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Integrated  
management plan

Elbe estuary

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Northern Directorate for Waterways and Shipping  
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<http://www.portal-tideelbe.de>



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February 2012

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## Reference

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## Layout and graphics

Kiel Institute for Landscape Ecology  
[www.kifl.de](http://www.kifl.de)



Elbe water dropwort, *Oenanthe conioides*



# Integrated management plan Elbe estuary



# Introduction

The Elbe estuary – from Geeshacht, via Hamburg to the mouth at the North Sea – is a lifeline for the Hamburg metropolitan region, a flourishing cultural landscape of historical significance. For the people of this region, the Elbe has enjoyed an excellent reputation for numerous reasons, which include its internationally important shipping channel, its trade and industrial links, its agriculture and fishing, and its leisure and recreation resources (including extensive water sports). The Port of Hamburg alone, the second largest sea port in Europe, employs more than 160,000 people in the region.

At the same time, the Elbe estuary is a unique habitat of international importance. The Elbe is home to many types of animals and plants, some of which are unique to this region. The powerful rhythm of the tides, the dynamic interaction between erosion and sedimentation, and the differing salt concentration all lead to a near-natural landscape, which due to its high conservation value throughout Europe was registered by Schleswig-Holstein, Hamburg and Lower Saxony almost entirely as a Natura 2000 site with the European Union.

As a result of this international responsibility, the federal states worked together with the Federal Administration for Waterways and Navigation and the Hamburg Port Authority to create a trans-state integrated management plan which aims to provide guidelines for state actions.

This plan is the result of constructive cooperation between the partners involved, including numerous organisations, stakeholders and individual scientific experts. Requirements, targets, the potential for synergy and conflict of the various interests in using the estuary were carefully brought together, discussed, and weighed up, and are the consensual basis for a comprehensive collection of measures to ensure the sustainable development of the Elbe estuary in the future.

The gradual implementation of the integrated management plan is a mutual consent of the federal states of Schleswig-Holstein, Hamburg and Lower Saxony, the Federal Administration for Waterways and Navigation and the Hamburg Port Authority. We would like to thank all of those who have been involved so far (and all of those who will be in the future!). Please continue to support us as energetically in the future as you have done in the past.



Jutta Blankau

**Free and Hanseatic City of Hamburg**  
Ministry of Urban Development and Environment



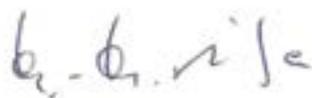
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# Acknowledgement

The trans-state Elbe estuary integrated management plan (IMP) for Hamburg, Schleswig-Holstein and Lower Saxony is a joint piece of work which is the result of four years of intensive labour based on comprehensive technical analysis, numerous discussions and many valuable conversations.

We would like to thank the members of the planning groups for Schleswig-Holstein/Hamburg and Lower Saxony for their continued technical, constructive and reliable cooperation.

The authors of the various special reports provided an important technical basis for the IMP, and made many of the discussions easier.

We wish to thank the BHD (Birds- and Habitats-Directive) Steering Committee of the North German Federal States for their trust and for explaining difficult specific questions.

We would like to thank the Kiel Institute for Landscape Ecology for the layout and the numerous editorial improvements they made.

Finally, we would like to thank all associations, authorities, offices, working groups and people who have supported the project by giving technical advice, bringing in their wide-ranging experience and providing data.

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## IMP guide: where can I find more information?

<http://www.natura2000-unterelbe.de/links-Gesamtplan.php>

All of the texts and plans for the IMP can be downloaded from the website for the integrated management plan (IMP) as PDF files. Messages and newsletters will also appear there.

This page is also linked to other internet sites in order to provide access to information on the activities of various groups and organisations working in the Lower Elbe Region.

### Overall view/functional areas

The planning area stretches over a river length of around 148km and covers an overall surface area of approximately 46,770 hectares. In such a large area, a coordinated planning process is necessary when considering cross cutting themes. But it must be remembered that the estuary is also a very varied area and as such, many questions are better addressed at a local scale. Accordingly, the IMP is made up of two main parts. In the general overview (part A), the higher-level framework is defined, with more detailed information at a 'functional area' level being offered in part.

In part A, "general overview", topics are addressed which are relevant to the entire planning area.

### Two planning groups – one IMP for the Elbe estuary

The IMP was developed in Hamburg, Lower Saxony and Schleswig-Holstein at the same time using a uniform project structure. Due to the size and spatial diversity of the Elbe estuary and the different management structures and responsibilities, two planning groups (Lower Saxony and Hamburg/Schleswig-Hol-

[www.portal-tideelbe.de](http://www.portal-tideelbe.de)

[www.tideelbe.de](http://www.tideelbe.de)

[www.fgg-elbe.de](http://www.fgg-elbe.de)

[www.wasserblick.net](http://www.wasserblick.net)

Together, the linked sites offer a comprehensive overview of the state, programme of measures and research activities related to Natura 2000 in the Elbe estuary. The groups who run the respective sites are responsible for their content.

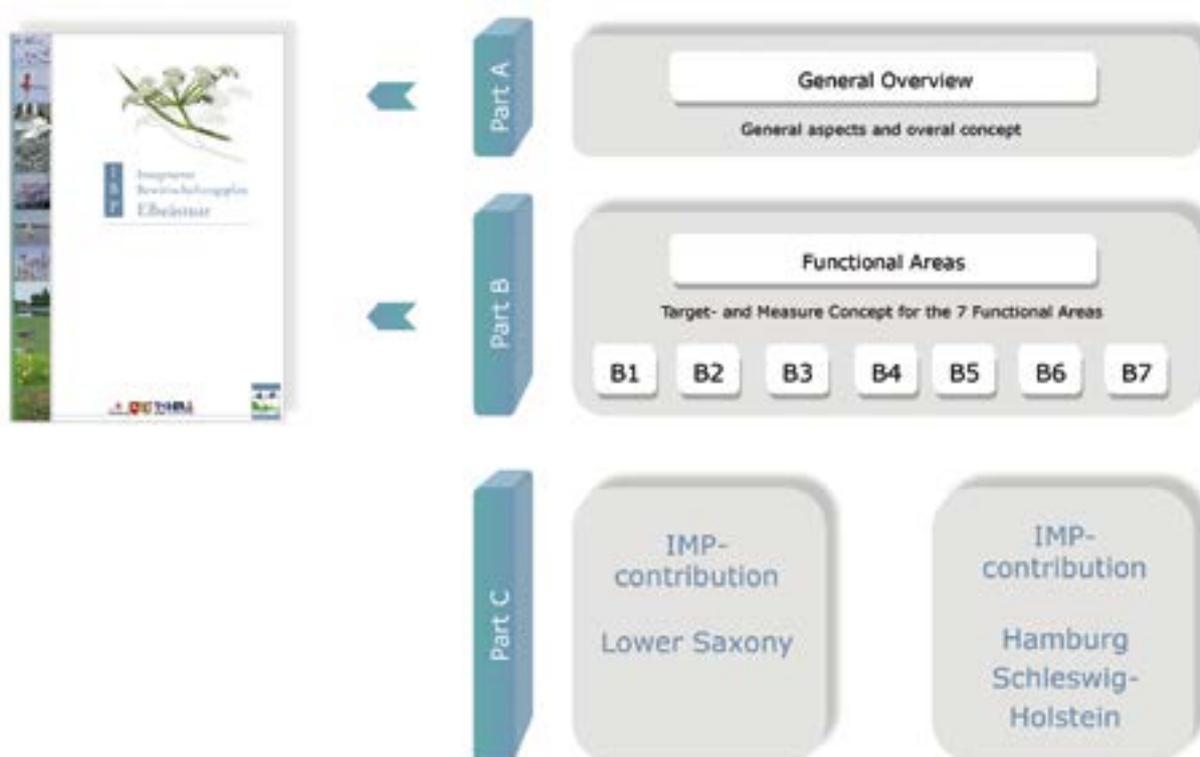
For example, the legal framework and the approach chosen for the integrated Natura 2000 plan are explained. An overview of the Natura 2000 legislation and the uses of the planning area are explained. Guidelines on the integrated targets, measure concept and associated information on its implementation are then discussed.

In part B, the focus is on the seven functional areas of the Elbe estuary. On a local level, the interaction between Natura 2000 and the uses of the area as well as the important partnerships are identified. For each functional area, targets are defined and measures are suggested.

stein) were set up, and their work was coordinated across the states. This report is a synthesis of the work of the two planning groups.

The complete contributions of the two planning groups from Lower Saxony and Hamburg/Schleswig-Holstein can be found on the attached DVD (part C: material) and on [www.natura2000-unterelbe.de/left-Gesamtplan.php](http://www.natura2000-unterelbe.de/left-Gesamtplan.php).

They contain a large amount of specific information on the Natura 2000 sites within the planning area and of the uses of the estuary at those sites. Maps and information on measures to be taken are also included.



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## Contents part C

Note: the original German version of the plan includes a CD-ROM with all the documents issued during the process of setting up the management plan. As these are not translated they are not included in this version at hand. However, all the German documents are available on the website [www.natura2000-unterelbe.de](http://www.natura2000-unterelbe.de).



I Integrated  
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# Part A

## General Overview







## A 1 Introduction

From Geesthacht, via Hamburg to the mouth near Cuxhaven, the Lower Elbe is the lifeline of an entire region. Approximately 4.3 million people live and work in the Hamburg metropolitan area today.

In the interactive region between the river, tide and North Sea, a unique natural area has developed. The Lower Elbe, also known as the Elbe estuary, is home to many plants and animals, some of which are only found here. The Elbe estuary is of high significance for nature conservation in Europe, and as such has been included in the nature protection network Natura 2000.

### Estuary

An Estuary is a 'semi-enclosed coastal body of water which has a free connection with the open sea and where freshwater, derived from land drainage, is mixed with sea water'. Estuarine habitats develop depending upon the influence of the tide and associated saline conditions. Habitats can therefore be dominated by fresh water salt water or brackish water features (a mixture of freshwater and saltwater), in which certain species of plants and animals have evolved to live.

Simultaneously, for centuries the Lower Elbe has been the basis of the successful economy of local residents, who in turn have shaped the landscape they live in. Many different uses present within the estuary including shipping and industry, fishing and agriculture, tourism, leisure, recreation and water sports.

The main goal of the EU-Habitats Directive is to conserve biological diversity in Europe. A large number of species and habitat types are threatened across Europe. For species and habitats which are in need of the most protection, areas have been selected which collectively make up the European ecological network Natura 2000. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) have been designated in accordance with the EC Directive 93/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora and the EC Directive 79/409/EEC on the Conservation of Wild Birds, respectively. There is a compulsory need to avoid environmental deterioration in Natura 2000 sites which prohibits changes and damage which could cause considerable deterioration of the species and habitats that are protected.

Conserving biological diversity can however, in many cases, require the continuation or the promotion of certain human activities.

In order to maintain the favourable conservation status of the species and habitats of mutual interest and, if necessary, to restore them, it is necessary to take certain measures. These measures are set out in management plans.

Natura 2000 is based on the idea that protecting the natural heritage can be combined with the goal of sustainable development. Accordingly, the economic, social, cultural and regional requirements have to be taken into consideration in the Natura 2000 management plans. Activities which could have a negative impact have to be impact assessed against the targets of Natura 2000. This is carried out separately from the management plan as part of the process set out for this.

The integrated management plan for Natura 2000 in the Elbe estuary (Elbe estuary IMP) aims to ensure the protection of a unique natural area and to demonstrate balanced solutions for the integration of the various uses and interests. A healthy and near-natural Lower Elbe is a positive for both nature and for the people who live and work here. The Elbe estuary IMP's cross-sectional approach helps the area to meet targets set out in additional European directives and international agreements.

There are many overlaps between the aims of Natura 2000 and the EU Water Framework Directive (WFD). A broad range of synergies is expected in the estuary landscape which is characterised by water between measures taken to conserve the Natura 2000 sites and those taken to protect water resources. Other positive interactions are, for example, between the Ramsar Convention to Protect Wetlands of International Importance, the Marine Strategy Framework Directive (MSFD) and the OSPAR Agreement on the Protection of the Most Sensitive Sea Areas.

For legal reasons, the federal states are responsible for nature conservation. Since the various interactions found in the Elbe estuary do not stop at state borders, the IMP deals with questions of management which affect the estuary as a single system. All other issues are considered and implemented at the state level.

This plan is applicable for a period of ten years. However, the critical biological and hydromorphological processes in the estuary play out over a longer time period. The targets and recommendations presented are therefore embedded in general guidelines that extend to the year 2020.



▲ Fig. A1  
Lower Elbe with the islands of Schwarztonnensand (left) and Pagensand (right)



## A 2 Legal basis, planning process

### A 2.1 Legal basis

The legal basis for Natura 2000 and the IMP is:

- The council directive on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), and
- The council directive on the conservation of wild birds (Birds Directive).

These two directives (Birds- and Habitats Directives, BHD) have been implemented using the legislation of the Federal Act for the Protection of Nature and the Hamburg implementing legislation on the Federal Act for the Protection of Nature, the Lower Saxony implementing legislation on the Federal Act for the Protection of Nature and the State Protection of Nature Act of the State of Schleswig-Holstein.

#### Legal nature of the IMP

The integrated management plan is a guideline for state-level action. It aims to achieve clarity and planning security, but is not legally binding in terms of uses carried out on personal property. No direct obligations for private individuals arise from the IMP.

The IMP provides a general framework. If, in the opinion of the responsible authorities of the federal states, it would be desirable to create separate management plans for individual Natura 2000 sites, the statutory implementation of the IMP remains open at a local level.

The guidelines on the assessment of projects and exceptions are not affected if there are negative results in the impact assessment (Section 34 of the Federal Nature Conservation Act) on planning (Section 36 of the Federal Nature Conservation Act) and on the protection of particular species (Section 44 Federal Nature Conservation Act). The impact of maintenance works carried out in the planning area, particularly dredging works, are not legally checked by the IMP.

Legal basis	Content of regulation
Article 3 of the Habitats Directive Section 31 of the Federal Nature Conservation Act	Structure and protection of the coherent European ecological network in particular protected areas (FHH and bird protection areas) designated Natura 2000
Article 4 paragraph 1 of the Habitats Directive Article 4 paragraphs 1 and 2 of the Birds Directive Section 32 paragraph 1 of the Federal Nature Conservation Act	Measures for the selection of the SACs and SPAs
Article 6 paragraph 1 of the Habitats Directive Article 3 paragraph 1 and Article 4 paragraph 4 of the Birds Directive Section 32 paragraph 3 of the Federal Nature Conservation Act	Determining the necessary conservation measures corresponding to the ecological requirements of the natural habitats according to annex I and the species according to annex II of the Habitats Directive and the species according to the Birds Directive
Article 6 paragraph 1 of the Habitats Directive Section 32 paragraph 5 of the Federal Nature Conservation Act	Setting up individual management plans or plans integrated into other development plans
Article 6 paragraph 2 of the Habitats Directive Section 33 of the Federal Nature Conservation Act	Finding suitable measures to avoid changes and damage which may have a negative impact on the natural habitats or species according to annex II of the Habitats Directive or according to the Birds Directive in a Natura 2000 area (deterioration ban)
Article 6 paragraphs 3 and 4 of the Habitats Directive Section 34 of the Federal Nature Conservation Act	Impact assessing plans and projects against the conservation goals of Natura 2000 sites (paragraph 3), conditions for approval in the case of a negative result of the impact assessment (paragraph 4).
Article 10 of the Habitats Directive Section 21 paragraphs 1 and 2 of the Federal Nature Conservation Act	Promotion of linked elements of the landscape to improve the coherence of Natura 2000
Article 11 of the Habitats Directive Section 6 paragraph 3(2) of the Federal Nature Conservation Act	Monitoring the conservation status of the natural habitats in accordance with annex I and the species in accordance with annex II of the Habitats Directive and species in accordance with the Birds Directive
Article 17 of the Habitats Directive	Report from the Member States of the European Commission on the conservation status of the species and habitats and on the conservation measures carried out

## A 2.2 Tasks of the IMP

The IMP serves to fulfil the obligations arising from the Elbe estuary being included in the protected area network Natura 2000:

- Conservation of biological diversity,
- Maintenance or achievement of a favourable conservation status of the species and habitats which are decisive for the designation of the Elbe estuary as a Natura 2000 site.
- Resolution of conflicts between the conservation objectives in accordance with the Habitats Directive, the Birds Directive and other goals of nature conservation
- Maintaining and developing linked elements of the landscape
- Maintaining the function of the Elbe estuary as

a neighbouring area in the Natura 2000 network

- Communicating the significance and the aims of Natura 2000 to the public
- Assigning relevant monitoring and environmental observation tasks
- Preparing for adaptations to the estuary ecosystem as a result of climate change.

The IMP shows the current conservation status of the habitats and species relevant to Natura 2000, names areas for action, defines general conservation and development focal points and gives information to coordinate the implementation of these at a local level. It also highlights areas for research and observation from a Natura 2000 perspective.

The Elbe estuary is a significant natural area which is used intensively in many diverse ways. Because of this, the IMP was developed by an interdisciplinary team to take into consideration the social, economic and cultural characteristics of the region. As a transparent plan which seeks to balance out the interests of all, the IMP promotes positive interaction between the various uses and interests by defining the important basis for this:

- A cross-state concept with general recommendations and concrete suggestions on how to fulfil Natura 2000 obligations

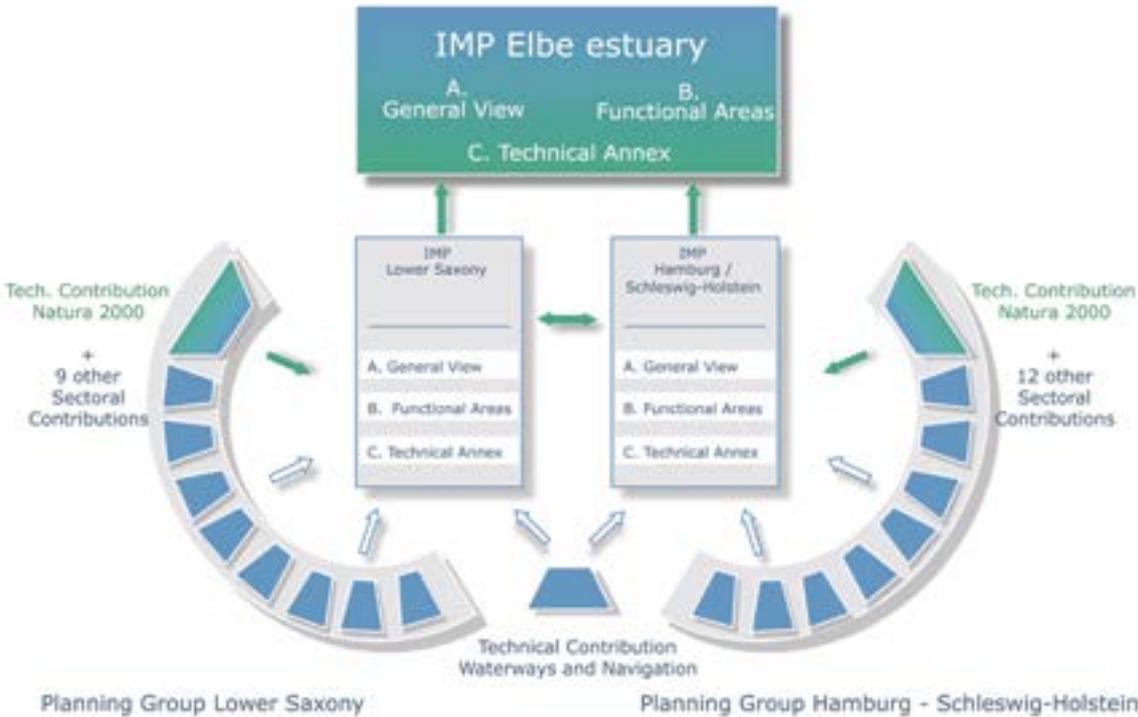
- Information issues for which in-depth work using a detailed concept at a local level is required
- Recommendations and suggestions on how to better integrate nature conservation projects with other environmental goals and activities (in particular in accordance with the WFD) and to coordinate their implementation
- Information on how to improve the compatibility of the existing uses with the Natura 2000 goals
- A basis for the evaluation of the BHD impact assessment of plans and projects and for the planning of coherence and compensation measures.

### A 2.3 Project organisation and structure of the IMP

#### A 2.3.1 Planning groups

The IMP was developed in Hamburg, Lower Saxony and Schleswig-Holstein at the same time using a uniform project structure. Due to the size and spatial diversity of the Elbe estuary and the different

management structures and responsibilities, two planning groups (Lower Saxony and Hamburg/Schleswig-Holstein) were set up, and their work was coordinated by a five-person working group.



▲ Fig. A2  
IMP project organisation

Hamburg, Lower Saxony, Schleswig-Holstein, the Federal Water and Shipping Authorities and the Hamburg Port Authority were all represented in the working group.



▲ Fig. A3:  
A meeting of the Lower Saxony planning group

### A 2.3.2 Structure of the IMP

This document shows the common core of Natura 2000 management in the Elbe estuary in a cross-state manner. Further detail on the different states can be found in the Hamburg/Schleswig-Holstein and Lower Saxony contributions.

In **part A** of the IMP, background information is given which is relevant to the entire area from Geesthacht to Cuxhaven:

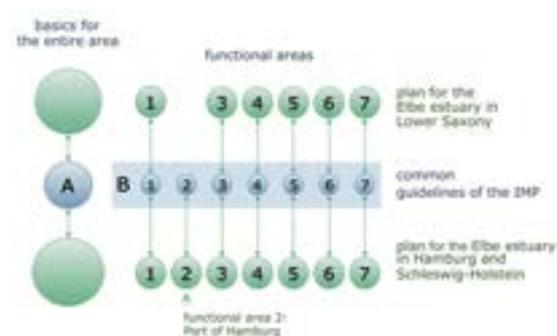
- Legal basis, project organisation (chapter 2)
- Ecological situation and most important uses (chapter 3)
- Integration of Natura 2000 goals and interest uses (chapter 4)
- Measure focal points for the entire estuary (chapter 5)
- Important steps in implementation (chapter 6)
- Information on environmental observation and required research (chapter 7)

**Part B** of the IMP is made up of seven chapters, in which the guidelines set out in part A are explained in more detail for the seven functional areas (for the definition and boundaries of the functional areas, see page 9). The integrated target and measure concept for each functional area takes into account the relevant features of the natural area and the uses practised in that area.

When members were being selected for the two working groups, care was taken to ensure a balanced representation of the various uses and interests.

The tasks of the members included:

- Bringing technical experience, facts and competence to the planning process
- Exchanging information between planning groups and interest groups
- Representing group-specific interests and developing common goals and suggested solutions for any conflicting interests.



▲ Fig. A4  
Structure of the IMP

The statutory implementation of the IMP shall take place on an individual federal state level. State-specific information can be found in the two contributions from Lower Saxony and from Hamburg/Schleswig-Holstein. These can be found in the attached **Part C**: material, with all the supporting reports on which they are based.



The IMP Guide at the start of the text gives a detailed overview of the structure of this document and of the material section included in digital form.



### A 3 Nature and uses in the Elbe estuary

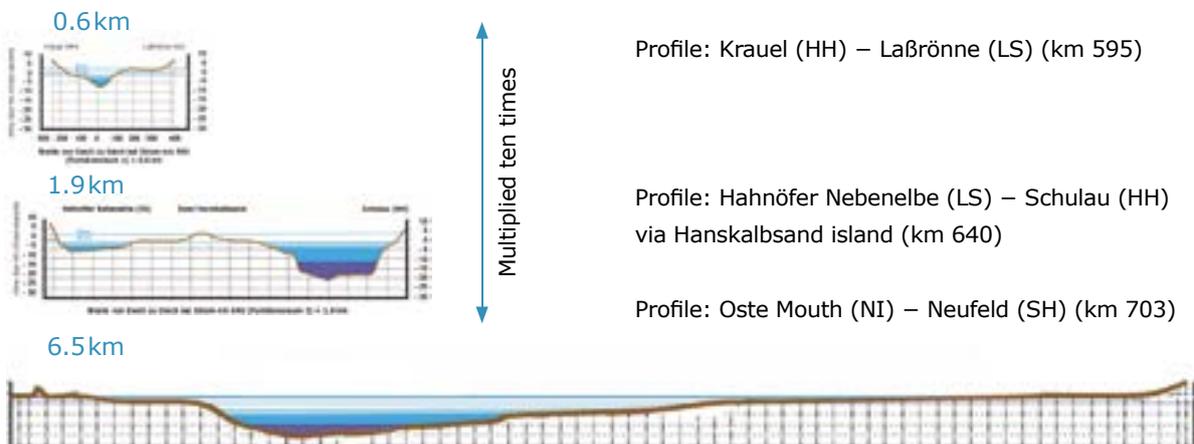
The lower reaches of the Elbe, which is influenced by the tides, forms the largest estuary in Germany and one of the largest estuaries in Europe. The Lower Elbe is approximately 148km long. It starts just below the Geesthacht weir (km 585.9) and goes as far as the crossing to the North Sea at Cuxhaven (km 734). A tidal flood wave takes an average of 4 hours 45 minutes to travel from Cuxhaven to Geesthacht. The barrage at Geesthacht which was completed in 1960 separates the Lower Elbe which is influenced by the tide from the Middle Elbe, which is not affected by tides.

One of the characteristic features of the Lower Elbe is its approximately 70km-long freshwater section

which is also tidally influenced from Geesthacht to Stade on an average head water discharge.

From Geesthacht to Cuxhaven, it is not only the hydrochemical parameters such as the salt concentration of the water that change, but also the dimensions of the area. Between Geesthacht and Hamburg, the distance between the banks is 500 to 700m. Downstream of Hamburg, the maritime influence increases, and the width expands to around 2km. From Brunsbüttel (at around km 700), the shaping power of the tide results in a typical funnel-shaped estuary mouth, which by the Oste is around 6.5km wide. Cuxhaven and the opposite Schleswig-Holstein coast are around 17km away from one another.

From bank to bank



▲ Fig. A5  
Cross-section through the Lower Elbe

The Lower Elbe region is characterised by a typical oceanic climate. The average annual temperature in Geesthacht is 8.5 to 9.1 °C, and in Cuxhaven it is 9.1 to 9.4°C (1971-2000). The average annual rainfall increased from around 750mm in the East to around 850mm in the West of the planning area.

The long-term average surface water runoff at the Geesthacht weir is 729m<sup>3</sup>/s and by Cuxhaven increases to 880m<sup>3</sup>/s due to the additional water.

The large tributaries of the Lower Elbe are the Ilmenau, the Stör and the Oste. The lower reaches of some larger rivers (e.g. Oste, Stör) are also influenced by the tide. The flood barrages at their mouths are only closed when there is a risk of flooding. Other tributing rivers such as the Alster, the Bille and the Seeve are separated completely from the Elbe by sluices.

The Wilhelmsburg island in Hamburg is surrounded by the two remaining arms of the Hamburg bifurcation area, the Norderelbe and the Süderelbe. In the section between Hamburg and Glückstadt there are six islands, which have been majorly remoulded by hydraulic filling.

Barges travel between Geesthacht and Hamburg which reach the Middle Elbe via the Geesthacht sluices. The area of the river which has been widened to allow ships to travel begins in Hamburg. The Lower Elbe is connected to the Baltic Sea via the Brunsbüttel sluices and the Kiel Canal.

The dyked marshes are made up of clay deposits and partially of moors. After they have been drained, parts of the marshes subsided to below sea level.

### A 3.1 Natura 2000 network

The three federal states Hamburg, Lower Saxony and Schleswig-Holstein have selected particular protected areas for the European network Natura 2000.

The overall area of the Natura 2000 sites is around 46,770 hectares, and is divided between water areas, mud flats, islands, forelands and dyked marshes.

#### ▼ Table A2

Natura 2000 sites in the Elbe estuary

EU Code	Name of area	Federal state	Area <sup>1</sup>
<b>SACs</b>			
DE-2018-331	Lower Elbe (including Hahnöfersand, late registration in Spring 2010)	Lower Saxony	18,680 ha + 105 ha (Hahnöfersand)
DE-2323-392	Schleswig-Holstein Elbe estuary and surrounding areas	Schleswig-Holstein	19,280 ha
DE-2424-302	Mühlenberger Loch/Neßsand	Hamburg	737 ha
DE-2424-303	Rapfenschutzgebiet Hamburger Stromelbe	Hamburg	340 ha
DE-2526-305	Hamburger Unterelbe	Hamburg	739 ha
DE-2627-301	Zollenspieker/Kiebitzbrack	Hamburg	109 ha
DE-2526-302	Heuckenlock/Schweensand	Hamburg	129 ha
DE-2526-332	Elbe between Geesthacht and Hamburg	Lower Saxony	573
DE-2527-303	Borghorster Elblandschaft	Hamburg	239 ha
<b>SPAs</b>			
DE-2121-401	Lower Elbe	Lower Saxony	16,715 ha
DE-2121-402	St Margarethen foreland	Schleswig-Holstein	224 ha
DE-2323-401	Lower Elbe up to Wedel	Schleswig-Holstein	7,426 ha
DE-2424-401	Mühlenberger Loch	Hamburg	737 ha

1: large areas of the estuary are protected as both SACs) and SPAs under the Habitats and Birds Directives respectively.



▲ Fig. A6  
 Natura 2000 sites of the Elbe estuary  
 The Wedeler Au upstream of the Wedeler Mühle and the two areas DE-2527-391 "Besenhorst sand hills and Elbe island" and DE 2527-421 "Besenhorst sand hills and Elbe sand meadows nature conservation area" (Schleswig-Holstein) are not part of the planning area.

### A 3.2 Functional areas as the basic units of planning

Within the Elbe estuary there is a gradual transition from fresh water to salt water habitats. In order to do justice to the diversity of life forms and the interactions between nature and use, seven functional areas were defined. These functional areas are defined across the boundaries of federal states and protected areas. They include both the water areas and the surrounding land surfaces of the Natura 2000 sites. The functional areas are not only parts of the Elbe with particular ecological characteristics, but they are also used as a framework for agreements and discussion between the various interest groups.

The flow of the Lower Elbe is characterised by wide meanders with a diameter of 20 to 25km. On each bank, the typical habitats on the inner and outer edg-

es of the flow curves vary greatly (cut bank vs. slip-off bank). Correspondingly, not all of the landscape components of the estuary which are characteristic for a given flow section are found on one side of the flow. For example, in functional area 5, on the Schleswig-Holstein side the mud flats are almost not present at all, while on the opposite Lower Saxony bank they are extensive. By defining functional areas that went beyond federal state and protection area boundaries, planning units have been created in which all characteristic landscape elements of the individual flow sections are represented. The functional areas therefore show the spatial units in which the ecological functions of the flow section are to be maintained or promoted.

Within the functional areas, priorities for the management of the individual Natura 2000 sites often arise from the structural differences between the left and the right banks.

With the exception of functional area 2, the functional areas are made up exclusively of Natura 2000 sites. Functional areas 1 and 7 only comprised SACs. Functional areas 3, 4, 5 and 6 are in addition for large parts designated as SPAs.

Functional area 2 with the Port of Hamburg is exceptional. It includes parts of the Norderelbe, the Süderelbe and the main Elbe channel which are not part of Natura 2000 designation but carry out an indispensable connective role between the areas upstream and downstream of the port. These Elbe sections are therefore treated as a distinct functional area in the IMP.

▼ Table A3

Brief characterisation of the seven functional areas of the IMP

Functional area	Boundaries	Flow length of the area	Brief description
1	Upper tidal Elbe from the Geesthacht weir to the Port of Hamburg	ca. 29km 1,748 ha	Limnic, not expanded for the passage of ships, dyke line near the bank
2	Norderelbe and Süderelbe in the Port of Hamburg, Elbe from Köhlbrandhöft to the Mühlenberger Loch	in total ca. 28km ca. 990 ha	Limnic, river area through the Port of Hamburg
3	From Mühlenberger Loch to the northern tip of Lühesand	ca. 17km 5,181 ha	Limnic, islands, side channels, centre of the oxygen deficiency zone, extensive mud flats, main dyke line near the bank
4	From the northern tip of Lühesand to the line between Brokdorf and the Freiburg port tidal inlet	ca. 32km 14,048 ha	predominantly oligohaline, islands, side channels, extensive grasslands behind the main dyke line
5	From the line between Brokdorf and the Freiburg port tidal inlet to the line between Brunsbüttel and the Oste mouth	ca. 22km 11,357 ha	predominantly mesohaline, turbidity zone of the estuary, extensive grasslands and arable land in front of and respectively behind the main dyke line
6	From the line between Brunsbüttel and the Oste mouth to the line between Cuxhaven-Kugelbake and the south-western tip of the Schleswig-Holstein Wadden Sea National Park	ca. 23km 13,564 ha	predominantly polyhaline, transition to the Wadden Sea, sandbanks and mudflats
7	Tributaries – Oste (ca. 11km), Stör (ca. 36km), Krückau (ca. 6km), Pinnau (ca. 15km)	in total ca. 68km 872 ha	Tributaries influenced by the tide, with flood barrages, Oste: mesohaline, Pinnau, Krückau, Stör: limnic



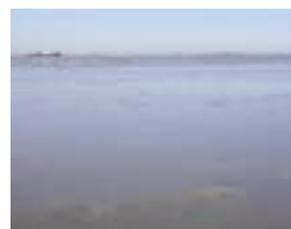
▲ Fig. A7  
Functional area 1  
Elbstorf (km 590)



Functional area 3  
Wedel (km 644)



Functional area 4  
Kollmar (km 668)



Functional area 5  
Balje (km 695)



▲ Fig. A8  
Functional areas of the IMP

### A 3.3 Looking back at the development of the Elbe estuary

In the post-glacial period, as a result of the penetration of the North Sea, the estuary was formed in the ancient Elbe river valley. Originally, the estuary was an amphibian landscape in which the Elbe and the tidal currents had to make their way through their own deposits. The increasing sea levels in the post-glacial period supported both the development of coastal and river marshes and the creation of extensive moors. In the sections with particularly intensive sedimentation such as the crossover between the Wadden Sea and the inland delta of the Elbe near Hamburg, the outflow separated out into many channels. Even the main channels were unstable and shallow. Relocation of large sandbanks in the mouth area caused significant shifts in how the Lower Elbe meanders were cut.

In the marshes near the river, extensive swamps developed, which in many places on the far east end of the flood plain turned into peat bogs. On the river banks, alluvial forest sprang up. The Tidal Elbe found to the east of Hamburg today was still not yet influ-

enced by the tide, and formed a hydromorphological unit with the Middle Elbe.

The Elbe estuary has been inhabited by humans for many millennia. These humans initially lived off hunting and fishing. The first signs of a lasting settlement date back to the seventh century A.D. houses were initially built on the natural river banks of the Elbe and its tributaries, but were later also built on synthetic structures (dwelling mounds). Around the year 1000 A.D., construction began on a dyke and draining system, which made it possible to develop new areas which could be used for agriculture. Since the 15th century, the natural forelands have been dyked and active processes have been carried out to gain land. This development was accompanied by repeated setbacks. Severe floods and shifts of the river flow made it necessary to give up dyked areas. As a result of this extensive use, in comparison to today's standards, the habitat diversity increased, for example, due to the creation of meadows.



▲ Fig. A9

In parts of the Haseldorf foreland, you can guess how the natural estuary landscape may have looked.



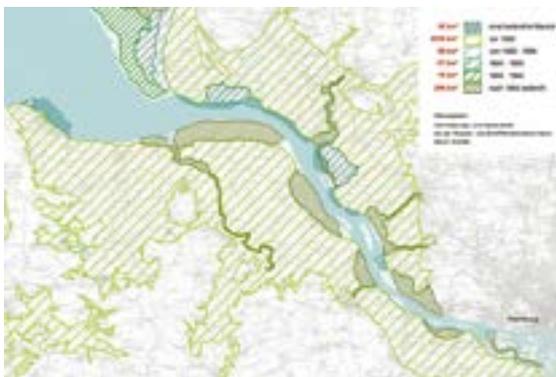
▲ Fig. A10

In the 17th century, the shape of the Hamburg bifurcation area was still there. (Extract from the "map of the principality of Stormarn, year 1650")

Although the wide range of human activities have characterised the estuary for centuries, it has only been in the past 150 years that the technical means have been available to make any significant change to the natural and cultural landscape. Measures to protect the coast mean that there is a permanent division between large parts of the marshes, tides and flood waters. By the 1970s, the main dyke in different sections of the Elbe had been moved towards the main channel. Since 1900, 50% of the forshore in Schleswig-Holstein and 75% of the foreland in Lower Saxony have disappeared.

In order to ensure a safe and sufficient navigable depth, the drainage has been gradually pooled into a main channel. The main channel in the Elbe was made deeper.

The sand that was salvaged from this process was utilised to embellish existing sand bars and islands (e.g. Schwarztonnensand, Pagensand, Neßsand), which led to further pooling of the draining and narrowing of the area available for the water. After the catastrophic surge of 1962, several large Elbe tributaries were separated from the river. As a result of this, the deep water areas increased at the expense of the shallow areas. Surveys of the area show that the overall extent of the mud flats has remained relatively constant, but the proportion of the areas which are of low ecological value (e.g. unstable sand bars, unfixed silt flows due to accelerated sedimentation in the side areas of the estuary) has increased.



▲ Fig. A11

Embankments in the Elbe estuary



▲ Fig. A12

The dyke completed in 1978 through the Haseldorfer Marsch is one of the most recent embankment projects in the Elbe estuary.

The industrial development in the Elbe river area sharply increased the pollution of both water and sediments. Only following the systematic expansion of sewage treatment plants did the damage to the Elbe by polluted waste water decrease.

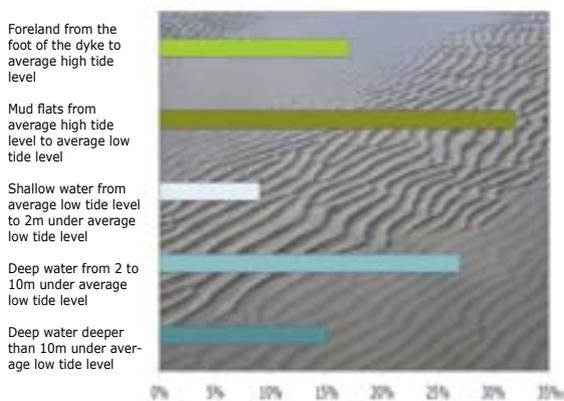
The trend towards using the landscape more intensively continues in some parts of the Natura 2000 sites of the Elbe estuary to this day. Among other things, this makes the increasing proportion of agriculture in the traditional grassland areas more noticeable.

### A 3.4 Current situation

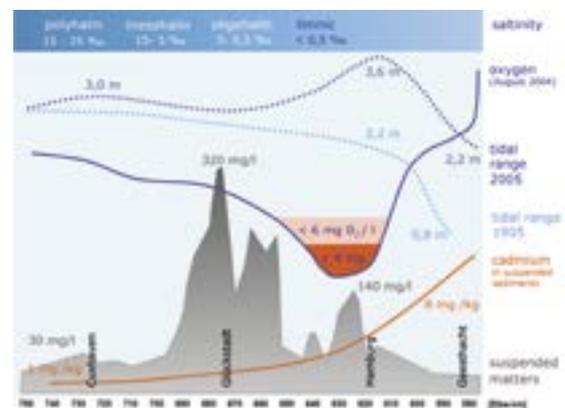
In historical times, the Lower Elbe was transformed into a landscape with a stark contrast between land and water. As a result of this development, the modern-day estuary is characterised by the following key features:

- Large areas of the original estuary are now removed from the direct influence of tidal high waters and have lost their flood plain character. The forelands which would exceed the mud flat areas in a near-natural landscape are only half as big as the mud flats.
- The proportion of shallow water areas which are particularly important for aquatic wildlife has decreased significantly compared to deep water areas. The loss of the forelands and the shallow water areas affects all of the functional areas.

- The dynamic creation and dying out of natural habitats has come to a standstill. Today, the landscape of the estuary is mostly characterised by deep channels, long dams, revetments and dykes.
- In the past 100 years, the tidal range in Hamburg has increased by approximately 1.4m. Sections of the river east of Hamburg, where there was no tidal influence naturally, now have a tidal range of more than 2m.
- The sediment budget of the Lower Elbe has been badly damaged. Anabranches and other neighbouring areas with oxygen-rich shallow water sites are decreasing, while marine sediments from the channelled flow are transported ever further upstream and in ever greater quantities (tidal pumping). The damaged sediment budget results in increasing costs to keep the ports and navigation channels clear. In other places, bank erosion is increasing, which increases the need for spending to secure dykes.



▲ Fig. A13  
Distribution of surfaces on the Elbe estuary (not including the Port of Hamburg or the tributaries)



▲ Fig. A14  
Gradients of the parameters salt content, tidal range, oxygen concentration, cadmium concentration

- Nutrients and contaminants, which have been carried the length of the river, accumulate in the Lower Elbe. As a result of the hydromorphic degradation and the high nutrient input, the oxygen content of the water often falls below 4mg O<sub>2</sub>/l in the oxygen deficiency zone of the estuary (roughly from Bunthaus to Lühesand), in extreme situations even below 2mg O<sub>2</sub>/l, which is dead-

ly to most aquatic animal species. When oxygen levels are extremely low, the biological continuity between the Natura 2000 sites is broken.

