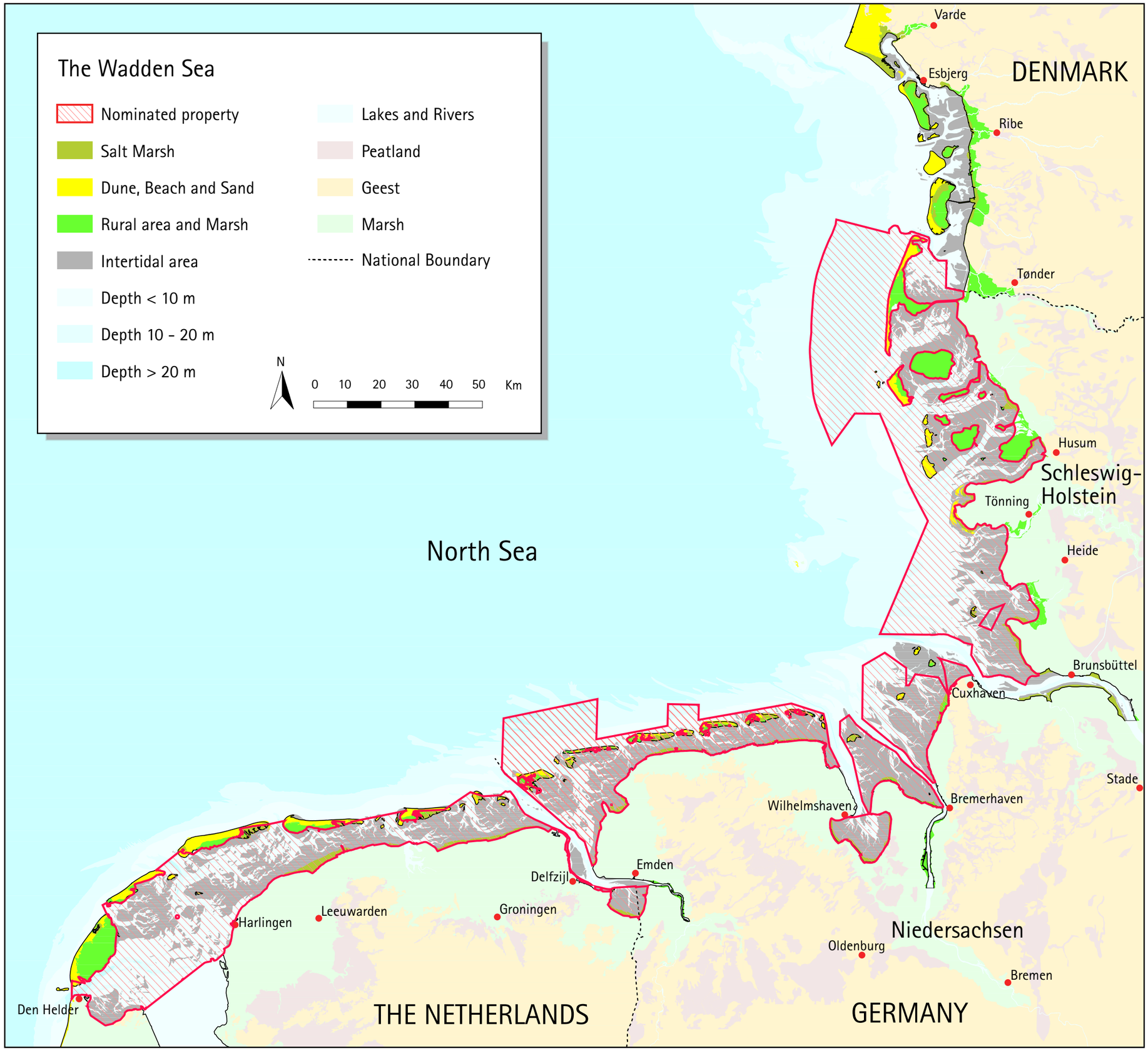
The national authorities and other relevant authorities including the state authorities are represented and cooperate intensively in the TWG, TMAG as well as in the technical working groups. The Ministerial Conferences have a significant impact on the allocation of financial and human resources to enhance the conservation and management of the nominated property. The financial and human resources for the TMAP, which was decided at the 1994 Ministerial Conference, have significantly increased both for the local and regional monitoring, serving the daily management as well as for the assessment carried out at the trilateral level and resulting in the regular Quality Status Reports and Policy Assessment Reports.