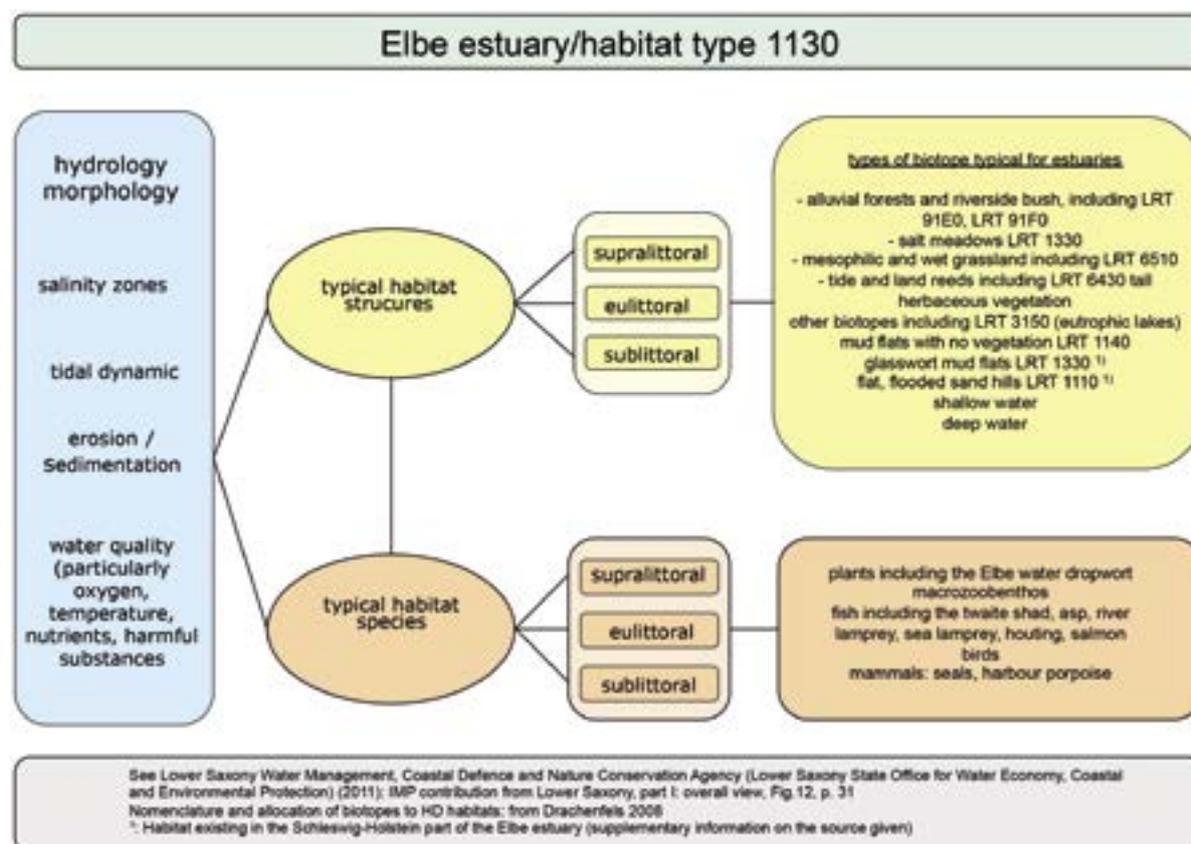
The developments shown here are not just relevant to the Elbe. In other North Sea estuaries, they have occurred to a similar degree, in some cases even more severely.

## A 3.5 Habitats and species in the SACs

### A 3.5.1 Complex habitat: "estuaries"

Among the types of habitat in the Lower Elbe, type 1130 ("estuaries") is particularly significant. The estuary stretches from Hamburg to the mouth at the North Sea, and therefore covers the entire salinity gradient (from fresh water to salt water conditions). When looked at in a cross section, the estuary contains all of the sites and habitats which are continual-

ly or periodically in contact with the Lower Elbe. The habitat extends from deep water to intertidal zones. The area included in this can be seen as a large and complex landscape. The habitat type "estuary" is also found in the tributaries which are influenced by the tide.



▲ Fig. A15

Significance of hydrology and morphology for the complex habitat type 1130 estuaries

In the estuary, there are additional habitats which are included separately in annex I of the Habitats Directive (e.g. mud flats, herbaceous vegetation on the banks, soft wood alluvial forests, etc). The estuary habitat therefore can be seen as a matrix in which subset components, which are of particular ecological value, are specifically named and characterised. In order to emphasise the particular nature of this habitat, the term "complex habitat" is used in the IMP. The individual elements of the complex habitat interact in very diverse ways. From the sublittoral to the supralittoral, they are affected by the same factors to a different extent.

### A 3.5.2 Other HD habitats

The Natura 2000 sites in the Lower Elbe can be sub-divided into three large landscape units:

- the aquatic area
- the forelands influenced by the tide
- the marshes and branches of the Elbe which are cut off from the influence of the tide by dykes.

In the aquatic area and in the forelands, the sequence of habitats is determined by the salt content of the water. Soft wood alluvial forests (priority habitat type 91E0) only occur under oligohaline and limnic conditions. The tidal reeds are particularly significant for the fresh water and brackish water section of the Lower Elbe (part of the "estuary" habitat type 1130), with the endemic plant species Elbe hair grass (*Deschampsia wibeliana*). The habitat types "sand bars with only slight continuous covering by sea water" (1110), glasswort mud flats (1310) and, in the estuary where there is grazing, salt meadows (1330).

The habitat type "moist tall herbaceous vegetation" (6430) can be found all the way from Geesthacht to the mouth. The composition reflects the change in the site conditions.

Measures which contribute to maintaining a favourable conservation status in the estuary as a whole also have a positive effect on the habitats found within the estuary. The same is true for the species named in annex II of the Habitats Directive such as the twaite shad, which depends on suitable conditions in the estuary for reproduction.

Measures which contribute to improving the hydro-morphological situation are particularly relevant for the conservation of all habitats and species (see Fig. A15).

East of Hamburg, the limnic estuary continues as habitat type "rivers with mud banks" (3270), represented here with particular characteristics influenced by the tide. The typical wildlife shows some similarities with that of the Middle Elbe above Geesthacht, and very significant overlap with the flora and fauna of the limnic section of the "estuary" habitat type west of Hamburg.

Lowland hay meadows (6510) occur both in the foreland and behind the dykes. Typical for the Lower Elbe are grasslands with chequered lily, meadow barley, meadow caraway and the large rattle.

East of Hamburg you will find the western outposts of alluvial meadows (6440), which are mainly found in the Middle Elbe. Species-richness of in the dyked Elbe meadows depends on the land use and also on the age of the diking.

The habitat type "eutrophic lakes" (3150) is formed at particular areas such as brackish water (hollows created by former dyke breaches, e.g. the Großes Brack area on the Borsteler Binnenelbe.



1110 sandbars



1130 estuaries



1140 mud flats with no vegetation



1310 glasswort mud flats



1330 salt meadows



2120 white dunes



3270 rivers with mud banks



6430 moist tall herbaceous vegetation



91E0 \* soft wood alluvial forests



6510 lowland hay meadows



6440 alluvial meadows



3150 eutrophic lakes

▲ Fig. A16  
HD habitats of the Lower Elbe

### A 3.5.3 Conservation status of the HD habitats

#### Information on reading the traffic light colours in the tables

In the following tables, the conservation status of the species and habitat types are shown with traffic light colours. These colours are also used in the national reports to the European Commission, although here they have different meanings. The EU-wide evaluation method and the evaluation matrix used in the IMP (area-specific evaluation using Federal Agency for Nature Conservation/ Federal Consortium for Nature Protection, Landscape Conservation and Regeneration) correspond on the important param-

eters, but the EU method takes additional criteria into consideration.

Thus assigning the statuses and giving the colour within the three-level scale is not identical. While in the EU system the colour yellow is used to portray an unfavourable conservation status, in the following table this is used for a good, favourable status (B). In recognition of these differences, the traffic light colours in the IMP are only used because they give a direct optical impression of the conservation status given in the context of the IMP.

Conservation status EU	<span style="color: green;">■</span> favourable	<span style="color: orange;">■</span> unfavourable – insufficient	<span style="color: red;">■</span> unfavourable – bad
Conservation status IMP	<span style="color: green;">■</span> A favourable – very good	<span style="color: orange;">■</span> B favourable – good	<span style="color: red;">■</span> C unfavourable – average to poor

▼ Table A4

Conservation statuses of the habitats in annex I of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2</sup>	SH <sup>3</sup>
1110	Sandbanks which are slightly covered by sea water all the time	–	–	<span style="color: red;">■</span> C
1130	Estuaries	<span style="color: orange;">■</span> B	<span style="color: red;">■</span> C	<span style="color: red;">■</span> C
1140	Mud flats, sand flats and mixed flat areas with no vegetation	–	<span style="color: orange;">■</span> B	–
1210	Annual vegetation of drift lines	–	–	–
1310	Pioneer vegetation with <i>Salicornia</i> and other annuals colonising mud and sand (glasswort mud flats)	–	–	<span style="color: green;">■</span> A
1310	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	–	<span style="color: orange;">■</span> B	<span style="color: orange;">■</span> B
2120	White dunes with along the shoreline with <i>Ammophila arenaria</i>	–	–	–
3150	Natural eutrophic lakes <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation	–	<span style="color: orange;">■</span> B	–
3270	Rivers with muddy banks with <i>Chenopodium rubri pp</i> and <i>Bidention pp</i> vegetation	<span style="color: green;">■</span> A	<span style="color: orange;">■</span> B	<span style="color: red;">■</span> C
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	<span style="color: green;">■</span> A	<span style="color: orange;">■</span> B	<span style="color: orange;">■</span> C
6440	Alluvial meadows of river valleys of the <i>Cnidion dubii</i>	<span style="color: green;">■</span> A	<span style="color: orange;">■</span> B	<span style="color: orange;">■</span> C
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	<span style="color: green;">■</span> A	<span style="color: orange;">■</span> B	<span style="color: red;">■</span> C
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	<span style="color: green;">■</span> A	<span style="color: orange;">■</span> B	<span style="color: orange;">■</span> C
91F0	Riparian mixed forests with <i>Quercus robur</i> , <i>Ulmus laevis</i> , <i>Ulmus minor</i> , <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> ( <i>Ulmion menoris</i> )	D <sup>4</sup>	B <sup>5</sup>	<span style="color: orange;">■</span> B

\* priority habitat  
 1 The evaluation is based on individual areas in different SACs.  
 2 Elbe estuary IMP contribution from Lower Saxony, part I, as at September 2011  
 3 The evaluation is based on the total area, different evaluations or evaluations for the individual functional areas are possible.  
 4 D: not significant  
 5 According to the latest information available (standard data sheet, October 2010), Riparian mixed forests no longer exist, but the partial contribution from Lower Saxony (as at September 2011) assumes differently.

### A 3.5.4 Species of annex II of the Habitats Directive

Of all of the species in annex II of the Habitats Directive, the priority plant species the Elbe water dropwort (*Oenanthe coniooides*) should be mentioned in particular. Around the world, the species only exists in the Lower Elbe and is threatened with extinction. There is an extensive, stable area of Elbe water dropwort with a favourable conservation status in the alluvial forest in the SAC Heuckenlock/Schweensand (Hamburg). Another large area has developed on the pioneer site on the Hahnöfersand in Lower Saxony (for information on the ecology of Elbe water dropwort see boxes on page 19).

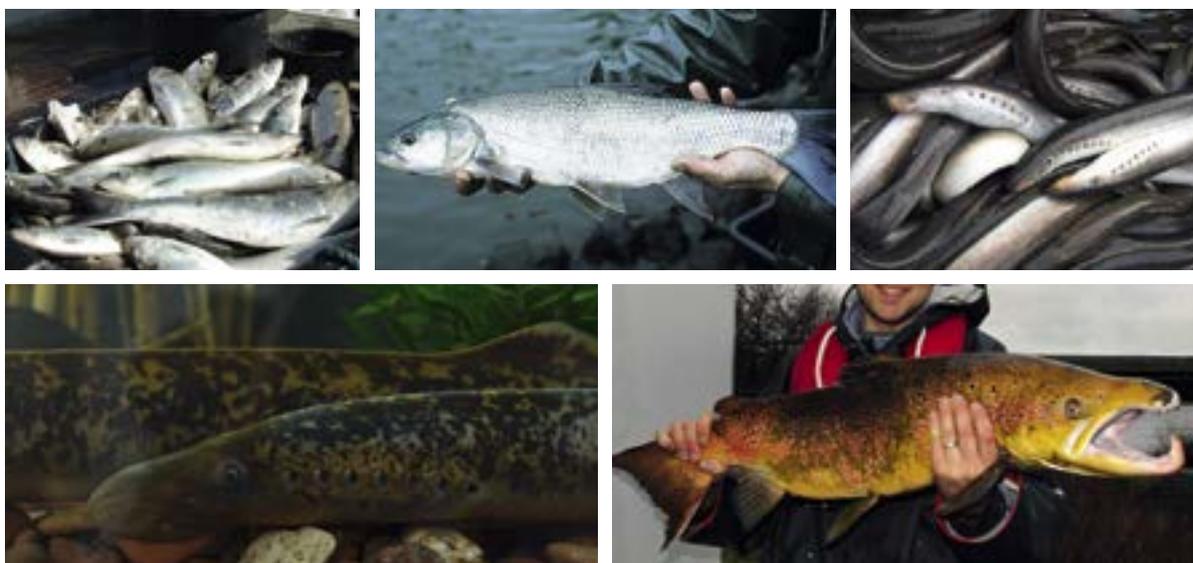
The twaite shad swims up to the Lower Elbe in spring to breed. Their breeding area extends from Glückstadt to the Mühlenberger Loch. The most important breeding grounds are in front of the Lower Saxony bank between Lühesand and Neßsand (functional area 3).

From summer to autumn, the young twaite shads gradually swim downstream to the North Sea and require nutrient-rich habitats along the entire stretch of the estuary.

In the Elbe, the asp is mainly prevalent in the sections of the river above the Geesthacht weir. In the Lower Elbe, the asp primarily reproduces east of Hamburg. There are small areas of asps in the tributaries in Schleswig-Holstein.

The salmon, river lamprey and sea lamprey arrive through the estuary on their migration between the North Sea and their breeding ground.

The pond loach and the bitterling live in the ditches of the dyked marshes.



▲ Fig. A17

Twaite shads, asps, river lampreys, sea lampreys and salmon

Seals can regularly be seen in the estuary on sand bars. Reproduction takes place to a limited extent on the Brammer Bank (functional area 4). Large groups stop at the mouth of the Elbe in the Medemgrund

area. Harbour porpoises sporadically make it as far as Hamburg. The species does not reproduce in the Lower Elbe. The individuals specified belong to the North Sea population.

## Ecology of the Elbe water dropwort

The Elbe water dropwort (*Oenanthe conioides*) only occurs in limnic to slightly oligohaline sections of the tidal Elbe (Geesthacht to Glückstadt). The germination capacity of the seeds is mostly destroyed at salt contents above 3 ‰. The plants germinate biannually. In the first year, a base rosette forms. In the second year, a higher, branched flower develops. Under optimal conditions, the plants reach 1.5m high, and their stem can grow to the thickness of an arm. This powerful form of growth is typical for open sites. Plants that grow in shaded areas or which have to compete with other plants generally remain smaller. The hibernation of the rosette is a critical phase. Many plants are destroyed by storms in winter, eaten by birds or covered by plant residue or foliage. It is estimated that the seeds remain able to germinate for around 30 years if they are stored in an airtight manner in waterlogged ground.

on reed-free areas, and on the other hand it can only grow in areas with a steady flow or areas where it is protected from wave action. These apparently contradictory requirements were met in the intermediate stages of the silting up of the river branch arms, which gradually formed new arms following the displacement of the outflow. After some time had passed, the reeds and the alluvial forest expanded, and at the same time new sites appeared that were suitable for the Elbe water dropwort. After the Elbe arm silted up, the Elbe water dropwort seeds which were dormant in the ground could only germinate again when they had been freed by the process of erosion. Due to their long germination capacity, they were able to do this.

As a result of the dramatic change in the landscape, the Elbe water dropwort population continues to decline.



▲ Fig. A18: basic rosette, flowers and fruits of the Elbe water dropwort

The Elbe water dropwort grows at depths of 0.4 to 1.3m below the average high tide level, in other words in an area in which reeds also thrive. It is therefore found in special sites where the growth of the reeds is lower. In the area where the river branches in Hamburg and east of Hamburg, the Elbe water dropwort is found in wet hollows in the tidal alluvial forest, with channel edges covered with reeds and, when they are protected, mud flats in front of the reed beds (sites of the annual flowering of habitat type 3270 "rivers with mud banks"). West of Hamburg, the Elbe water dropwort grew until into the 1970s on the edge of the ditches of the marshes influenced by the tide, on imperfections in the reed beds and, if protected, on mud flats in the band of katniss plants in front of the reed bed. Almost none of the original habitats from the sites once populated west of Hamburg remain. After the grassland areas in the Seestermühe and Haseldorfer Marsch were dyked, the population of Elbe water dropwort there, which was previously the largest, died out.

The Elbe water dropwort is a typical coloniser of the original estuary landscape. On the one hand it is found

In the past few years, it fluctuated between 2,000 and 5,000 individuals. The number of plants which survive to produce seeds is significantly less than this. A positive for the conservation of the population is that the ratio of adult to rosette plants at the time of blooming is at least 1:10. If this ratio falls below 1:30, in a few years there will not be sufficient numbers of adult plants to replenish the seed bank. Currently, the levels are maintained by around 200 to 500 flowering plants each year. Individual successful measures and the spontaneous occurrence of the plants at newly-created sites still cannot change the fact that the species continues to be threatened with extinction.

Like almost no other species, the Elbe water dropwort is dependent on the growth and death of natural habitats. Today, the estuary, in which the river is mainly channelled between fixed bank lines, is no longer a sufficient habitat for the Elbe water dropwort. Its decline is therefore a symbol of the development of many other types of habitat and species in the estuary.

### A 3.5.5 Conservation status of the species in annex II of the Habitats Directive

▼ Table A5

Conservation status of the species in annex II of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2</sup>	SH <sup>3</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	B	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	B	C	B
1103	Twaite shad ( <i>Alosa fallax</i> )	B C	C	B <sup>2</sup> C <sup>3</sup>
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	C	C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>4</sup>	D <sup>4</sup>	D <sup>4</sup>
1130	Asp ( <i>Aspius aspius</i> )	B	B	B
1145	Pond loach ( <i>Misgurnus fossilis</i> )	–	–	C
1149	Spined loach ( <i>Cobitis taenia</i> )	–	–	B
1351	Harbour porpoise ( <i>Phocoena phocoena</i> )	–	C	–
1365	Seal ( <i>Phoca vitulina</i> )	–	B	A
1601	* Elbe water dropwort ( <i>Oenanthe conioides</i> )	A B C	C <sup>5</sup>	C

\* priority species  
 (M): The estuary is used by this species as a migration channel.  
 1 The evaluation is based on the entire area, different evaluations from the standard data sheet of the individual SACs are possible.  
 2 Standard data sheet (as at March 2009)  
 3 Bioconsult 2010  
 4 The population of the houting was categorised as not significant in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (2009).  
 5 In accordance with the most recent standard data sheet (as at October 2010), the conservation status is rated B when it includes the Hahnöfersand, but in the partial contribution of Lower Saxony of September 2011, it is rated with a conservation status of C

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

### A 3.5.6 Strengths and weaknesses of the estuary: habitats and species in the Habitats Directive

In comparison to other European estuaries, the Lower Elbe sets itself apart through some features which are particularly worthy of conservation:

- Consistency: from Geesthacht to the mouth, the entire estuary of the Lower Elbe is continuous. The ease of passage in the Lower Elbe has a decisive influence on the fish fauna of many of the Natura 2000 sites in the river region of the Elbe. The continuity at the Geesthacht barrage has improved considerably in the past few years.
- Completeness of the habitats: although the habitats which are typical for the estuary require development on an individual level, in the Lower Elbe, in contrast to other estuaries, the habitats are still represented in most of the functional areas
- Expansion and diversity of the fresh water section affected by the tide: certain conditions led to the creation of a landscape which is both fresh water and affected by the tides, which is unique to this area of the North Sea. The interaction between the river and the tides brought about the particular characteristics of the mud flats, reeds and alluvial forests. The Elbe water dropwort and the less well known Elbe hair grass, which only exist here, have evolved into stand-alone, endemic species. The fresh water tide reed beds are home to several species of plant which are severely endangered across the country and threatened with extinction. Some species such as the reed and the swamp caltha have developed special Elbe ecotypes under the influence of the tide.

In the limnic to oligohaline sections of the tidal Elbe, there are concentrations of the key functions and values of the Elbe estuary for Natura 2000:

- Soft wood alluvial forests (priority habitat 91E0 in the particular form of the tidal alluvial forests)
- Elbe water dropwort (priority endemic species)
- Breeding ground of the twaite shad (largest reproduction areas of all of the estuaries in the south area of the North Sea)
- Breeding ground of the smelt (key species for biomass levels and the food chain in the habitat type 1130 – estuaries)
- particularly high diversity in the typical plant and habitat types “hydrophilous tall herb communities” (6430) and “rivers with mud banks” (3270).
- particularly high structural diversity thanks to adjacent rivers and islands.

At the same time, the fresh water tidal Elbe is the most vulnerable and most damaged section of the Lower Elbe:

- highest level of contaminants
- highest level of channelling drainage, greatest increase in the tidal range, damaged sediment dynamics, standardisation of the flow conditions
- endangered reproduction of the twaite shad due to the site of the breeding ground in the oxygen deficiency zone of the tidal Elbe
- disruption of the aquatic habitat network during oxygen deficiency
- disruption of the habitat network in the land areas and on the banks, in particular in the area of the Port of Hamburg
- severe fragmentation and deficient expansion of the habitats in the foreland, in particular the priority alluvial forests

- limited site dynamics as a result of the small foreland area and the attachment of the banks: negative conditions for habitats and species which, like the Elbe water dropwort, are, in particular, dependent on the habitat, rivers with mud banks (3270), bank herbaceous vegetation (6430) and alluvial meadows (6440) with a nearly natural site dynamic.
- highest population density and most diverse usage demands due to the city of Hamburg

The extensive hydromorphological changes in the estuary and the deepening of the fairway, the channelling of the river and the major loss of flood plain area do not only affect the fresh water section, but are an issue along the entire Lower Elbe. In all of the functional areas, the shallow water areas and the forelands have decreased significantly. As a result of installing dykes near to the banks and fixing the bank lines, in many places there is not enough space to permit a more dynamic development. This growth would be necessary to promote the development of species and habitats typical for the estuary.

The dykes have made more intensive use of the landscape possible and caused a considerable decline in the typical Elbe meadows. Successful measures to extensify the area, in particular meadows in governmental ownership, have shown that marshlands also have the potential to develop into species-rich meadows of the “lowlands-hay meadow” (6510) type.



▲ Fig. A19 Examples of areas which are of particular ecological value, Wide forelands at the Allwörder Aussendeich, reeds and mud flats at Bishorster Sand, tidal alluvial forest in the Heuckenlock



▲ Fig. A20 Challenges for area management Revetments in the Altengammer Vorland, silting at the Haseldorfer Binnenelbe and lack of foreland in Howe

### A 3.6 Types of bird protection areas

Thanks to its large size, the direct juxtaposition of land and water and the diversity of bird habitats on land, the Elbe estuary is one of the largest breeding and migration areas for birds in Germany. In overview, the bird protection areas of the estuary range from the Wadden Sea to the Mühlenberger Loch to the west of Hamburg. They stretch from the North Sea coast to the Middle Elbe.

The estuary and its marshes are important bird habitats all year round. The breeding time is from early spring to the height of summer. In the height of summer, the anatidae family of birds meet to change their plumage in the peaceful areas of the estuary. From the end of summer and in the autumn, thousands of migrating birds on their way between their breeding and hibernating areas take a rest on the Lower Elbe.

Some species spend the entire winter and spring in the estuary; others move on and pause at the Lower Elbe again on their return to the far North for a few days or weeks.

The total number of birds fluctuates depending on the year and the time of year. On some days, more than 100,000 birds are in the area. Large parts of the Elbe estuary are categorised as wetlands of international importance under the Ramsar Convention:

- 7DE031: Mühlenberger Loch
- 7DE030: Schleswig-Holstein Wadden Sea and adjacent areas
- 7DE004: Lower Elbe between Barnkrug and Otterndorf

### A 3.6.1 Breeding birds

The breeding bird fauna in the Elbe estuary is exceptionally rich in species and individuals. The range of species reflects the diversity of habitats in the open water areas, mud flats, salt meadows and open grasslands, the reed banks, the bushes and the alluvial forests:

- Salt meadows and of the pioneer sites, e.g. pied avocet and gull-billed tern
- Reed bed and the sedges: e.g. spotted crake, marsh harrier, bluethroat and sedge warbler
- Alluvial forests, scrub and copses, e.g. white-tailed eagle, red kite, penduline tit and red-backed shrike
- Extensively used grassland, e.g. corncrake, lapwing, black-tailed godwit, common snipe, redshank, ruff and skylark

- Wide ditches, sluices and clay tapping points, e.g. shoveller, garganey,
- gadwall and kingfisher
- Settlement habitats, e. g. white stork and peregrine (breeding place in nesting aids on buildings, electricity pylons)

In addition to the species which were decisive for the selection, differentiation and designation of the bird protection areas (see table A6), there are many other species of breeding bird in the Elbe estuary and in its marshes which benefit from the protection measures for the target species either directly or indirectly.

▼ Table A6

Conservation status of the species of breeding bird which are the priority for protection in the bird protection areas of the Elbe estuary

Species	Annex I Birds Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2, 4</sup>	SH <sup>3, 4</sup>
Common snipe ( <i>Gallinago gallinago</i> )	–	–	C	B
Penduline tit ( <i>Remiz pendulinus</i> )	–	–	–	B
White-spotted bluethroat ( <i>Luscinia svecica</i> )	•	–	B	B
Whinchat ( <i>Saxicola rubetra</i> )	–	–	C	–
Kingfisher ( <i>Alcedo atthis</i> )	•	–	–	B
Skylark ( <i>Alauda arvensis</i> )	–	–	B	–
Common tern ( <i>Sterna hirundo</i> )	•	–	C	B
Ruff ( <i>Philomachus pugnax</i> )	•	–	C	–
Lapwing ( <i>Vanellus vanellus</i> )	–	–	C	B
Garganey ( <i>Anas querquedula</i> )	–	–	C	–
teal ( <i>Anas crecca</i> )	–	–	C	–
Gull-billed tern ( <i>Gelochelidon nilotica</i> )	•	–	C	C
Shoveller ( <i>Anas clypeata</i> )	–	–	C	–
Red-backed shrike ( <i>Lanius collurio</i> )	•	–	–	B
Bittern ( <i>Botaurus stellaris</i> )	•	–	C	C
Marsh harrier ( <i>Circus aeruginosus</i> )	•	–	C	B
Red kite ( <i>Milvus milvus</i> )	•	–	–	B
Redshank ( <i>Tringa totanus</i> )	–	–	B	B
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	–	C	B
Sedge warbler ( <i>Acrocephalus schoenobaenus</i> )	–	–	B	B

Species	Annex I Birds Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2, 4</sup>	SH <sup>3, 4</sup>
Gadwall ( <i>Anas strepera</i> )	–	–	B	–
White-tailed eagle ( <i>Haliaeetus albicilla</i> )	•	–	–	B
Short-eared owl ( <i>Asio flammeus</i> )	•	–	C	–
Spotted crane ( <i>Porzana porzana</i> )	•	–	C	B
Black-tailed godwit ( <i>Limosa limosa</i> )	–	–	C	B
Corncrake ( <i>Crex crex</i> )	•	–	B	B
Peregrine ( <i>Falco peregrinus</i> )	•	–	–	B
Water rail ( <i>Rallus aquaticus</i> )	–	–	C	–
White stork ( <i>Ciconia ciconia</i> )	•	–	C	B
Yellowwagtail ( <i>Motacilla flava</i> )	–	–	B	–
Montagu's harrier ( <i>Circus pygargus</i> )	•	–	C	–

1 Regulation on the Nature conservation area Mühlenberger Loch/Neßsand (11 May 2010), standard data sheet on the "Mühlenberger Loch" bird protection area (as at March 2009)  
2 Lower Saxony IMP contribution September 2011  
3 Avifaunal Schleswig-Holstein 2007  
4 The evaluation is based on the entire area, different evaluations in the individual functional areas are possible.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

### A 3.6.2 Strengths and weaknesses of the Elbe estuary: breeding birds

Estuaries are naturally very productive bodies of water which play a key role in the reproduction of fish. In the Lower Elbe, the seasonal growth of the smelt attracts not just seals, but also swarms of gulls and other water birds which feed on fish. The wide range of fish in the estuary is the basis for the conservation of the nationally significant breeding colonies of the common gull and the Mediterranean gull.

The western forelands of Neufeld are home to one of the largest colonies of common terns and the last colony of gull-billed terns (around 40 breeding pairs) in North-West and Central Europe. The breeding colonies in Denmark have now died out. In Lower Saxony, there are still up to four pairs. The colony of breeding gull-billed terns in the Elbe estuary is the last regular occurrence of breeding gull-billed terns in Germany. A significant proportion of the responsibility for the protection of the gull-billed tern in North-West Europe lies with the Elbe estuary.

The grassland areas are particularly significant as a breeding ground for black-tailed godwits and corncrakes (10% and 20% respectively of the Lower Saxony breeding population) and for additional species

of breeding birds associated with grassland areas.

An additional feature is the populations of breeding birds in the reed beds and alluvial forests on the islands and in the forelands which are no longer used. Of the species in annex I of the Birds Directive are the spotted crane, the bluethroat, the marsh harrier and the white-tailed eagle should be mentioned in particular. As the forests, which are still young, get older, the abundance and diversity of the bird habitat will probably increase, particularly in the large, coherent "wilderness", such as the Haseldorf forelands.

The population of breeding birds in the grassland is, however, concerning. Although the Elbe marshes are still some of the most important breeding grounds in North Germany, for black-tailed godwits, lapwings and corncrakes among others, their populations have dropped significantly in the last 30 years. Despite successful protection measures in some areas, it has still not been possible to reverse this general trend. The population sizes of some species are now below the levels that would be necessary for the population to survive. This is true in particular for ruffs, which are threatened with extinction across

Germany. The origins of the causes of this negative development are to be found in the changes to the overall estuary landscape described above, which have had a particularly drastic effect on bird species with specialised habitat requirements.

### Restriction of the natural habitat dynamic

As a result of the diking, large parts of the marshes are separated from the influence of the tides and flooding. The deposits of fresh layers of silt which are important for meadow birds have been absent ever since the dykes were built. With the dyking and the associated increasing necessity to stabilise the banks, the natural dynamic of the bank has mostly been irradiated. Important bird habitats such as slightly overgrown pioneer sites on the water line, flooded reed beds and structurally rich wetland meadows with flooded hollows have disappeared as a result.

### Increasing the intensity of the use of grasslands

As a result of the dyking and the lack of flooding, the marshes could be effectively drained and used more intensively. The standardisation of the site conditions across large surfaces and the loss of the amphibian transitional areas have had a negative impact on meadow breeding species which require various habitats at the same time and in close proximity (e.g. a nesting place in the dry and moist nutrient areas near to the nest, a hidden nest in the reed beds and wide open grasslands to look for nutrients). Intensive fertilisation, frequent cutting of the grass during the breeding season of the meadow breeding species, a lack of food and associated wide grazing

areas have significantly decreased the success in reproduction for the birds present there.

### Transformation of grasslands into arable land

The expansion in the use of arable land at the expense of grasslands has decreased the habitat available for species of grassland breeding birds. In Nordkehdingen, more than a fifth of the grassland areas of the bird protection area which existed in 1989 have now transformed into arable land.

Nordkehdingen is by far the largest and the least fragmented Natura 2000 grassland sites in the estuary. The size of this area is an important quality marker for the protection of meadow birds. Large and interconnected habitats are disproportionately attractive for many species of breeding and migrating birds, and are therefore key to the conservation and development of stable bird populations. The existence of a good source area which generates sufficiently large populations is one of the conditions required for the success of measures to promote meadow birds. Settling into newly-created habitats, particularly for species with small population, is of paramount importance to ensure productive breeding. The change in use in Nordkehdingen could therefore have a negative effect on the conservation status of the meadow birds in the entire estuary.



▲ Fig. A21 Meadow birds and agricultural use  
Lapwing chicks, extensive use of grassland, grassland transition



Common tern



Pied avocet



Common gull



Black-tailed godwit



Common snipe



Lapwing



Spotted crane



Short-eared owl



Bluethroat



Garganey



White stork



White-tailed eagle

▲ Fig. A22  
Breeding birds of the estuaries and the marshes

### A 3.6.3 Migrating birds

#### Migrating birds

Migrating birds are those which use the area in question without breeding there. This includes resting birds that stop for a pause on their migration route, hibernating birds for which the area is the end of the migration south, and food migrating birds which breed outside of the area but regularly come to the area during breeding time to source food.

The Elbe estuary and the adjacent wadden sea are in a key area for bird migration in Europe. On their way between the breeding areas in the far North and the hibernation areas in the more southerly regions, the majority of the birds which move along the western coasts of Europe come through the estuary. In the context of the European network of resting and hibernation areas of migrating birds, the Lower Elbe area is a stepping stone of particularly significance. As a hub of international bird migration, the Elbe estuary has a European-wide responsibility for the conservation of the migrating birds in many other areas.



▲ Fig. A23

Migration paths of selected bird species (waders, geese, swans, gulls, storks and birds of prey) (put together on the basis of various maps from: Elphick, J. (2008): Atlas of Bird Migration. The Migration of the Birds on our Planet. – Main Publishing House, Bern)

The estuary is used by birds from various groups to rest and hibernate.

- On the transitional area to the Wadden Sea, common ringed plovers, pied avocets and other snipe bird species dominate. This includes species which, like the rare spotted redshank, prefer the habitats in the Wadden Sea which are similar to the shallow water areas of the mouth of the Elbe.
- Further up the estuary, waders and anatidae birds live on the mud flats., these include ducks, mergansers, gulls and terns.
- In the marshes, geese, swans, Eurasian widgeons and meadow waders dominate. Flat, flooded, open grasslands are preferred by many species. From an ornithological perspective, the entire area between Hamburg and Cuxhaven is one common habitat. Depending on disturbance, weather conditions and the availability of food, the resting and hibernating birds alternate between individual areas of the estuary. Some areas, however, have a particular function and are a major reason why other areas are able to carry out their functions for Natura 2000. This includes safe and undisturbed places to sleep which can be flown to when there is a storm or at twilight, and the next morning can be left again to travel to the feeding area.

Many species stop either on the mud flats when there is a low tide or on grasslands when there are floods. Areas where large expanses of these two habitats can be found in close proximity to one another or are woven together like a mosaic are especially important (e.g. Nordkehdingen, Fährmannssand).

Long-term studies of water birds in winter show that shallow water and mud flats at the mouths of the large tributaries and the rivers adjacent to the main river are frequented often and by a large number of birds.

▼ Table A7: Conservation status of the migrating bird species which are the priority for protection in the bird protection areas

Species	Annex I Birds Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2, 4</sup>	SH <sup>3, 4</sup>
Dunlin ( <i>Calidris alpina</i> )	–	–	–	B
White-fronted goose ( <i>Anser albifrons</i> )	–	–	B	B
Shelduck ( <i>Tadorna tadorna</i> ) <sup>5</sup>	–	A	B	B
Spotted redshank ( <i>Tringa erythropus</i> )	–	–	C	B
Common tern ( <i>Sterna hirundo</i> )	•	B	–	B
Eurasian gold plover ( <i>Pluvialis apricaria</i> )	–	–	B	B
Grey goose ( <i>Anser anser</i> )	–	–	A	B
Eurasian curlew ( <i>Numenius arquata</i> )	–	–	B	–
Greenshank ( <i>Tringa nebularia</i> )	–	–	B	–
White swan ( <i>Cygnus olor</i> )	–	–	B	–
Ruff ( <i>Philomachus pugnax</i> )	•	–	–	B
Lapwing ( <i>Vanellus vanellus</i> )	–	–	B	–
Gray plover ( <i>Pluvialis squatarola</i> )	–	–	–	B
Common teal ( <i>Anas crecca</i> )	–	A	B	B
Black-headed gull ( <i>Larus ridibundus</i> ) <sup>5</sup>	–	A	B	–
Northern shoveller ( <i>Anas clypeata</i> )	–	C	B	–
Eurasian widgeon ( <i>Anas penelope</i> )	–	–	B	–
Bar-tailed godwit ( <i>Limosa lapponica</i> )	•	–	–	B
Whimbrel ( <i>Numenius phaeopus</i> )	–	–	B	–
Brent goose ( <i>Branta bernicla</i> )	–	–	–	B
Redshank ( <i>Tringa totanus</i> )	–	–	B	–
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	–	B	B
Sanderling ( <i>Calidris alba</i> )	–	–	–	B
Common ringed plover ( <i>Charadrius hiaticula</i> )	–	–	B	B
Curlew sandpiper ( <i>Calidris ferruginea</i> ) <sup>6</sup>	–	–	–	6
Whooper swan ( <i>Cygnus cygnus</i> )	•	–	B	B
Pintail ( <i>Anas acuta</i> )	–	B	B	B
Mallard ( <i>Anas platyrhynchos</i> )	–	–	B	–
Common gull ( <i>Larus canus</i> ) <sup>5</sup>	–	B	B	–
Broad-billed sandpiper ( <i>Limicola falcinellus</i> )	–	–	–	6
Temminck's stint ( <i>Calidris temminckii</i> ) <sup>6</sup>	–	–	–	6
Black tern ( <i>Chlidonias niger</i> )	•	B	–	B
Barnacle goose ( <i>Branta leucopsis</i> )	•	–	A	B
Little gull ( <i>Larus minutus</i> )	–	B	–	B
Smew ( <i>Mergus albellus</i> )	•	–	–	B
Tundra swan ( <i>Cygnus columbianus</i> )	•	–	C	B
Little stint ( <i>Calidris minuta</i> ) <sup>6</sup>	–	–	–	6

1 Standard data sheet for the Mühlenberger Loch bird protection area  
2 Lower Saxony IMP contribution September 2011  
3 Standard data sheet for the Lower Elbe to Wedel and Sankt Margareten foreland bird protection areas  
4 The evaluation is based on the total area, different evaluations in the individual functional areas are possible.  
5 The species is not given as an example of a conservation objective in the Lower Saxony Regulation (at 18 October 2005).  
In current technical evaluations, it is to be treated as a conservation objective.  
6 The evaluation of the conservation status in the Lower Elbe to Wedel bird protection area has not yet been carried out.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



Barnacle geese



Tundra swans



Common ringed plover



Little gull



Eurasian gold plovers



Black-tailed godwits, Dunlins



Common teal

▲ Fig. A24  
Migrating birds of the estuary and the marshes

### A 3.6.4 Strengths and weaknesses of the Elbe estuary: migrating birds

The importance of the Elbe estuary for migrating birds is due to the volume of birds which regularly come to the area. This is illustrated in table A8.

Of the northern geese, the barnacle goose should be mentioned in particular. In spring, around ten percent of its global population resides in the Lower Elbe. In accordance with the criteria of the Ramsar Convention, the Elbe estuary also has international

importance for populations of other species, such as the Eurasian gold plover, Eurasian widgeon and lapwing.

The extensive brackish and fresh water mud flats of the Elbe estuary are of great importance almost all year round as feeding areas for species such as the spotted redshank, pied avocet, shelduck, common teal and northern shoveller.

Another special feature is the moulting areas of the shelducks in front of the mouth of the Elbe. In July and August, up to 200,000 shelducks from the entire North Sea and some from the Baltic Sea area congregate in front of the mouth of the Elbe. The limit for international importance is 3,000 animals. This gathering is unique in Europe. The central point of the moulting area has moved numerous times over time. In the past few years, it has been in the area of the directly neighbouring Schleswig-Holstein Wadden Sea National Park.

#### ▼ Table A8

Numbers of resting birds of selected migrating species

Species	Number of resting birds <sup>1</sup>	Internationally important from <sup>2</sup>
Dunlin	21,000	13,300
Spotted redshank	6,600	900
Eurasian gold plover	37,600	7,500
Lapwing	37,700	20,000
Eurasian widgeon	21,000	15,000
Barnacle goose	58,000	4,200

1 Since the birds move between the bird protection areas in the estuary, the numbers of resting birds cannot be added up. The highest number of resting birds in the standard data sheet of a bird protection area is given.

2 Level required to achieve international importance according to WPE4 (Wahl et al. (2007), Report on Bird Protection 44: 83-105)

Due to the key location of the Elbe estuary for bird migration in Europe (Fig. A23, p. 27) and the number of birds that reside in the area for a short period, any damage has a significantly negative effect.

#### Loss of feeding areas in the marshes

As a result of the increase in arable land and the increasing significance of corn and potato cultivation in the bird protection areas, the feeding areas suitable for the migrating grassland birds are decreasing.

#### Changes to the mud flats, deterioration of the shallow water zones

Waders eat small animals which they pick out of the soft intertidal sediments. Muddy tidal flats have larger amounts of various invertebrates than sandy

tidal flats and therefore are particularly important as feeding areas. While the species which rest on the mouth of the Elbe also use the sandy tidal flats, there are particular species of bird in the inner estuary which prefer the muddy tidal flats. As a result of the change in hydromorphic dynamics in the Lower Elbe, the muddy tidal flats are currently deteriorating for two main reasons:

- Over sanding of mud flats due to the increase in flow and effect of waves
- Quick sedimentation of very soft silt in the side waters. This soft silt can be so unstable that its surface can no longer support the weight of birds.

The deterioration of the shallow water zones in the flow-protected side areas is associated with a loss of habitat particularly for species of duck.

#### Disturbance

Outside of breeding periods, migrating birds travel several thousands of kilometres and are dependent on finding sufficient nutrients and resting space in their resting and hibernation areas. Any disturbance is associated with an increased energy requirement which has a negative impact on the bird and weakens it. The rest requirement varies from species to species. The barnacle geese, which are found in the Elbe estuary in particularly significant numbers in winter and spring, are one of the most easily disturbed species. It is common for there to be hundreds of barnacle geese in one area. Because the panic of a single goose affects the entire group and even other species, any single disturbance can have an effect on a large number of animals. The relevance of any disturbance therefore increases exponentially with the significance of the area. The major sources of disturbance in the Elbe estuary are deterrence actions on agricultural surfaces, hunting, some recreational activities and dogs running free. The significance of these sources of disturbance varies locally within the planning area.

### A 3.7 Uses

The Natura 2000 sites of the Elbe estuary have a very diverse range of uses. In the course of the production of the IMP, the various interest groups technical knowledge and expertise was utilised when developing targets and management measures for nature conservation. Below you can find a short overview of the various activities carried out in the Natura 2000 sites.

#### Regional development

- Sustainable regional development, coordination of the various usage requirements, maintenance of the ecological functionality

The Natura 2000 sites are established as priority areas in spatial planning for Natura 2000. The Elbe itself is also a priority area for shipping. As part of the planning system, we started from the perspective of unifying the two uses.

#### Water management/Water Framework Directive

- Quality management of water and volume management of water in the working area of the tidal Elbe of the river area unit "Elbe" (part of the ecological region 14 "central lowlands")

Water management was necessary for settlement and use of the marshes. The Elbe, its tributaries and the adjacent waters have been changed considerably in the past. In the marshes, a large surface water network was put in place to drain the areas.

In order to implement the Water Framework Directive, the tidal Elbe was split into four surface water bodies: Elbe (east), Elbe (port), Elbe (west) and Elbe (transition waters), which were classified "HMWB" (heavily modified water bodies) due to hydromor-

A detailed view is given in the section on functional areas (see part B of the IMP). For state-specific features and interests, mention is made of the contributions of the Lower Saxony and Hamburg/Schleswig-Holstein contributions. The technical contributions from the interest groups from the three federal states can be found in part C of the IMP (material).



The overall planning area is characterised considerably by the metropolitan region of Hamburg, the most important economic centre in northern Germany. The connecting lifeline of the region is the Elbe.

Communal administration units: Counties of Pinneberg, Steinburg, Dithmarschen, Cuxhaven, Harburg, Stade, the independent city of Cuxhaven.



phological changes with "significant" development potential. Material damage was also identified as additional damage which has to be checked. The tributaries of the Elbe were also classified to a significant extent as "HMWB", and the marsh waters as AWB – artificial water bodies.



The systems for coastal protection (dykes, flood barrages, pumping stations etc.) meet the current demands and are continuously being maintained. Clay production can occur in this way. Flood barrages protect the tributaries of the Elbe.



East of Hamburg, the Lower Elbe is used for internal shipping. There is a connection to the Middle Elbe via the sluice at Geesthacht. From Hamburg to Cuxhaven, the river is adapted for the requirements of marine shipping and is one of the most commonly travelled marine shipping waterways in the world (mainly containers, bulk goods ships and tankers). The Lower Elbe provides access to the Kiel Canal from the sea. The Lower Elbe and the lower sections of the Stör, the Krückau and the Pinnau are federal waterways. The Lower Oste is a state water way.

The Port of Hamburg, which is about 100km away from the North Sea, is the second largest container port in Europe. The Port of Hamburg employs approximately 160,000 people in the metropolitan region both directly and indirectly.

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### Coastal protection

- Maintenance, overhaul and if necessary adaptation of the coastal and flood water protection systems

As a result of the significant strain caused by waves generated by the wind and shipping, the banks of the Lower Elbe, especially in the areas where there are no mud flats, are particularly well engineered.

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### Waterways and ports

- Sea and inland shipping
- Cruises, sports ships
- Ferry traffic
- Adapting and maintaining the waterways, particularly sediment management and bank maintenance by the Water and Shipping Administration and the HPA
- Ensuring and maintaining the ports

Many jobs at other ports within the Elbe region are also dependent on this maritime connection. The sea ports of Stade, Glückstadt, Brunsbüttel and Cuxhaven work in global goods exchange, and are important logistics and services centres. Additional small transshipment ports are also found on the tributaries.

There are several ferry connections on the Lower Elbe (e.g. Glückstadt-Wischhafen, Zollenspieker-Hoopte) and passenger ferries (e.g. to Helgoland).

In the past few years, cruises have increased considerably. On the Lower Elbe, there are a total of 120 marinas.

The transport centres of Cuxhaven and Brunsbüttel are responsible for securing maritime travel.

## Agriculture

- dominating cattle industry
- arable land and fruit growing in some areas
- using the waters to sprinkle fruit cultures outside of the Natura 2000 sites

The majority of the land in the Natura 2000 sites is used for agriculture. The use of grasslands (grazing by cattle, sheep and horses and food production) is prevalent. Large areas of arable land are also operated, mainly in the Nordkehdingen area. Growing fruits is particularly significant adjacent to the Natura 2000 sites.

The majority of the areas used are situated between dykes. This is due on the one hand to the expansion of the dyke areas in recent decades and on the other hand to the abandonment of areas in the remaining, mainly small, foreland areas being subject to significant flood risk.



Large areas used in connection with one another can be found between dykes in the Wedeler and Haseldorfer Marsch, at the mouth of the Stör and the Krückkau and on Krautsand and in the former outer dyke at Nordkehdingen.

The suitability for agricultural use and the intensity of cultivation vary considerably in different areas. In the past decade, grassland, particularly in public ownership, has been used extensively. In contrast to this, use on many private areas has been intensified, especially in Nordkehdingen.

## Fishing

- ca. 25 main commercial fisheries and many additional fisheries
- Recreational fishing

Commercial fishing in the Lower Elbe is carried out from boats with nets and in the outer estuary with beam trawls. The main species fished are smelt, eels, zander and crabs in the Wadden Sea.

Net fishing mainly occurs on the edges of the fairway. Fish traps and eel baskets are used in the bank area. The number of fishing activities decreased from around 200 in 1970 to 25 today. Alongside other factors, this decline is due to the considerable damage to the living conditions of the fish in the estuary.



Recreational fishing using hand-held angling equipment generally occurs from the banks. It is practised on the Lower Elbe, the tributaries and on many inland waters (areas where clay has been removed).



The Lower Elbe and its marshes are classified as small game regions. Hunting is carried out in accordance with relevant legislation, and in some areas there are extensive regulations.



In addition to the Port of Hamburg, Stade, Cuxhaven, Glückstadt and Brunsbüttel are also important industrial and trade locations. Industrial and trade systems are outside of the Natura 2000 sites, however they have a very diverse interaction with the river (e.g. infrastructure, connection to the port).

Traditionally, foods are processed on the Lower Elbe (e.g. fish processing in Cuxhaven).




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### Hunting

- Hunting for furred and winged game
- Communal hunting groups and individual hunting
- Hunting on the Elbe in many of the areas between the average level at high tide and the flowing water of the Elbe

Flying game (particularly ducks and geese) are hunted in parts of the Natura 2000 sites. In some bird protection areas, hunting is limited to protect the migrating birds.

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### Trade, industry, infrastructure

- Chemical industry
- Metal production and processing
- Vehicle construction, shipyards, aircraft industry
- Generating energy: power plants, power lines

Today, the chemical industry, metal production and processing and vehicle production dominate the area. A developing activity is the expansion of the logistics required for offshore wind energy.

Nuclear and coal power stations are operated in Hamburg, Wedel, Brokdorf and Brunsbüttel. South of Stade, the Elbe is crossed by around 200m high power lines.

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### Leisure and tourism

- Water sports
- Excursions
- Mountain biking
- Eco-tourism
- Specific cultural activities

The Elbe estuary and the Elbe marshes are important recreational areas for the conurbation of Hamburg.

The Lower Elbe is a popular water sports area (sailing, surfing, kite surfing, canoe camping, motor boating, water skiing and jet skiing). These activities are operated from more than 120 marinas (AG Maritime Landschaft Lower Elbe) and many smaller landing points. The beaches on the banks of the Elbe are popular destinations for recreation.

The following activities are also carried out in the Natura 2000 sites and in the immediate vicinity:

- Eco-tourism, mainly at museums (e.g. the Lower Elbe Natureum in Balje) and nature conservation zones (nature trails, guided tours, boat trips, exhibitions, excursions with the Vogelkieker bus and the Tidenkieker boat)

- Bicycle tourism (trans-regional cycle paths and local routes)
- Stunt kits, gliding and trips on sports planes and helicopters
- Cultural activities related to agriculture, including art exhibitions, and the thriller area in Kehdingen East, festivals (e.g. the Schlickolympiade in Brunsbüttel and the Wild Goose Festival in Freiburg on the Elbe)
- Maintenance of tradition, keeping up historical uses (e.g. traditional rush crafts, wicker crafts, the scull-ferry Kronsnest)

Tourism has an increasing economic significance for the Lower Elbe region. The passenger ferries, individual traders and the hotel and guests house industry all benefit from the diverse range of activities. There is also a wide range of holiday accommodation, camp sites and bike and sporting equipment rental.

### A 3.8 Future developments

The general management of the environmental conditions will be decisive for the future of the Elbe estuary. This is true for both the Natura 2000 sites and for the activities carried out in the surrounding areas. As a result of climate change, in the medium to long term the conditions in the Lower Elbe and in the North Sea will probably change. Both desirable and undesirable changes for the species present in the estuary are taking place already. This includes on the one hand the re-settlement and re-expansion of species relevant to Natura 2000, but on the other hand there can also be negative impacts from newly-arriving species. These aspects should therefore

be highlighted, even when they, in some cases, go beyond the planning horizon of 2020.

Future developments which can be triggered by plans and projects which require approval are not part of the IMP. The BHD implications of infrastructure projects such as power plants, the planned deepening of the Elbe or the crossing of the Elbe by motorway A20 at Glückstadt/Drochtersen will be checked in accordance with the approval method set out in law.

#### A 3.8.1 Re-settlement and re-expansion of species in annex II of the Habitats Directive

##### Marine otters

An association named "Blaues Netz" has been developed in the metropolitan region of Hamburg for

marine otters. The efforts to protect the species are showing the first signs of success, and the otters are common in the section of the Elbe between Geesthacht and Hamburg.

### Priority fish species houting and sturgeon

The original populations of the priority fish species the Atlantic sturgeon (*Acipenser sturio*) and the houting (*Coregonus maraena* including *C. oxyrinchus*) were thought to have died out in the Elbe river region.

For the houting, population management measures with offspring from the North Sea population of the species from Denmark are currently taking place as part of the management of the biosphere reserve "Lower Saxony Elbe Floodplain". Since 2010, adult houting have been increasing in the Middle Elbe once again.



▲ Fig. A25

Adult houting after passing through the fish ladder on the northern bank of the Geesthacht weir

The Atlantic sturgeon is at the centre of a re-settlement programme organised by the Federal Office for Nature conservation. The fish ladder set up in 2010 on the northern banks of the Geesthacht weir is the only system in Europe which can be passed through by adult sturgeons with a body length up to 3.5m. In future the Lower Elbe could become a migration area for the two priority species to their reproduction areas in the Middle Elbe and the Elbe tributaries (e.g. Oste).



▲ Fig. A26

Young Atlantic sturgeon

## A 3.8.2 Climate change

The intentions to be able to ensure the existence of species and habitats of common interest are one of the three main criteria which are to be checked in accordance with the evaluation scheme set out by the European Commission to evaluate the conservation status at the level of Natura 2000 bio-geographical regions.

As a transitional ecosystem, estuaries are at the centre of the interaction of the influences of the coastal area and its drainage basin. In addition to the increasing temperatures and the rainfall in the planning area itself, the consequences of the accelerated rise in sea levels on the one hand and the changes in the drainage characteristics of the Elbe are relevant to the Elbe estuary.

The predictions set out in collaboration between the Federal Agency for Nature Conservation and the Potsdam Institute for Climate Research for the Natura 2000 sites in Germany indicate a significant increase in winter rainfall, a decrease in summer rainfall and overall higher winter and summer temperatures for the Lower Elbe area.

Additionally, higher water levels and increased flooding are to be expected as a result of the rising sea levels. The drainage characteristics of the Elbe will be affected by severe surface water flow in the winter and low stores of water in the summer (see [www.glowa-elbe.de](http://www.glowa-elbe.de)).

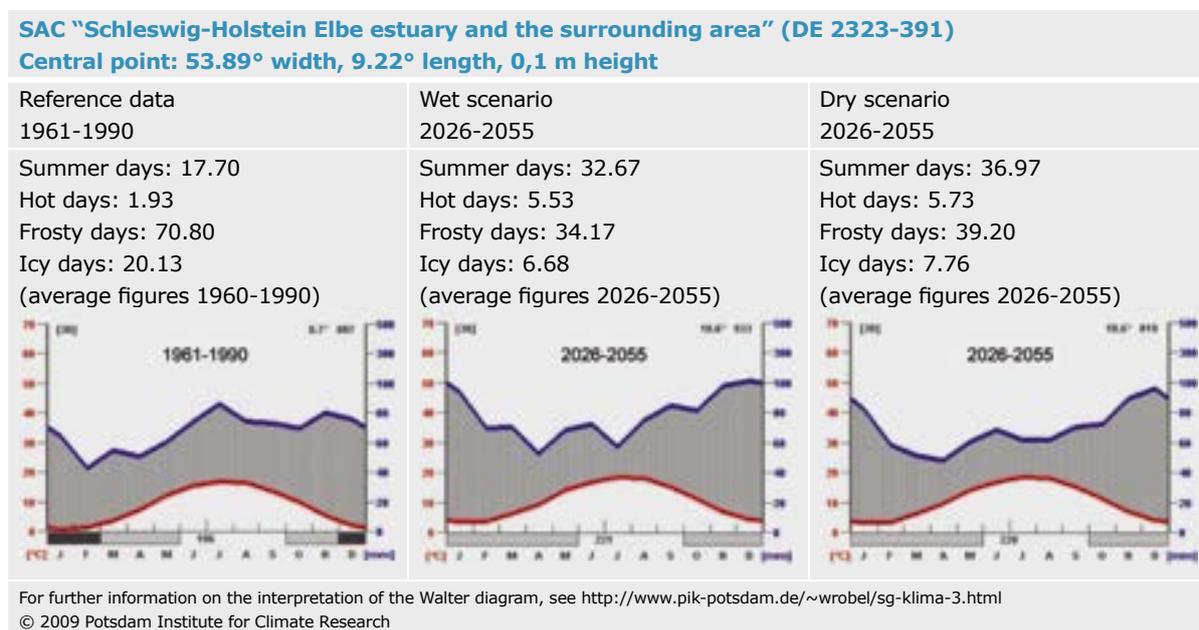
The following developments are likely for the Elbe estuary:

- continued shift of the salt water and brackish water influence upstream
- worsening oxygen deficiency in the inner estuary in summer

- the flood plain remains the same, further increase to the tidal range
- loss of foreland areas
- increase in waterlogging at the foreland and changes to the possibilities for use and maintenance.

▼ Table A9

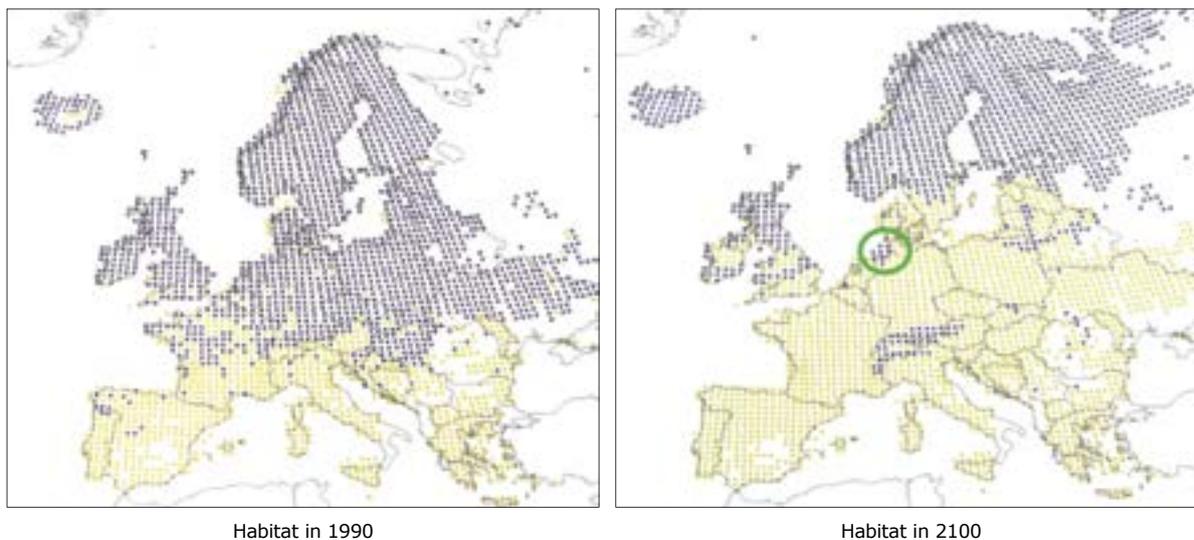
Predictions for changes in rainfall and temperature for the period 2026–2055 in the Elbe estuary



As a result of global climate change, the habitats (areals) of species of animals and plants which are found in the Elbe estuary today will move: many species will shift to the North; others will migrate in from the South. It is unclear whether all species will be capable of adapting to such a dynamic change.

ffects meadow waders such as the black-tailed godwit and common snipe, and meadow pipits, corncrake and red kite. The breeding area of many species of duck in Germany will probably be limited to the coastal areas in Lower Saxony and Schleswig-Holstein. The bluethroat will suffer significant losses in its European habitat. In Germany, its presence may in the future be concentrated in western Lower Saxony and Schleswig-Holstein.

There is now increasingly reliable information on the vulnerability to climate change for important species in the Elbe estuary (e.g. fish: [www.diadfish.org/english/document.htm](http://www.diadfish.org/english/document.htm), plants: [www.ufz.de/klimawandel-flora](http://www.ufz.de/klimawandel-flora)). By intersecting climate models with the current distribution of breeding bird species, the likely shift in their breeding areal can be predicted. This type of information is particularly significant for setting long-term priorities for species which are predicted to decline rapidly in other areas. This af-



▲ Fig. A27

Predicted changes to the habitat of the common snipe

(Huntley et al. (2007): A Climatic Atlas of European Breeding Birds. Lynx Edicions, Barcelona. Durham University & RSPB)

These few examples make it clear that the responsibility of the Natura 2000 sites in the Elbe estuary for the conservation of several species in Europe is very likely to change, and for many species may take on Europe-wide significance. The consequences of climate change for the conservation of the Elbe water dropwort, which is a priority species and only occurs in the Lower Elbe, have not yet been researched.

In addition to changes in the qualitative characteristics of the habitats (composition of species, moisture, temperature etc.) quantitative changes should also be taken into account. There are currently no predictions on the proportion and spatial distribution of deep water, shallow water, mud flats and foreland areas.

### A 3.8.3 Invasive species

Invasive species, often known as invasive alien species or non-native species, come in all shapes and sizes. Most of the non-European species were intentionally introduced, such as more robust and faster-growing trees and agricultural crops, decorative plants or pets. Other undesirable exotic plants

As climate change progresses, new species from neighbouring regions will migrate into the area. For those which set up a permanent home, they will no longer be "alien" species, but will be new, native species. The migration of new species into the area is a condition for maintaining biodiversity. An important task will be to identify those species among the new arrivals which are a threat to the existing species and the process of adaptation of the community to the new climate conditions because of their capacity to spread.

come to us unintentionally as "blind passengers" in ships containers, in ballast water, or on the outer shell of ships. Increasing international trade, tourism and passage of goods has accelerated this type of expansion.

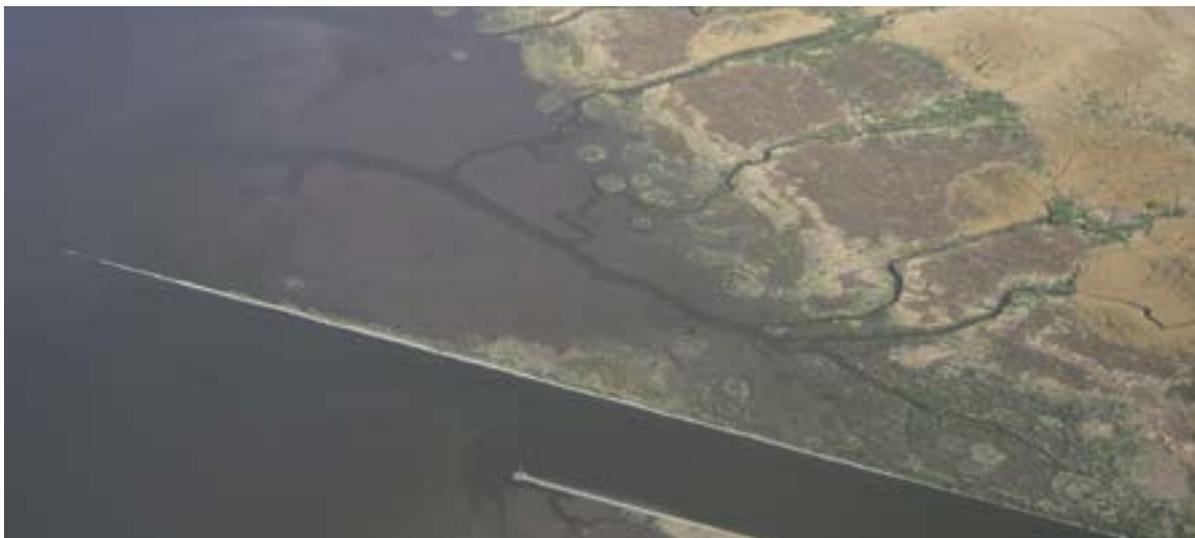
The expansion of alien species is classified as a serious, fast-increasing threat to biological diversity worldwide.

It can also have a negative impact on human health, fishing and agriculture. Not all exotic species cause damage to the previous natural biocoenosis. Invasive species only become a problem when they breed so widely that they suppress the native species.

The development of targeted strategies on how to deal with invasive species is a focus of European nature conservation policy (see [http://ec.europa.eu/environment/nature/invasivealien/index\\_en.htm](http://ec.europa.eu/environment/nature/invasivealien/index_en.htm)).

Alien species are common in the Elbe estuary. Some of the most commonly brought in animals are species of zoobenthos. The zebra mussel (*Dreissena polymorpha*) is a good example of this. Even the bristle worm species *Marenzelleria viridis* which often constitutes up to 80-90% of the total number of individuals in samples of zoobenthos is a new arrival.





## A 4 Consolidating Natura 2000 and usage targets

In the Natura 2000 sites of the Elbe estuary, those species and habitats identified as particular subject matters of protection (chapters 3.5 and 3.6) should be prioritised for protection. From the ecological requirements of these species and habitats, there are particular conditions for the estuary that should be targeted (in short, Natura 2000 targets).

The various activities carried out in the estuary (chapter 3.7) are currently compatible with Natura 2000 targets to a varying extent. The members of

the two IMP planning groups have illustrated their interests in their technical contributions to the IMP and formulated their targets in terms of the use of the estuary (in short, usage targets).

The analysis of the commonalities and contradictions between the targets of the interest groups is the focus of the IMP. Common goals and solution strategies were defined (chapter 4.3) from the consolidation of Natura 2000 targets (chapter 4.1) and usage targets (4.2).

### A 4.1 Natura 2000 targets

The SACs and SPAs of the Elbe estuary were included in the Natura 2000 network with the aim of preserving the Lower Elbe's contribution to Europe's biological diversity.

This task is achieved when Natura 2000 protected items have a favourable conservation status. If the current status is favourable, it is for necessary measures to be taken to prevent any potential worsening. If the actual situation is not favourable then it is necessary for measures to be taken to restore a favourable status for the species and habitats. This

includes measures that improve the sustainability of existing uses.

The focus is on the habitats of annex I of the Habitats Directive, the species of annex II of the Habitats Directive and the breeding and migrating bird species of the SPAs which have been defined within the Natura 2000 sites of the Lower Elbe as the particular subject matter of protection. These species and habitats are described below as "determining value".

### A 4.1.1 Natura 2000 management targets for the entire Elbe estuary

For the Natura 2000 sites, the fundamental goal is to preserve the biological diversity, in particular through:

- avoiding any worsening of the conservation status of the Natura 2000 protected items
- retaining and restoring a favourable conservation status to the Natura 2000 protected items, specifically:
  - the "complex habitat" type 1130 – estuaries (for more information on the habitat see p. 14),
  - the remaining water and land habitats
  - the animal and plant species in annex I of the Habitats Directive
  - breeding bird species
  - migrating bird species.

On the basis of an assessment of the entire planning area, the following management targets can be identified as having a particular significance for the entire area, taking into account the ecological requirements of the species, the habitats to be preserved and the evaluation of their conservation status:

- retaining and restoring near-natural estuary areas and alluvial areas influenced by the tide and their biocoenosis with a dynamic mosaic of shallow and deep water areas, flow types, mud flats and reed beds, tidal inlets, islands, sandbars and land areas, with an interaction which is as natural as possible between the biotopes typical for the estuary and the alluvial areas.
- retaining and restoring hydrological and morphological interactions within the estuary which are as natural as possible (tidal water areas, flow characteristics, sediment build-up and transport processes, water and sediment quality, oxygen content and proportions of the various morphological structural elements.
- retaining and restoring the spawning ground and nursery areas of the twaite shad

- retaining and restoring ecologically continuous river courses and side branches (Elbe and its tributaries) as a (partial) habitat of migrating fish species.
- retaining and restoring the Elbe water dropwort population
- as a priority in the bird protection areas, retaining and restoring the connected and extensively used grassland ditch complexes and their biocoenosis, in particular its function as a (partial) habitat for breeding and resting birds, as well as retaining and restoring high water levels (in particular in areas not affected by the tide) and rest and relaxation area which are free from disturbances
- retaining and restoring a favourable conservation status of the relevant breeding and migrating bird species within the bird protection areas.
- retaining and developing alluvial forests in combination with hydrophilous tall herbaceous vegetation and reed beds; on the area near the banks of the limnic section of the Elbe as a habitat for the Elbe water dropwort
- retaining high levels of unspoiled and mainly disturbance-free habitats

In addition to these management targets, for almost all of the Natura 2000 sites in the planning area there are legally binding, conservation objectives. In the federal state contributions, there are also extensive and differentiated statements on the targets which are relevant, for example, to measure planning (part C: material).

### Priority on species and habitats which are typical for the estuary

As part of the anthropological transformation of the Elbe estuary, the diking and sand filling has resulted in the existence of some biotopes which are protected under federal state legislation but the presence of which is due to the continued destruction of the natural estuary landscape (e.g. nutrient-poor grassland on sand deposit sites, deposited dunes in the clay marsh). As long as there is no conflict of interest be-

tween biotopes which are not typical for the estuary and estuary-specific targets, there is no reason not to maintain biotopes which contribute to the species diversity in the area. If there is a conflict of interest, the habitat which is typical for the estuary has priority (see framework concept for the BHD areas in the Elbe estuary 2005: [www.natura2000-unterelbe.de](http://www.natura2000-unterelbe.de)).

### Interaction between the estuary and the river

Estuaries are open systems at the crossover point between river and sea. They therefore have a diverse and very broad ranging interaction with their surroundings.

Nutrients and contaminants from the flow of the Elbe and its tributaries can damage the water and the sediments in the estuary. The estuary area itself is mainly a through-flow for migrating aquatic species, but there are obstacles in the tributaries which flow into the river. In terms of the estuary, the following targets are set for areas which are beyond the scope of the IMP:

- reducing the nutrients in the waters of the river in order to improve the oxygen content in the estuary and to reduce eutrophication of the coastal waters at the mouth of the Elbe
- reducing the damage to Elbe sediments from contaminants by taking measures at the Elbe river basin level
- improving the biological flow or removing the obstacles in the tributaries leading to improved flow between the estuary and the waters of the dyked marshes
- strengthening the Natura 2000 network beyond the borders of the protected areas of the estuary by retaining and promoting connected landscape elements

#### A 4.1.2 Focus for the management of the SACs

Some of the species and habitats in the Elbe estuary have an unfavourable conservation status across Europe. These species and habitats are a particular priority. In addition, the species and habitats which are classified as a priority in the annexes of the Habitats Directive are severely endangered according to pan-European measurements and require special protective efforts.

From the cross-Europe report on the conservation status of species and habitats (report in accordance with Article 17 of the Habitats Directive), the species and habitats can be identified which have been ranked at the least favourable status (C = unfavoura-

ble – poor) in the overall Atlantic bio-geographical region of Europe (European Commission 2009: <http://biodiversity.eionet.europa.eu/article17>).

Included in this are the following habitats and species of the Habitats Directive which are to be preserved in the Elbe estuary:

- estuaries (1130)
- hydrophilous tall herb communities (6430)
- Lowland hay meadows (6510)
- Soft wood alluvial forests (priority habitat \*91E0)
- 1103 Twaite shad
- 1601 Elbe water dropwort (priority species)

Their priority status means that the alluvial forests and the Elbe water dropwort require particular efforts for protection. The Natura 2000 sites of the Lower Elbe have a worldwide responsibility for the Elbe water dropwort, as it only exists in the fresh water sections of the tidal Elbe. Since the species occurs in structurally rich tidal alluvial forests, the maintenance and restoration of alluvial forests with Elbe water dropwort is twice as high a priority as a conservation objective.

The hydrophilous tall herb communities of the banks of the Elbe upstream from Hamburg are characterised by a particularly high number of species. They are also an important habitat of the Elbe water dropwort.

As a result of the change in use of the landscape, the habitats in the meadows in all of the Member States in Western Europe have an unfavourable conservation status. The development over the past decade in some parts of the planning area has shown that even sites on marshes have the potential to become meadows rich in species, and should be utilised.

The twaite shad has a generally unfavourable conservation status in North-West Europe. In comparison to the remaining estuaries on the southern side of the North Sea (in Belgium, the Netherlands, Germany), the status of the Elbe twaite shad is somewhat better, but a particular responsibility for the conservation of this species in Europe must be assumed.

### A 4.1.3 Focus for the management of the bird protection areas

Those breeding and migrating bird species which were decisive for the selection, differentiation and designation of the bird protection areas by the federal states are particularly important for the management of the bird protection areas.

The obligation of the EU Member States to protect birds arises from Article 4 of the Birds Directive (Chapter 2.1). The Birds Directive gives particular weight to the wetlands of international importance as designated by the Ramsar Convention. These are areas in which more than 1% of the flyway population of a bird species associated with a wetland live. The Elbe estuary meets these criteria for several migrating bird species.

For some breeding and migrating bird species which are significant to the Elbe estuary, their unfavourable conservation status (C) means that there is a par-

ticular need for species-specific protection measures. This applies, for example, to the following species which were named among others for consideration in the Lower Saxony strategy on the protection of species and biotopes (Information on breeding bird species: value-defining breeding bird species of the bird protection areas with the highest priority for conservation and development measures):

- **Breeding birds:**  
Common tern, ruff, lapwing, gull-billed tern, bittern, redshank, pied avocet, black-tailed godwit and corncrake
- **Migrating birds:**  
Spotted redshank, garganey, teal, northern shoveller and tundra swan

## A 4.2 Usage targets

The members of the two IMP planning groups gave their expectations and targets for the IMP. These

planning targets can be summarised as follows:

- **Natura 2000 planning target/  
nature conservation**  
Fulfilling the international and national nature conservation legislation on the conservation of biological diversity by creating favourable conservation statuses of species and habitats and avoiding the deterioration of conservation statuses
- **Regional planning target**  
Coordinating the various usage requirements from a federal state and regional planning perspective as part of sustainable regional development
- **Water management/Water Framework Directive planning target**  
Fulfilling the international and national obligations to achieve a "good ecological potential" of the body of water
- **Coastal protection planning target**  
Long-term and ecologically viable protection of people, materials and cultural assets from the effects of flooding
- **Waterways and ports planning target**  
Ensuring simple and secure ship transport on the federal waterways and their necessary and efficient development
- **Agriculture planning target**  
Long-term security and promotion of efficient agriculture in the various types of cultivation in suitable production areas
- **Fishing planning target**  
Ensuring and developing the fishing economy and usable fish populations
- **Hunting planning target**  
Maintaining the biological diversity and use of species which can be hunted
- **Trade, industry and infrastructure planning target**  
Ensuring the site conditions, production capacities and production potentials to achieve competitiveness and ability to develop
- **Conservation of the cultural heritage planning target**  
Preserving listed objects and evidence of agricultural and settlement history
- **Leisure and tourism planning target**  
Ensuring and developing the usable potential for tourists of the natural and cultural environment, taking into consideration the recreational function of the water

### A 4.3 Integrated targets for the Elbe estuary

As a basis for Natura 2000 management supported by all of the interest groups, the Natura 2000 targets and the usage targets were combined to create integrated targets. The Natura 2000 and usage targets were combined based on the relevant legal framework which formed the underlying framework for action for each technical discipline. This approach assumes a fundamental compatibility between the usage and the Natura 2000 targets. The common weighing up of targets required all user groups to accept and adapt to the demands of the natural interactions, resources and potential. It is only possible

to achieve the conservation of the functionality of the ecosystem and sustainable usability of the natural wealth as well as favourable conservation statuses for the Natura 2000 protected items in this way.

The combination of the various interests with the Natura 2000 network provides common targets and guidelines which guide the management of the Natura 2000 sites. It becomes clear that integrating measures for nature conservation into the uses is indispensable, and that favourable conservation statuses cannot be achieved by nature conservation

actions alone. A spatial separation is the goal if conflicting targets are not compatible.

In the future the continued exchange and the trusting cooperation between all organisations and stakeholders in the area will remain a condition for putting together commonly accepted targets and for the development of solution strategies. When implementing the targets and guidelines given below, it is often only the continuation or intensification of existing activities which is required. New developments (e.g. increased sediment deposits in the Elbe, cultivation of raw materials which regrow and new types of sports) will require a conflict analysis carried out jointly and a search for new solutions which can be integrated into the ongoing management of the relevant Natura 2000 sites.

In order to implement these initial ideas on their target concepts, the planning groups from Lower Saxony and Hamburg/Schleswig-Holstein selected methods that corresponded to the federal state-specific requirements the best and therefore were not completely identical. Taking into account this independence, the results of the two planning groups are brought together below and are therefore relevant for the entire estuary. In order to structure the representation, the planning area is sub-divided into three landscape areas:

- The aquatic landscape covers the aquatic area in a literal sense (water areas and mud flats)
- The land-based and tidally-influenced landscape zones are mainly made up of the bank, the foreland and some marshes between dykes (e.g. Wedeler Marsch, Asselersand)
- The dyked marsh areas not affected by the tide, make up a third landscape zone.

These three landscape zones form a pragmatically defined framework which serves to structure the results of the integration process. Like every sub-division of an ecological continuum, this arrangement can suggest that strict lines are drawn across the landscape. As is clear from the measures suggested, the fundamental goal, however, is to increase the interaction between aquatic and land areas.

The following remarks place the focus on those targets of area cultivation which are relevant to the entire area. Specifically, additional species and habitat-specific targets which are specified on a functional area level (see part B) and in the federal state contributions (see part C: materials) should be borne in mind in order to ensure the function of Natura 2000.

### A 4.3.1 Integrated targets for individual landscape zones

The following table gives an overview of the results of the target integration for the aquatic area, the

area influenced by the tide and the land areas not affected by the tide.



▼ Table A10 (part 1)

Cross-state major synergies and conflicts between targets in the aquatic area

Targets which are particularly important in the aquatic landscape zone		
Natura 2000	<ul style="list-style-type: none"> <li>• Maintaining the length and expansion of the limnic section of the tidal Elbe</li> <li>• Maintaining and promoting the diverse flow which is typical for the Lower Elbe</li> <li>• Avoiding a further increase in tidal range, if possible reducing the tidal range</li> <li>• Maintaining and restoring the flood plains</li> <li>• Maintaining and restoring the shallow water zones</li> <li>• Returning to nearly natural levels of erosion, sediment transport and sedimentation</li> <li>• Nearly natural spatial distribution of the sediment types sand, silt and clay, maintaining the spectrum of benthic biocoenosis typical for the Elbe</li> <li>• Optimising sediment management with the goal of minimising the negative effects generated by excavations and works</li> <li>• Reducing damage to the sediment by contaminants</li> <li>• Ensuring water conditions corresponding to the ecological demands of the estuary (particularly oxygen concentration generally &gt; 6mg/ l), complying with the target values for nutrient and contaminant content in accordance with relevant regulations (including the Water Framework Directive)</li> <li>• Maintaining and restoring through-flowing water systems between the estuary and its natural tributaries and the system of ditches and sluices which feeds into the river</li> <li>• Maintaining and restoring the breeding and nursery areas of the twaite shad between Hamburg and Glückstadt and of the asp between Geesthacht and Hamburg</li> <li>• Maintaining and developing feeding and resting areas free from disturbances, particularly for bird species prone to disturbance in the mud flats and the shallow water areas</li> </ul>	
Usage interests	<p><b>Particularly significant synergies in the targets</b></p> <p>There are fundamental overlaps in targets, in particular in targets or partial targets related to water management, shipping and fishing. Examples of this are:</p> <ul style="list-style-type: none"> <li>• Implementing the targets of the Water Framework Directive</li> <li>• Nearly natural tide and sediment behaviour in order to decrease the maintenance</li> <li>• Minimising maintenance, as far as possible replacing revetments with nearly natural bank revetments</li> </ul>	<p><b>Particularly significant conflicts in the targets</b></p> <ul style="list-style-type: none"> <li>• Conflicts in the targets can arise as a result of river engineering measures. The maintenance of channels and banks can even lead to conflicts, depending on the location, time at which the maintenance is carried out and extent of the maintenance.</li> <li>• Conflicts in the targets can occur between trade/industry/infrastructure. Although the facilities in question are mainly outside of the planning area if the effect of uses or intended uses impacts on the Natura 2000 sites, e.g. by water extraction/outfalls then these activities will need to be managed accordingly.</li> </ul>

▼ Table A10 (part 2)

Cross-state major synergies and conflicts between targets in the aquatic area

Targets which are particularly important in the aquatic landscape zone		
	Particularly significant synergies in the targets	Particularly significant conflicts in the targets
Usage interests	<ul style="list-style-type: none"> <li>Maintaining and restoring fish populations which can be used sustainably and are suitable to be marketed as a food.</li> </ul> <p>Synergies in the targets also occur for additional uses such as coastal protection, for example where shortening the dyke line leads to the creation of additional flood plains. Tourism and leisure use are often dependent on an attractive natural environment. The offer of a natural experience and voluntary agreements with water sports groups on practising water sports in a manner compatible with nature in the Lower Elbe are examples of targets or measures which benefit both parties. Nearly natural sediments are also useful in water sports, as this minimises the maintenance expenditure required for the marinas.</p>	<ul style="list-style-type: none"> <li>Two power lines which cross the Elbe south of Stade near Lühesand are a collision danger for migrating birds.</li> </ul> <p>There are no fundamental conflicts with the remaining usages. Whether or not there are conflicts with the Natura 2000 targets depends firstly on the type and intensity of the use and the activities determined by the location or the time period. Problems could be caused, for example, by hunting game in bird resting areas, dyke maintenance measures during the breeding and resting period, or water sports activities which cause a great deal of disturbance (e.g. jet skiing) if they are carried out in areas in which species that are sensitive to disturbances live.</p>
Results		
	<ul style="list-style-type: none"> <li>In the aquatic area there are intensive interactions between Natura 2000 and natural uses in water management and shipping.</li> <li>Cooperation with the Water and Shipping Administration and the Hamburg Port Authority is an essential condition in order to achieve positive effects for everyone involved in the concrete implementation of measures. The goal of returning to nearly natural hydromorphological activities in the tidal Elbe is shared by all parties. The approach presented in the "waterways and ports" technical contribution on river engineering and sediment management appears in principle to be suitable to improve the conservation status of the estuary. The impact of the measures in the technical contribution, as far as they are categorised as plans and projects in the meaning of Section 34 of the Federal Nature Conservation Act, has yet to be tested. Reducing the damage to the waters of the Elbe and the sediments in the Elbe has a direct or indirect positive impact on all uses and interest groups (e.g. increasing value for tourism).</li> <li>The measure programme of the management plan in accordance with Article 11 of the Water Framework Directive is designed to improve the conservation status of the estuary. In the practical implementation, the management plans are expanded in accordance with both the Habitats Directive and the Water Framework Directive.</li> </ul>	





▼ Table A11 (part 1)

Cross-state major synergies and conflicts between targets in the land areas influenced by the tide

<b>Targets which are particularly significant for land-based landscape zones influenced by the tide</b>					
<b>Natura 2000</b>	<ul style="list-style-type: none"> <li>• Maintaining and restoring areas with unimpeded influence from the tide/flood waters</li> <li>• Improving the conditions for the development of a dynamic typical for the estuary, particularly in the Elbe bank area, the foreland and in parts of the Elbe islands</li> <li>• Maintaining and restoring tidal inlet structures and small waters which temporarily contain water</li> <li>• Increasing the proportion of nearly natural banks, restoring a nearly natural ratio of banks protected from the flow of the river and banks exposed to the flow of the river, protection from unnatural high bank breaches</li> <li>• Maintaining and promoting a distribution of tidal reeds, tall herbaceous vegetation on the banks and alluvial forests which is typical for the estuary, taking into particular consideration their role as a habitat for the Elbe water dropwort.</li> <li>• Maintaining and restoring the population of the Elbe water dropwort</li> <li>• Maintaining and restoring the connected, unused areas</li> <li>• Promoting a dynamic independent new development of pioneer sites</li> <li>• Maintaining and developing a distribution of meadow habitats typical for the estuary</li> <li>• Maintaining and developing extensively used, unspoilt wet grassland areas which are as large as possible, especially as breeding, feeding and resting areas for valuable and characteristic bird species</li> </ul>				
<b>Usage interests</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #0070C0; color: white;">Particularly significant synergies in the targets</th> <th style="background-color: #0070C0; color: white;">Particularly significant conflicts in the targets</th> </tr> </thead> <tbody> <tr> <td> <p>There are fundamental synergies between the targets with the partial targets of water management, coast protection, agriculture and leisure and tourism uses. Examples of these are:</p> <ul style="list-style-type: none"> <li>• The habitats and species of the cultivated landscape in the marshes are dependent on an extensive use of the meadows and pastures for their continued existence.</li> <li>• Having a nearly natural bank shape and maintenance at suitable sections of the Elbe also serves the purposes of the Water Framework Directive and reduces the maintenance expenditure (e.g. for the Water and Shipping Administration).</li> <li>• Wide forelands influenced by the tide are advantageous for coastal protection because of their protective function. They also improve the nutrient withdrawal and thereby contribute to the cleaning of the water.</li> </ul> </td> <td> <p>Conflicts in targets occur mainly in the partial targets of agriculture, water management and shipping, as well as infrastructure. These are mainly:</p> <ul style="list-style-type: none"> <li>• Target conflicts in agriculture can occur particularly where the economic requirements are not compatible with the Natura 2000 targets. Agreements on uses which are consistent with the targets are not always economically attractive.</li> <li>• The waves caused by shipping traffic in some areas lead to significant mechanical damage to the banks of the Elbe.</li> <li>• Two power lines which cross the Elbe south of Stade near Lühesand are a collision danger for migrating birds.</li> </ul> </td> </tr> </tbody> </table>	Particularly significant synergies in the targets	Particularly significant conflicts in the targets	<p>There are fundamental synergies between the targets with the partial targets of water management, coast protection, agriculture and leisure and tourism uses. Examples of these are:</p> <ul style="list-style-type: none"> <li>• The habitats and species of the cultivated landscape in the marshes are dependent on an extensive use of the meadows and pastures for their continued existence.</li> <li>• Having a nearly natural bank shape and maintenance at suitable sections of the Elbe also serves the purposes of the Water Framework Directive and reduces the maintenance expenditure (e.g. for the Water and Shipping Administration).</li> <li>• Wide forelands influenced by the tide are advantageous for coastal protection because of their protective function. They also improve the nutrient withdrawal and thereby contribute to the cleaning of the water.</li> </ul>	<p>Conflicts in targets occur mainly in the partial targets of agriculture, water management and shipping, as well as infrastructure. These are mainly:</p> <ul style="list-style-type: none"> <li>• Target conflicts in agriculture can occur particularly where the economic requirements are not compatible with the Natura 2000 targets. Agreements on uses which are consistent with the targets are not always economically attractive.</li> <li>• The waves caused by shipping traffic in some areas lead to significant mechanical damage to the banks of the Elbe.</li> <li>• Two power lines which cross the Elbe south of Stade near Lühesand are a collision danger for migrating birds.</li> </ul>
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▼ Table A11 (part 2)

Cross-state major synergies and conflicts between targets in the land areas influenced by the tide