As a result of decisions taken at the Ministerial Conferences and in the context of the WSP, significantly more resources have been devoted to the coordinated management e.g. with regard to the coordinated management of seals in the framework of the Seals Agreement, impacts from shipping and shipping safety in the framework of the designation of the Wadden Sea as a Particularly Sensitive Sea Area (PSSA), salt marsh management and in principle the ban on further embankments. Enforcement, as documented in the nomination dossier 5. c and 5.j, has been significantly extended since it was addressed at the Ministerial Conference in 1991. The International Wadden Sea School (IWSS), presented during the field mission, was established following a decision at the 2005 Ministerial Conference. Finally, as a direct result of decisions of the Ministerial Conferences, the financial and human resources of the Common Wadden Sea Secretariat increased considerably over the past period.

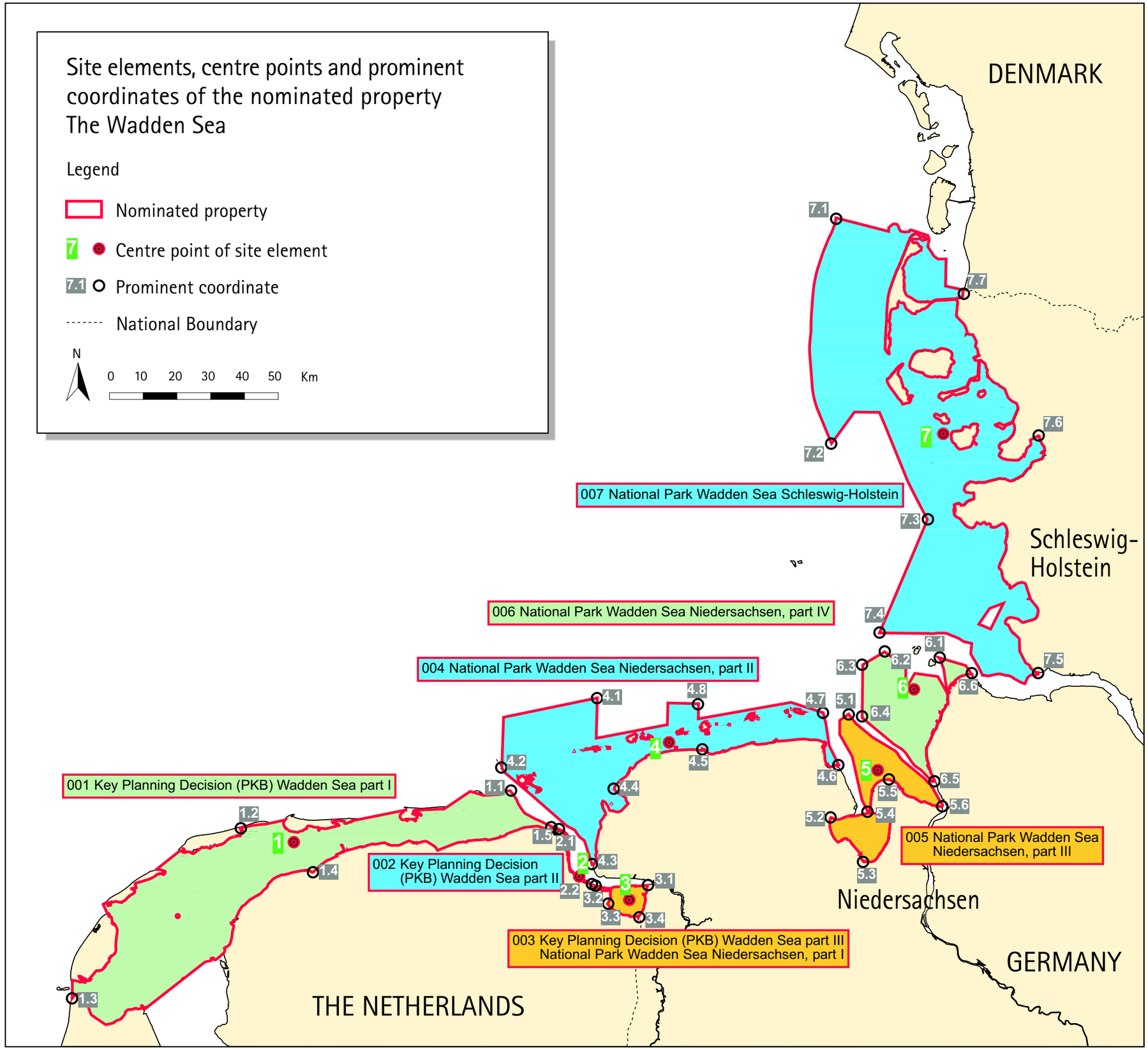
As outlined in a.o. chapter 5.e of the nomination document, the Wadden Sea Forum (WSF) is the trilateral stakeholder forum of representatives of regional and local governments and the main sectors. Recently a Memorandum of Understanding has been concluded with the Trilateral Wadden Sea Cooperation (TWSC). The WSF will serve as independent trilateral advisory and consultation body to the TWSC and prepare 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 further 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. Finally the WSF 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. The costs of the WSF secretariat are financed on a common basis by the WSF members and the TWSC.