Targets which are particularly significant for the land-based landscape zones influenced by the tides		
	Particularly significant synergies in the targets	Particularly significant conflicts in the targets
Usage interests	<ul style="list-style-type: none"> <li>The implementation of the conservation objectives in SACs and bird protection areas also leads to a reevaluation of the possibility for natural experiences.</li> </ul> <p>Other synergies in targets can also occur subject to the type and intensity of the usage activity and the site or the time period at which the activities are carried out. For example, the removal of soil to generate clay can have positive aspects if it is done in places where increasing the proportion of water areas is desirable from a nature conservation perspective.</p>	<p>There are no fundamental conflicts in the remaining uses. Whether or not there are conflicts with the Natura 2000 targets depends firstly on the type and intensity of the use and the activities determined by the location or the time period.</p> <p>Problems could be caused, for example, by hunting game in foreland areas, dyke maintenance measures during the breeding and resting period, the removal of clay in areas with Natura 2000 habitats, maintaining summer dykes, draining surfaces used for agriculture and the use of areas for leisure activities which cause disturbance or which are carried out in areas which are sensitive to disturbances.</p>
<b>Results</b>		
<ul style="list-style-type: none"> <li>Since a very high proportion of the land areas influenced by the tide are used for agriculture, the most intensive interactions are between Natura 2000 and agricultural uses. Primarily in areas of considerable avifaunal significance, the use should be carried out in a manner adapted to the target. Area-specific defining of the conservation goals shows the technical guidelines for the management process and the implementation of measures. The aim is to cooperate with the farms in order to have an effect on nature conservation. Voluntary agreements and fiscal options play an important role here. The close cooperation between agriculture and nature conservation is one of the most important long-term goals in this area.</li> <li>The approach presented in the technical contribution "waterways and ports" for optimising bank maintenance is designed to increase the proportion of nearly natural banks and to improve the conservation status of the estuary and the riverbank habitats.</li> <li>It is recognised that eliminating the wave action caused by ships completely is not possible without severely limiting the used of the river as a waterway. The suggested intensification of pilot training and monitoring of the recommended speed of shipping traffic in the Lower Elbe should contribute to a reduction in the mechanical damage. Research should also be carried out into whether the procedures carried out to date to reduce the damage to the banks caused by waves from ships is sufficient to protect the sensitive bank vegetation. If necessary, additional avoidance measures should be developed.</li> </ul>		





▼ Table A12 (part 1)

Cross-state major synergies and conflicts between targets in the land areas not affected by the tide

Targets which are particularly significant for the land-based landscape zones not affected by the tides					
<b>Natura 2000</b>	<ul style="list-style-type: none"> <li>• Expanding the influence of the tide</li> <li>• Maintaining and developing extensively used, unspoilt wet grassland areas which are as large as possible, especially as breeding, feeding and resting areas for valuable and characteristic bird species</li> <li>• Maintaining and creating a variety of water bodies and high water levels in grassland areas</li> </ul>				
<b>Usage interests</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #bbdefb; color: #00796b;">Particularly significant synergies in the targets</th> <th style="background-color: #bbdefb; color: #00796b;">Particularly significant conflicts in the targets</th> </tr> </thead> <tbody> <tr> <td style="background-color: #e0f2f1;"> <p>Fundamental synergies in targets arise mainly from the partial targets of agriculture, leisure use and tourism. Examples of this are:</p> <ul style="list-style-type: none"> <li>• The habitats and species of the cultivated landscape in the marshes are dependent on an extensive use of the meadows and pastures for their continued existence.</li> <li>• Ensuring suitable resting areas for geese in the Natura 2000 sites takes the pressure off agricultural areas outside of the Natura 2000 sites.</li> <li>• The implementation of the conservation objectives in SACs and SPAs also leads to a reevaluation of the possibility for natural experiences.</li> </ul> <p>Other synergies in targets can also occur subject to the type and intensity of the usage activity and the site or the time period at which the activities are carried out. For example, the removal of soil to generate clay can have positive effects if it is done in places where increasing the proportion of water areas is desirable from a nature conservation perspective.</p> </td> <td style="background-color: #e0f2f1;"> <p>Conflicts in targets mainly arise from the partial targets of agriculture and water management. Examples of this are:</p> <ul style="list-style-type: none"> <li>• Target conflicts in agriculture can occur particularly where the economic requirements are not compatible with the Natura 2000 targets. Agreements on uses which are consistent with the targets are not always economically attractive.</li> <li>• Conflicts in targets due to the transformation from grassland into arable land in bird protection areas (particularly in Lower Saxony) and the intensification of the use of grassland.</li> <li>• Parts of the marsh waters are intensively maintained.</li> </ul> <p>There are no fundamental conflicts in the targets arising from the remaining uses. Whether or not there are conflicts with the Natura 2000 targets depends firstly on the type and intensity of the use and the activities determined by the location or the time period. Problems could be caused, for example, by hunting game, targeted measures to frighten resting birds, dyke maintenance measures during the breeding and resting period and the use of areas for leisure activities which cause a great deal of disturbance or which are carried out in areas in which species live which are sensitive to disturbances.</p> </td> </tr> </tbody> </table>	Particularly significant synergies in the targets	Particularly significant conflicts in the targets	<p>Fundamental synergies in targets arise mainly from the partial targets of agriculture, leisure use and tourism. Examples of this are:</p> <ul style="list-style-type: none"> <li>• The habitats and species of the cultivated landscape in the marshes are dependent on an extensive use of the meadows and pastures for their continued existence.</li> <li>• Ensuring suitable resting areas for geese in the Natura 2000 sites takes the pressure off agricultural areas outside of the Natura 2000 sites.</li> <li>• The implementation of the conservation objectives in SACs and SPAs also leads to a reevaluation of the possibility for natural experiences.</li> </ul> <p>Other synergies in targets can also occur subject to the type and intensity of the usage activity and the site or the time period at which the activities are carried out. For example, the removal of soil to generate clay can have positive effects if it is done in places where increasing the proportion of water areas is desirable from a nature conservation perspective.</p>	<p>Conflicts in targets mainly arise from the partial targets of agriculture and water management. Examples of this are:</p> <ul style="list-style-type: none"> <li>• Target conflicts in agriculture can occur particularly where the economic requirements are not compatible with the Natura 2000 targets. Agreements on uses which are consistent with the targets are not always economically attractive.</li> <li>• Conflicts in targets due to the transformation from grassland into arable land in bird protection areas (particularly in Lower Saxony) and the intensification of the use of grassland.</li> <li>• Parts of the marsh waters are intensively maintained.</li> </ul> <p>There are no fundamental conflicts in the targets arising from the remaining uses. Whether or not there are conflicts with the Natura 2000 targets depends firstly on the type and intensity of the use and the activities determined by the location or the time period. Problems could be caused, for example, by hunting game, targeted measures to frighten resting birds, dyke maintenance measures during the breeding and resting period and the use of areas for leisure activities which cause a great deal of disturbance or which are carried out in areas in which species live which are sensitive to disturbances.</p>
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## ▼ Table A12 (part 2)

Cross-state major synergies and conflicts between targets in the land areas not affected by the tide

**Targets which are particularly significant for the land-based landscape zones not affected by the tides**
**Results**

- Since almost all of the land areas which are not affected by the tide are used for agriculture, the most intensive interactions are between Natura 2000 and agricultural uses. Area-specific defining of the conservation goals shows the technical guidelines for the management process and the implementation of measures. The aim is cooperate with the farms in order to have an effect on nature conservation. Voluntary agreements and fiscal options play an important role here. The close cooperation between agriculture and nature conservation is one of the most important long-term goals in this area.
- Changes to grassland need to be urgently stopped in areas where grassland changes occur. The priority in open areas and areas which are particularly important in the protection of breeding birds is to return the arable land to grassland in an economic manner. Where it is possible to do this in cooperation with harvesting processes, water level management is optimised particularly in the spring, and the water maintenance is adapted to the relevant needs and carried out in a way that improves nature. The optimisation of the marsh ditches will be continued (see for example the concept of dyke sluice drainage in Nordkehdingen).
- Against the background of the insufficient conservation status of various species of water bird, maintaining or expanding the areas protected from hunting is essential. This also serves to reduce the grazing pressure of northern migrating birds on agricultural land. The priority here should be voluntary agreements and fiscal options. As long as the protected areas are not yet protected under the law, the possibility of creating areas protected from hunting should be agreed as far as possible with hunting communities as part of the designation process.

### A 4.3.2 Results applicable to all landscape zones

- When planning new coastal protection systems for the further development of the estuary and its flood plains it is very important to agree measures early on for water management, operations of waterways and nature conservation
- There are often no fundamental conflicts in the targets of the activities currently carried out which do not require approval – it is far more common for the type, intensity, location and time period of the activities carried out to have an effect on the potential for synergy and conflict. Depending on local circumstances, this is applicable to varying degrees, e.g. for agriculture, measure for coastal protection and water management, hunting and recreational fishing and other recreational activities. The effects of activities in the trade, industry and infrastructure sector are indirect, as existing facilities and the areas provided for this and with the relevant planning permission are outside of the Natura 2000 boundaries.
- The practices already used in many places for mutual benefits should be continued, in order to take advantage of the possibility for conversations (e.g. with hunters). The continued search for compromise should be actively supported by all parties. Where necessary, pilot projects are a proven way of discussing concrete advantages and disadvantages and then developing joint solutions. The existing offers to experience nature are successful examples of joint projects.
- Voluntary agreements and fiscal options should continue to be used. Where these tools are insufficient, there are suitable official measures to ensure the conservation status of the Natura 2000 protected features.
- The impact of planned works on conservation objectives in the Natura 2000 sites can only be checked using the methods set out in law. Indirect effects from works planned for outside of the Natura 2000 sites should be taken into account as early as possible. If there is a possibility of considerable damage, contractual solutions should be considered as early as

possible. If a planned activity, which will cause considerable damage, meets the conditions to be granted exceptional approval in accordance with Section 34 paragraph 3 of the Federal Nature Conservation Act, the scope of the coherence requirement should be determined as part

of an official approval and planning approval procedure (see chapter A6.2).

## A 4.4 Targets until 2020 and long-term goals

In accordance with legal requirements, the Natura 2000 targets were put together for the existing species and habitats in the estuary. Until 2020 the focus will be on those species and habitats which are in the Atlantic bio-geographical region and have an unfavourable conservation status and for which the Elbe estuary is of particular conservation importance.

Achieving a favourable conservation status for the habitat type "estuaries" is a particular challenge. It is assumed that improvements can be targeted for some of the deficiencies in the estuary and for the conservation status of several species and habitats by 2020.

### A 4.4.1 Targets by 2020

In the short to medium term (up to 2020), the main target for the aquatic area is to halt the negative changes that have taken place in the past few decades. The Water and Shipping Administration's new relocation strategy presented in the technical contribution "waterways and ports" can contribute significantly to this. In order to reverse the current deficits, however, efforts will need to be continued well beyond 2020. The Natura 2000 technical contributions contain considerations and suggestions for river engineering measures such as the reconnection of adjacent river arms which have been cut off, the opening up of summer dykes, the restoration of the influence of flood waters behind the dykes or the relocation of dykes to suitable areas. The first projects to restore the floodplains are just about to be implemented by the Water and Shipping Administration (WSA) and the HPA in the Hamburg area. An important focus here is increasing the proportion of nearly natural riverbanks. In collaboration with the WSA, realistic prospects are being developed to achieve substantial progress in the next ten years. In all likelihood, these would also have a positive impact on the Elbe water dropwort. In addition, new stepping stone biotopes should be created.

Additional progress in habitat and bird protection can also be targeted for the marshes in collaboration with cultivating operations by 2020 by continuing the care and development of grassland. Particularly in publicly owned areas, the proportion of biotopes typical for the estuary will be increased. The areas which are designated for the development of alluvial forests will soon be concretised so that the creation of forests can begin here as early as possible and can then continue undisturbed.

New or more intense handling requirements may arise as a result of the migration of additional invasive species into the area, climate change impacts, and additional demands of flood protection. Not least because of the expanse of the current functional deficit of the complex habitat "estuaries", it is therefore recommended that the conditions for long-term development are continued until 2020, in particular by means of regional planning and urban land use planning.

### A 4.4.2 Long-term goals

Not all of the problems in the Elbe estuary will be resolved by 2020. The return to a nearly natural tidal range and a nearly natural level of sediment will require common, long-term efforts. The same is true for ensuring continuously sufficient oxygen levels in the fresh water sections of the estuary in summer. How climate change will affect the hydromorphological behaviour of the river cannot yet be predicted.

A short-term decrease in the expected climate changes is no longer possible, even by successful protection against climate change. There is therefore an urgent need for society, the economy and politics to develop new and improved ways of further developing the estuary in a sustainable way. In parallel to the implementation of short to medium-term measures, long-term strategies for the future development of the estuary should be developed.



## A 5 Measures

Due to the size of the Elbe estuary, in addition to the higher level integrated targets for the entire area, a specific strategy for the implementation of measures is also necessary. This means that measures which are carried out on a local level can contribute as effectively as possible to achieving the targets for the entire estuary. The strategy has a general framework but leaves some flexibility in the implementation. This means there are no doubts about the binding nature of the targets.

The general measure strategy is made up of two pillars:

- methodological guidelines
- measure focuses for species and habitats for which there is a priority for actions across federal states and functional areas.

Building on this, measure concepts are developed which implement and substantiate these general points of view at a federal state-specific level (see part C: materials).

### A 5.1 Methodological guidelines

#### Optimal use of the space available

- Since there is not a large amount of space in the Elbe estuary, measures in accordance with the principle of indiscriminate all-round distribution would be counterproductive, so instead clear spatial focuses are given.
- In order to increase the effectiveness of measures, ideally measures should be implemented which serve to improve several Natura 2000 functions.



Research and modelling\* has shown that the area which is required to maintain stable populations of animal and plant species is much greater when the overall area is made up of several smaller areas rather than fewer larger areas.

Despite the dimensions of the Elbe estuary, the available space within the boundaries of the Natura 2000 sites is very small. In order to increase the shallow water areas which are deficient inside the estuary, there are only a few areas available which can be sacrificed without causing sensitive losses in other areas. In the conception of a measure, consideration is therefore made of the fact that it should work to



Returning to a nearly natural dynamic in the estuary is fundamentally desirable. The dynamic has a positive effect which naturally ensures that losses of species and habitats can be balanced out by their spontaneous creation at another location. Dynamic, self-healing ecosystems are more able to adapt and more able to deal with climate change. On the other hand, the dynamic is not selective: where there are large habitats and many species, slight losses are acceptable, and populations which are already very weak can be badly damaged. The area which is available for enhancing the dynamics of the ecosystem is

correct as many deficiencies as possible. The aim of causing as many positive effects as possible should not lead to populations being too small or to targets which are incompatible with one another. The strategy of setting subsequent focuses (see above) then contributes to the effectiveness.

\* 6th European Conference on Ecological Restoration Ghent, Belgium, 8-12/09/2008: Towards a sustainable future for European ecosystems – Providing restoration guidelines for Natura 2000 habitats and species

### Allow and promote greater dynamics

- The return to greater dynamics of the Elbe estuary must be done carefully. In the first phase, protection measures to maintain and strengthen the current presence of species and habitats with unfavourable conservation statuses are necessary.
- Spatial measure focuses contribute to strengthening the resilience and the ability to adapt to the biocoenosis.

a fraction of the original estuary (Fig A12, p. 12). The potential for self-regeneration is therefore limited.

In particular for species and habitats for which the Natura 2000 sites of the Elbe estuary bear the sole responsibility for maintaining the specie abundance. The aim is to develop at least two large focuses in order to reduce the risk of losing unique species ("replacement wheel" principle).

## Functional, coherent habitat systems

- A functioning coherent habitat system helps to minimise the risks of a more dynamic development and to use its advantages.
- As far as possible, focus areas should be chosen in order to achieve a habitat system which is as effective as possible.

The habitat composite of the Natura 2000 sites and its exchange relationships with the surrounding area should be strengthened. The water is the most important connecting medium in the Elbe estuary. The spatial focuses for measures are selected so that natural distribution mechanisms (e.g. drifting of Elbe water dropwort seeds in the river) and interactions between partial areas (e.g.



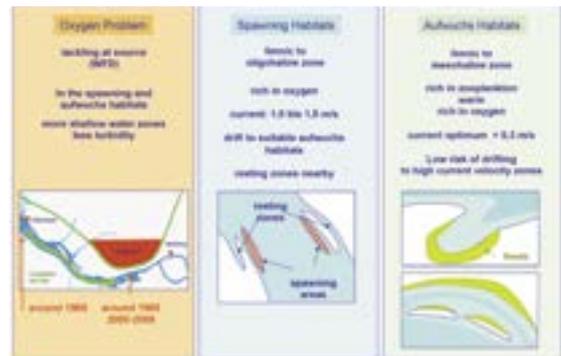
between bird breeding areas) are used (key word: working with nature).

Even in small areas, the effectiveness of individual measures can be increased with a functioning habitat composite.

## Management of risks

- In addition to improving the ecological state of the sites in question, alternative locations in lower risk areas are developed as a safety net, with the aim of avoiding temporary interruption of function.
- The habitat composite has to enable an exchange between areas and alternative locations.

Some of the deficiencies in the Elbe estuary such as the tidal range, which operates at far from natural levels and the lack of oxygen in the summer may get considerably worse in the future as a result of climate change. Whether or not a complete reversal of these deficiencies will be possible is uncertain. What is certain is that efforts need to be made over an extended period in order to achieve this. In parallel to this, the damaging effects on the biocoenosis in the estuary must be reduced.



There is a particular need for action for essential functions of the estuary which are currently mainly carried out in areas which are already badly damaged (e.g. the breeding areas of the twaite shad in the oxygen deficiency zon of the tidal Elbe). The measure concept is based on

- the identification of relevant areas
- an analysis of the functions which are currently being carried out in damaged areas
- identification of areas which can be developed, located in less risky areas and can take on the function of the damaged areas at least partially and temporarily (e.g. to avoid a generation of twaite shad dying out completely).



The suggested measures are agreed within large areas. These areas are selected so that the essential functions can be dynamically shifted there and so that the estuary as a whole can continue with its Natura 2000 tasks. This means, not only can risks be dealt with better (see above) but also that the scope



The measures, which are intended to achieve a good chemical state and a good ecological potential in accordance with the WFD will have a positive effect on the conservation status of the aquatic habitats and species (e.g. reducing the nutrient and pollutant damage, helping to restore the biological continuity of tributaries etc.).

### Increase the scope of action

- The development of alternative locations to the damaged areas of the estuary is not only useful for risk management, but also increases the scope of action necessary to generate a win-win situation for as many of the species involved as possible, or to create small loss-big gain situations from the perspective of Natura 2000.

of actions is increased. These scope of actions enable the implementation of priority measures which are associated with unavoidable changes and losses of certain habitats (e.g. new shallow water areas to lower the tidal range).

### Synergies with the implementation of the Water Framework Directive (WFD)

- The measures of the WFD, which lead to the improvement of the water quality and the biological continuity of the waters, have a positive effect on aquatic species and habitats in Natura 2000 sites.

The IMP provides fundamental information on the consideration of Natura 2000 interests in the context of implementing the WFD:

- Information on the conservation status of the Natura 2000 protected items in the aquatic area
- Conservation objectives
- Measures and measure types related to the waters

**Communication as a measure focus**

- The task of communication is particularly important in the 1st period until 2020 (first stage of implementation of the IMP).



This period will be the first performance test for the IMP. Its success is dependent on the development of a functioning communication network both between the various companies, organisations, interest

groups and federal agencies operating in the Elbe estuary and from managers to those involved on site. It is therefore key that the IMP is both planned and implemented jointly.

**A 5.2 Cross-functional area measurement focuses for species and habitats**

For the species and habitats dealt with below, coherent measurements are needed without regarding boundaries of federal states or functional areas, since a favourable conservation status can only be achieved or restored through coordinated measures. For the remaining protected features, the conservation and development of the current species and

habitats is the key. According to current knowledge, there is no need for strategic decisions to be taken for these items at a cross-functional area level. The relevant measures are therefore described in part B (functional area view).

**A 5.2.1 Complex habitat type: estuaries (1130)**



The complex habitat type “estuaries” shows the matrix in which the biotopes of the flood plains, includ-

ing other habitats in annex I of the Habitats Directive are embedded.

The habitats of various target species in the Natura 2000 sites are also included. An ecologically functional estuary is one of the conditions of the conservation status of many other species and habitats. Measures which are taken for the complex habitat therefore also have a positive effect on other Natura 2000 conservation objectives.

Due to the key role played by the mud flats and shallow water areas in Natura 2000, measures in

the aquatic area are urgently needed. Corresponding with the complexity of the shaping processes and the habitat structure, a comprehensive and holistic collection of measures should be implemented as soon as possible. Close cooperation of federal waterway administration, the Hamburg Port Authority and nature conservation authorities is necessary to achieve this.

▼ Table A13

Measure focus – habitat: estuaries (1130)

<p><b>Key problems</b></p>	<p>As a result of the usage-based development, there have been significant hydrological and morphological changes, particularly in the aquatic area:</p> <ul style="list-style-type: none"> <li>• significantly increased tidal range and altered flow characteristics</li> <li>• badly damaged sedimentation with upstream transport of sediments which is very different to that occurring naturally</li> <li>• loss of shallow water zones</li> <li>• badly damaged balance of matter (nutrient inputs, sediments damaged by harmful substances)</li> <li>• in summer, very low oxygen content in the river section from Hamburg (including Hamburg) to approximately Lühesand</li> <li>• River bank construction</li> <li>• Up to 1980, continual loss of forelands</li> </ul>
<p><b>Management targets</b></p>	<ul style="list-style-type: none"> <li>• Maintaining and restoring nearly natural estuary areas and their bio-coenosis with a dynamic mix of all elements of a nearly natural estuary, particularly the maintenance and restoration of hydrological and morphological interactions which are as natural as possible.</li> </ul>
<p><b>Important measures</b> The suitability should be checked on a site-by-site basis</p>	<ul style="list-style-type: none"> <li>• Development of sustainable solutions to return to a nearly natural hydromorphic dynamic</li> <li>• Integration of the Natura 2000 interests in the ongoing maintenance of the channels, particularly the Elbe (dredging, relocation works)</li> <li>• Integration of the Natura 2000 interests in the ongoing maintenance of the banks</li> <li>• Measures to maintain and restore the shallow water areas</li> <li>• Measures to promote or create tidal inlet systems</li> <li>• Measures to promote nearly natural banks with tidal reeds and hydrophilous bank herbaceous areas</li> <li>• Deconstruction of summer dykes</li> <li>• Measures to extensify the use of grassland</li> <li>• Giving up the agricultural use of foreland areas</li> <li>• Measures to reduce pollutant content in the water and sediments</li> <li>• Measures to maintain and restore the biological continuity of the tributaries of the Elbe and of sluices, pumping stations and locks</li> </ul>

<p><b>Supporting measures</b></p>	<ul style="list-style-type: none"> <li>• Continuation of PR work, maintenance and if necessary expansion of the spectrum of types of natural experience</li> <li>• Maintenance and expansion of the exchange between management teams from other estuaries</li> <li>• Development of a nature guide for the Elbe estuary</li> <li>• Legal protection of the Natura 2000 sites</li> </ul>
<p><b>Need for research/ environmental monitoring</b></p>	<ul style="list-style-type: none"> <li>• The effects of climate change on the structure of the landscape zones of the estuary in longitudinal section and in cross section as well as on species and habitats</li> <li>• Determining the structure and settlement of aquatic habitats outside of the Elbe channels and the areas monitored as part of the evidence gathering process.</li> <li>• Checking the effectiveness of the reductions carried out to date in terms of bank erosion by waves caused by ships, paying particular attention to bank vegetation</li> <li>• Continuing and further developing data capture related to the ecosystem</li> </ul>

**A 5.2.2 Elbe water dropwort**

The Elbe water dropwort grows in the limnic to oligohaline section of the Lower Elbe and in the lower reaches of its tributaries influenced by the tide.

Suitable locations are found between the average high tide and the average low tide, under slight shadow, in very wet parts of the tidal alluvial forest, on the water side of the reed bed and on open, silty mud flats.



▲ Fig. A28  
Measure programme for the Elbe water dropwort

## ▼ Table A14

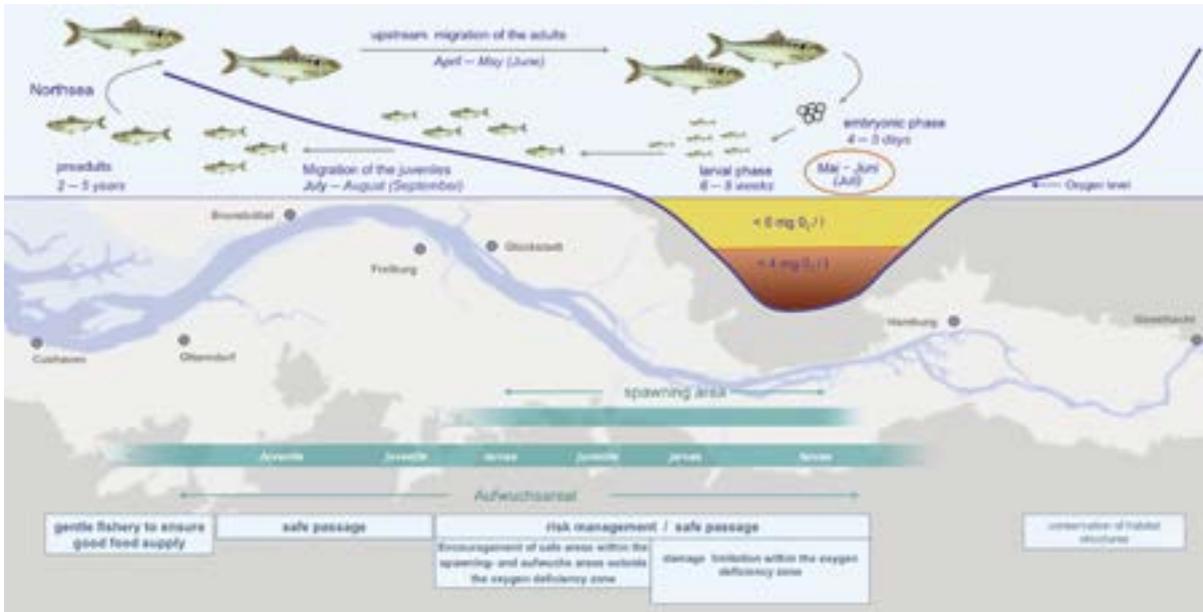
Measure focus Elbe water dropwort

<b>Key problems</b>	<ul style="list-style-type: none"> <li>• In the past few years, the total number of fertile plants determined was between 200 and 500. According to IUCN* criteria, the species which is endemic to the tidal Elbe is classified as being threatened with extinction globally.</li> <li>• The dilemma of management is that the Elbe water dropwort is dependent on a location dynamic which is difficult to accommodate with other uses and interests in the current, mostly static landscape.</li> </ul> <p><small>* IUCN: International Union for Conservation of Nature and Natural Resources</small></p>
<b>Management target</b>	<ul style="list-style-type: none"> <li>• Development of a location network which ensures the survival of the metapopulation in the long-term</li> </ul>
<b>Important measures</b> Suitability should be checked on a site-by-site basis.	<ul style="list-style-type: none"> <li>• Promotion of a dynamic which is typical for the estuary in the bank areas</li> <li>• Maintaining the survival ability of the existing species, if necessary through supporting measures</li> <li>• Maintaining and developing significant donation populations in strategic locations to supply as many other locations as possible by means of diaspora export (at least one location to the west and one location to the east of Hamburg)</li> <li>• Stepping stones at locations which are available for the maintenance of the species in the long term; in this case ideally the creation of suitable habitat conditions e.g. the removal of bank supports, promotion of tidal inlet structures and development of alluvial forests on abandoned areas</li> <li>• Stepping stones at locations which are temporarily available: also use of potential locations available in the short term outside of the Natura 2000 sites</li> <li>• Reactivation of previous population focuses (vision project in the Hasel-dorfer Marsch, reconnecting the Alte Süderelbe)</li> </ul>
<b>Supporting measures</b>	<ul style="list-style-type: none"> <li>• Ex-situ protection</li> <li>• Increasing the plant material for re-settlement measures</li> <li>• Providing information and training to responsible and interested persons (regional nature conservation authorities, communities, organisations, private individuals etc.)</li> <li>• Creating or developing a responsibility and reporting system in order to recognise dangers early and to prevent them (e.g. sponsorship)</li> </ul>
<b>Need for research/environmental monitoring</b>	<ul style="list-style-type: none"> <li>• Continuous observation of the development of populations</li> <li>• Modelling of the spread of Elbe water dropwort seeds via the waterway in the section west of Hamburg (a comparable test for the section from Finkenwerder to Geesthacht has already been carried out).</li> <li>• Analysis of the danger to the species caused by climate change.</li> </ul>

### A 5.2.3 Twaite shad

The twaite shad lives in the North Sea and swims up to the estuaries in spring in order to reproduce there. The estuaries of the Elbe and the Weser are currently the only North Sea estuaries in Germany where reproduction can be seen.

Twaite shads of different ages occur in the Elbe estuary all year round. Early development stages are particularly sensitive to a lack of oxygen.



▲ Fig. A29  
Measure programme for the twaite shad

▼ Table A15 (part 1)  
Measure focus for the twaite shad

<p><b>Key problems</b></p>	<ul style="list-style-type: none"> <li>• Conservation status C Population size still significantly less than the target value for a favourable conservation status (Bioconsult 2010 *)</li> <li>• The spawning areal of the twaite shad extends over 35 km from the Mühlenberger Loch to Krautsand. Within this section of the river, spawning activities have been identified at various parts of the river. In the past few years, the most important spawning area was in functional area 3. The particularly sensitive embryonic and larval phases of life occur in an area where acute oxygen deficiency can occur as early as the middle of June. Considerable losses are possible in some years. If there are repeated interruptions to the habitat, a favourable conservation status is threatened.</li> </ul> <p>* Bioconsult (2010): Study on the Biology of Fish in the Tidal Elbe in 2009 – Evaluation of the existence of fish and cyclostomes relevant for the Habitats Directive and evaluation of the body of water in accordance with the WFD (part I), and Evaluation of the Conservation Status of the Twaite Shad (<i>Alosa fallax</i>) in the Tidal Elbe (part II). – Report commissioned by the Agency for Agriculture, Environment and Rural Areas of the Federal State of Schleswig-Holstein, 109 pages.</p>
<p><b>Management targets</b></p>	<ul style="list-style-type: none"> <li>• Population with a nearly natural abundance and population structure</li> </ul>
<p><b>Important measures</b></p>	<ul style="list-style-type: none"> <li>• Section above Hamburg (functional area 1): maintaining the habitat potential The upper tidal Elbe east of Hamburg currently does not play a relevant role in the life cycle of the twaite shad (Bioconsult 2010). If the brackish water level and the twaite shad areal move upstream in the future, this section and the surrounding area could become significant. By maintaining suitable habitat structures which are also used by other species (e.g. the asp), this potential is retained.</li> </ul>

## ▼ Table A15 (part 2)

## Measure focus for the twaite shad

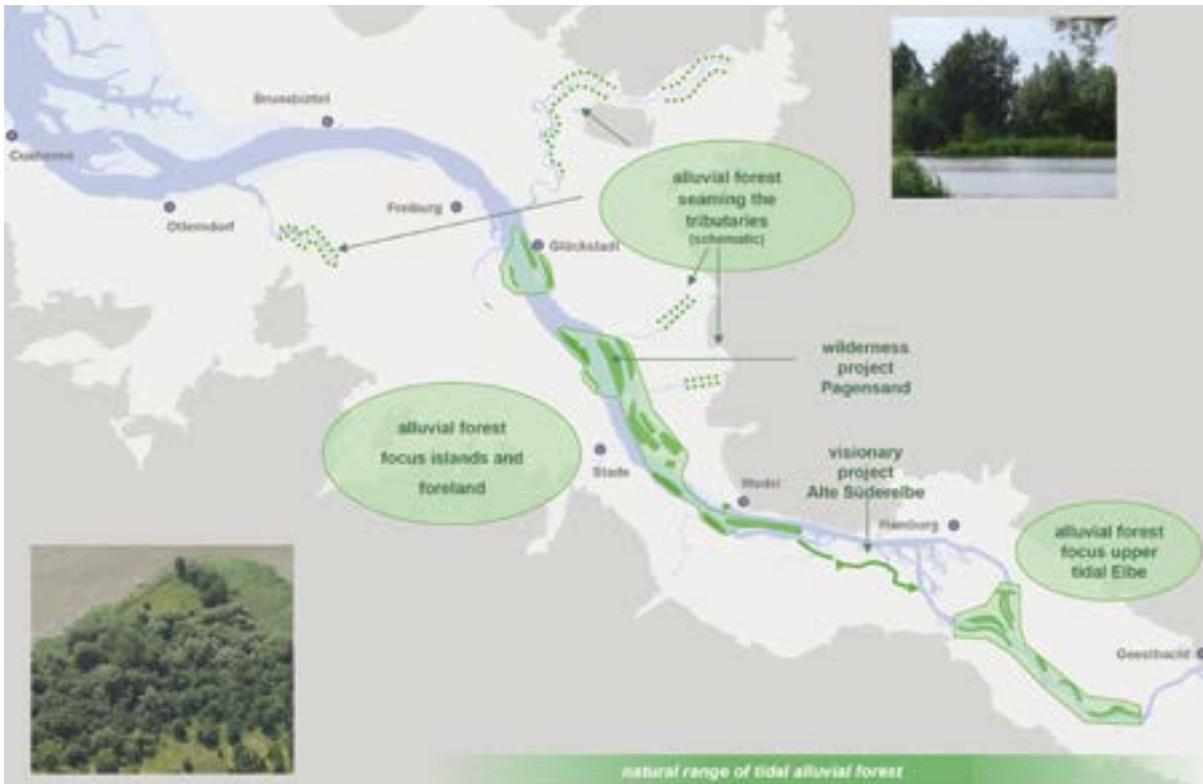
<p><b>Important measures</b></p>	<ul style="list-style-type: none"> <li>• Section from Mühlenberger Loch to Lühesand (functional area 3): damage limitation The problem of the oxygen deficiency zone cannot be solved in the short term. The risks for the twaite shad can be minimised slightly by retaining oxygen-rich and nutrient-rich side areas with a moderate flow as habitats for twaite shad larvae. Sediment management will be optimised in order to keep any damage as low as possible in the relevant time period.</li> <li>• Section from Krautsand to Pagensand (functional area 4): promoting the breeding function and the growing functions for the early development stages of the twaite shad, reducing the threat from cooling water being taken out of the river in Stade. In the past few years, twaite shad have probably also bred in the section between Pagensand and Krautsand. This area is outside of the oxygen deficiency zone and presents fewer risks. It is therefore sensible to ensure a habitat which is as optimally equipped as possible during the breeding phase, growing phase and larval development stages. Since breeding is controlled, among other things, by the water temperature and the location of the upper brackish water limit, schools of twaite shad swimming up the river will probably not manage to steer clear of the dangerous area between Lühesand and Mühlenberger Loch. An expansion of the nursery areas to less risky locations, however, reduces the risk of individual generations of twaite shad dying out considerably.</li> <li>• Section from Störmündung to Neufeld (functional areas 5 and 6): reducing the threat from cooling water intakes In the summer months, this section of the river is part of the migration path of young twaite shad to the sea. At this stage in development, the young fish are weak swimmers and very small, which can mean that cooling water intakes can be particularly dangerous for them.</li> <li>• Mouth of the Elbe – crossover to the Wadden Sea (functional area 6): ensuring there is a supply of food in the nursery areas</li> <li>• The mouth of the river turns into the Wadden Sea. In the life cycle of the twaite shad, this area acts as a feeding and nursery area for adolescents. The MSC certification which is a target for crab fishers can contribute to maintaining the conditions required for a good food supply.</li> </ul>
<p><b>Need for research/ environmental monitoring</b></p>	<ul style="list-style-type: none"> <li>• There is a lack of scientific research on the structure of the twaite shad population and their use of the Elbe estuary in terms of space and time.</li> <li>• The bank of data on the twaite shad in the Elbe estuary, however, is comparably comprehensive. Although, due to the fact that different methods are used to prepare the data, the results of monitoring studies, scientific projects and population studies as part of project planning can often not be compared with each other particularly well (Bioconsult 2010). It is suggested that in future, groups ensure that the results of studies are provided in a compatible format (if necessary as raw data).</li> </ul>

### A 5.2.4 Alluvial forests (\*91E0, 91F0)

The soft wood alluvial forests are part of the priority habitat type "alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)". In the Elbe estuary, alluvial forests made up of willows, alders and ashes occur in the rare tidal type of the alluvial forests. Today, the area extends from Geesthacht to the line between Glückstadt and Freiburg.

Alluvial forests are naturally not formed in the mesohaline areas.

Riparian mixed forests (LRT 91F0) are made up of oaks, elms and ashes and are typical for alluvial areas on lowland rivers which are briefly flooded once or twice a year (in winter and spring and when the river is high in the summer).



▲ Fig. A30 Measure programme for alluvial forests

▼ Table A16 (part 1) Measure focus alluvial forests

Key problems	
	<ul style="list-style-type: none"> <li>• The tidal alluvial forests are divided into small, somewhat isolated individual areas. They are limited to the Elbe islands, the dyked forelands and on small edges along the tributaries. The area available is in many areas not sufficient to create the dynamic and structural diversity typical for this habitat. Parts of the forests are not exposed to the full dynamic of the tide.</li> <li>• The composition of species is in many places not typical for the habitat. Many forests developed from plantations of very fast-growing trees and shrubs which are not typical for the habitat and the landscape (poplar and willow hybrids)</li> </ul>

▼ Table A16 (part 2)

Measurement focus alluvial forests

<b>Management targets</b>	<ul style="list-style-type: none"> <li>• Increasing the size of the alluvial forests, promoting diversity in that area, improving the network of alluvial forests             <ul style="list-style-type: none"> <li>– Functional area 1: alluvial forest focus in the section from the Geesthacht weir to the boundary of functional area 2</li> <li>– Functional area 2: alluvial forest edges along the Alte Süderelbe which has been reconnected to the tide (long-term goal)</li> <li>– Functional areas 3 and 4: alluvial forest focus on the islands and in selected forelands. Promoting the diversity of species and structures through the Pagensand Wildlife Project</li> <li>– Functional area 7: fringes of trees and shrubs between individual forests populations. Consideration is then made of dyke security, bird protection (no effect on the landscape in areas which are important to breeding and resting birds from open areas, and of the landscape picture.</li> </ul> </li> </ul>
<b>Important measures</b> The suitability should be checked on a site-by-site basis.	<ul style="list-style-type: none"> <li>• Ceasing use of the alluvial forests and development of new alluvial forests</li> <li>• Replacing the bank revetments with nearly natural forms of bank support, checking the possibility of avoiding bank supports altogether</li> <li>• Improving the penetration of land and water (e.g. using tidal inlets)</li> <li>• Promoting the black poplar which is typical for the habitats in the upper tidal Elbe</li> <li>• Removing trees and shrubs which are alien to the area</li> </ul>
<b>Supporting measures</b>	<ul style="list-style-type: none"> <li>• Battling invasive plant species (mainly shrubs)</li> </ul>
<b>Need for research/ environmental monitoring</b>	<ul style="list-style-type: none"> <li>• Observation of the changes in alluvial forests, taking into consideration the structural diversity in particular</li> </ul>

### A 5.2.5 Grassland habitats (1330, 6440, 6510)

There are three types of grassland habitat in the Elbe estuary:

- Alluvial meadows of river valleys (6440) only occur in the upper tidal Elbe in the forelands in Altengamme and in the Elbe meadows near Borghorst (Hamburg). This is the westernmost outpost of the habitat type, which is a characteristic of the alluvial areas in the Middle Elbe.
- Lowland hay meadows (6510) in the Elbe estuary are formed of infertile tall oatgrass meadows and foxtail meadows which are rich in nutrients. Typical plant species include the chequered lily, caraway, the large rattle and meadow barley. The habitat exists from Geesthacht to Otterndorf.

- Salt meadows (1330) can be found from Freiburg an der Elbe to the mouth of the river. In the mesohaline to polyhaline zones of the estuary, they only develop when grazing occurs.

Many breeding bird species are dependent on extensively used grassland habitats which are moved to maintain and develop the meadow habitats.



▲ Fig. A31  
Measure programme for grassland habitats

▼ Table A17 (part 1)  
Measure focus for grassland habitats

<p><b>Key problems</b></p>	<ul style="list-style-type: none"> <li>The typical, extensive forms of use are no longer compatible with grassland cultivation in northern Germany. Maintaining the grassland habitats requires the use to be adapted.</li> </ul> <p>Extensive grassland habitats only cover a fraction of their previous area in the Elbe estuary. Haymaking now plays a minor role in agricultural production processes in the foreshore. With the exception of the salt meadows, which can be grazed from spring to autumn, the maintenance of the lowland hay meadows requires the use of meadows or hay meadows, depending on the area. In contrast to this, the alluvial meadows cannot tolerate any grazing.</p>
<p><b>Management targets</b></p>	<ul style="list-style-type: none"> <li>Maintaining and promoting the diversity of the grassland habitats using the synergies with the protection of birds (see meadow birds below) and the traditional cultivation landscape             <ul style="list-style-type: none"> <li>– Maintaining the current populations by adapting the use (habitats 1330, 6440, 6510)</li> <li>– Developing new populations in suitable areas</li> </ul> </li> </ul>
<p><b>Important measures</b> The suitability should be checked on a site-by-site and habitat-by-habitat basis.</p>	<ul style="list-style-type: none"> <li>Acquisition of areas</li> <li>Nature conservation legislation</li> <li>Adapted use in compensation areas</li> </ul>

▼ Table A17 (part 2)

Measurement focus grassland habitats

<p><b>Important measures</b> The suitability should be checked on a site-by-site and habitat-by-habitat basis.</p>	<ul style="list-style-type: none"> <li>• Area-specific combination of elements of extensive types of usage, such as             <ul style="list-style-type: none"> <li>– no artificial fertilisation, no pesticides</li> <li>– late mowing</li> <li>– adapted levels of grazing</li> </ul> </li> <li>• Restoring a natural water supply</li> </ul>
<p><b>Supporting measures</b></p>	<ul style="list-style-type: none"> <li>• On-site care for the agricultural operations and flexible control of the use, as a function, of the relevant location, weather conditions and targets set for nature conservation</li> <li>• Effective PR (e.g. chequered lily festival in Hetlingen)</li> </ul>
<p><b>Need for research/ environmental monitoring</b></p>	<ul style="list-style-type: none"> <li>• Continuation of the efficiency controls of the cultivation measures designs to protect nature at various locations</li> </ul>

**A 5.2.6 Meadow birds (breeding populations)**

Among others, the category of meadow birds includes the bird species lapwing, black-tailed godwit, redshank, common snipe, ruff and corncrake. These species are typical for wet grasslands or swamps (common snipe), and are endangered across Eu-

rope. The northern shoveller and the garganey, which breed on flooded meadows, are also included here, as they are also dependent on extensive use of grassland.



▲ Fig. A32

Measure programme for grassland habitats

▼ Table A18 (part 1)

Measure focus meadow birds

<p><b>Key problems</b></p>	<ul style="list-style-type: none"> <li>• Significant loss of habitat caused by the narrowing of the flood plains, drainage and intensive land use, in some areas reduced breeding success due to sub-optimal conditions at that location (lack of food due to dry soil, area used too intensively, loss of predation).</li> </ul> <p>In some bird protection areas, the reproduction success is probably not sufficient to maintain the population (sink situation). The Elbe estuary's responsibility for the species lapwing, black-tailed godwit and common snipe against the background of a decreasing areal caused by climate change will probably continue to increase (see Fig. A27, p. 38).</p>
<p><b>Management targets</b></p>	<ul style="list-style-type: none"> <li>• Maintaining and restoring breeding areas which meet the conditions required for successful breeding to ensure the population continues</li> <li>• Focus on sites around Nordkehdingen</li> </ul> <p>The largest meadow bird populations in the Elbe estuary are found in the Lower Saxony Elbe marshes. The management of the Schleswig-Holstein grassland area, which is significantly smaller, is targeted towards maintaining and developing suitable breeding and rearing conditions for meadow breeders in Nordkehdingen.</p> <p>In order to maintain the populations, it is not only necessary to increase the number of breeding pairs by increasing the attractiveness of the area, it is also necessary to ensure a level of breeding success which will continue the population. Most of the meadow birds tend to stick with breeding locations and return to areas where they have had past success in breeding. Setting large-scale focus areas increases the possibility that a new breeding area will be adopted. Re-settlement following local interruptions in population is also aided by large populations being found in close proximity.</p> <p>Many meadow breeders tend to form loose breeding colonies. The size of the colony has a positive effect on the success of reproduction. It increases the likelihood that predator species will be recognised early and attacked by a group of adult birds.</p> <ul style="list-style-type: none"> <li>• Risk management: development of meadow bird areas on the land side of the barrages on the Stör, Krückau and Pinnau.</li> </ul> <p>In the dyked mouths of the Stör, the Krückau and the Pinnau, the water levels are still controlled for flood protection. In the future, if there is an increase in flood events during the breeding season, it is possible that the destruction of nests of eggs and the young birds may be avoided by operating the barrages as necessary. Due to the size and proximity of Nordkehdingen, the mouth of the Stör is particularly important in the measure programme in Schleswig-Holstein. This development focus makes risk management possible in the medium term, but it does not replace a comprehensive adaptation strategy for the bird protection area to the effects of climate change.</p>

▼ Table A18 (part 2)

Measure focus meadow birds

<b>Management targets</b>	<ul style="list-style-type: none"> <li>• Focus on the Wedeler Marsch Despite the isolated location beyond the large population focus, the meadow birds continue to be promoted in the Wedeler Marsch. There are a wide range of bird watching opportunities from the Carl Zeiss bird hide.</li> </ul>
<b>Important measures</b> The suitability should be checked on a habitat-by-habitat basis.	<ul style="list-style-type: none"> <li>• Improving the location conditions through targeted management of the water supply, predator control by flooding large areas outside of the breeding times</li> <li>• Nature conservation legislation, care agreements as part of compensation measures, area acquisition</li> </ul>
<b>Need for research/ environmental monitoring</b>	<ul style="list-style-type: none"> <li>• Determining and analysing the breeding success of meadow birds in selected areas</li> <li>• Location scenarios for long-term suitability of the breeding areas, taking into account climate change and the restoration of extended flood plains</li> </ul>

### A 5.3 General measures

General measures have been derived as part of the planning group work from the methodological guidelines and measure focuses already outlined (e.g. PR measures). The relevant groups responsible in the three federal states must be taken into account for implementation. Accordingly, the results of the planning groups are organised using slightly different systems, but the content is aligned.

The suggested measures for the three federal states of Hamburg, Lower Saxony and Schleswig-Holstein are listed below. The lists have not been combined, as this would prevent the planning groups from finding their results in this document. They are shown clearly and equally in the two chapters below. The table structures and the measure numbers from the federal state contributions have been reproduced without change.

#### A 5.3.1 Hamburg and Schleswig-Holstein

The measure programme for Hamburg and Schleswig-Holstein has two parts: the general measures, and the measure programme for the functional areas 1–7.

Table A20, p. 73) are dealt with in the Hamburg and Schleswig-Holstein measure programme at the functional area level, as concrete measures are suggested.

General measures (GM) are measures for which coordination is sensible for their planning and implementation above the individual functional area level. In this way, they differ from the functional area-related measures (FM), which have been designed at the individual functional area level. Some of the types of measures in the Lower Saxony concept (see

You can find further information on the content and effect of the individual measures in the description sheets (see part C: materials).

▼ Table A19 (part 1)

GM of the Hamburg/Schleswig-Holstein planning group

Number	Title
<b>Scope of duties 1: Administration and law</b>	
A 1.1 HH/SH	Setting up a permanent Lower Elbe working group with representatives of the federal states, The Federal Water and Shipping Administration and the Hamburg Port Authority
A 1.2 HH/SH	Temporary nature: checking the practicability from a legal perspective
<b>Scope of duties 2: preparing adaptation to the effects of climate change</b>	
A 2.1 HH/SH	Including Natura 2000-specific interests into intended research on the effects of climate change in the Lower Elbe
A 2.2 HH/SH	Determining the elements of the biocoenosis of the Lower Elbe which are particularly sensitive and setting up landscape scenarios for the Natura 2000 which take into account climate change-related development in the Lower Elbe
<b>Scope of duties 3: Avoiding and reducing damage</b>	
A 3.1 HH/SH	Cooperation in the development of spatially differentiated plans for average cases
A 3.2 HH/SH	Estimating the long-term danger to mobility from contaminated soil in the bank areas and in the adjacent marshes
A 3.3 HH/SH	Optimising sediment management in order to reduce damage of water and sediment with toxic substances
A 3.4 HH/SH	Optimising the maintenance activities in order to reduce the negative impact on the oxygen supply
A 3.5 HH/SH	Optimising the maintenance activities in order to reduce the negative impact on the benthic population
A 3.6	HH/SH Monitoring the ecological effect of the maintenance activities
A 3.7	HH/SH Minimising the negative effects of the waves by monitoring existing regulations
A 3.8	HH/SH Researching the state of the mud flats and developing sustainable solutions for the protection of sensitive mud flat and bank habitats
A 3.9	HH/SH Making agreements to avoid using ammunition containing lead when hunting in the Natura 2000 sites of the Elbe estuary
A 3.10	HH/SH Clarifying the effects of lamprey being caught along with eel in the eel baskets
A 3.11	HH/SH Checking the technical status of the fish protection systems at the areas where water is removed (old systems)
<b>Scope of duties 4: Measures for the river and the banks</b>	
A 4.1 HH/SH	Creation of flood plains biologically connected to the Natura 2000 sites
A 4.2 HH/SH	Checking the possibility of carrying out a nature protection evaluation of the tributaries of the Elbe which are far removed from natural levels, with the aims of creating a diverse, nearly natural flow
A 4.3 HH/SH	Maintaining nearly natural banks and developing nearly natural banks with reed banks which are typical for the estuary
A 4.4 HH/SH	Developing/reactivating tidal inlet systems
A 4.5 HH/SH	Promotion of the conservation objectives of the Natura 2000 sites by excavating deposit areas with biotopes which are not typical for the estuary
A 4.6 HH/SH	Developing sustainable solutions to achieve a return to a nearly natural hydromorphic dynamic

## ▼ Table A19 (part 2)

GM of the Hamburg/Schleswig-Holstein planning group

<b>Scope of duties 5: Dealing with alien species</b>	
A 5.1 HH/SH	Developing a strategy to deal with invasive alien species (monitoring, information, training)
A 5.2 HH/SH	Minimising the risk of infiltration of invasive alien species through sustainable ballast water actions
A 5.3 HH/SH	Introducing a ban on the cultivation of energy plants with potentially invasive behaviour in the Natura 2000 sites
A 5.4 HH/SH	Neophyte monitoring, if necessary fighting them using bank shaping measures
<b>Scope of duties 6: PR</b>	
A 6.1 HH/SH	Information sessions on the progress of the IMP
A 6.2 HH/SH	Communicating open questions about the future of the estuary from a Natura 2000 perspective
A 6.3 HH/SH	Communicating the contribution of the Lower Elbe to species diversity
A 6.4 HH/SH	Communicating the botanical significance of the Elbe estuary
A 6.5 HH/SH	Flyway partnerships
A 6.6 HH/SH	Developing themes and methods of communication which appeal to all generations
A 6.7 HH/SH	Improving the barrier-free natural experience
A 6.8 HH/SH	Publishing a nature guide for the Lower Elbe
A 6.9 HH/SH	Promoting the identity of the area
<b>Scope of duties 7: Cooperation and training</b>	
A 7.1 HH/SH	Continuing cooperation with nature conservation organisations and individual people and organisations
A 7.2 HH/SH	Assessing the flora in the Lower Elbe
A 7.3 HH/SH	Compiling and expanding knowledge on the fauna species which have not been considered to date
A 7.4 HH/SH	Training of people who are responsible for the management of the Natura 2000 sites
A 7.5 HH/SH	Workshops to facilitate the sharing of best practices with management teams from other estuaries
A 7.6 HH/SH	Cross-state agreement on the design and application of projects subsidised by the federal state and the EU
A 7.7 HH/SH	Developing a sponsorship concept for Natura 2000 in the Lower Elbe

### A 5.3.2 Lower Saxony

The Lower Saxony action and measure concept defines measures in a total of five areas of work. A descriptive measure information sheet has been prepared for each measure type, which includes, among other things, information on implementation

locations (part C: materials). There is also additional information in part B of the IMP (functional areas). Maps can be found as an annex to the Lower Saxony IMP contribution under ↪ annex ↪ technical contributions ↪ technical contribution 01: Natura 2000.

▼ Table A20 (part 1)

Overview of the measure types developed by the Lower Saxony planning group

Number	Title
<b>Scope of duties 1: Developing concepts/plans</b>	
1.1	Developing area-specific Natura 2000 management concepts for partial areas
1.2	Restoring habitat structures typical for the habitat (hydrology, morphology) – technical requirements for the implementation of the river engineering and sediment management concept (HPA & WSA 2008)* *From a nature conservation organisation perspective, a concept for renaturing the hydromorphological actions should be developed independently of the HPA and WSA's river engineering and sediment management concept (2008), with the aim of turning the habitat type "estuaries" into an area with a favourable conservation status. A concept should also be developed to improve the oxygen supply in the tidal Elbe, in order to create the conditions required for a favourable conservation status for the fish species to be protected.
1.3	Integration of Natura 2000 interests into the ongoing maintenance of the Elbe (excavation, revetments)
1.4	Integration of the Natura 2000 interests into the ongoing bank maintenance
<b>Scope of duties 1: Developing concepts/plans</b>	
2.1	Estimating the effects of climate change on landscape development, species and habitat types in the Elbe estuary
2.2	Determining the significance of various mud flats in their function for bird species
2.3	Creating a specific assessment and monitoring concept for the Elbe estuary
2.4	Setting up and running a Natura 2000 database for the planning area
<b>Scope of duties 3: Practical habitat and species protection measures</b>	
3.1	Development of biotypes and species which are typical for the estuary by removing species from the Elbe islands
3.2	Opening or rebuilding summer dykes
3.3	Measures to maintain and restore shallow water areas
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SACs in the Lower Elbe which currently have lower surface proportions (supralittoral)
3.5	Measures to promote salt meadows
3.6	Measures to promote the development of alluvial forests
3.7	Measures to promote/create tidal inlet systems
3.8	Measures to promote nearly natural banks with hydrophilous tall herbaceous vegetation
3.9	Permitting the growth and restoration of pioneer locations on the foreland and on the Elbe islands
3.10	Ceasing use of the foreland areas
3.11	Measures to maintain and promote the Elbe water dropwort population
3.12	Measures to maintain and promote the chequered lily population
3.13	Checking the fish protection systems at areas where water is removed (old systems)
3.14	Measures to maintain and restore continuity in the Middle Elbe and the waters surrounding the Elbe
3.15	Measures to maintain and restore the continuity of sluices, pumping stations and locks
3.16	Measures to optimise the groyne fields
3.17	Measures to maintain the large, open character of the landscape
3.18	Measures to promote connected resting areas in the grassland which have low disturbance levels
3.19	Measures to promote areas with low disturbance levels in the mud flats and shallow water areas
3.20	Measures to decrease the danger of migrating birds colliding with overhead power lines
3.21	Measures to maintain/develop extensive use of grassland areas including turning arable land back into grassland

## ▼ Table A20 (part 2)

Overview of the measure types developed by the Lower Saxony planning group

Number	Title
<b>Scope of duties 3: Practical habitat and species protection measures</b>	
3.22	Improving the water supply in public areas
3.23	Creating tidal water ponds on the dyked forelands and small inland waters
3.24	Protecting and maintaining the nationally significant breeding colonies of the Mediterranean gull and the common gull
3.25	Maintaining protection zones free from disturbance as a breeding site for white-tailed eagles
3.26	Improving the breeding sites for the white stork
<b>Scope of duties 4: PR, communication</b>	
4.1	Maintaining, and if necessary, expanding the spectrum of types of natural experience
4.2	Maintaining/expanding exchanges with management teams from other estuaries
4.3	Developing a nature guide for the Elbe estuary
<b>Scope of duties 5: Official regulations and implementation of legal requirements</b>	
5.1	Developing a concept to ensure the safety of the Natura 2000 sites in the overall planning area
5.2	Clarifying protection areas and implementing additional protection regulations



## A 6 Information on implementing the IMP

### 6.1 Implementing Natura 2000 measures

The federal state and county nature conservation authorities, as well as other public offices are responsible for the implementation of the Elbe estuary IMP. In many cases, the implementation of the measures requires Natura 2000 contractual uses.

Initiatives, associations and groups, universities and research institutions are all very much implicated in

the task of environmental monitoring and PR work already. Continuing these activities is an important building block of the IMP.

Cross-state cooperation has increased due to the coordinated development of the IMP. This should be further continued with a constant exchange of information and experiences.

#### A 6.1.1 Implementation through nature conservation

The federal and country nature conservation authorities are primarily responsible for the implementation of the measures for maintaining and improving the conservation status. Other official administrations, foundations, associations etc. can, however, play an important role in the implementation of compensation measures or PR work. Their commitment has been particularly valuable in the past.

Important tools for implementing the measures are land acquisition and contractual nature conservation. In both cases, close and trusting cooperation with agricultural operations is a necessity.

This cooperation has been very successful to date and should be continued. It requires there to be a sufficient on-site presence of nature conservation authorities. In order to finance the measures, various federal state-specific tools are available. Where necessary, a greater focus on the estuary should be considered when updating these tools. A detailed breakdown of the various financing options can be requested from the relevant bodies of the federal states. In areas where the Natura 2000 sites do not yet have sufficient legal protection, the competent authorities are responsible for ensuring the protection in accordance with Section 32 of the Federal Nature Conservation Act.

### A 6.1.2 Natura 2000 impact of activities: implementing the IMP in partnership

The IMP gives guidelines on federal actions. Sufficient protection of the Natura 2000 interests should be included at all planning levels and in all future upgrades. The applicable legal instruments will continue to be used to ensure Natura 2000-compliant impact of activities.

The Elbe estuary is one of the landscapes in which the maintenance and improvement in the status of many Natura 2000 protected items is particularly dependent on the impact of the activities carried out there. The various interest groups and sectors can contribute to the compatibility of nature conservation and uses in different ways through their activities.

- Water management/WFD

The surface waters of the planning area are either artificial or have changed considerably in the past. There is a real need for action to improve the ongoing maintenance and management of the waters in the planning area.

- Coastal protection

The Natura 2000 interests should be considered in the operation and maintenance of coastal protection systems to a greater extent.

- Waterways and ports

Generating waterway operation which conforms to Natura 2000 objectives is one of the urgent implementation steps of the IMP. Concepts on the integration of Natura 2000 interests have already been developed by the WSA and by the HPA. By working closely with the WSA, HPA and nature conservation authorities, the possibilities arise of using the waterways in an environmentally and naturally compatible manner.

- Agriculture

The type and intensity of agricultural activities is a key to the effective protection of various habitats and breeding and migrating bird species. The existing cooperation between agriculture and nature conservation should be continued and intensified.

- Fisheries

A use of the fish population which is consistent with the principle of sustainability is compatible with Natura 2000. Against this background, fishing initiatives and those implemented by fishing associations recognised as nature conservation associations can have a positive effect on the Natura 2000 sites (e.g. development of nearly natural water structure). Recreational fishing groups can contribute to avoiding damage, for example to the reed beds.

- Hunting

A priority of hunting activities carried out in accordance with Natura 2000 is taking into account the requirements for bird protection. Cooperation with hunting organisations should be continued in order to clarify existing contradictory requirements in terms of space or content.

- Trade, industry, infrastructure

The operation of some existing infrastructure facilities can, in individual cases, be optimised in accordance with the most recent technology, in order to improve the compatibility of Natura 2000.

- Leisure and tourism

When the infrastructure is arranged appropriately and care is taken with the behaviour in nature, the Elbe estuary has a high potential to be used for agricultural, nature-oriented types of recreation. A condition for this is the spatial or temporal minimisation of disturbances caused by leisure activities. The responsibility for implementing these tasks lies with the counties and the leisure and tourism groups. As part of the PR work, one possibility is to inform the general public about the aims of Natura 2000.

## A 6.2 Information on the planning and approval of activities which are subject to mandatory testing

When writing application documents, checking their completeness or their technical quality, there are certain technical requirements which must be met. The following information is therefore targeted both at offices and people who are responsible for the

planning of activities which are subject to mandatory testing, to comply with the required application documents and for checking them in the context of the relevant approval procedures.

### A 6.2.1 Checking compatibility in accordance with Section 34 paragraph 1 of the Federal Nature Conservation Act

The IMP defines spatial focal points for the future maintenance and development of areas. This information is one of the fundamental principles which must be taken into consideration when defining the study framework, when assessing and evaluating damage, and when planning measures to limit damage.

ensured that the relevant current state of scientific knowledge, practice and case law is used.

The annexes of the IMP contain technical information on ecological requirements of species and habitats in the estuary, their populations, their conservation statues and conservation goals, as well as general estimates of their sensitivity (only in Lower Saxony), which can be used as a basis for determining potential negative effects of the activity for which the application is being made. As the level of scientific knowledge develops continuously, it should also be

In terms of the general methodological requirements of the Natura 2000 compatibility test, there are no significant differences between the activities in the estuaries and in other landscapes. The compatibility of an activity is, in principle, determined by testing out an individual case. In order to determine the compatibility of an activity, an analysis of its specific effect structure in terms of construction, system and operation in a concrete spatial context is required, as is taking into account its specific accumulation effect in combination with other plans and projects.

For more information, please see the relevant guidelines.

#### ▼ Table A21 (part 1)

Guidelines on BHD compatibility testing

Title	Link
Federal Ministry of Transport, Building and Urban Development (2004): Guidelines on BHD compatibility testing in the construction of national interstate highways	<a href="http://www.naturschutzrecht.eu/materialien">www.naturschutzrecht.eu/materialien</a>
Working Group of the Kieler Institute for Landscape Ecology et al. (2004): Promotion and development activities: "development of methods and forms of representation for BHD compatibility testing in the context of EU Directives on bird protection areas and BHD areas"	<a href="http://www.naturschutzrecht.eu/materialien">www.naturschutzrecht.eu/materialien</a>
Federal Ministry of Transport, Building and Urban Development (2008): Guidelines on BHD compatibility testing on federal waterways The BHD guidelines for the federal waterways are based on the two above mentioned sources.	<a href="http://www.bafg.de/U1">www.bafg.de/U1</a> → Publikationen
European Commission (2000): Natura 2000 – area management. "The targets set out in Article 6 of the Habitats Directive 92/43/EEC"	<a href="http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_de.pdf">http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_de.pdf</a>

## ▼ Table A21 (part 2)

Guidelines on BHD compatibility testing

Title	Link
European Commission (2007): Guidance on Article 6(4) of the 'Habitats Directive' 92/43/EEC.	<a href="http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf">http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf</a>
European Commission (2011): European Commission guidelines on the implementation of the Birds Directive and the Habitat Directive in estuaries and coastal areas, with particular attention being paid to port development and excavation measures.	<a href="http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm">http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm</a>

## A 6.2.2 Compatibility of other activities carried out in Natura 2000 sites

According to the European Court of Justice, an abstract/general exemption of activities previously carried out which are subject to mandatory testing in accordance with Article 6(3) of the Habitats Directive is not compatible with EU law. This also applies if the relevant national law is admissible in the Natura 2000 sites. The Court of Justice has placed the blame for the privileging of certain, otherwise legal activities with the Member States\*. This does not necessarily mean that no activity is compatible, but that the compatibility has to be checked first. Any measures and programmes which aim to serve the maintenance and restoration targets of the Natura 2000 sites may be exempted from the obligation for testing. In this context, there is also the so-called "Ems verdict", which related to maintenance measures in the estuary of the river Ems \*\*.

\* ECJ, Verdict of 10 January 2006, Case C-98/03, ECR 2006, Commission v. Germany, Points 43, 44; ECJ, Verdict of 4 March 2010, Case C-241/9'08, Commission v. France, Point 76.

\*\* ECJ, Verdict of 14 January 2010, Case C-226/08, City of Papenburg v. Federal Republic of Germany, Case 50: "ongoing maintenance measures in the channels of estuaries which are not directly connected to the administration of the region or are not necessary to support a compatibility test in accordance with these regulations, as long as they represent a project which could cause significant damage to the area in question"

## A 6.2.3 Measures to ensure coherence

If an activity which may cause significant damage to the conservation objectives of a Natura 2000 area meets the requirements of Section 34(3) of the Federal Nature Conservation Act, it may be approved provided that the European Commission permits this. The necessary measure to protect the Natura 2000 network should be taken.

By demonstrating the guidelines and targets of development in the area, the IMP defines the framework which must be considered when planning

measures to ensure coherence. This is a requirement for the measure to be included in the overall development targets for the Elbe estuary. This means counterproductive effects of individual measures are avoided, and the potential for synergy of coherence measures and area management is used.

The IMP shows a number of measures which are suitable to maintain or improve the conservation status of habitats and species. In principle, some of these measures can also be identified and carried

out as measures to ensure coherence in the sense of Section 34(5) of the Federal Nature Conservation Act. The requirements for them to be identified as such are that:

- the measure is suitable to ensure the coherence of the Natura 2000 network
- the measure is not a standard measure only designed to ensure and maintain a favourable conservation status of habitats and species
- the measure is not a regular standard measure for the restoration or development of a favourable conservation status in order to improve badly damaged or degenerated SAC or species habitats whose degeneration is the result of omitted conservation management.

Standard measures are defined following a technical evaluation carried out by the competent authorities.

Measures which, in the opinion of the technical authorities in Hamburg and Schleswig-Holstein, may possibly be measures to ensure coherence, are identified in the measure information sheets in the IMP contributions from both federal states (see part C: materials). Measure types in the Lower Saxony IMP contribution which could potentially be suited to ensuring coherence are listed in table A22.

An indication of suitability as a measure to ensure coherence does not mean that these measures should be implemented exclusively in this way. It should simply be made clear that the measures can also be implemented in this way.

▼ Table A22

Habitat and species protection measures which may potentially be suitable as coherence or compensation measures (Lower Saxony)

Number	Title
3.1	Development of biotypes and species which are typical for the estuary by removing species from the Elbe islands
3.2	Opening or rebuilding summer dykes
3.3	Measures to maintain and restore shallow water areas
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SACs in the Lower Elbe which currently have lower surface proportions (supralittoral)
3.5	Measures to promote salt meadows
3.6	Measures to promote the development of alluvial forests
3.7	Measures to promote/create tidal inlet systems
3.8	Measures to promote nearly natural banks with tidal reeds and hydrophilous bank herbaceous areas
3.11	Measures to maintain and promote the Elbe water dropwort population
3.13	Checking the technical status of the fish protection systems at the areas where water is removed (old systems), and if necessary optimising them
3.14	Measures to maintain and restore the continuity in the Middle Elbe and the Elbe backwaters
3.15	Measures to maintain and restore the continuity at sluices, pumping stations and locks
3.16	Measures to optimise the groyne fields
3.18	Measures to promote connected resting areas in grasslands which have low levels of disturbance
3.19	Measures to promote areas with low levels of disturbance in the mud flat and shallow water areas
3.20	Measures to decrease the danger of migrating birds colliding with overhead power lines
3.21	Measures to maintain/develop extensive use of grassland areas including turning arable land back into grassland
3.22	Improving the water supply in public areas
3.23	Creating tidal water ponds in the dyked foreland areas and small inland waters

Whether or not a measure in the IMP which is potentially suitable is actually a suitable measure for ensuring coherence for a particular activity has always to be checked on a case-by-case basis by the competent authorities using the documents presented.

Measures to ensure coherence generally have to be capable of functioning at the point at which the damage to the relevant Natura 2000 site occurs. In practice, there can be delays caused by the long

development periods of some habitats. Unavoidable time gaps between the intervention and the functioning of compensation are normally taken into account by overcompensation. In some cases, the time gaps can also be shortened by forward planning and implementation of coherence measures. In order for measurements which are planned or implemented in advance to be recognised for ensuring coherence if there is considerable damage, the particular requirements for ensuring coherence must be considered.



## A 7 Environmental monitoring

### A 7.1 Need for monitoring and research from a Natura 2000 perspective

In accordance with Article 11 of the Habitats Directive, the Member States of the European Union are obliged to monitor the conservation status of BHD species and habitats. This monitoring is aimed at evaluating the conservation statuses at the level of entire bio-geographical regions of Natura 2000. The results form the basis of the report to the European Commission which must be produced every six years in accordance with Article 17 of the Habitats Directive. The technical authorities in the federal states are responsible for carrying out the Natura 2000 monitoring.

Due to these and other legal requirements and other monitoring needs, comprehensive environmental monitoring is already carried out in the planning area. In future, the need for assessment may change for both area-specific reasons or as a result of new or expanded legal obligations.

In the process of developing the IMP, it has become clear that there are certain gaps in the knowledge on some questions related to management. It has been established that very little is known about the habitat structures and the settlement of the soil at the bottom of the bodies of water (benthic area of the "estuaries" habitat) beyond the Elbe channels and as part of the adaptation of the channels carried out in 1999 as part of the proceedings for the preservation of evidence. In order to clarify the open questions, targeted monitoring is required of the development of selected parameters (e.g. the change in structural diversity in the alluvial forests). In summary, the following shows the need for environmental monitoring (Table A23):

▼ Table A23 Overview of the requirement for ongoing and future assessments and studies

Natura 2000 protected items	Ongoing research and assessment programmes	Need for research, planned assessments and studies
Complex habitat type: estuaries (1130)		
Aquatic area	<ul style="list-style-type: none"> <li>• Various individual parameters are already routinely assessed by other groups (e.g. tidal water levels), or assessed to preserve evidence. (See chapter A7.2)</li> </ul>	<ul style="list-style-type: none"> <li>• Continuation of the ongoing studies and assessments</li> <li>• Taking into account specific Natura 2000 interests when preserving evidence</li> <li>• Assessing the evaluation parameters of the sublittoral and the eulittoral, in particular:               <ul style="list-style-type: none"> <li>– to characterise the benthic habitat structures</li> <li>– to assess the settlement of the bottom of the bodies of water, with the areas outside of the Elbe channels being a priority</li> </ul> </li> <li>• Comprehensive system monitoring of the tidal Elbe is currently carried out by the WSA</li> </ul>
Bank and land areas	<ul style="list-style-type: none"> <li>• Extensive basic assessment of biotope types and habitats as well as Natura 2000 monitoring exists in part.</li> </ul>	<ul style="list-style-type: none"> <li>• Continuation of the ongoing studies and assessments, in particular:               <ul style="list-style-type: none"> <li>– monitoring samples</li> <li>– comprehensive assessment</li> </ul> </li> <li>• Efficiency checks of nature conservation measures</li> </ul>
Individual habitat types in water and land areas	<ul style="list-style-type: none"> <li>• Comprehensive basic assessment of biotope types and habitats and Natura 2000 monitoring exist for some areas.</li> <li>• Long-term monitoring in grasslands (selected areas)</li> </ul>	<ul style="list-style-type: none"> <li>• Continuation of the ongoing studies and assessments, in particular:               <ul style="list-style-type: none"> <li>– monitoring samples</li> <li>– comprehensive assessment</li> </ul> </li> <li>• Regular assessment of the priority habitat type alluvial forests (*91E0)</li> <li>• Regular individual assessment of the chequered lily population (6510)</li> <li>• Efficiency checks of nature conservation measures</li> <li>• Regular continuation of the long-term monitoring in the grassland areas</li> </ul>
Plant and animal species in annex II of the Habitats Directive	<ul style="list-style-type: none"> <li>• Individual assessment, in particular for               <ul style="list-style-type: none"> <li>– Elbe water dropwort</li> <li>– Fish</li> <li>– Seals</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Regular and systematic continuation of the ongoing assessments</li> <li>• Efficiency checks of nature conservation measures</li> </ul>
Value-determining breeding bird species	<ul style="list-style-type: none"> <li>• Assessing the breeding populations of the bird species on a six-year cycle (and in individual cases annually)</li> <li>• Monitoring hatching success in meadow birds</li> <li>• Assessing the breeding colonies of gulls and terns</li> </ul>	<ul style="list-style-type: none"> <li>• Regular and systematic continuation of the ongoing assessments</li> <li>• Clarification of particular issues (e.g. the significance of mud flats as a feeding habitat, threats of predators)</li> <li>• Efficiency checks of nature conservation measures</li> </ul>
Value-defining migrating bird species	<ul style="list-style-type: none"> <li>• Regular counting of migrating bird species on the land surfaces and of the Elbe</li> </ul>	<ul style="list-style-type: none"> <li>• Regular and systematic continuation of the ongoing assessments</li> <li>• Clarification of particular issues (e.g. the effect of hunting game)</li> </ul>

It has also been shown that some issues do not only have a need for monitoring but also have a need for research. This applies in particular to the understanding of the hydromorphological system in the estuary and to its future development as a result of climate change. A continuous flow of information from the various groups and stakeholders is particularly important in coordinating the individual study concepts with one another and in working towards incorporating the Natura 2000-specific interests in a measured way in any research carried out by third parties.

In chapter 5.2, specific information on environmental monitoring and the need for research for the complex habitat type of estuaries, for the habitat of alluvial forests and grasslands and for the Elbe water dropwort, the twaite shad and meadow birds is provided. Priority monitoring and research needs are given in the measure programmes of the Lower Saxony and Hamburg/Schleswig-Holstein planning groups, which are combined in the following overview. In addition to these general measures, comprehensive monitoring requirements were specified in the contributions of the two planning groups.

▼ Table A24

Study and research needs at the estuary level

Measure No	Federal state	Title
Climate change		
2.1	LS	Estimation of the effects of climate change on the development of the landscape, species and habitats in the Elbe estuary
A 2.1	HH/SH	Research into the effects of climate change in the Lower Elbe, including Natura 2000-specific interests into
A 2.2	HH/SH	Determining the elements of the biocoenosis in the Lower Elbe which are particularly sensitive and establishing landscape scenarios for the Natura 2000 sites, taking into account climate-related development in the Lower Elbe
Development of the mud flats		
2.2	LS	Determining the significance of various mud flats in their function for bird species
A 3.7	HH/SH	Minimising the negative effect of waves by monitoring existing regulations
A 3.8	HH/SH	Investigating the status of the mud flats and the development of sustainable solutions to protect sensitive mud flat and bank habitats
Assessment and monitoring concept for the Elbe estuary		
2.3	LS	Creation of a specific assessment and monitoring concept for the Elbe estuary
2.4	LS	Setting up and running a Natura 2000 database for the planning area
A 3.6 HH/SH	HH/SH	Monitoring the ecological effects of maintenance activities

## A 7.2 Environmental monitoring as part of additional projects and programmes

The changes in the Lower Elbe have been monitored for several decades as part of a comprehensive programme. When added together, a very diverse, comprehensive and continually updated pool of information is available. This information can be used in a variety of ways and as a supplement to Natura 2000 monitoring for the management of the Natura 2000 sites.

It is not possible to name all of the activities and organisations working in the area here. The following list is therefore just a few examples:

- Elbe Working Group/Elbe Water Quality Group (now Elbe River Basin Community, Elbe RBC): from 1950 onwards, regular assessment of many important parameters such as nitrates, phosphorous, various harmful substances, water temperatures, oxygen concentration, plankton, fish, fauna etc.
- General monitoring of the quality components in accordance with the WFD, monitoring by Elbe RBC
- Level measurements (tidal levels, flooding), surface water flooding etc.
- Study programmes carried out by the HPA (e.g. quantitative and qualitative assessment of sediment)
- System monitoring in the tidal Elbe planned by the WSA
- Regular counting of migrating birds on land surfaces and in the water
- Assessing breeding birds, as part of the care of the nature conservation areas
- Voluntary activities carried out by the nature conservation organisations maintaining the areas
- Special assessment, e.g. of breeding colonies of gulls and terns
- Study programmes run by universities and research institutes
- Proceedings for the preservation of evidence to adapt the channels in the Lower and Outer Elbe to container ship traffic (water and shipping offices, Federal Institute for Hydrology)
- Efficiency checks on compensation measures
- Monitoring the movement of fish on the northern and southern banks of the Geesthacht weir



**I** Integrated  
**M** management plan  
**P** Elbe estuary

# Part B

## Functional areas



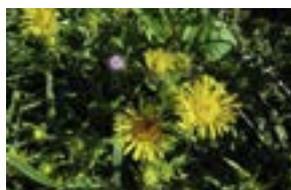
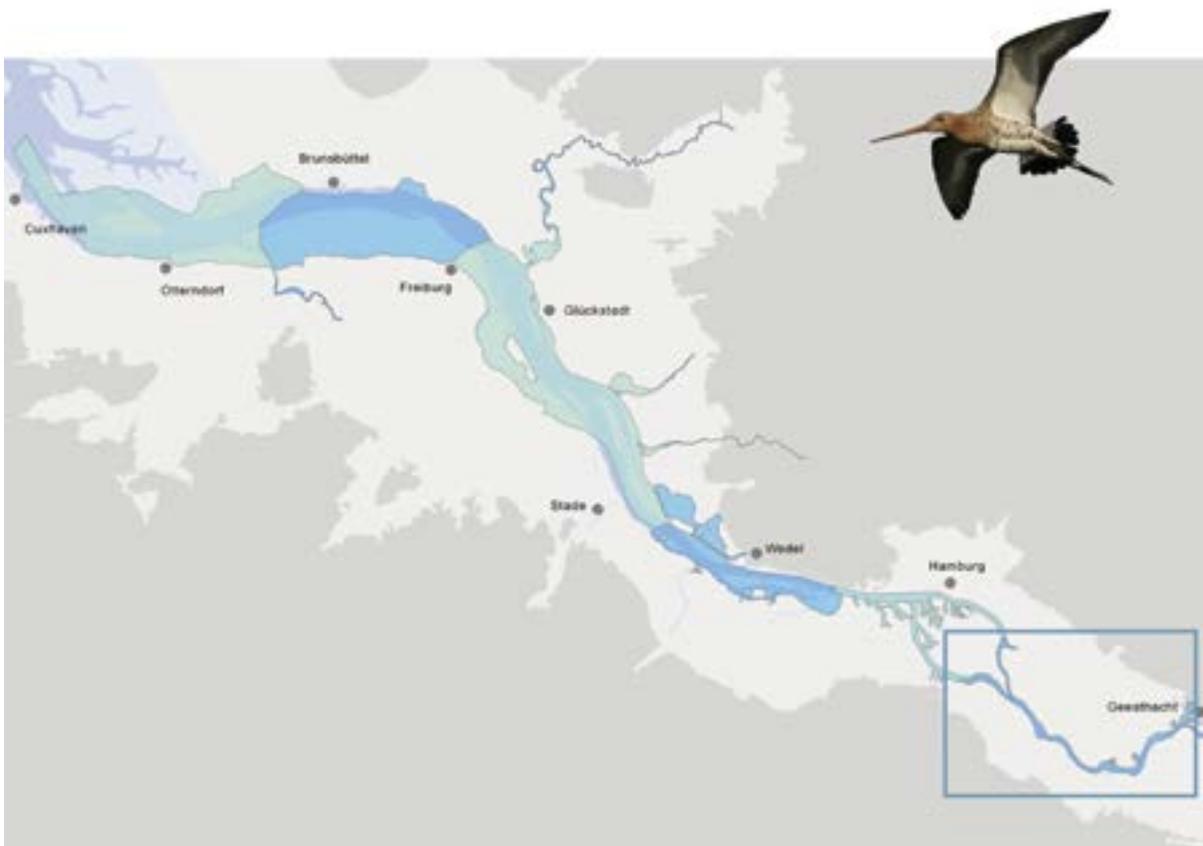




I Integrated  
M management plan  
P Elbe estuary

B1

## Functional area 1



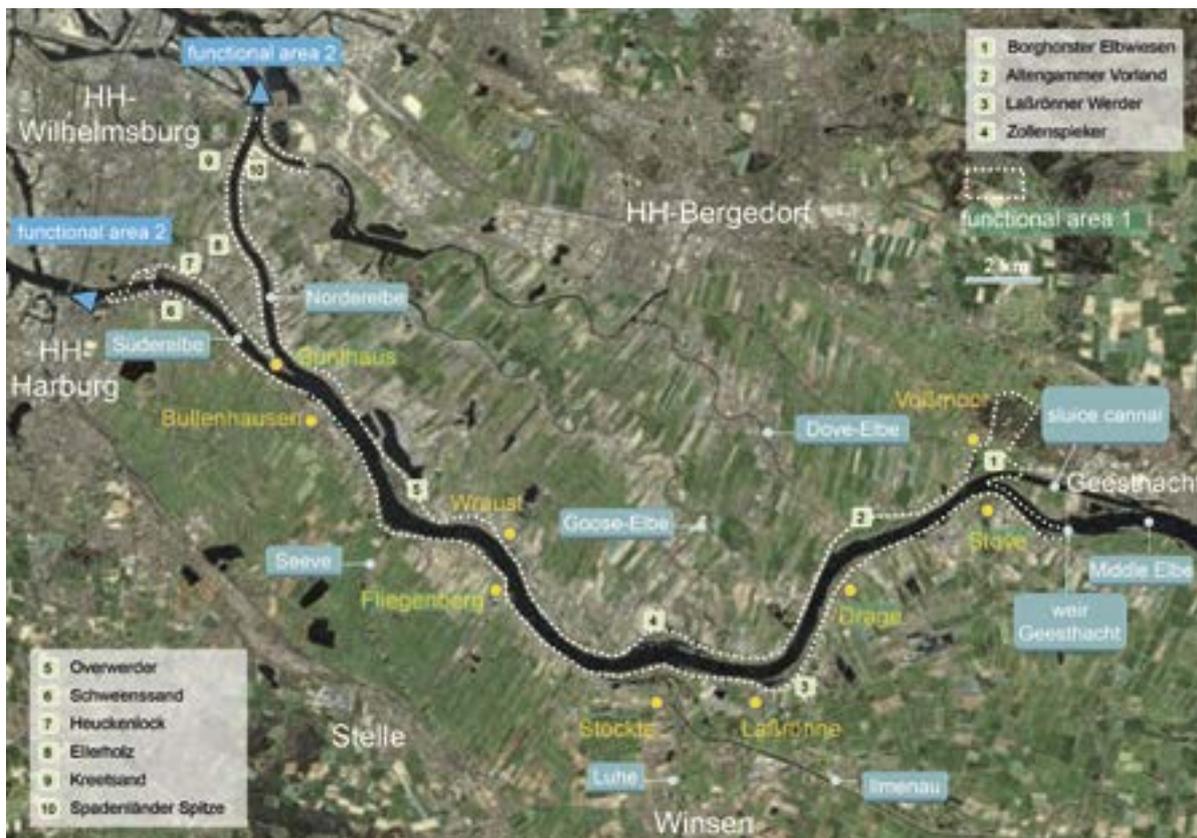
overleaf

Fishing spot on a river dam on the Altengammer Vorland

Ship at Zollenspieker

Common fleabane (*Pulicaria dysenterica*), a characteristic type of tall herbaceous vegetation on the banks of the upper tidal Elbe

Bunthäuser Spitze



## B1 1 Overview of functional area 1

Functional area 1 extends from the upper limits of the influence of the tide at the Geesthacht weir to the Port of Hamburg and corresponds with the section of the Elbe which is designated the upper tidal Elbe. It comprises areas in the Hamburg districts of Bergedorf, Harburg and central Hamburg and the county of Harburg (Lower Saxony).

The functional area is characterised more than the other areas by headwater runoff. The upper tidal Elbe supports a fresh water environment all year round. The construction of the barrage in Geesthacht in 1960 severely limited the biological continuity between the Middle Elbe and the Lower Elbe.

The section between Geesthacht and the splitting of the Dove Elbe (592km along the river adjacent to Drage), which is now cut off, belongs to the Middle Elbe from a morphogenetic perspective. Up until around 100 years ago it was almost completely cut off from the tide. Nowadays, the tidal range in Geest-

hacht is 2.2m. No other section of the Lower Elbe has experienced such a drastic change in its ecological characteristics in such a short time as a result of the increase in tidal range.

Upstream of Drage, the original inner delta of the Lower Elbe begins, which stretches as far as Mühlenberger Loch (functional area 3). Today, the Elbe splits just 17km upstream, at Bunthaus. The large numbers of arms of the delta which used to exist have now been brought together to form the Nordereibe and the Südereibe. The tidal range reaches its maximum in the tidal Elbe at Bunthaus, at 3.9m. In the past 50 years, the tidal range here has increased by around 1m.

The river width varies between 200 and 300m. The shore line is mainly fixed and segmented with groynes. Most of the mud flats are small. Banked dykes run along large sections of the river. The foreland is rarely wider than 300m, and is mainly composed of reed

beds, tall herbaceous vegetation and alluvial forests (e.g. Heuckenlock and the foreland at Laßrönne). Large areas of grassland only occur on the Altengammer Vorland. The remaining grasslands affected by tides and flooding are generally formed in small strips. The dykes are grazed by sheep. With the exception of the Borghorst Elbe meadows, the functional area does not have any land areas outside of the influence of the tide. The brackish water between the dykes (e.g. lapwing brackish waters, Hamburg) and the dune landscape of the Besenhorst sandbanks (Schleswig-Holstein) are not part of the functional area.

The Ilmenau (with the Luhe) and the Seeve are the most important tributaries in functional area 1. At the mouth of the Ilmenau, there is a flood barrier. The Seeve is cut off from the Elbe by a sluice.