During the extensive consultations in the region, preceding the nomination of the Wadden Sea as a World Heritage Property, the WSP has been declared the coordinated management for the nominated property. This has met wide understanding by all partners and stakeholders. The further development of the WSP will explicitly include this as well as the information and awareness program of the information and interpretation centers in the region. The WSP is considered the foundation upon which the outstanding universal value of the nominated property in addition to its legal protection on national and state levels is being preserved and it ensures the effective protection for present and future generations.

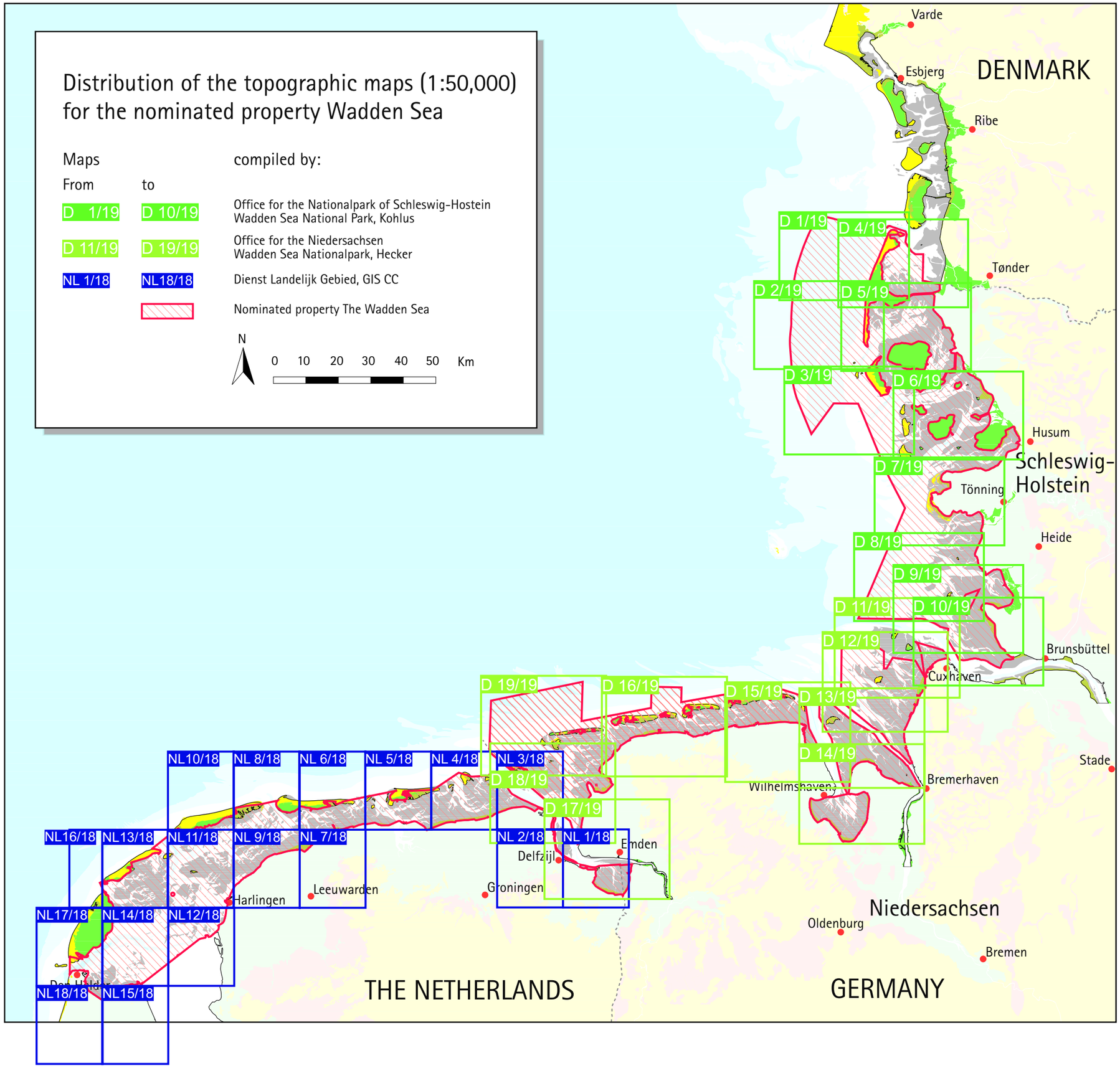
In summary, the WSP is in combination with the national management systems an effective mechanism for ensuring the coordinated management of the separate components of the nominated property.



Rev.: The Wadden Sea
(Volume One, A3 folded map).



Rev.: Different site elements of the nominated property (Volume One, A3 folded map).



Rev.: Distribution of the topographic maps for the nominated property (Volume One, A3 folded map).