The upper tidal Elbe is used for internal shipping. The barrage at Geesthacht connects the outer reaches of

the Elbe, which is affected by the tide, with the Middle Elbe which is not. The area has not been deepened to allow marine shipping. Discharge is focused on the fairway by groynes. Maintenance dredging is only carried out in small areas and to a minor extent. In contrast to the other functional areas, water zones deeper than 10m make up less than 1% of the water area.

While the supply of oxygen is always sufficient between Geesthacht and Bunthaus all year round, in both the Norderelbe and the Süderelbe there are areas with a lack of oxygen. This phenomenon is due to the transport of oxygen-poor water from the Port of Hamburg (functional area 2) when the water flows upstream.

Due to its close proximity to the large city, functional area 1 is particularly significant for recreational use.

▼ Table B1.1

Selected abiotic parameters in functional area 1

Length	Km 585.9 (Geesthacht weir) to km 615.3 (Norderelbe, boundary of the SAC "Hamburger Unterelbe") and 614.5 (Süderelbe, boundary of the SAC "Hamburger Unterelbe")
Total area	1,748 ha (with SAC-expansion in Georgswerder and Kreetzand: additional 32 ha)
River width	200 to 300 m
Distribution of the landscape zones Hamburg <sup>1</sup> and Lower Saxony <sup>2</sup>	<ul style="list-style-type: none"> <li>• Dyked areas: 206 ha (11.8%)</li> <li>• Foreland: 534 ha (30.5%)</li> <li>• Mud flats and water areas: 1,018 ha (57.7%)</li> </ul>
Tidal range <sup>3</sup>	2.2 m at the Geesthacht weir, 3.9 m at Bunthaus
Chloride content <sup>4</sup>	Less than 0.5‰ or around 160 mg Cl/l as a long-term average (= fresh water)
WFD water body	Coordination area tidal Elbe: Elbe (east) water body type 20, classified as heavily modified water body (HMWB)

<sup>1</sup> WSA November 2008    <sup>2</sup> basic assessment (BIOS 2010, see Lower Saxony IMP contribution)

<sup>3</sup> www.bsh.de/aktat/wvd/elbepegel    <sup>4</sup> www.fgg-elbe.de



▲ Fig. B1.1 Landscape in functional area 1  
Upper tidal Elbe at the Laßrönne level (right in the image), Borghorster Elbwiesen, banks of the Elbe at Drage

# B1 2 Natura 2000

The specific Natura 2000 targets for functional area 1 are determined using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs which occur in the functional area, evaluation of their conservation status

- Evaluation of the strengths and weaknesses of the functional area from the perspective of species and habitats which are relevant for Natura 2000
- Analysis of the interaction with the other functional areas in the Lower Elbe
- Development of a Natura 2000 model for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

## B1 2.1 Natura 2000 status

### B1 2.1.1 Special Areas of Conservation (SACs)

The Natura 2000 backdrop is comprised of five SACs which were registered by the Free and Hanseatic City of Hamburg and the Federal State of Lower Saxony as part of the European protection area network Natura 2000. Functional area 1 does not contain any bird protection areas.

The two Natura 2000 sites in Schleswig-Holstein, "Besenhorst sand hills and Elbe islands" (SAC 2527-391) and "Conservation area (CA) Besenhorst sandbars and Elbe sand meadows" (bird protection area 2527-421) are not part of the planning area of the IMP.

▼ Table B1.2

Protected areas in functional area 1

Area category	Area designation
SACs	2526-305 Hamburger Untereibe 2527-303 Borghorster Elblandschaft 2627-301 Zollenspieker/Kiebitzbrack 2526-302 Heuckenlock/Schweenssand 2526-332 Elbe zwischen Geesthacht und Hamburg
Conservation areas which are part of Natura 2000	CA Borghorster Elblandschaft CA Auenlandschaft Norderelbe CA Heuckenlock CA Schweenssand CA Rhee CA Zollenspieker CA Kiebitzbrack
Landscape conservation areas which are part of Natura 2000	Almost all of functional area 1 in the Hamburg area is classified as a landscape conservation area.

The technical authorities in Hamburg and Lower Saxony have defined the habitats in annex I and species in annex II of the Habitats Directive as objects

of protection in the BHD areas, and evaluated their conservation statuses. The evaluation results given here take into account federal state-specific features

and are based on the relevant information given by the two federal states.

An overview of the Natura 2000 protected features which are relevant for all of functional area 1 is given below. Additional information on the basis for

the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the "Natura 2000" technical contributions in the federal states' contributions (see part C: materials).

▼ Table B1.3

Conservation statuses of the habitats in annex I of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status			
		HH <sup>1</sup>			LS <sup>2</sup>
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> pp and <i>Bidention</i> pp vegetation	A	B	C	C
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	A	B	C	C
6440	Alluvial meadows of river valleys of the <i>Cnidion dubii</i>	A	B	C	–
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	A	B	C	B
91E0	* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	A	B	C	B
91F0	Riparian mixed forests with <i>Quercus robur</i> , <i>Ulmus laevis</i> , <i>Ulmus minor</i> , <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> (Ulmenion menoris)	D <sup>3</sup>			B

\* priority habitat  
<sup>1</sup> Standard data sheet as of September 2010  
<sup>2</sup> Elbe estuary IMP contribution from Lower Saxony, part II, functional area 1, as of September 2011  
<sup>3</sup> D: not significant

Conservation status (see p.17) **A** favourable/very good   **B** favourable/good   **C** unfavourable/average to poor

The priority alluvial forests (\*91E0) are particularly important. In functional area 1, there is a focal point of alluvial forests in Heuckenlock, on Schweenssand and on the foreland near Fliegenberg, and at the Laßbrönnner ait (island). There are only small areas of riparian mixed forests (91F0).

The Elbe is categorised as the habitat type "rivers with muddy banks" (3270). In contrast to the populations in the Middle Elbe, the habitat in functional area 1 is influenced by the tide. The characteristic (annual) vegetation develops on mud flats in the summer and is made up of species which can tolerate being submerged for a short period during flooding (e.g. aquatic veronica species, marigold species).

Hydrophilous tall herb fringe communities (6430) are mostly only small, but they occur at a number of

different locations. They are often closely linked with annual vegetation of the "rivers with muddy banks" habitats. The abundance of species in the two habitats 3270 and 6430 in the upper tidal Elbe is due to the diaspora deposits from the entire drainage area.

One particular feature of functional area 1 is the exceptionally thick and bushy reeds which are formed from a Lower Elbe ecotype of reed. In functional area 1, the species achieves a height of up to 4.5m, which is exceptional for western and central Europe.

From the vegetation, you can still recognised that the section between Geesthacht and Drage used to be part of the Middle Elbe. On the northern bank, the westernmost outposts of the sub-continental alluvial forests (habitat type 6440) were

able to be maintained. Since the dyke line is near the bank, this habitat type does not form on the southern bank.

Lowland hay meadows (habitat type 6510) which are rich in species only exist to a significant extent on the Altengammer Vorlandforeland and in the Borghorster Elblandschaft. The remaining locations are distributed along small strips on the forelands.

The continual addition of plant seeds and diaspores and of animal species that drift in (e.g. beetles, snails) on the river, promotes the diversity of species. From the results of a nationwide evaluation of the distribution of ferns and flowering plants, we can see the significance of the flowers of the tidal alluvial forests east of Hamburg. Despite significant anthropogenic transformation, they are some of the areas with the greatest diversity of plants in northern Germany.



▲ Fig. B1.2  
Hot spots of plant diversity in northern Germany (Schmitt, T. & H. Haeupler (2009): Hot spots of phytodiversity in Germany. Geographische Rundschau 61: 18-25)



▲ Fig. B1.3  
Nearly natural zoning of alluvial forest habitats (\*91E0), taller fringe communities (6430) and muddy bank flowers (3270), characteristic species of the habitat 3270 Elbe cocklebur (*Xanthium albinum*) and water mudwort (*Limosella aquatica*)



▲ Fig. B1.4  
Edge of purple loosestrife (*Lythrum salicaria*) (habitat type 6430) in CA Zollenspieker, around 4.5m high reeds at Bunthaus, alluvial forests (\*91E0) in the Heuckenlock and at Schweenssand

In CA Heuckenlock, functional area 1 is home to the largest population of the Elbe water dropwort in the entire Elbe estuary. There are additional significant populations in the Norderelbe and the Süderelbe, at the mouth of the Seeve and in the section of the river west of the Zollenspieker/Laßrönnen line. Further upstream, the species occurs sporadically and individually at a few locations until just before the Geesthacht weir. The spontaneous development of more than 100 samples on a foreland area which had been moved above the mouth of the Ilmenau indicates a sufficient seed potential in the area. The sparse population in the east of the functional area is primarily due to the lack of suitable locations. Grazing sheep on the southern bank keep causing massive damage to Elbe water dropwort populations.

On the Lower Saxony bank, various settlement measures were carried out in 2005, but to date only a few have seen long-term success. However, on a newly-created tidal inlet in Overhaken, a large population with good reproduction has developed. In the intervening period, there was a withdrawal phase which was dominated by reeds, but under the

protection of the advancing alluvial forests the plants once again find suitable conditions for development. The settlement measures have been rated as being successful by those looking after the area.

Functional area 1 is the focal point for the asp population in the Lower Elbe. Its main breeding area is in the Middle Elbe. All of the age groups of the species can be found in functional area 1, which indicates successful reproduction in the area.

Sea lamprey, river lamprey, salmon and houting use the functional area as a migration channel. The accessibility of the breeding areas in the Middle Elbe is limited by the Geesthacht weir. By 2010, fish were only able to swim up through a fish ladder on the southern bank which was not large enough. In autumn 2010, a second, larger fish ladder was installed, which was expected to enable a significant improvement in the ability to pass around the weir. In the Seeve and Ilmenau/Luhe tributaries, fish are limited in their ability to swim upstream by transverse structures outside of the planning area.

▼ Table B1.4

Conservation statuses of the species of annex II of the Habitats Directive

EU code	Species in annex II of the Habitats Directive	Conservation status			
		HH <sup>1</sup>		LS <sup>2</sup>	
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	3			C
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	3			C
1103	Twaite shad ( <i>Alosa fallax</i> )		C <sup>4</sup>		C
1106	Salmon ( <i>Salmo salar</i> ) (M)	3			C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)		D		D
1130	Asp ( <i>Aspius aspius</i> )		B		B
1601	* Elbe water dropwort ( <i>Oenanthe conioides</i> )	A	B	C	C

\* priority species (M): The estuary is used by this species as a migration channel.  
 1 Standard data sheet, as of September 2010  
 2 Elbe estuary IMP, part II, functional area 1, as of September 2011  
 3 In accordance with the evaluation methods of the national-federal state working groups (Federal Agency for Nature Conservation/ Federal Consortium for Nature Protection, Landscape Conservation and Regeneration), the conservation status of the anadromous fish and cyclostome species is only evaluated in their reproduction areas. The conservation status is not evaluated for the sea lamprey, river lamprey and salmon species which use functional area 1 as a migration channel.  
 4 The evaluation for the twaite shad is based on the potential function as a growing nursery area.  
 5 The asp population is categorised as not significant in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (2009).

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

### B1 2.1.2 Strengths and weaknesses of the functional area

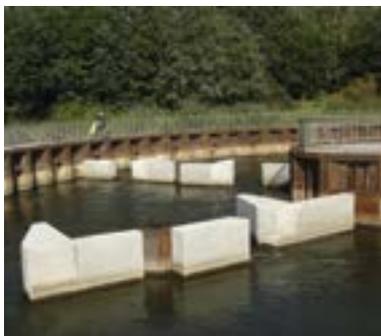
From the analysis and evaluation of the populations of species and habitats which are relevant to Natura 2000 in connection with the manifestation of location

factors, the following strengths and weaknesses of the functional area should be taken into consideration in particular (Table B1.5):

▼ Table B1.5

Overview of the strengths and weaknesses of functional area 1

Particular strengths
<ul style="list-style-type: none"> <li>• Population focus of the Elbe water dropwort</li> <li>• no deep water areas below 10m</li> <li>• good supply of oxygen all year round east from Bunthaus</li> <li>• population focus of the asp</li> <li>• despite the expansion and bank revetment, relatively high structural diversity in the groyne regions and comparatively good range of habitats for fish and cyclostomes</li> <li>• Complex made out of priority alluvial forests (*91E0), hydrophilous tall herb fringe communities (6430) and particular development of the habitat "rivers with muddy banks" (3270)</li> <li>• particular abundance of species of vegetation (Elbe water dropwort, hot spot for plant diversity)</li> </ul>
Particular weaknesses
<ul style="list-style-type: none"> <li>• Unnaturally severe and increasing tidal range which threatens the diversity in functional area 1</li> <li>• Greatest damage from pollutants in the entire Lower Elbe</li> <li>• Lack of oxygen in the summer in the Norderelbe and Süderelbe</li> <li>• Complete division of the tributaries which are typical for a lowland river (e.g. Gose Elbe, Dove Elbe)</li> <li>• Despite an improvement in the possibility for fish to swim up the river, the barrage at Geesthacht is still an obstacle for fish in the Elbe</li> <li>• Very high proportion of built-up banks</li> <li>• Mainly small foreland areas</li> <li>• Potential habitat creation for the Elbe water dropwort is limited due to the the river´s low expansion of the forelands, significant damage in certain areas caused by grazing and trampling by sheep (southern bank)</li> <li>• Leisure use in the foreland areas and immediate vicinity</li> </ul>



▲ Fig. B1.5

Fish ladder on the northern bank, Geesthacht barrage with the federal highway 404, fish ladder on the southern bank



▲ Fig. B1.6

Examples of areas with particular significance for Natura 2000 and development potential  
Small but structured foreland near Fliegenberg, meadows in the Altengammer Vorland



▲ Fig. B1.7

Examples of areas with limited development potential

Only a few species such as the Elbe hair grass can live on bank walls, Elbe water dropwort on the base of a bank revetment, small foreland near Howe

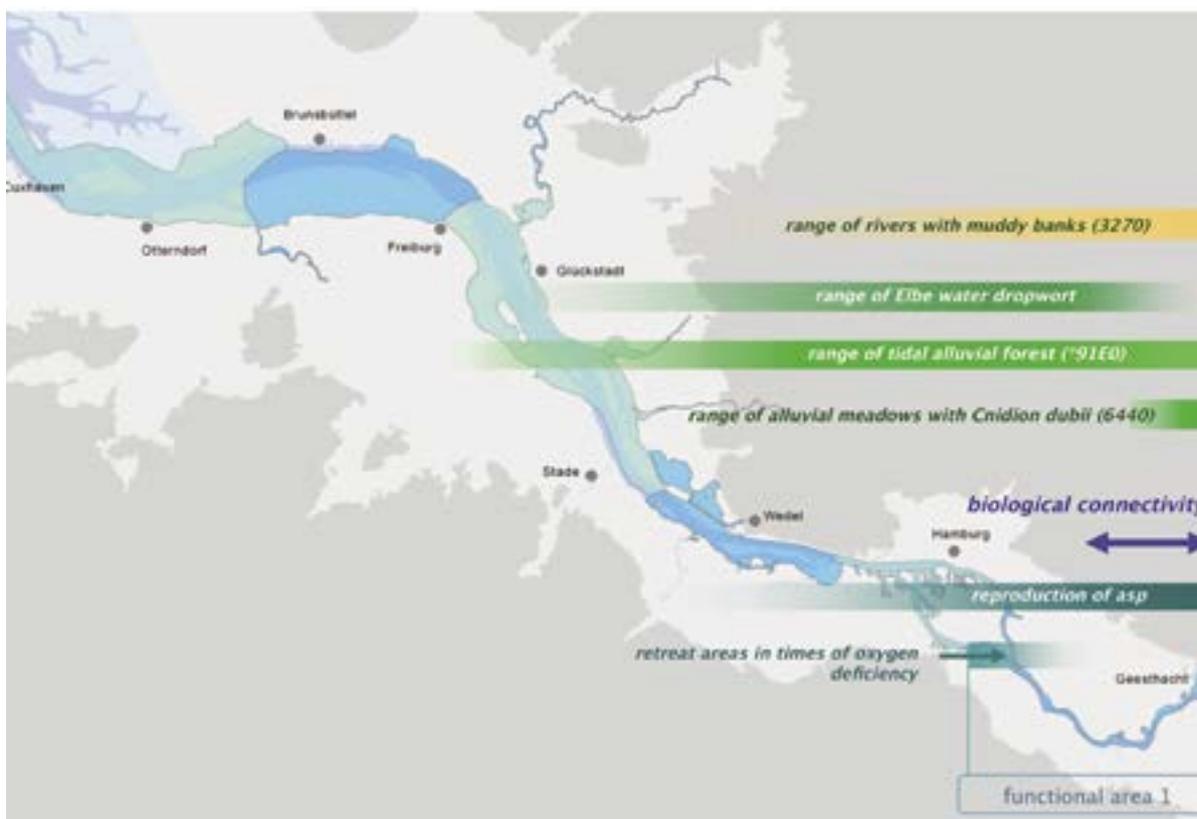
## B1 2.2 Interactions with other functional areas

- The barrage at Geesthacht is key to the biological continuity in the river area of the Elbe.
- When there is an acute lack of oxygen in the eastern parts of functional area 2, the river sections of functional area 1 which are better supplied with oxygen can become the reserve for aquatic species
- The overall number of Elbe water dropwort plants found in the Elbe estuary was between 1,000 and 2,000 individuals in the past few years. The current core population in Heuckenlock can be considered as being comparatively stable over several decades with 500 to 1,500 plants per year. The remaining populations are between individual plants and 200 samples. Only some of the populations produce mature seeds every year. The Heuckenlock is incomparable for the maintenance of the Elbe water dropwort species.
- Modelling the distribution of the Elbe water dropwort seeds shows that some locations in functional area 1 can play a particular role as

donation populations for additional locations upstream (e.g. Schweenssand). It can be assumed that the promotion of donation populations in functional area 1 can increase the success of measures in functional area 2.

- Functional area 1 is the connecting link between the fluvial and the tide-influenced formations

of alluvial forests (\*91E0), the rivers with annual mud vegetation (3270), the tall herba-ceous vegetation (6430) and the alluvial forests (6440). This transitional nature results in the highest levels of plant diversity in the entire estuary being found here.



▲ Fig. B1.8  
Significance of functional area 1 in terms of important focal points of functions relevant for Natura 2000

### B1 2.3 Natura 2000 model

#### Biological continuity of the tidal Elbe and Middle Elbe

- Biological continuity all year round thanks to oxygen concentrations throughout the year of at least 6 mg/l
- Exchange of fish in both directions between the tidal and the Middle Elbe
- Rest zones for migrating fish and lamprey in ecologically valuable groyne areas and side waters with nearly natural bank zones

### Nearly natural alluvial forest landscape

- Nearly natural bank where the width of the foreland permits this
- Foreland as a landscape dominated by reeds and alluvial forests
- Alluvial forests, tidal and land reeds, bank vegetation and annual vegetation on muddy banks occur accompanied by tidal inlet structures in alternating areas
- Near to the banks there are plant and animal species which can tolerate the regular flooding caused by the tide and frequent substrate deposits. Landwards, there is a zone which is only occasionally flooded when the water levels are high and coincide with the highest tide. Corresponding with the nearly natural location gradient, both zones move inland. In the slight shadow of the alluvial forests and in pioneer locations, the development conditions at changing locations are particularly favourable for the

Elbe water dropwort. This ensures a constant population in the functional area.



▲ Fig. B1.8  
Elements of the model for sections of woody landscape

### Flood meadows on the northern bank between Geesthacht and Neuengamme

- Foreland as open meadow and pasture landscapes
- Open banks with annual vegetation and hydrophilous tall herbaceous vegetation. Alluvial forests and fast-growing reeds are present but do not dominate the landscape
- High species diversity in the meadows caused by the natural insertion of plant diaspores and

of animal species which drift in when water levels are high (flood events and high tide)

- Relief typical for the alluvial forests made of flat ditches which lead to backwaters and sandy areas
- Transition of the forests into the dune landscape of the Besenhorster Sandberge through shrub belts rich in species and individual thorny bushes



▲ Fig. B1.8  
Elements of the model for flood meadows  
Alluvial forests in the Borghorster Elbwiesen, back water ponds in the Altengammer Vorland with the notostraca (*Lepidurus apus*) and sea monkeys as characteristics species

## B1 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based in the capture and evaluation of the current situation in the population. They implement the models in concrete spatial and protected item target formulations. These general management targets define the framework for the integrated target and measure concept for the functional area. The detailed, connected conservation objectives for the individual Natura 2000 sites can be found in the contributions from the federal states.

The following management targets apply to functional area 1:

- Preventing a further increase in the tidal range, and if possible reducing the tidal range
- Maintaining and developing priority alluvial forests (\*91E0)
- Maintaining and improving alluvial forests (6440) and lowland hay meadows (6510) (only in Hamburg)
- Maintaining and in some places restoring the populations of the priority species Elbe water dropwort with a dynamic which is typical for the species, developing additional habitats to improve the habitat availability
- Maintaining and developing breeding and nursery habitats for asps, particularly in the groyne areas; protecting the habitats potential for the twaite shad
- Maintaining and restoring the connecting function of the functional areas between the upper boundary at the Middle Elbe and the estuary after Hamburg, particularly for the migrating fish species of annex II of the Habitats Directive

## B1 3 Uses and usage targets

In functional area 1, the Lower Elbe is primarily characterised by internal shipping. Due to the high levels of settlement and intensive agricultural use in the surrounding marshes, issues of flood protection are a particular concern.

The proportion of intensively used grassland areas in the foreland is in continuous decline. As part of the compensation measures, large areas are being transformed for uses which are compatible with nature. The dykes are maintained by sheep grazing.

There are shipyards in Stöckte and Overhaken (outside of the planning area).

Due to the proximity of a large city, water sports and other recreational activities play a particularly important role. Large marinas are found along the entire section of the river on both banks. Directly next to the Natura 2000 sites, there are

large camp sites and holiday homes. There are popular cycle paths and walkways on the Elbe dyke.

The following table gives an overview of the interests and uses which are relevant to Natura 2000 and are of significant importance in the functional area. Information on uses of local significance can be found in the relevant contributions from Hamburg, Schleswig-Holstein and Lower Saxony.

▼ Table B1.6

Current interests and uses relevant to Natura 2000 in functional area 1

Natura 2000-relevant uses/interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>• Total functional area: priority area for Natura 2000</li> <li>• Precaution areas for recreation, agriculture and grassland cultivation shown in partial sections (Regional Planning Programme for Lower Saxony)</li> <li>• Water areas, naturally occurring areas, Bunthaus point is part of the port (HH: land development plan)</li> </ul>
Water management/ Water Framework Directive	<ul style="list-style-type: none"> <li>• Ecological region 14 (central lowland); Elbe river area unit; tidal Elbe production area; surface water bodies: Elbe (east), classified as a heavily modified water body</li> <li>• Irrigation/drainage in the hinterlands through sluices and pumping stations</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Main dykes protected in part by small forelands and in some areas by dams. The dykes are mainly earth dykes, in some places as flood protection systems, the remainder are summer dykes in the Altengamme foreland</li> <li>• Ilmenau flood barrage and Seeve sluice, Bullenhausen, Wuhlenburg and Hoopte sluices</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Internal shipping on the Elbe federal waterway, sluice at Geesthacht (outside of the planning area)</li> <li>• occasional maintenance work to regulate the level at the crossover between river and marine shipping levels</li> <li>• Bank maintenance carried out by Water and Shipping Administrations WSA and the HPA</li> <li>• Bunthaus river bank enforcement unit</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Agricultural areas in Hamburg covering around 47.3 ha; primarily grassland, compatible use mainly regulated by contractual agreements, compensation measures or public ownership</li> <li>• Sheep grazing on the dykes</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Commercial fishing: net fishing along the edge of the river, secondary fishing (weirs, anchor nets) in the bank region</li> <li>• Recreational fishing with hand-held equipment on the banks across the entire planning area</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• HH: permitted in the Natura 2000 sites with certain limitations</li> <li>• LS: 15 hunting areas</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Shipyards in Stöckte and Overhaken, industrial area in Geesthacht (directly adjacent to but outside the Natura 2000 sites)</li> <li>• Vehicle and passenger ferries from Hoopte/Zollenspieker</li> <li>• Passenger ferries from Altengamme/Stove (operate seasonally)</li> <li>• Elbe crossed at km 607.8 by power lines</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• LS: 1 port in the Winsen area of Stöckte, 4 marinas in Bullenhausen (Seevetal), Stöckte (Winsen), Elbstorf, Stove (Drage)</li> <li>• HH: Marinas in Altengamme, Zollenspieker, Oortkaten, Bunthaus, Schweenssand</li> <li>• Kayaking, canoeing, windsurfing, sailing, speed boating, jet skiing, 2 water skiing areas (599-603km and km 587)</li> <li>• Swimming on the sandy banks (e.g. Overhaken, Stove)</li> <li>• Locations developed particularly for rest and relaxation Over (Seevetal), Fliegenberg (Stelle), Hoopte (Winsen) and Stove/Schwinde (Drage)</li> <li>• Walkways on the dykes</li> <li>• Components of the LEADER region Achtern-Elbe dyke</li> </ul>

The members of the planning groups defined their targets and intended uses for functional area 1, which are given below in short form. For additional information, see part C: materials.

The targets given generally consist of continuing existing activities, but in some cases there are intentions beyond this. The main usage targets are for shipping and flood protection.

▼ Table B1.7

Current interests and uses relevant to Natura 2000 in functional area 1

Uses	Short description of the targets for functional area 1
Regional planning	<ul style="list-style-type: none"> <li>• Coordination of the various usage requirements from a federal state regional and construction planning perspective in terms of a sustainable and resource-efficient development of the area</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential in terms of the biological quality components and the targets for hydromorphological and physical/chemical quality components in the surface water bodies Elbe (east) and in the marsh waters, e.g. at Ilmenau and Seeve</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Elevation of the Ilmenau flood barrage</li> <li>• Elevation of the protective dykes</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Economic maintenance as necessary of the banks</li> <li>• Implementation of the river engineering and sediment management concept by the HPA and the WSA: reducing the increased tidal range, if possible reversing the trend, minimising the sediment damage</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of grassland cultivation (HH)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development</li> <li>• Alternative bypass of Hamburg via the expansion of the B404 to the A21 crossing the Elbe over the existing barrage at Geesthacht</li> <li>• Stöckte marine project: planning to expand the historical port in Stöckte (Winsen)</li> <li>• Hotels in Zollenspieker in the outer dyke area (outside of the Natura 2000 site)</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, especially the promotion of forms of nature tourism</li> <li>• Revaluation of the Oortkaten port and its surrounding area</li> </ul>



▲ Fig. B1.10 shipping, camp site on the foreland near Stove, main dyke at Warwisch

## B1 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, after these were evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B1 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

The priority target for functional area 1 is to maintain the ecological value of the sparsely available area on the foreland and if necessary increase it.

From a Natura 2000 perspective, important synergies arise from river engineering measures which reduce the tidal range. In order to expand the flood plain, areas are particularly suitable which are ecologically connected to the Natura 2000 sites after the measures have been implemented and which can therefore directly or indirectly strengthen these areas.

Within the scope of Natura 2000, achieving management targets for the Elbe water dropwort, the alluvial forests, the bank vegetation and the Elbe with muddy banks primarily requires the banks to have a nearly natural form. Where the dykes transform into busy areas, there is almost no room to manoeuvre. In sections with wide forelands, the maintenance efforts can be reduced by flattening the banks, as the vegetation in the area stabilises the bank (see part C: materials: technical contribution “waterways and ports”).

The sediments carried by the Elbe have the highest content of harmful substances in the Elbe estuary in functional area 1. This damage originates in the headwaters. There are therefore considerable synergies which arise from the management plan of the Elbe River Basin Community in accordance with Article 11 of the WFD. Measure

implementation, however, is concentrated on the entire drainage basin of the Elbe.

In order to avoid further damage to the Elbe water dropwort through grazing, common solutions must be found with the farmers whose sheep graze the dykes.

Due to its immediate proximity to the large city of Hamburg, the functional area is particularly important as a location for rest and recreation activities. On the one hand, the frequent visits mean that public communications regarding the significance of Natura 2000 could potentially reach large numbers of people, but on the other the rush of people trying to relax could be associated with disturbance and damage.

#### Conclusion

The analysis of the synergies and conflicts shows that there is a particular need for coordination between various interest groups.

Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. In order to maintain the Elbe water dropwort and several habitat types, upgrading the bank structures and creating nearly natural transitions between land and water as well as reducing the tidal range is particularly important.

▼ Table B1.8

Important tasks of the cooperation with the uses and interest groups represented in functional area 1

Natura 2000-relevant uses and interest	Focus points for cooperation
Regional planning	<ul style="list-style-type: none"> <li>• No specific need for action</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Designing and implementing agreed measures from the range of suggested measures for the tidal Elbe</li> <li>• Restoring the nearly natural water structures including tidal inlets</li> <li>• Reducing the damage caused by harmful substances</li> <li>• Improving the biological continuity of the Elbe and its tributaries</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Optimising the maintenance and operation of waterways in terms of Natura 2000: developing Natura 2000 compatible solutions for limiting, and if possible reversing, the increased tidal range and for ensuring a nearly natural sediment supply, taking into account the particular interactions in functional area 1</li> <li>• Cooperation, especially to create additional flood plains</li> <li>• Optimising the bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the Elbe water dropwort and the development of alluvial forests</li> <li>• Maintaining and developing nearly natural habitat structures in the groyne areas as a replacement for natural fish habitats</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Protecting the Elbe water dropwort population from damage by sheep grazing or trampling on them (southern bank)</li> <li>• Continuing cooperation with agricultural operations, particularly in the care of the grassland (northern bank)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• LS: no specific need for action/HH: no major conflicts</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Minimising the risk of birds colliding with power lines</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Resolving conflicts about the use of areas (holiday homes and marinas in Natura 2000 sites)</li> <li>• Using and if necessary expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>• Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerately as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> </ul>

## B1 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level. They are

supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures (see chapter A5).

### B1 4.2.1 Suggested measures for functional area 1

At the measure level, the relevant planning responsibilities in the two federal states of Hamburg and Lower Saxony must be taken into account.

For Hamburg, spatial, concrete individual measures (FA 1 measures) are suggested.

The two lists below include the suggested measures for Hamburg and Lower Saxony.

General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been taken over from the contributions without being changed.

For Lower Saxony, spatial, concrete measures, and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

#### ▼ Table B1.9

Suggested measures for functional area 1 in Hamburg

Number	Title
<b>Relevant to the entire functional area</b>	
FA 1.1 HH/SH	Checking the possibility of damming the increase in the tidal range in a natural way
FA 1.2 HH/SH	Maintaining and developing suitable habitats for fish and cyclostomes in groyne areas
FA 1.3 HH/SH	Checking the status of the population of whitefin gudgeons
FA 1.4 HH/SH	Protection programme for plant species typical for the banks of the Elbe
FA 1.5 HH/SH	Wild tulip action: there are also some nice neophytes!
<b>Norderelbe/Süderelbe section</b>	
FA 1.6 HH/SH	Maintaining alluvial forest reed complexes with Elbe water dropwort at the Norderelbe and Süderelbe
FA 1.7 HH/SH	Removal of the 3 marinas of the CA Schweenssand
FA 1.8 HH/SH	Improving the bank structure on the Norderelbe and Süderelbe
FA 1.9 HH/SH	Maintaining the chequered lily populations in the Heuckenlock
FA 1.10 HH/SH	Repressing invasive neophytes on the Norder- and Süderelbe and in the surrounding protected areas
FA 1.11 HH/SH	Maintain the free view of Bunthäuser Spitze
FA 1.12 HH/SH	Minimising the risk of migrating birds colliding with power lines (km 607.8)
FA 1.13 HH/SH	Connecting the CA Rhee to the tide

Number	Title
FA 1.14 HH/SH	Shallow water area Spadenlander Busch/Kreetsand
FA 1.15 HH/SH	Creation of a tidal inlet open on two sides on the Spadenländer Spitze
FA 1.16 HH/SH	Ellerholz: developing shallow water zones on the Norderelbe
FA 1.17 HH/SH	Expanding Heuckenlock, potentially connecting Ellerholz to Heuckenlock
FA 1.18 HH/SH	Expanding Schweenssand
<b>Overhaken/Wrauster Bogen section</b>	
FA 1.19 HH/SH	Long-term expansion of the holiday villages in Overwerder and Overhaken
FA 1.20 HH/SH	Raising awareness among those who use the plots in Overhaken/Overwerder of the neophyte problem
FA 1.21 HH/SH	Developing an alluvial forest-reed complex with Elbe water dropwort (south-east Overhaken)
FA 1.22 HH/SH	Maintaining Elbe water dropworts at the Wrauster Bogen
<b>Zollenspieker section</b>	
FA 1.23 HH/SH	Developing meadow areas into structurally rich alluvial forests with Elbe water dropwort (west Zollenspieker)
FA 1.24 HH/SH	Developing nearly natural banks (east Zollenspieker)
FA 1.25 HH/SH	Maintaining hay meadows at the base of the dykes which have many species (Zollenspieker)
<b>Borghorster Elblandschaft section</b>	
FA 1.26 HH/SH	Maintaining the land forms which are typical for the Altengammer Vorland
FA 1.27 HH/SH	Maintaining the open landscape character of the Altengammer Vorland
FA 1.28 HH/SH	Maintaining and developing alluvial forests in the Altengammer Vorland
FA 1.29 HH/SH	Maintaining and developing lowland hay meadows in the Altengammer Vorland
FA 1.30 HH/SH	Caring for the currently and formerly cultivated areas in the Altengammer Vorland
FA 1.31 HH/SH	Bank shape in the Altengammer Vorland: berm for mud bank species
FA 1.32 HH/SH	Maintaining hydrophilous herbaceous bank vegetation in the Altengammer Vorland
FA 1.33 HH/SH	Maintaining herbaceous vegetation typical for the Elbe on the sandbanks in the Altengammer Vorland
FA 1.34 HH/SH	Nearly natural shaping of the "Schlinz" (Altengammer Vorland)
FA 1.35 HH/SH	Restoring the influence of the tide in the Borghorster Elblandschaft

▼ Table B1.10

Suggested measures for functional area 1 in Lower Saxony

<b>Sphere of action 1: developing concepts/plans</b>	
1.2	Restoring habitat structures which are typical for the habitats in question (hydrology, morphology) – Technical requirements for the implementation of the river engineering and sediment management concept (HPA and WSA 2008)
1.3	Integration of Natura 2000 interests into the ongoing maintenance of the Elbe (excavations, deposits)
1.4	Integration of the Natura 2000 interests into the ongoing maintenance of the banks
<b>Sphere of action 3: concrete habitat and species protection measures</b>	
3.6	Measures to promote the development of alluvial forests
3.7	Measures to promote/create tidal inlet systems
3.8	Measures to promote nearly natural banks with tidal reeds and hydrophilous bank vegetation
3.11	Measures to maintain and promote the Elbe water dropwort population
3.16	Measures to optimise the groyne areas

Additional information can be found in the federal state contributions (part I or A and texts on functional area 1).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Hamburg part of the functional area: ↳ annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Map views can be found under ↳ Technical contribution Natura 2000 ↳ Measure programme ↳ Functional area 1

- Lower Saxony part of functional area: ↳ annex of the LS IMP contribution ↳ annex: technical contributions ↳ technical contribution 01: Natura 2000 ↳ FB01 part B with target map C1.

Target map C1 gives an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (here in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

### B1 4.2.2 Interdisciplinary cooperation in implementing the measures

Central Natura 2000 targets for the aquatic area of functional area 1 will only be achieved if measures are implemented in the entire Elbe estuary (e.g. tidal range problem) or at the level of the Elbe RBC (e.g. reducing nutrient and harmful substance damage and thereby improving the oxygen content). For this latter category, mention is made of the management plan in accordance with Article 11 WFD. The measures provided for there make a significant contribution to the implementation of the Natura 2000 targets.

Cooperation with the WSA and the HPA shows an additional focus, which can be combined from the following measures:

- Limiting, and if possible reversing, the increase in the tidal range, particularly by creating new flood plains at hydromorphologically and ecologically suitable locations
- Cooperation in maintaining and developing nearby natural banks which at the same time do not require high levels of maintenance.

Prior to the implementation of concrete measures, in many cases fundamental works and concepts have to be worked out. These have to be coordinated closely between leading administration and the relevant nature conservation authorities in the federal states.

### B1 4.2.3 Information on studies and environmental monitoring

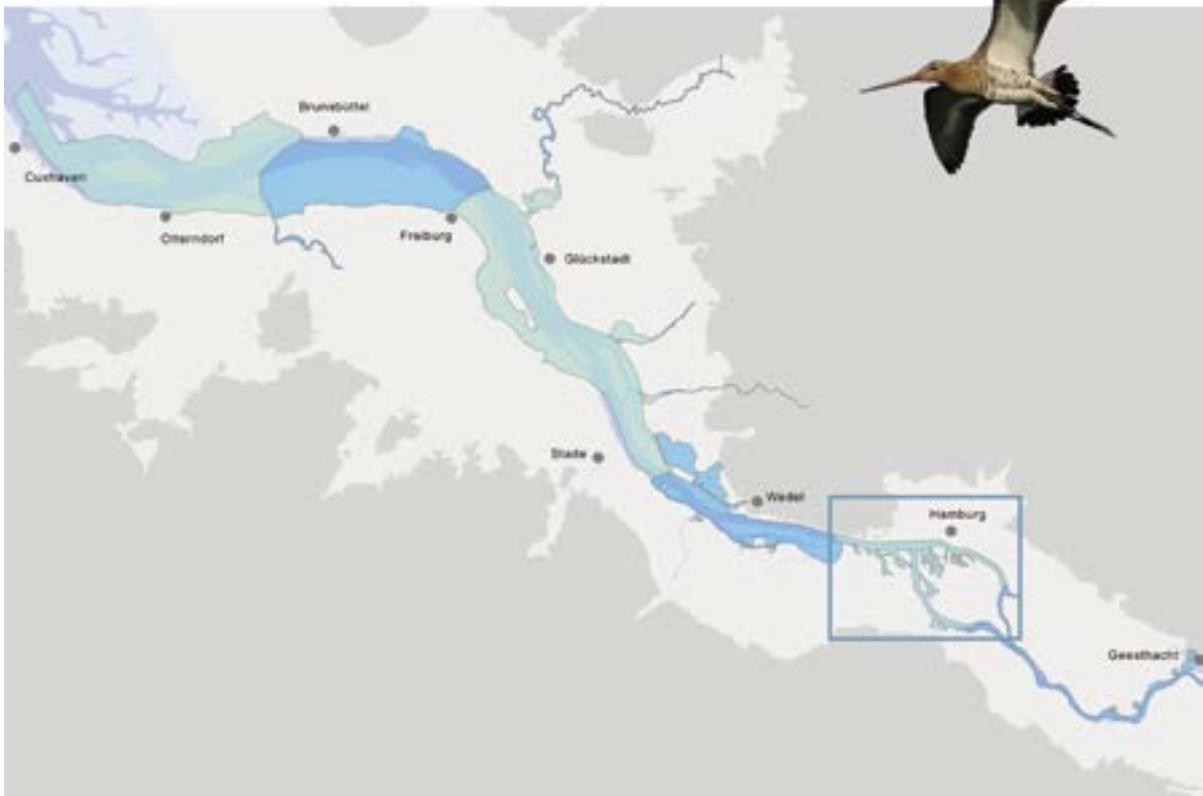
An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7). For functional area 1, the following aspects are particularly significant:

- Assessing the hydromorphological development of the Lower Elbe
- Monitoring the development of the proportion and the distribution of the nearly natural banks
- Monitoring the population development of the Elbe water dropworts
- Monitoring the distribution of invasive neophytes in the particularly susceptible habitats 3270, 6430 and \*91E0 and in terms of location competition with the Elbe water dropwort (Hamburg)
- Monitoring the fish and cyclostomes in annex II of the Habitats Directive



I Integrated  
M management plan  
P Elbe estuary

## Functional area 2



overleaf

Blumensand port

Alte Süderelbe and Westerweiden

Containers at Waltershof



## B2 1 Overview of functional area 2

Functional area 2 stretches from the beginning of the sections of the Norderelbe and the Süderelbe deepened for sea vessels to the Mühlenberger Loch. It comprises the Norderelbe and the Süderelbe, and from Seemannshöft, the so called "Stromelbe". Measures are proposed for additional, non-enclosed areas which could fulfil relevant functions for the Natura 2000 sites in the Lower Elbe.

The nature of the Elbe in functional area 2 is the result of the expansion of the area in Hamburg where the river divides into a port significant in Europe and the creation of a city inhabited by millions of people. The current state of the area dates back to a century-long process by which the many arms of the branched inner delta were gradually separated from the river.

In parallel to this, the Lower Elbe was deepened in order to allow ever larger ships to access the port. Even the flood protection measures which were implemented following the catastrophic floods of 1962 changed the Elbe landscape for the long

term, and completed the channelling of the river into the Norderelbe and the Süderelbe.

In keeping with the demands of port use and the protection from erosion and flooding, the banks of the North and the Süderelbe and the south banks of the main Elbe are almost completely covered with revetments or with vertical structures on the banks (sheet piling, walls).

The northern bank of the main Elbe is also fixed at many stages between Othmarschen and Mühlenberg. The main use here is recreational. The revetments have been overgrown in some areas. The sandy sections of the bank are used as a beach.

Some areas of the port and city landscape are also important for nature conservation. In addition to short-lived locations (fallow land) which can be very important for species in the early stages of settling open ground, there are also some conservation areas (CA Westerweiden, CA Finkenwerder Süderelbe, CA Flottbektal).

## ▼ Table B2.1

Selected abiotic parameters for functional area 2

Length	Km 615.3 (Norderelbe) or km 614.5 (Süderelbe) to km 633 (Mühlenberger Loch)
Total area	990 ha
River width	Norderelbe and Süderelbe: 150 to 200m, Stromelbe: 700m
State of the bank	far from natural or morphologically highly altered bank >98%
Depth	Minimum sea vessel depth: 15.30 m below KN (= lowest astronomical tide (LAT))
Tidal range <sup>2</sup>	Average tidal range at Pegel Sankt Pauli 3.6 m
Chloride content <sup>3</sup>	Less than 0.5‰ or around 160mg Cl/l as a long-term average (= fresh water)
WFD water body	Coordination area tidal Elbe: Elbe port water body Water body classified as heavily modified water body (HMWB)

<sup>1</sup>: WSA Hamburg November 2008 <sup>2</sup>: [www.bsh.de/aktuat/wvd/elbepegel](http://www.bsh.de/aktuat/wvd/elbepegel) <sup>3</sup>: [www.fgg-elbe.de](http://www.fgg-elbe.de)

## B2 2 Natura 2000

Within the seven functional areas of the Lower Elbe, functional area 2 is special because it is not part of Natura 2000. However, its river sections carry out an important function for Natura 2000 as a connection corridor between the protected areas above and below the Port of Hamburg. They correspond to the landscape elements in accordance with Section 21 paragraphs 1 and 2 of the Federal Nature Conservation Act, but do not fall under the category of a protected area in accordance with Sections 32 and 33 of the Federal Nature Conservation Act.

The species and biotopes present in the functional area are therefore not the focus of the IMP, but rather it is the interactions between the functional area and the Natura 2000 sites. If necessary, measures needed for the aquatic biocoenosis of the water body in the Elbe port are carried out in accordance with the ecological potential determined as part of the implementation of the WFD.

The derivation of the functional area-specific Natura 2000 targets took place over several evaluation steps:

- Carrying out an inventory of the species and habitats present in the functional area
- Evaluating the strengths and weaknesses of the functional area
- Analysing the interactions with other functional areas
- Developing a Natura 2000 model for the functional area
- Defining functional area-specific Natura 2000 management targets

## B2 2.1 Types and functions relevant to Natura 2000

### B2 2.1.1 Functions relevant to Natura 2000 for conservation objectives in accordance with the Habitats Directive

For some species of fish and lamprey which are conservation objectives of the Natura 2000 sites, the water sections of functional area 2 are a migration pathway.

The same connecting function exists for the typical species from the habitats 3270 "rivers with muddy banks" (functional area 1) and 1130 estuaries (functional area 3). In the limnic tidal Elbe, the aquatic biocoenosis of both types of habitat have a lot of

overlap. This means that the number of smelt, the most important fish species in the estuary in terms of abundance, increases as far as functional area 1.

The Elbe water dropwort (*Oenanthe conioides*) is currently present at relatively few locations in functional area 2, which carries out an important function as a stepping stone between the populations in functional areas 1 and 3.

#### ▼ Table B2.2

Species of annex II of the Habitats Directive in functional area 2

EU code	Species of annex II of the Habitats Directive
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)
1103	Twaite shad ( <i>Alosa fallax</i> )
1106	Salmon ( <i>Salmo salar</i> ) (M)
1113	*Houting ( <i>Coregonus maraena</i> ) (M) <sup>1</sup>
1130	Asp ( <i>Aspius aspius</i> )
1601	* Elbe water dropwort ( <i>Oenanthe conioides</i> )

\* priority species (M): The estuary is used by this species as a migration channel. <sup>1</sup>: The population of the species in the Lower Elbe is rated as being "not significant".

### B2 2.1.2 Natura 2000-relevant functions for conservation objectives in accordance with the Birds Directive

The Lower Elbe is one of the most important inter-regional bird migration pathways between bird resting and hibernation areas on the Middle Elbe and in the North Sea. The birds orientate themselves using the river.

There are interactions between the Hamburg city area and the surrounding Natura 2000 sites of the Elbe estuary. Particularly noteworthy are the migrating bird populations in Holzhafen and Westerweiden (CA Westerweiden and Finkenwerder Süderelbe).

The Holzhafen (wood port) is a bay on the Norderelbe between Billwerder and Moorfleet. Its bird population is characterised by typical species of the fresh water mud flats.

For the northern shoveller, the Holzhafen is particularly significant during the autumn migration. Its resting population was 425 individuals (September 2007), which is above the threshold of international importance (400 individuals).

The Westerweiden and Finkenwerder Süderelbe conservation areas stretch along the Alte Süderelbe directly east of the Mühlenberger Loch. The grassland area is frequented by increasing populations of resting grey geese, barnacle geese and white-fronted geese. In November 2008, 2,000 barnacle geese were counted on Westerweiden.

### B2 2.1.3 Strengths and weaknesses of the functional area

From the analysis and evaluation of the populations of species and habitats which are relevant to Natura 2000 in connection with the manifestation of location

factors, the following strengths and weaknesses of the functional area should be taken into consideration in particular (Table B2.3):

#### ▼ Table B2.3

Overview of the strengths and weaknesses of functional area 2

##### Particular strengths

- no limitation of the biological continuity caused by crossing construction work: connecting corridor for aquatic organisms and plant diaspores which have drifted in on the tide between the Natura 2000 sites above and below Hamburg

##### Particular weaknesses

- considerable changes to the water morphology
- anthropological changes to the tidal and sediment regime
- limited biological continuity due to a shortage of water during the summer months
- removing and re-adding cold water
- port-related TBT
- long sections of banks which lack structure and provide few sheltering opportunities for migrating fish and habitats for the Elbe water dropwort

## B2 2.2 Interactions with other functional areas

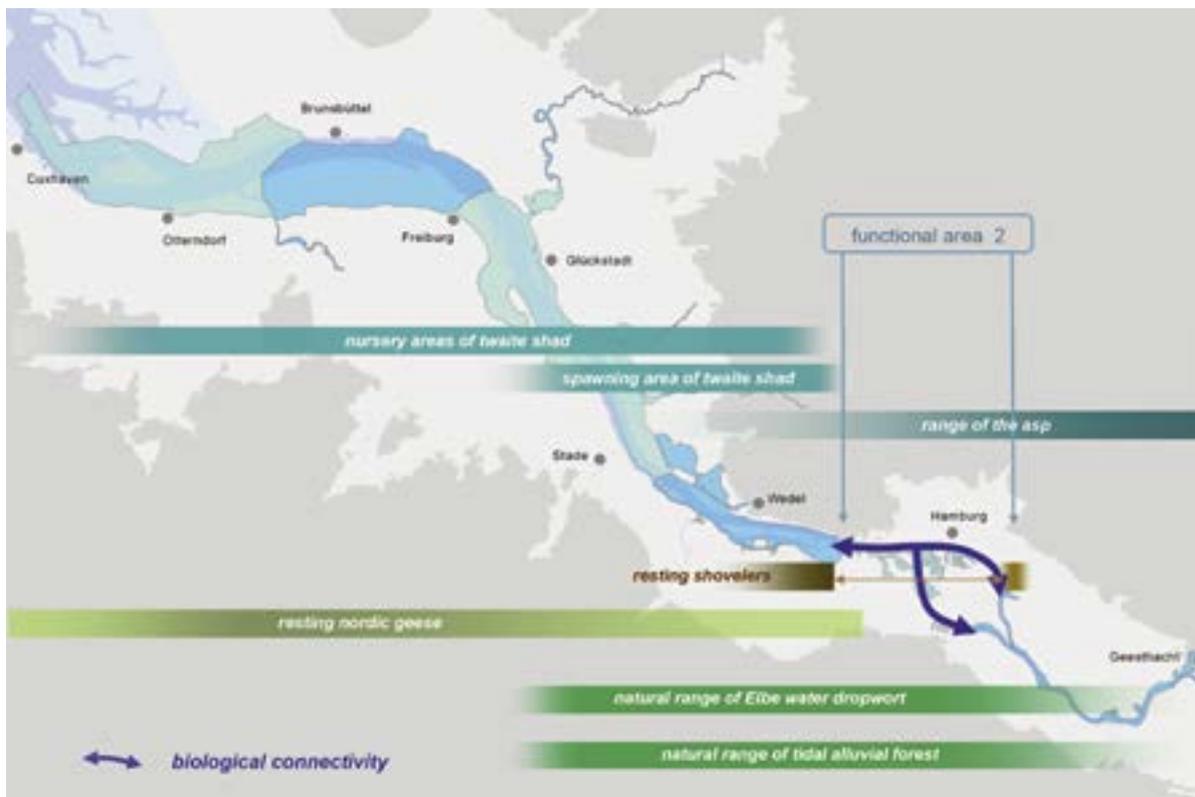
The lack of oxygen during summer in functional area 2 has an effect on other areas of the estuary. In times of serious oxygen deficiency, the biological continuity in the Lower Elbe is interrupted.

Beyond its general function as a connector (e.g. for migrating fish and lamprey), functional area 2 interacts intensively with the surrounding functional areas.

Functional areas 1 and 2 are part of the area of the river where it splits (inner delta) from the tidal Elbe, and forms common habitats which can be recognised, for example, in the current distribution of "river valley plants". In accordance with the WFD, both functional areas belong to the same reference type of "sandy lowland rivers affected by the tide" and the bream region of the fish population. When there is an acute lack of oxygen in the summer, the sections of the river in functional area 1 which are better provided with oxygen can act as a reserve location for aquatic species.

The Holzhafen took on the function of a rest area for shelducks, teals and northern shovellers, as this function has only been partially fulfilled by the Mühlenberger Loch since parts of this were filled in during 2001. Outside of the port area, there are also resting places for water and mud flat birds which use the Elbe valley as a migration pathway between their breeding grounds and winter homes. Since the important rest populations of the northern shoveller have decreased rapidly since their maximum in 2000, the relative importance of the rest population in Hamburg has risen accordingly.

The area where the river splits was originally the breeding centre of the priority species Elbe water dropwort. An exchange of Elbe water dropwort seeds occurs via the waterway by drifting. Functional area 2 is therefore a significant component of the habitat network of the Elbe water dropwort. In order to ensure the exchange between the populations east and west of Hamburg, it is important that as many stepping stones as possible developed in functional area 2.



▲ Fig. B2.1  
Significance of functional area 2 as an important focus for functions relevant to Natura 2000

### B2 2.3 Natura 2000 models

At the centre of the model is the function, which is particularly relevant for interlinkages and the conservation targets of the Natura 2000 sites of the Lower Elbe.

This includes in particular the biological continuity and the maintenance of partial areas which are frequently used by large numbers of target resting bird species in the EU bird protection areas.

A biological continuity which is as uninhibited as possible for aquatic species which alternate between functional areas 1 and 3 is achieved through:

- sufficient oxygen supply for the needs of the migrating species

- a lack of constructions which impede migration
- an exchange of migrating fish and lamprey which is as danger-free as possible

Functional area 2 offers the Elbe water dropwort, the seeds of which drift on the tide, a network of various stepping stone biotopes. In this way, functional area

2 supports the entire population of this species which is threatened with extinction even in the other fresh water tidal habitats in the Lower Elbe.

As part of the cross-regional network of resting places, functional area 2 offers target bird species in Natura 2000 sites a valuable resting place.

## B2 2.4 Natura 2000 management targets

The following management targets translate the ideas of the overall concept into concrete target formulations for the particular areas and protected subjects. These general management targets define the framework for the integrated target and measure concept for the functional area.

- Restoring a nearly natural sedimentation and tide dynamic
- Developing tidal alluvial forests and complexes of reeds and tall herbaceous vegetation which have large numbers of species
- Developing a network of stepping stone habitats for the Elbe water dropwort
- Maintaining and developing suitable resting habitats for fish and lamprey swimming up the river along their migration stretch
- Maintaining the functions of the Hamburg conservation areas which are relevant for bird protection, particularly Westerweiden for resting geese and the Holzhafen for resting ducks
- Strengthening the ecological coherence of Natura2000 (measure in accordance with Section 21 paragraphs 1 and 2 of the Federal Nature Conservation Act), particularly the creation of an ecologically valuable bypass section in order to bypass the Port of Hamburg

## B2 3 Uses and usage targets

In addition to the prevailing uses of the port, there are also additional uses in functional area 2. Within the Port City of Hamburg, a structural change is occurring associated with the port beginning to be used for additional functions such as housing, culture and leisure. The experience of the maritime landscape from the land or to the water is a fixed part of city tour in Hamburg. In addition to commercial shipping, water sports also have a place. Due to the concentration of people, goods and commercial activities, flood protection is particularly important.

The direct surroundings of functional area 2 are characterised by fruit and vegetable cultivation.

The members of the planning groups defined their targets and intended uses for functional area 1, which are given below in short form. For additional information, see part C: materials.

▼ Table B2.4

Usage targets in functional area 2

Uses	Short description of the targets for functional area 2
Regional planning	<ul style="list-style-type: none"> <li>• Development of the port</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential in terms of the biological quality components and the targets for hydromorphological and physical/chemical quality</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Maintaining and developing the Port of Hamburg as the economic driver of the region</li> <li>• Maintaining and developing the federal waterways</li> <li>• Minimising or stabilising maintenance expenditure</li> <li>• Minimising sediment damage</li> </ul>

Uses	Short description of the targets for functional area 2
Waterways and ports	<ul style="list-style-type: none"> <li>• Reducing the increased tidal range, if possible reversing the trend</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of productive agriculture in the various management forms in suitable production areas</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• No functional area-specific targets</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• No functional area-specific targets</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment</li> </ul>



Shipping



Industry and transport



Living

▲ Fig. B2.2: Uses in functional areas 2 and the surrounding area



Leisure (water and water sports)



Maintaining and experiencing the maritime legacy



Agriculture



Nature conservation

▲ Fig. B2.3: Uses in functional areas 2 and the surrounding area

## B2 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being developed which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B2 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

Due to the location of the functional area in a big city and an important port, it can be assumed that there will be an almost complete overlap of the areas relevant for Natura 2000 and areas used elsewhere. In recognition of this unusual situation, the integrated target and management concept aims to ensure fewer but more essential functions.

The aim of having an Elbe which is less damaged by pollutants (see technical contribution “waterways and ports” 2010, part C: materials) is also shared by water sports organisations. The return to natural sedimentation and tidal dynamic is a common goal for all interest groups.

The deepening of the channel up as far as the Port of Hamburg is one of the causes of the oxygen deficiency zone and the increase in the tidal range. According to current scientific knowledge, the creation of flood plains in functional area 2 itself and its immediate surroundings is particularly effective in reducing the tidal range (see technical contribution waterways and ports 2010, part C: materials). The creation or maintenance of oxygen-rich shallow water areas which are suitable and accessible as compensation habitats for aquatic species if there is a lack of oxygen is, where necessary, in synergy with the creation of flood plains. In the case of the Holzhafen, the creation of flood plains in Billwerder Bay conflicts with maintaining the mud flats as a rest area for migrating birds. Synergies with flood protection are possible by expanding the flood plains. In individual cases, the use of newly connected alluvial areas can be considered as a relief polder at high tide.

The reconnection of the Alte Süderelbe and the long-term vision of a third branch of the Elbe as a bypass for the port for Natura 2000 have a high synergy from the current perspective, but there is also the potential for conflict. In the context of a future adaptation strategy for the Elbe, the interests of the individual sectors may change as a result of climate change.

The creation of stepping stone habitats for the Elbe water dropwort can, on an individual basis, be in conflict with local uses.

Large and small companies taking out cold water and replacing it with warm water is a major risk to biological continuity.

The important requirements for action arising from the management targets from a Natura 2000 perspective are the protection of biological continuity, the creation of stepping stone habitats for the Elbe water dropwort, the maintenance of the resting place for migrating birds as part of a cross-regional network of resting places and the development of a natural tidal dynamic.

## B2 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level.

In functional area 2, they are supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures directly (see chapter A5).

### B2 4.2.1 Suggested measures for functional area 2

For functional area 2, eight spatial, concrete individual measures (FA measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

The measure information leaflets with a detailed description can be found in part C: materials under: Annex to the HH/SH IMP contribution ↪ HH SH IMP measures. Map overviews can be found under ↪ Natura 2000 technical contribution ↪ measure programme ↪ functional area 2

Additional information can be found in the IMP contribution for Hamburg and Schleswig-Holstein (part I or A and texts on functional area 2).

#### ▼ Table B2.5

Suggested measures for functional area 2

Number	Title
FA 2.1 HH/SH	Ecological port bypass via the Alte Süderelbe
FA 2.2 HH/SH	Developing the Holzhafen/Billwerder island area: focal point for bird protection
FA 2.3 HH/SH	"Stepping stones" for fish and lamprey migrating over long distances
FA 2.4 HH/SH	"Stepping stones" for the Elbe water dropwort: maintaining the population in the old Moorburg port
FA 2.5 HH/SH	"Stepping stones" for the Elbe water dropwort: developing permanent stepping stones
FA 2.6 HH/SH	"Stepping stones" for the Elbe water dropwort: developing temporary stepping stones
FA 2.7 HH/SH	Creating a ditch on the northern bank of the Stromelbe south of the deer park
FA 2.8 HH/SH	Restoring the Elbe beach at Othmarschen

### B2 4.2.2 Interdisciplinary cooperation in implementing the measures

Due to the concentration and diversity of the uses carried out, the establishment of consensus-based cooperation of the various sectors is a significant target for action.

and that these uses are always in line with legal requirements.

The use of the port in functional area 2 will continue to be very important on a cross-regional, economic level. Housing, leisure and tourism are also important locally. The agreed cooperation ensures that negative effects on the Natura 2000 network are reduced to a minimum which cannot increase,

Current scientific knowledge and technology must be taken into account when minimising the negative effects on Natura 2000.

The removal of some of the deficiencies which are particularly noticeable in functional area 2 requires measures in the entire estuary (e.g. the tidal range and sediment problems), or at the level of the Elbe

RBC (e.g. reducing the damage from harmful substances/pollutants). Mention is made here of the measures of the management plan in accordance with Article 11 of the WFD.

A particular focus is the interdisciplinary cooperation with shipping and port administrations. This relates to the following measures:

- Optimising sediment management with the aim of creating sediment flows which decrease the rate of sedimentation and reduce damage to the sediment by pollutants without jeopardising the biological continuity
- Maintaining, and if possible reversing the increased tidal range e.g. by creating new flood plains
- Maintaining and developing suitable rest habitats for fish and lamprey swimming up the river along their migration channel. Passing through the port is associated with stress caused by noise under the water and difficulty with orientation for fish and lamprey swimming up or downstream (sometimes made worse by the turbidity). These disturbances, which are caused by shipping traffic and by the layout of the harbour basin, cannot be reduced without causing considerable limita-

tions to the operation of the power and would therefore not be accepted. Neither Hamburg nor any other large port has given any indications that such disturbances are a key obstacles to migration.

- Preventative measures against the infiltration of invasive species caused by shipping.

Additional measures can only be achieved in collaboration with all relevant interest groups (e.g. HPA, trade and industry):

- Developing and implementing a network of stepping stone habitats for the priority species Elbe water dropwort
- Developing framework conditions which make it possible for the Elbe water dropwort and other plants to temporarily take up residence in a location without limiting or preventing later use
- Determining the significance of nearly natural tide and sediment dynamics for Natura 2000, for the port economy and for additional uses. Determining the need for a Lower Elbe strategy to adapt to the effects of climate change

### B2 4.2.3 Information on studies and environmental monitoring

An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7). For functional area 2, the following aspects are particularly significant:

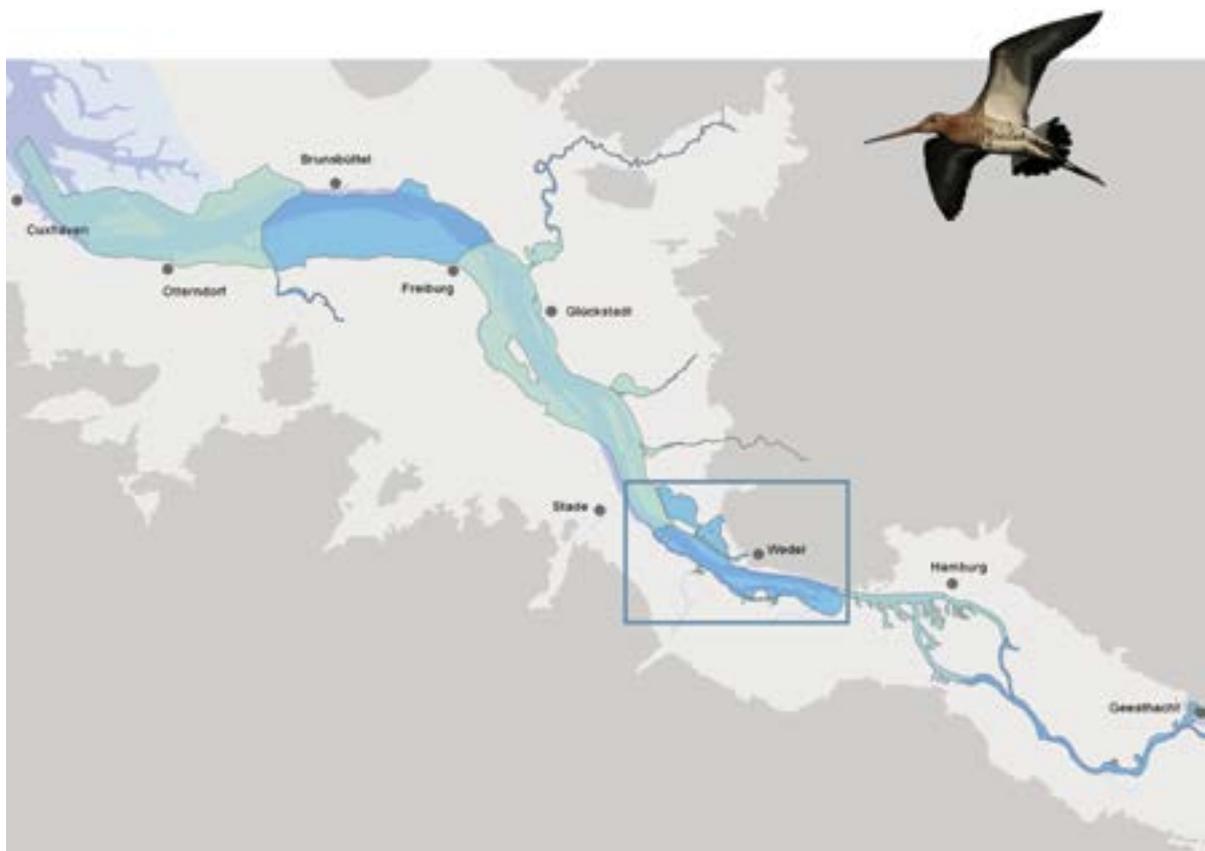
- Monitoring the oxygen levels and nutrient levels in the Elbe and the surrounding areas
- Monitoring the population development of the Elbe water dropworts





I Integrated  
M management plan  
P Elbe estuary

# Functional area 3



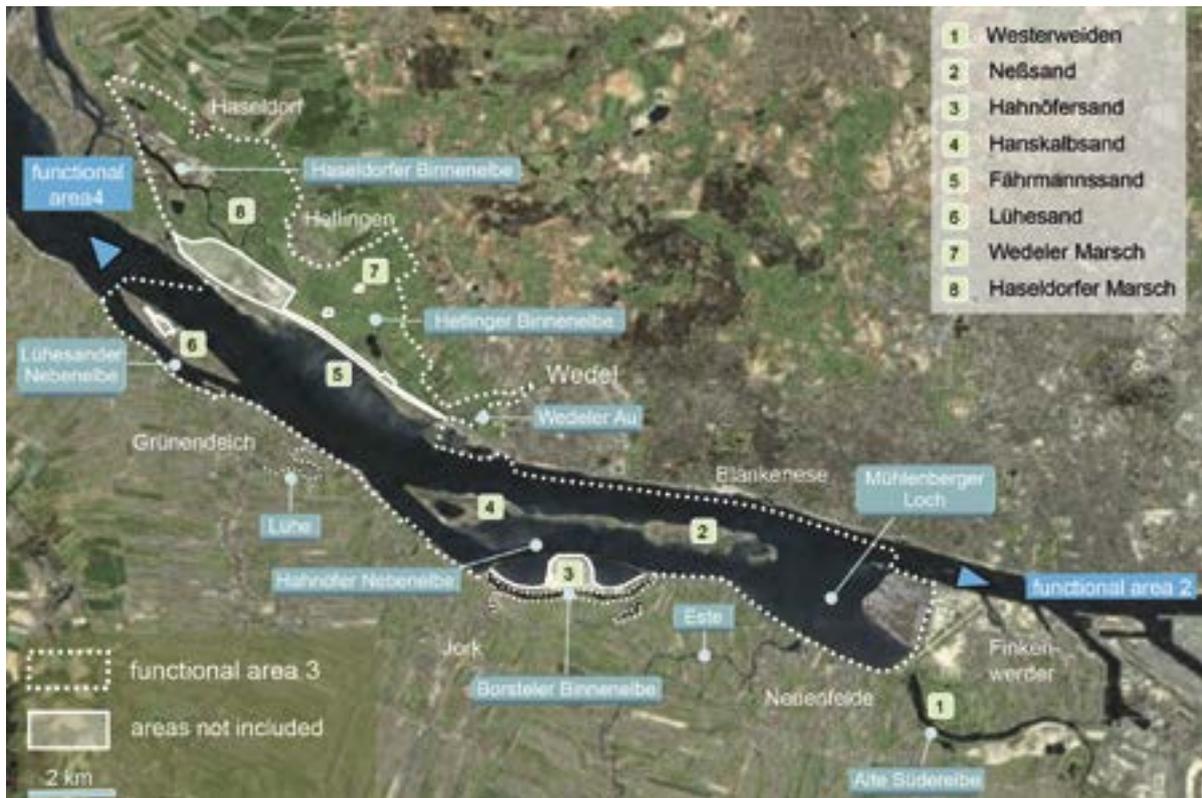
overleaf

Mud flats in Fährmannssander Watt

Alluvial forests at Hanskalbsand on the Hahnöfer Nebelbe

Chequered lily (*Fritillaria meleagris*), a characteristic species of the Elbe meadows

Wedeler Marsch



## B3 1 Overview of functional area 3

Functional area 3 stretches around 17km from Mühlenberger Loch to the northern tip of Lühesand.

Characteristic elements of the river landscape here are extensive mud flats and long islands (Hanskalbsand, Neßsand, Lühesand) and branches (Hahnöfer Nebenelbe, Lühesander Nebenelbe). The forelands are very small. In terms of the land, the main dyke line of the Natura 2000-registered parts of Wedel Marsch and Haseldorfer Marsch (Schleswig-Holstein) and the Borsteler Binnenelbe and the large brackish area (Lower Saxony) surrounds the functional area. Due to their interactions with Natura 2000 sites, the Hamburg conservation areas Westerweiden and Finkenwerder Süderelbe (western section of the Alte Süderelbe) are included in the IMP.

The functional area includes areas of the Hamburg districts of Altona and Harburg, and the counties of Stade (Lower Saxony) and Pinneberg (Schleswig-Holstein).

From east to west, the following landscape elements can be identified:

- The main Elbe is characterised by its use as a shipping channel. The channel is deepened to allow shipping and intensively maintained. Due to its considerable use, the northern bank in the Hamburg area and as far as Wedel is not part of the Natura 2000 area, which in this case only covers the water areas.
- The Mühlenberger Loch was used as a landing strip for sea planes between 1940 and 1941. Since the Alte Süderelbe was dammed, there is no flow to prevent sedimentation. Nowadays, extensive mud flats dominate the artificial side bay.

Despite being partially filled to expand the Airbus factory in 2001, the Mühlenberger Loch is still an important resting place for water birds. At high tide fish can here find oxygen-rich waters.

- The almost 8km long island chain of Schweinesand, Neßsand and Hanskalbsand occurred as a result of filling in the middle of the river. The sandy material that occurred as a result of the excavation of the Mühlenberger Loch in the 1940s was deposited on the available mud and sandbanks. With the exception of a few high areas, the sandy islands are completely flooded when there are high levels of flooding. They are covered with alluvial forests and dry grass and herbaceous vegetation. The northern bank which faces the river is mostly formed as a sandy beach which is free of vegetation. The mud flats are mainly sandy.
- The Hahnöfer Nebelbe has a diverse river flow and a high proportion of shallow water zones. Its banks are lined with copious mixed and mud flats which are sought out by resting ducks in the winter months. The Hahnöfer Nebelbe is particularly important for the fish fauna, especially the twaite shad, as a breeding, nursery and resting area. Since the Hahnöfersand was dyked, the Borsteler Binnenelbe and the large brackish area have been cut off from the tide. The mud flats on Hahnöfersand created as part of the coherence measures carried out between 2002 and 2005 to the partially filling of the Mühlenberger Loch are home to the largest population of the Elbe water dropwort in the Lower Saxony area and west of Hamburg.
- The short tide-influenced lower reaches of the Wedeler Au and the Lühe are part of functional area 3. The barrages at their mouths allow the normal tide to pass. While the Wedeler Au has maintained a mostly near-natural morphology and bank reeds, the banks of the Lühe are mainly fixed. The heather and moor landscape in the upper flow of the Wedeler Au is not part of the working area of the Elbe estuary IMP.
- West of the Wedeler Au, the Fährmannssander Watt begins, which since the Mühlenberger Loch was partially filled in is now the largest fresh water mud flat in Europe. The up to 1km wide mud flat area is protected here by groynes, which stick out a long way into the river. To the west, the mud flats are smaller and shrink back by the port of Hetlingen to a small sandy beach. In the dyked foreland, there are grasslands and small alluvial forests, which are mainly covered in bulrush reeds. The mud flats are a rich source of nutrients for migrating birds. The sandbanks are particularly important as a source of nutrients, and are mainly used by gulls as a resting place.
- The swash sand island of Lühesand and the Lühesander Nebelbe contribute to the structural diversity of the Lower Elbe. The complex made up of an island and a branch does not, however, achieve the expansion and nearly natural character of the Neßsand/Hanskalbsand Hahnöfer Nebelbe-complex. On the southern tip of Lühesand, you can find the so called "Pionierinsel", which is home to a nationally significant breeding colony of common gulls and Mediterranean gulls.
- The Wedeler Marsch and the Haseldorfer Marsch have been dyked since 1976. In the Wedeler Marsch, the influence of the tide reaches up beyond the Hetlinger Binnenelbe and Bullenfluss to Hetlingen, albeit in a weakened form. In contrast, the Haseldorfer Marsch is completely disconnected from the influence of the tide. The grassland areas behind the dyke are often relatively poor in species because of the intensive use which has developed. In the parts of the Haseldorfer Marsch which make up the conservation area, large areas are left for succession. The biggest attraction of the Wedeler Marsch is the chequered lily meadows, which attract many migrating species in spring and offer bird watching opportunities at the Fährmannssand clay withdrawal area.

▼ Table B3.1

Selected abiotic parameters in functional area 3

Length	Km 633 (Mühlenberger Loch) to km 650 (northern tip of Lühesand)
Total area	Total area 5,207 ha
River width	Mühlenberger Loch to Wedel: ca. 0.8km, Wedel to Lühesand: 1.8 to 2 km
Length of the bank <sup>1</sup>	ca. 71km, including: <ul style="list-style-type: none"> <li>• unobstructed: ca. 29.4 km</li> <li>• Replenishment: ca. 1.3 km</li> <li>• only with groynes: ca. 2.9 km</li> <li>• with revetments, with revetments + groynes: ca. 37.4 km</li> </ul>
Distribution of the landscape zones <sup>2</sup>	<ul style="list-style-type: none"> <li>• Dyked areas: 1,618 ha (31.1%)</li> <li>• Foreland: 554 ha (10.6%)</li> <li>• Mud flats (average low tide level to average high tide level): 1,026 ha (19.7%)</li> <li>• Shallow water zones from 2m below average low tide level to average low tide level: 465 ha (8.9%)</li> <li>• Water zones from 10m to 2m below average low tide level: 764 ha (14.7%)</li> <li>• Water zones deeper than 10m under average low tide level: 780 ha (15%)</li> </ul>
Tidal range <sup>3</sup>	3.43 m at Cranz, 3.09 m at Schulau (Wedel), 3.09 m at Hetlingen
Chloride content <sup>4</sup>	Generally less than 0.5‰ (= fresh water), upstream from Wedel above this in some places (= parts very slightly brackish)
WFD water body	Coordination area tidal Elbe: water body Elbe (west) type 22.3 Water body classified as HMWB

<sup>1</sup>): technical contribution waterways and ports 2010: Table 3    <sup>2</sup>): WSA November 2008    <sup>3</sup>): www.bsh.de/aktdat/wvd/elbepegel  
<sup>4</sup>): www.fgg-elbe.de



Mud flats in the Mühlenberger Loch



Fährmannssander Watt and Wedeler Marsch



Hahnöfer Nebenelbe, Neßsand, Hanskalbsand, Hahnöfersand



Lühesand and Lühesand Nebenelbe

▲ Fig. B3.1: Landscape in functional area 3

## B3 2 Natura 2000

The specific Natura 2000 targets for functional area 3 are determined by using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs which occur in the functional area, and the bird species of the SPAs, evaluation of their conservation statuses
- Evaluation of the strengths and weaknesses of the functional areas from the point of view of species and habitats relevant from a Natura 2000 perspective
- Analysis of the interaction with the other functional areas in the estuary
- Development of a Natura 2000 model for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

### B3 2.1 Natura 2000 status

In functional area 3, the Natura 2000 sites of the Elbe estuary in Hamburg, Lower Saxony and Schleswig-Holstein

are made up of four SACs and two SPAs.

▼ Table B3.2

Protected areas in functional area 3

Area category	Area designation
Special Areas of Conservation (SACs)	DE 2424-302 Mühlenberger Loch/Neßsand (HH) DE 2424-303 Rapfenschutzgebiet Hamburger Stromelbe (HH) DE 2018-331 Unterelbe (LS) DE 2323-392 Schleswig-Holsteinisches Elbeästuar und angrenzende Flächen (SH)
EU bird protection areas (SPAs)	DE 2424-401 Mühlenberger Loch (HH) DE 2323-401 Unterelbe bis Wedel (SH)
IBA area	Pinneberger Elbemarschen DE 025 (SH)
Ramsar area	7DE031 Mühlenberger Loch (HH) 7DE030 Schleswig-Holstein Wadden Sea and adjacent areas (SH)
Conservation areas in Natura 2000	CA Neßsand/Mühlenberger Loch (HH) CA Neßsand (SH) CA Neßsand (LS) CA Borsteler Binnenelbe und Großes Brack (LS) CA Hahnöfersand (LS) CA Haseldorfer Binnenelbe mit Elbvorland (SH)
Conservation areas adjacent to Natura 2000 sites	CA Wittenbergen (HH) CA Westerweiden (HH) CA Finkenwerder Süderelbe (HH)
Landscape protection areas in 2000	LPA Lühesand (LS) LPA Pinneberger Elbmarschen (SH)

Hamburg, Lower Saxony and Schleswig-Holstein have defined the habitats in annex I and the species in annex II of the Habitats Directive as objects of protection in the SACs and evaluated their conservation statuses. At the same time the relevant breeding and migrating bird species relevant in accordance with the Birds Directive were identified. The evaluation results given here take into account federal state-specific features and are based on the relevant information given by the three federal states.

An overview of the Natura 2000 protected items which are relevant for all of functional area 3 is given below. Additional information on the basis for the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the "Natura 2000" technical contributions in the federal states' contributions (see part C: materials).

### B3 2.1.1 Special Areas of Conservation (SACs)

The conservation status of the habitat feature "estuaries" (1130) is overall more favourable in the land portions than in the aquatic area. This is primarily due to the frequent lack of oxygen in the main river and the significant hydromorphological characteristics of the majority of the water sections. Only in Hamburg does the "estuaries" habitat have a favourable conservation status.

The priority alluvial forests (\*91E0) are particularly important. In functional area 3, they occur in some places on the islands of Schweinsand, Neßsand and Hanskalbsand, where their conservation status is rated as good, sometimes even excellent. With their vegetation zones typical for estuaries and their alluvial forests, the Hahnöfer Nebenelbe and the Neßsand and Hanskalbsand islands are some of the sections of the Lower Elbe which are closest to their natural states.

▼ Table B3.3

Conservation statuses of the habitats in annex I of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2</sup>	SH <sup>3</sup>
1130	estuaries	B	C	C
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	-	B	-
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	-	B	B
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	-	B	C
91E0	* Alluvial forests with <i>Alnus glutinosa</i> und <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	B C	A	A B
91F0	Riparian mixed forests with <i>Quercus robur</i> , <i>Ulmus laevis</i> , <i>Ulmus minor</i> , <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> (Ulmenion menoris)	-	B <sup>4</sup>	-

\* priority habitat

<sup>1</sup> Standard data sheet, as of September 2010

<sup>2</sup> Elbe estuary IMP, part II, functional area 3, as of September 2011. In Lower Saxony, the habitat type 'estuaries' is currently evaluated using several individual components. The conservation status shown here is a composite view of these individual evaluations.

<sup>3</sup> Standard data sheet, as of March 2009. For Schleswig-Holstein, the status evaluations in the standard data sheet are based on the entire area from the mouth of the Elbe to the Hamburg city limits. The evaluation of the conservation statuses of the habitats is mainly based on the results of the first data capture from 2003. In summer 2010, more data was captured, the results of which are not yet available in an evaluated form.

<sup>4</sup> According to most recent knowledge (standard data sheet, October 2010) riparian mixed forests no longer occur, in the partial contribution from Lower Saxony

(September 2011), however, different assumptions are made.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

The chequered lily meadows in the Wedeler Marsch at Hetlingen represent the habitat type “lowland hay meadows” (6510) which used to be widespread in the Elbe marshes, and have, not least because of their attractiveness for a wide range of people, a particularly high value as part of the PR work related to Natura 2000.

Functional area 3 is currently the most important breeding and nursery area for the twaite shad in the Lower Elbe. According to assessments by LAVES

in Lower Saxony, around 90% of the twaite shad population of the Elbe breed here (see part C, materials). When oxygen levels are low in the main Elbe, the oxygen-rich shallow water zones in the Hahnöfer Nebenelbe are important as a resting area for the twaite shad.

The functional area is also home to the largest current population of the Elbe water dropwort west of Hamburg.

▼ Table B3.4

Conservation statuses of the species in annex II of the Habitats Directive

EU code	Species in annex II of the Habitats Directive	Conservation status		
		HH <sup>1</sup>	LS <sup>2</sup>	SH <sup>3</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	B	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	B	C	B
1103	Twaite shad ( <i>Alosa fallax</i> )	B	C	B <sup>4</sup> C <sup>4</sup>
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	C	C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>5</sup>	D <sup>5</sup>	D <sup>5</sup>
1130	Asp ( <i>Aspius aspius</i> )	B	C	B
1351	Harbour porpoise ( <i>Phocoena phocoena</i> )	-	C <sup>6</sup>	-
1365	Seal ( <i>Phoca vitulina</i> )	-	B <sup>6</sup>	A <sup>6</sup>
1601	*Elbe water dropwort ( <i>Oenanthe coniooides</i> )	C	C <sup>7</sup>	C

\* priority species (M): The estuary is used by this species as a migration channel.

<sup>1</sup> Standard data sheet, as of September 2010

<sup>2</sup> Elbe estuary IMP, part II, functional area 4, as of September 2011,

<sup>3</sup> Standard data sheet (as of March 2009)

<sup>4</sup> Bioconsult 2010

<sup>5</sup> The population of the houting is categorised as not significant in agreement with the federal states HH, SH and LS, see “Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4” on the results of the marine Atlantic conference in Galway (24-25 March 2009).

<sup>6</sup> The conservation status of the species is only evaluated for the entire SAC, but not for the individual functional areas.

<sup>7</sup> According to the most recent standard data sheet (as of October 2010), the conservation status taking into consideration the Hahnöfersand is classified as B, in the technical contribution from Lower Saxony (September 2011), it was still classified as conservation status C.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B3.2  
Mud flats and reeds (habitat type 1130)



Tidal alluvial forests rich in tall herbaceous vegetation (priority habitat \*91E0)



▲ Fig. B3.3

Chequered lily meadows (habitat 6510) mature fruit of the Elbe water dropwort  
Bottom: twaite shad (left male, right female)

### B3 2.1.2 Special Protection Areas (SPAs)

The birdlife in functional area 3 reflects the diversity in landscape structure. The areas which have proven to be most valuable for bird protection are in the Hamburg and Schleswig-Holstein areas.

In the Wedeler Marsch, endangered species of waders such as the black-tailed godwit and the common snipe breed. The population of the lesser spotted crane is an unusual feature. The reed and wood-covered Haseldorfer Marsch also offers birds of prey such as the white-tailed eagle and the red kite suitable breeding habitats. The conservation status of the breeding birds is overwhelmingly favourable in functional area 3.

The functional area is also important for migrating birds. Almost all of the little gulls and black terns resting in the Elbe estuary are concentrated in the river section between Mühlenberger Loch and Lühensand.

The fact that the open grassland is adjacent to the marsh and that there are extensive mud flats with sleeping areas in the forelands makes the area attractive to Nordic geese and swans. Ducks such as the shelduck, the teal and the northern shoveller are also characteristic, and prefer the water areas outside of the strong flow.

The conservation status of the migrating birds in functional area 3 is overwhelmingly favourable. The northern shoveller, however, is in decline in the entire estuary west of Hamburg. In functional area 3, this development is due to a decline in the quality of the habitat, which was caused by a decrease in the shallow water areas and changes to the nature of the mud flats. Some of the migrating bird species given in Table B3.6 such as the bar-tailed godwit and the grey plover only occur sporadically in the inner estuary.

▼ Table B3.5

Conservation statuses of the breeding bird species in functional area 3

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
Common snipe ( <i>Gallinago gallinago</i> )	–	–	B
White-spotted bluethroat ( <i>Luscinia svecica</i> )	•	–	B
Kingfisher ( <i>Alcedo atthis</i> )	•	–	B
Lapwing ( <i>Vanellus vanellus</i> )	–	–	B
Black-headed gull ( <i>Larus ridibundus</i> )	–	–	–
Red-backed shrike ( <i>Lanius collurio</i> )	•	–	B
Bittern ( <i>Botaurus stellaris</i> )	•	–	C
Eurasian marsh harrier ( <i>Circus aeruginosus</i> )	•	–	B
Red kite ( <i>Milvus milvus</i> )	•	–	B
Redshank ( <i>Tringa totanus</i> )	–	–	B
Hedge warbler ( <i>Acrocephalus schoenobaenus</i> )	–	–	B
White-tailed eagle ( <i>Haliaeetus albicilla</i> )	•	–	B
Common gull ( <i>Larus canus</i> )	–	–	–
Spotted crane ( <i>Porzana porzana</i> )	•	–	B
Black-tailed godwit ( <i>Limosa limosa</i> )	–	–	B
Corncrake ( <i>Crex crex</i> )	•	–	B
White stork ( <i>Ciconia ciconia</i> )	•	–	B

<sup>1</sup> Standard data sheet on the bird protection area Mühlenberger Loch (as of March 2009)  
<sup>2</sup> Avifaunistik Schleswig-Holstein 2007

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

▼ Table B3.6

Conservation statuses of the migrating bird species in functional area 3

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
Dunlin ( <i>Calidris alpina</i> )	–	–	B
White-fronted goose ( <i>Anser albifrons</i> )	–	–	B
Shelduck ( <i>Tadorna tadorna</i> ) <sup>3</sup>	–	A	B
Spotted redshank ( <i>Tringa erythropus</i> )	–	–	B
Common tern ( <i>Sterna hirundo</i> )	•	B	B
Eurasian golden plover ( <i>Pluvialis apricaria</i> )	–	–	B
Greylag goose ( <i>Anser anser</i> )	–	–	C
Eurasian curlew ( <i>Numenius arquata</i> )	–	–	B
Greenshank ( <i>Tringa nebularia</i> )	–	–	B
White swan ( <i>Cygnus olor</i> )	–	–	B
Ruff ( <i>Philomachus pugnax</i> )	•	–	B
Lapwing ( <i>Vanellus vanellus</i> )	–	–	B
Grey plover ( <i>Pluvialis squatarola</i> )	–	–	B
Teal ( <i>Anas crecca</i> )	–	A	B
Black-headed gull ( <i>Larus ridibundus</i> ) <sup>3</sup>	–	A	–
Northern shoveller ( <i>Anas clypeata</i> )	–	C	B
Bar-tailed godwit ( <i>Limosa lapponica</i> )	•	–	B

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
Pied avocet ( <i>Recurvirostra avosetta</i> )	●	–	B
Common ringed plover ( <i>Charadrius hiaticula</i> )	–	–	B
Whooper swan ( <i>Cygnus cygnus</i> )	●	–	B
Pintail ( <i>Anas acuta</i> )	–	B	B
Common gull ( <i>Larus canus</i> ) <sup>3</sup>	–	B	–
Black tern ( <i>Chlidonias niger</i> )	●	B	B
Barnacle goose ( <i>Branta leucopsis</i> )	●	–	B
Little gull ( <i>Larus minutus</i> )	–	B	B
Tundra swan ( <i>Cygnus columbianus</i> )	●	–	B

<sup>1</sup> Standard data sheet for the bird protection area Mühlenberger Loch (as of March 2009)  
<sup>2</sup> Avifaunistik Schleswig-Holstein 2007  
<sup>3</sup> The species is not named as a conservation objective in the CA regulation (as of 18 October 2005). According to current technical evaluations, it is to be treated as a conservation objective.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B3.4 Breeding bird species in functional area 3: white stork, spotted crake, red kite



▲ Fig. B3.5 Migrating bird species in functional area 3: little gull, northern shovellers, barnacle geese

### B3 2.1.3 Strengths and weaknesses of the functional area

Overall, the essential elements of a nearly natural estuary landscape (shallow water areas, mud flats, reeds, tidal alluvial forests and extensively used grasslands) are present in the functional area, but

they have both qualitative and quantitative deficiencies which are mainly due to the behaviour of the river and sedimentation in the tidal Elbe which is increasingly far from the natural state.

In functional area 3, the hydrological effects of the continued expansion of water areas are particularly evident. The maintenance of the federal waterways requires a great degree of dredging and deposits.

In the summer months, the area is characterised by a lack of oxygen. On the other hand, the deposits on the routing islands have made it possible to maintain branches with varied current patterns and nearly natural bank zones. The shallow water areas beyond the main flow of the river are a condition for the successful reproduction of the twaite shad despite the lack of oxygen and vastly altered current patterns. The Hahnöfer Nebelbe and the Mühlenberger Loch also take on an important reserve function

for other fish species typical for the estuary when there are unfavourable conditions in the main river. The habitat conditions for the priority species Elbe water dropwort are favourable in the Hahnöfersand and Neßsand areas, but otherwise they are greatly limited by the highly fixed areas of the bank. The nearly natural grassland areas in the Wedeler Marsch and the Haseldorfer Marsch are particularly important for birdlife.

From an analysis and evaluation of the populations of species and habitats relevant for Natura 2000 in connection with the characteristic location factors, the following strengths and weaknesses of the functional area arise (table B3.7):

#### ▼ Table B3.7

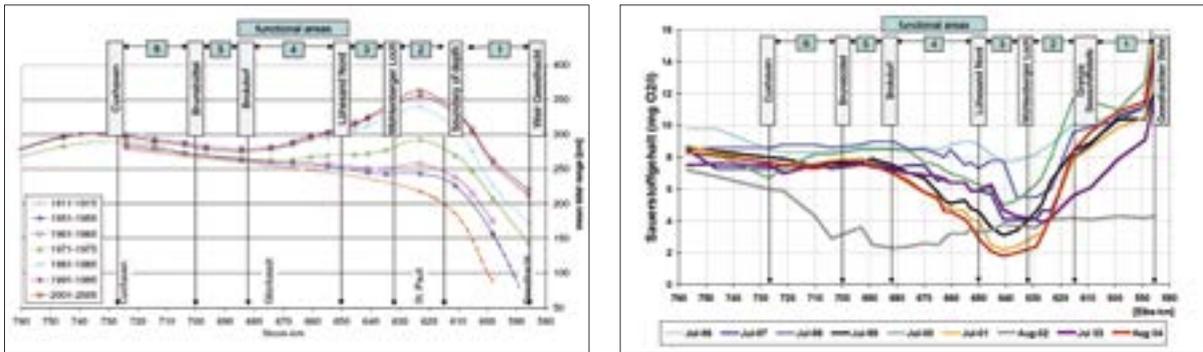
Overview of the strengths and weaknesses of functional area 3

##### Particular strengths

- Elbe tributaries (Hahnöfer Nebelbe, Lühesander Nebelbe) and side bays affected by the flow (Mühlenberger Loch) with large shallow water areas and retreat areas for aquatic species
- Main breeding area for the Elbe population of twaite shad and the largest spatially separate nursery area for the early stages in twaite shad development (Mühlenberger Loch and Hahnöfer Nebelbe)
- Main breeding and nursery area for the smelt (together with functional area 4) (characteristic species of habitat type 1130: estuaries)
- tidal alluvial forests on the islands which are typical for the estuary
- largest connected fresh water mud flats in Europe in a complex with large grassland areas: particularly significant for bird species which are dependent on the combination of both habitat types
- largest resting population of key species in the Elbe estuary (particularly teal and northern shoveller)
- largest population of Elbe water dropworts west of Hamburg
- large population of chequered lily meadows (Wedeler Marsch)
- increasing proportion of cultivated grassland areas which conform with the targets (Wedeler Marsch and Haseldorfer Marsch)

##### Particular weaknesses

- Situation at the lowest point of the oxygen deficiency zon of the tidal Elbe, for some years also a decrease in the summertime oxygen content in the Hahnöfer Nebelbe
- Significantly altered water morphology, particularly through the adaptation of the Lower Elbe to container shipping
- Anthropogenously altered tidal range, damaged sediment balance and very intensive maintenance in the channels (flow excavations)
- Advancing loss of shallow water areas and flood plains
- Degradation of the mud flats: sandy mud flats in the Mühlenberger Loch, over-sanding of the mud flats at Fährmannssander Watt
- high proportion of nearly natural banks (e.g. on Lühesand)
- small foreland areas (supralittoral of the estuary)
- branches of the Elbe which are cut off from the tide and mostly standing (Haseldorfer Binnenelbe, Borsteller Binnenelbe) or have limited tidal impact (Hetlinger Binnenelbe)
- in some areas, disturbances caused by leisure activities (Haseldorfer Marsch, Wedeler Marsch)



▲ Fig. B3.6  
The change in the tidal range (left) and the oxygen concentration in July and August (right) is particularly critical in functional area 3.



▲ Fig. B3.7  
Examples of areas which are particularly important for Natura 2000 or show development potential  
above: alluvial forests and reeds at the Hahnöfer Nebeneibe, bottom left: sand and mud banks on the Hahnöfer Nebeneibe, bottom right: Haseldorf Binneneibe

### B3 2.2 Interactions with other functional areas

As a result of channelling the river, the damaged sediment balance and the recurrent lack of oxygen in the summer, they key problems in functional area 3 originate in the changed hydromorphology of the entire tidal Elbe and in the material input into the

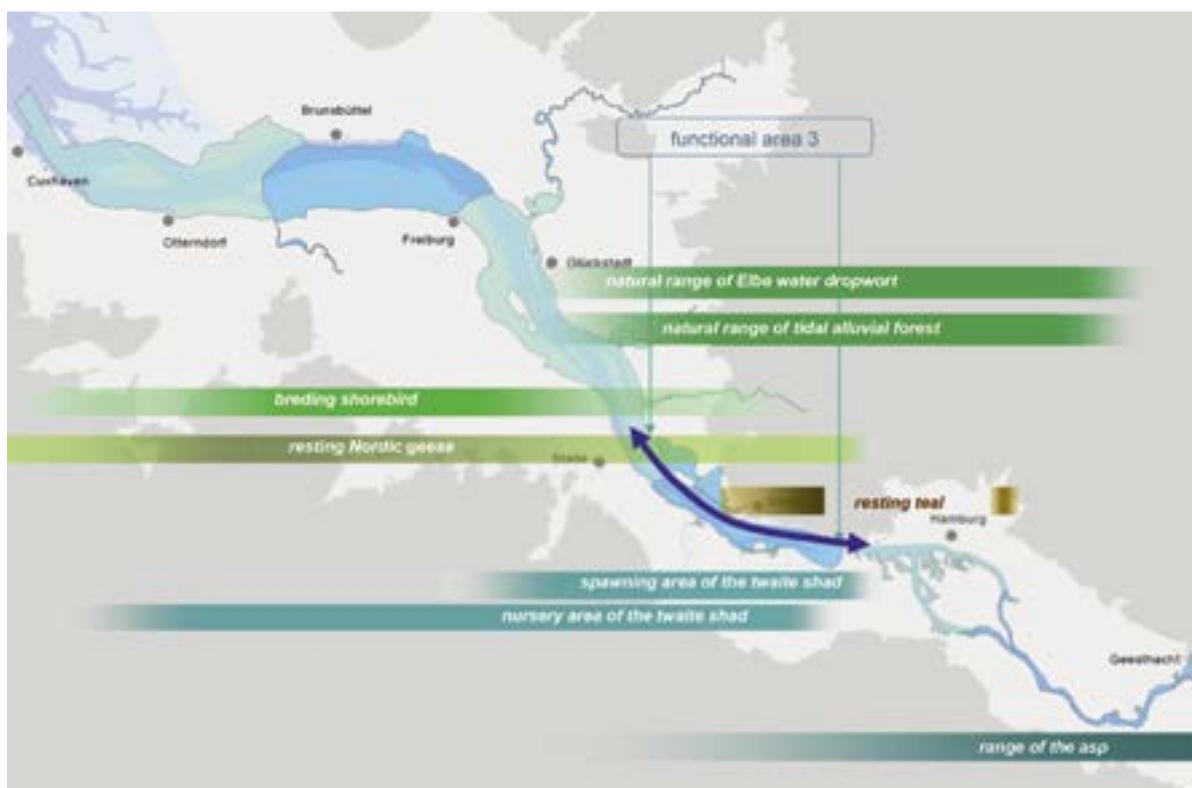
river area. The lack of oxygen in the summer in functional area 3 is significant for other areas of the estuary. In times of severe oxygen decrease, the biological continuity of the Lower Elbe is interrupted.

In addition to its connective function (e.g. for migrating fish and lamprey), functional area 3 has particularly high levels of interaction with adjacent functional areas.

Functional areas 3 and 4 are characterised by limnic to periodically slightly brackish conditions, and carry out comparable functions for the aquatic biocoenosis. This connection is still expressed in many ways today, including in the status of the most important breeding and nursery areas for twaite shad and smelt. It can also be recognised in the spatial distribution of the Elbe water dropworts and the tidal alluvial forests. The increase in the tidal range has pushed the upper limits of the estuary upstream.

The lowland alluvial forests there have taken on a character which is particularly affected by the tide. In the course of this development, the commonalities between functional areas 1 and 3 have increased.

The pattern of use for most of the breeding bird species and bird protection areas are affected by the land used in the marshes. Functional area 3 is part of the network of water areas, mud flats and grasslands which are used alternately by resting birds and hibernating migrating birds. The Holzhafen in the Port of Hamburg has taken on a role as the resting areas for shelducks, teals and northern shovellers, as this role can only partially be carried out by Mühlenberger Loch since parts of it were filled in during 2001.



▲ Fig. B3.8

Situation in functional area 3 taking into account important focal points of functions relevant to Natura 2000

### B3 2.3 Natura 2000 models

If the entire Lower Elbe is looked at together, the section of the Elbe from Mühlenberger Loch to Lühesand achieves particular functions for Natura 2000 which cannot be achieved by any other functional area.

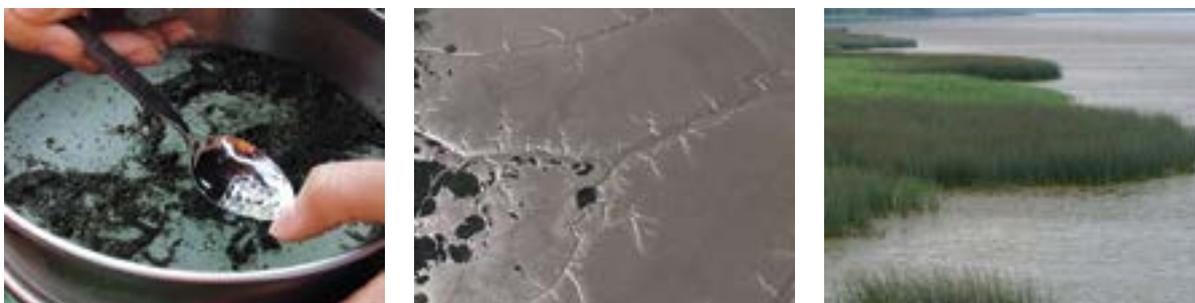
#### Aquatic habitats and mud flats

The target oxygen concentration is 6mg O<sub>2</sub>/l. While the aquatic biocoenosis in the main river is not supplied with sufficient oxygen, the open, biologically continuous and nutrient-rich branches and side waters affected by the tide provide very important alternative habitats. Mud flats and water areas of different depths, flow intensities and substrate sensitivities are present in a nearly natural ratio.

The plankton and benthic populations are diverse and comprise large numbers of species. Young fish

The maintenance and development of these functions is the focus of the model, which describes the target state of the essential landscape elements in the future.

find sufficient nutrient-rich water areas which are protected from the flow of the river and extensive reed areas. The underwater embankment in front of Neßsand and Hanskalbsand continues to carry out an important function as a breeding ground for the twaite shad. Young twaite shad find suitable nursery habitats in the adjacent oxygen and nutrient-rich shallow water areas of the Mühlenberger Loch, the Hahnöfer Nebenelbe and the Lühesander Nebenelbe.



▲ Fig. B3.9 Twaite shad eggs, nearly natural mud flats and reeds

#### Alluvial forests and wooded alluvial landscapes

On the Elbe islands and surrounding the Mühlenberger Loch, alluvial forests and alluvial forests edges form. At the mouth and in the lower section of the Wedeler Au, sparsely populated forests dominate the landscape. Nearly natural banks with structurally rich reeds and alluvial forests contribute to the long-term protection of a sufficiently large metapopulation of

the Elbe water dropwort. In parts of the Haseldorfer Marsch, a landscape has formed in which there are many breeding possibilities for water birds. Large birds such as the white stork, various heron species, short-eared owls and various birds of prey are found here in high numbers.

#### Meadows and pastures

The fact that there are large expanses of water, mud flat and grassland areas which have low levels of dis-

turbance situated next to one another is important for the area's role as a rest area for birds. This is

particularly important in the Schleswig-Holstein part of the functional area. The grasslands of the Wedeler marsch and the Haseldorfer Marsch which are covered in trenches and tidal inlets are mostly grazed. On some of the areas, hay meadows and hay pastures typical for the landscape are formed with chequered lilies or meadow barley (habitat type 6510).

In accordance with the traditional image of the cultivation landscape, the marshes are affected by the tide again. In keeping with the requirements of the economy, social and culture and regional and local distinctiveness, the first dyke line on the right-hand side of the Elbe has been moved.



▲ Fig. B3.10 Elements of the model for wooded sections of the landscape (left Schweinsand and Neßsand, right Haseldorfer Marsch)



▲ Fig. B3.11 Model for open marshes (left Wedeler Marsch with the farm Fährmannsand, right Klappertopf meadow near Haseldorf)

### B3 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based in the capture and evaluation of the current situation in the population. They implement the models in concrete spatial and protected item target formulations.

These general management targets define the framework for the integrated target and measure concept for the functional area. The detailed, connected conservation objectives for the individual Natura 2000 sites can be found in the contributions from the federal states.

Those functions which are currently only carried out in the section from Mühlenberger Loch to Lühesand are particularly important for area management in functional area 3.

In the water and bank area (sublittoral and littoral), the focus is on factors which are key to oxygen supply and sediment characteristics. In the land area (supralittoral), it is mainly the grasslands that require care. Correspondingly, the following management targets apply to functional area 3:

- Improving the hydromorphological habitats condition for the estuary habitat type (1130), maintaining and restoring a dynamic which is typical for the estuary, as far as possible taking into consideration the framework conditions
- Maintaining and further developing populations of reeds, tall herbaceous vegetation (6430) and the priority tidal alluvial forests (\*91E0, especially on the islands) which are typical for the estuary
- Maintaining, restoring and developing grassland areas with vegetation which is typical for the Elbe and lowland hay meadows (6510), taking into account their avifaunal functions
- Maintaining and in some cases restoring the population of the priority species Elbe water dropwort with a dynamic typical for the species, particularly on the islands of Neßsand and Hahnöfersand and on Hahnöfersand; developing additional habitats to improve the habitat network
- Maintaining and restoring the importance of the functional area for twaite shad reproduction
- Maintaining and in some cases restoring and developing the breeding function, particularly for species in the extensively used hydrophilous grassland, the large reed beds and the grassland-ditch complexes in the marshes in the relevant habitats
- • Maintaining and developing the rest function, particularly for Nordic geese and swans and many wader species on extensive grassland areas which have low levels of disturbance
- • Maintaining the resting populations of ducks (including the northern shoveller), gulls and terns

## B3 3 Uses and usage targets

The Lower Elbe in functional area 3 is primarily characterised by its use as a waterway. Important dredging locations are found in front of Fährmannsand and at Wedel, where sediment is being captured. Repositioning works are located at Neßsand and in the section from the mouth of the Lühe to Hetlinger schanze (see technical contribution "waterways and ports" in part C: materials).

The foreland areas are small. Larger forelands which are used more intensively for agriculture (Mojenhörn near Grünendeich, Lower Saxony) are outside of the boundaries of Natura 2000. The Elbe islands are mainly unused. The campsite on Lühesand is not part of the region.

Grassland areas which are used intensively for agriculture can be found in the dyked Wedeler Marsch and the Haseldorfer Marsch. In the past ten years, the proportion of areas used intensively for agriculture has decreased, since large areas are being transformed for more natural uses as part of the compensation measures.

With the Airbus factory in Finkenwerder and the Siemas shipyard at the mouth of the Este, the major industrial locations are concentrated around Mühlenberger Loch. Another central point for commercial use is the city of Wedel (including a boat builder's yard and a coal power station). There are ferry connections between Blankenese and the Este barrage and between Wedel and Grünendeich.

Due to the close proximity of the large town, water sports and other recreational activities are particularly important in functional area 3. The Hamburg marina in Wedel, the Finkenwerder marina and the port at Schulau are the largest marinas in the Lower Elbe. On the Lower Saxony side, the marina on the former pioneer land at Steinkirchen is the largest recreational marina in the functional area. There are popular cycle paths and walkways on the Elbe dyke.

The following table gives an overview of the interests and uses which are important at the functional area level for Natura 2000. Information on important local uses can be found in the contributions from Hamburg, Schleswig-Holstein and Lower Saxony.

▼ Table B3.8

Current interests and uses relevant to Natura 2000 in functional area 3

Natura 2000-relevant uses/interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>• The Elbe is a priority area for Natura 2000 and a priority area for shipping (Lower Saxony Regional Planning Programme)</li> <li>• Recreational area, marinas in Neuenschleuse and Siebenhöfen, water skiing areas in the Lühesander Nebeneibe, energy connections crossing the Elbe and ferry connections on the Elbe (Stade County Regional Planning Programme)</li> <li>• Area of particular significance for nature and recreation. Natura 2000 sites (SH)</li> <li>• Water areas, naturally defined areas, channels are part of the port area (HH, Land Development Plan)</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Ecological region 14 (central lowland); Elbe river area unit; tidal Elbe production area; surface water bodies: Elbe (west), classified as a heavily modified water body</li> <li>• Lühe, Wedeler Au tributaries (marsh waters) also classified as HMWB</li> <li>• Hetlingen sewage works, Hamburg Water Works (HWW) in Wedeler Marsch</li> <li>• Irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Main dyke mostly protected by small foreland, some dams (e.g. above the mouth of the Lühe); dykes mainly earth dykes, in some places as flood protection systems in areas where there are technical construction works</li> <li>• Flood barrages: Este, Wedeler Au and Lühe</li> <li>• Drainage of the Natura 2000 sites and the surrounding marshes carried out in part by sluices and pumping stations</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Sea shipping on the Elbe federal waterway</li> <li>• dredgings mainly at Wedel but also at Lühesand, deposits at Lüheort and Hetlingen (retrospective, as there have been deposits in other functional areas and outside of the planning area of the IMP)</li> <li>• Bank maintenance carried out by Water and Shipping Administrations</li> <li>• Signs of shipping, radar station at Neßsand, massive port in Wedel, "Willkomm-Höft" welcoming station in Schulau</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• LS: areas used for agriculture ca. 21 ha ( HD basic assessment in Lower Saxony)</li> <li>• SH: areas used for agriculture ca. 543 ha; intensive use primarily as a grassland, increasing proportions of areas which have uses that are compatible with Natura 2000 ensures part of the compensation measures, agricultural operations in Wedeler Marsch (Fährmannssand, Giesensand, Idenburg)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Commercial fishing: net fishing along the edge of the river, secondary fishing (weirs, anchor nets) in the bank region</li> <li>• Recreational fishing, angling on the banks and from boats</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• HH: –</li> <li>• LS: 5 hunting areas</li> <li>• SH: hunting carried out in parts of the Wedeler Marsch</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Elbe is crossed by two 220 and 380 kV power lines</li> <li>• Ferry connections from Wedel to Lühe, Este barrage to Blankenese/Landungsbrücken</li> <li>• Airbus factory with landing area in Finkenwerder, Sietas shipyard, industrial area in Wedel (outside of the Natura 2000 sites)</li> <li>• Wedel power station (removing and adding cold water)</li> </ul>

Natura 2000-relevant uses/interests	Short description
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Model project: Maritime Landscape of the Lower Elbe run by the Hamburg metropolitan region, various tourism concepts</li> <li>• Water and beach tourism: bathing on the sandy banks (Blankenese, Wittenbergen, beach in Wedel, beach on the Hetlingen entrenchment, beach at Hanskalbsand), tents on Hanskalbsand</li> <li>• Sports boats: kayaking, canoeing, sailing, motor boating</li> <li>• Marinas in Mühlenberg, Blankenese and Schulau, Neuenschleuse and Siebenhöfen, and in Wedel and the Hetlingen entrenchment, regatta areas in the Mühlenberger Loch</li> <li>• Walking and cycling, flying kites (special dyke section near Fährmannssand)</li> </ul>

The members of the planning groups defined their targets and intended uses for functional area 3 which are given below in short form. For additional information, see part C: materials. The targets given generally consist of continuing existing activities, but in some cases there are intentions beyond this.

In accordance with the current situation, shipping dominates the intended uses. When the requested channel adaptation in the Lower and Outer Elbe is carried out in functional area 3 at Neßsand/Hanskalbsand, a "meeting place" for large sea ships will be set up

▼ Table B3.9 (part 1)

Usage targets in functional area 3

Uses	Short description of the targets for functional area 3
Regional planning	<ul style="list-style-type: none"> <li>• Coordination of the various usage requirements from a federal state regional and construction planning perspective in terms of a sustainable and resource-efficient development of the area (LS/SH)</li> <li>• Expanding the Este opposite the Sietas shipyard in Neuenfelde (HH)</li> </ul>
Water management/ Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential in terms of the biological quality components and the targets for hydromorphological and physical/chemical quality components in the surface water bodies Elbe (west) and the marsh waters Lühe, Este and Wedeler Au</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Taking into account future requirements to increase and strengthen flood protection in all planning.</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Economic maintenance as necessary of the channels and banks</li> <li>• Adapting the banks of the Lower and Outer Elbe for container ships which are 14.5m deep</li> <li>• Creating and operating a meeting place between 636km and 644km (Neßsand/Hanskalbsand section)</li> <li>• Minimising sediment damage</li> <li>• Minimising or stabilising maintenance expenditure, maintenance all year round of the sediment deposit in front of Wedel, maintaining the channels to the Este barrage through the Mühlenberger Loch, continuing the use of the transfer location at Neßsand with reduced impact if possible</li> <li>• Implementing the river engineering and sediment management concept set out by the HPA and the WSV</li> <li>• Reducing the increased tidal range, if possible reversing the trend</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>

## ▼ Table B3.9 (part 2)

Usage targets in functional area 3

Uses	Short description of the targets for functional area 3
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of productive agriculture in the various management forms in suitable production areas</li> <li>• Contractual nature conservation of cultivation in line with nature conservation, avoiding unnecessary restrictions</li> <li>• Not using agricultural areas for compensation measures in Schleswig-Holstein</li> <li>• Using the non-valuable straw from extensively used grasslands and other grassland areas to produce energy</li> <li>• Keeping horses</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, e.g. expanding the Borstel ports and the Lühe jetty</li> <li>• Continuing the previous use of the sailing area in the Mühlenberger Loch</li> <li>• Measures to prevent silting in the ports</li> <li>• Improving of the offers for ferry passengers, expanding excursion trips</li> <li>• Expanding the camp sites (development potential in the Pinneberger Elbmarshen in particular)</li> <li>• Expanding the number of youth hostels by providing a second youth hostel</li> </ul>

## B3 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B3 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

Due to the unfavourable status of the Elbe in functional area 3, measures with a positive effect in the aquatic area are particularly relevant. From a Natura 2000 perspective, important synergies arise from river engineering measures which reduce the tidal range. On the other hand, significant conflicts cannot be ruled out when the interests of nature conservation are not taken into consideration sufficiently well in the planning and implementation of such measures.

The links between wave action cause by ships and the change in sediment at the mud flats have to be clarified.

A large proportion of the grassland areas in the functional area are already cultivated taking into account the nature conservation requirements. In principle, it has been established that cooperation is advantageous for both sides. On an individual basis, however, conflicts can arise between the requirements for nature conservation and the business considerations of the agricultural operations. Generally, individual solutions should be developed in this instance.

Due to its close proximity to the large city, the functional area is particularly significant for leisure and recreational activities. The frequent visits mean that public communications regarding the significance of Natura 2000 could potentially reach large numbers of people, but on the other hand the rush of people trying to relax could be associated with disturbance and damage which may, for example, threaten sen-

sitive breeding bird species. In order to avoid conflicts between the Natura 2000 management targets and the continually changing types of leisure and recreational activities, a continual adaptation of information and guidance measures is required.

#### Conclusion

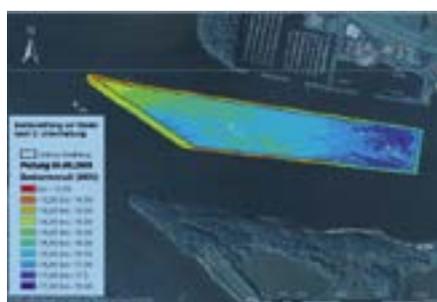
The analysis of the synergies and conflicts shows that in functional area 3, with its broad range of uses, there is a particular need for coordination with various interest groups.

Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. If the uses are not adapted to conform with Natura 2000, the management targets set out (see chapter B3 2.4) will probably not be achieved. This applies to both the aquatic part of the functional area and the grassland areas in the Wedeler Marsch and the Haseldorfer Marsch.

▼ Table B3.10

Important tasks of cooperation between the uses and interest groups found in functional area 3

Natura 2000-relevant uses / interests	Focus of cooperation
Regional planning	<ul style="list-style-type: none"> <li>No need for action</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>Designing and implementing agreed measures from the range of suggested measures for the tidal Elbe</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>Minimising disturbance of Natura 2000 protected items caused by maintenance work. The coordination carried out to date should be continued.</li> <li>When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary with its flood plains</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>Optimising maintenance and operation of the waterways taking into account Natura 2000: including minimising the amount of maintenance, taking into account the distribution of particular features and functions (particularly the breeding and nursery area of the twaite shad), reducing the wave action</li> <li>Cooperation especially to create additional flood plains</li> <li>Optimising the bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the protection of species and biotopes</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>Continuing cooperation with agricultural operations, especially in the case of grassland</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>Continuing cooperation to ensure hunting is carried out in a manner compatible with Natura 2000</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>Minimising the risk of birds colliding with power lines</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>Using and if necessary expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerately as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> </ul>



▲ Fig. B3.9

Examples of the need for cooperation between Natura 2000 and uses in functional area 3

Sediment deposits in front of Wedel, Elbe crossing 1: 220 kV power line across the Elbe, use of grassland

## B3 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level.

They are supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures (see chapter A5).

### B3 4.2.1 Suggested measures for functional area 3

At the measure level, the relevant planning responsibilities in the three federal states must be taken into account.

For Hamburg and Schleswig-Holstein spatial, concrete individual measures (FA 3 measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

The two following lists contain the suggested measures for Hamburg, Lower Saxony and Schleswig-Holstein. Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been presented from the original contributions without being changed.

For Lower Saxony, spatial, concrete measures and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

#### ▼ Table B1.11 (part 1)

Measure areas and suggested measures for functional area 3 in Hamburg and Schleswig-Holstein

Number	Title
<b>Hamburg</b>	
FA 3.1 HH/SH	Mühlenberger Loch
FA 3.2 HH/SH	CA Westerweiden and CA Finkenwerder Süderelbe
FA 3.3 HH/SH	Neßsand and Schweinesand
FA 3.4 HH/SH	Restoring an open sandbank in Blankenese
FA 3.5 HH/SH	Expanding the Elbe meadows in CA Wittenbergen
FA 3.6 HH/SH	Optimising the open filter metering pumps on the former water works site in Blankenese (Bausberg)
<b>Schleswig-Holstein</b>	
FA 3.7 HH/SH	Wedeler Au: maintaining the possibility of experiencing nature near the city
FA 3.8 HH/SH	Restoring the ability of lamprey to pass through the Wedel mil
FA 3.9 HH/SH	Settling the Elbe water dropwort at Wedel
FA 3.10 HH/SH	Maintaining the applicable closed water status at the flood barrage at the mouth of the Wedeler Au
FA 3.11 HH/SH	Maintaining hay meadows at Scharenberg (Wedeler Marsch)
FA 3.12 HH/SH	Maintaining the mud flats and structurally rich reeds at the Fährmannssander Watt
FA 3.13 HH/SH	Maintaining breeding and resting bird habitats by grazing in the Fährmannssand foreland area
FA 3.14 HH/SH	Maintaining and promoting diverse breeding bird populations in the Giesensand area
FA 3.15 HH/SH	Maintaining resting areas which have low levels of disturbance in Wedeler Marsch
FA 3.16 HH/SH	Maintaining and promoting lowland hay meadows with chequered lilies in the Wedeler Marsch and in the Haseldorfer Marsch

## ▼ Table B1.11 (part 2)

Measure areas and suggested measures for functional area 3 in Hamburg and Schleswig-Holstein

Number	Title
<b>Schleswig-Holstein</b>	
FA 3.17 HH/SH	HH/SH Using the river in the area around the Hetlinger Schanze
FA 3.18 HH/SH	Alluvial landscape at the Haseldorfer Marsch (development in dyked area)
FA 3.19 HH/SH	Expansion of the Haseldorf foreland by moving the first dyke line back
FA 3.20 HH/SH	Improving the breeding ground for the white stork
FA 3.21 HH/SH	Defusing the danger of birds colliding with the power lines
FA 3.22 HH/SH	Maintaining protection zones free from disturbances around the breeding grounds of endangered birds of prey
FA 3.23 HH/SH	Strategy for dealing with leisure activities which cause high levels of disturbance (together with functional area 4)
FA 3.24 HH/SH	Improving the information available on the diversity of species in the estuary, with a particular focus on the flora
FA 3.25 HH/SH	Expanding the range of nature experiences on offer

## ▼ Table B1.12

Suggested measures for functional area 3 in Lower Saxony

<b>Sphere of action 1: Developing concepts/plans</b>	
1.2	Restoring habitat structures typical for the habitat (hydrology, morphology) – technical requirements for the implementation of the river engineering and sediment management concept (HPA & WSA 2008)
1.3	Integration of Natura 2000 interests into the ongoing maintenance of the Elbe (excavation, revetments)
1.4	Integration of the Natura 2000 interests into the ongoing bank maintenance
<b>Sphere of action 3: Concrete habitat and species protection measures</b>	
3.1	Developing biotope types and species typical for the estuary by removing species from the Elbe islands
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SAC in the Lower Elbe which currently have lower surface proportions (supralittoral)
3.6	Measures to promote the development of alluvial forests
3.11	Measures to maintain and promote the Elbe water dropwort population
3.19	Measures to promote areas with low disturbance levels in the mud flats and shallow water areas
3.20	Measures to decrease the danger of migrating birds colliding with overhead power lines
3.24	Protecting and maintaining the nationally significant breeding colonies of the Mediterranean gull and the common gull
3.25	Maintaining protection zones free from disturbance as a breeding site for white-tailed eagles

Additional information can be found in the federal state contributions (part I or A and texts on functional area 3).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Hamburg and Schleswig-Holstein part of the functional area: ↳ Annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Map overviews can be found under ↳ Natura 2000 technical contribution ↳ measure programme ↳ functional area 3

- Lower Saxony part of the functional area:
  - ↳ Annex of the Lower Saxony IMP contribution
  - ↳ Annex: technical contributions
  - ↳ technical contribution 01: Natura 2000
  - ↳ FB01 part B with target map C2.

Target map C2 gives an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

### B3 4.2.2 Interdisciplinary cooperation in implementing the measures

Central Natura 2000 targets for the aquatic area of functional area 3 will only be achieved if measures are implemented in the entire Elbe estuary (e.g. tidal range problem) or at the level of the Elbe RBC (e.g. reducing nutrient and pollutant damage and thereby improving the oxygen content). For this latter category, mention is made of the management plan in accordance with Article 11 WFD. The measures provided make a significant contribution to the implementation of the Natura 2000 targets.

Cooperation with the WSA and the HPA shows an additional focus, which can be combined from the following measures:

- Carrying out the necessary maintenance of the channels of the Elbe and the Este in a manner compatible with Natura 2000 and restoring as balanced a sediment supply as possible in the functional area
- Limiting, and if possible reversing, the increase in the tidal range, particularly by creating new flood plains at hydromorphologically and ecologically suitable locations
- Developing solutions to create new shallow water areas. These should indicate ways in which the need for additional shallow water areas can be combined with protecting the irreplaceable functions of the remaining landscape units of the functional area
- Reducing the damage caused by wave action to the mud flats and banks at a level which enables the maintenance of the reeds found there and permits a risk-free use of the beach, taking into account the relevant precautions
- Investigating the causes of the changes in the mud flats in the Mühlenberger Loch and the Fährmannssander wATT; developing solutions to ensure the specific functions of the mud flats in the functional area for the benthic populations, the fish fauna and the avifauna (particularly core elements)

As a priority in the implementation of concrete measures, in many cases basic steps and concepts have to be developed which coordinate the leading administration closely with the relevant nature conservation authorities in the federal states.

### B3 4.2.3 Information on studies and environmental monitoring

An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7). For functional area 3, the following aspects are particularly significant:

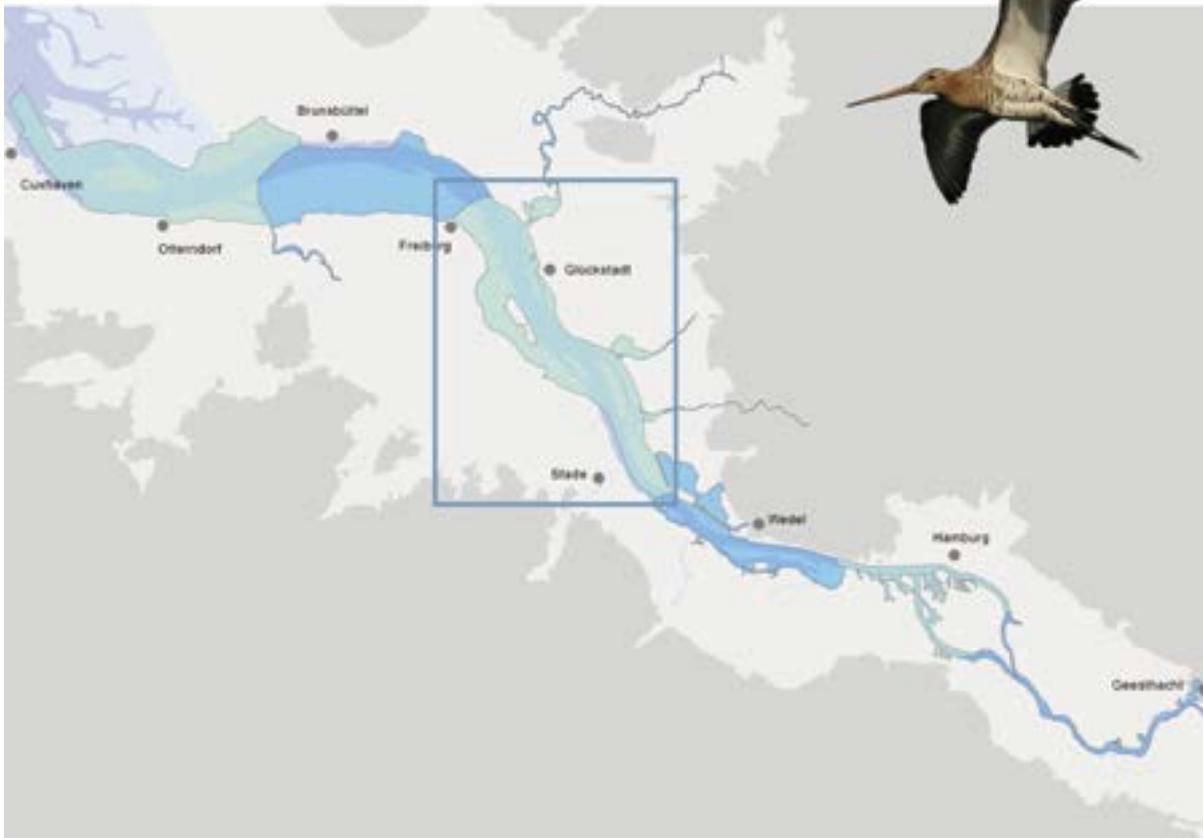
- Monitoring the change in the hydrological and morphological behaviour of the main Elbe, the branches and the side bays
- Monitoring the changes in oxygen and nutrient content in the main Elbe, the branches and the Mühlenberger Loch
- Monitoring the changes in the twaite shad populations (e.g. additional assessment of the fish larvae population in functional area 3 in spring)

- Monitoring the change in the Elbe water dropwort population
- Monitoring the change in the chequered lily population in the Wedeler Marsch
- Monitoring the change in reed beds
- Monitoring the change in the Mühlenberger Loch as a habitat for resting birds, fish and plants



I Integrated  
M management plan  
P Elbe estuary

## Functional area 4



overleaf

Haseldorf foreland

Lapwing nest

Landscape at Krautsand

The Tidenkieker, an excursion boat for nature excursions



## B4 1 Overview of functional area 4

Functional area 4 extends over a stretch of the river measuring around 32km from the north point of Lühesand (km 650) to the line between

the Brokdorf nuclear power station and Freiburg (km 682).

It comprises areas in the counties of Stade (Lower Saxony), Pinneberg (Schleswig-Holstein) and Steinburg (Schleswig-Holstein).

The river flow is characterised by long curves with wide radii. Sections that are nearly natural and have high levels of settlement alternate at offset intervals along the two banks of the river. The southern part of the functional area is characterised by the contrast between the port and industrial facilities at Stade-Bützfleth on the south bank of the river and the nearly natural areas of the Haseldorf foreland and the island Pagensand on the north bank.

Further upstream the nearly natural areas are mainly on the Lower Saxony side. From Asselersand to the outer Allwörden dyke, there are extensive grassland areas which are mostly influenced by the tide. A high level of structural diversity in the aquatic area is achieved between the island of Schwarztonnensand, the Schwarztonnensander Nebelbe and the Bramm bank. In contrast, on the Schleswig-Holstein bank on the opposite side, between Kollmar and Bielenberg, there are dykes without foreland and high lying dredger discharge pools and port facilities around Glückstadt. Reed beds and alluvial bushes have settled on the sediment-covered routing island of Rhinplate. At the Glückstädter Nebelbe and on both sides of the mouth of the Stör there are wide mud flats.

Functional area 4 is not only the longest and largest functional area, it also has a particularly high structural diversity. The following landscape elements can be identified:

- **Main flow with the navigation channel and side channels**

The natural tendency of the river to form meanders and to shift its flow is increasingly prevented by the creation of routing islands. The channels are maintained in accordance with the needs of marine shipping. The proportion of mud flats and deep water areas has increased, while the shallow water areas which are so important for aquatic species have de-

creased rapidly. Important shallow water areas can be found in the areas around Bramm bank and the mouth of the Stör and the Wischhafen Süderelbe.

- **Islands and branches**

Haseldorf inner Elbe, Pagensander Nebelbe, Schwarztonnensander Nebelbe, Glückstädter Nebelbe, islands not used for agriculture: Drommel, Auberg, Bishorst Sand, Pagensand, Schwarztonnensand, Rhinplate

Most of the islands were created by sand being deposited on natural sandbanks, mud flats and clay marshes. They are a condition for the existence of the tributaries. These tributaries offer aquatic habitats with different depths, flows and sediment natures. They carry out an indispensable function for the biocoenosis. The tributaries are used for leisure activities and water sports. While the deeper areas of the islands are populated with nearly natural reeds and tidal alluvial forests, reforested areas, dry grass and vegetation and nutrient-poor (yet worth preserving) grassland dominate on the high sand areas, although these are not typical to this extent and with this distribution in the estuary landscape.

- **Forelands with reeds and alluvial forests**

Pastorenberg, Eschschallen, parts of the foreland at Krautsand, the Bielenberg forests, the fore-shore south of Glückstadt, reeds at the mouth of the Stör

The largest unused forelands are found in the Haseldorf and Seestermühe foreland. As a result of use, land reed beds have spread in which alluvial bushes are gradually settling.

- **Grassland areas affected by the tide**

Foreland: Twielenfleth Sand, Asselersand, Allwördene outer dyke

Dyked areas affected by the tide: Asselersand, Gauensiekersand, parts of Krautsand, estuaries of the Pinnau, Krückau and Stör tributaries

The grassland areas on the land side of the dyke are outside of the closing area for the flood barrage influenced by the tide. Above the branches tidal inlet systems at the Wischhafen Süderelbe, Ruthenstrom and the marshes at the mouth of the Krückkau, the tidal influence is moving inland. The dyked mouth areas of the Pinnau, the Krückkau and the Stör are mainly used as grassland. White, for example, on the Twielenfleth Sand and in parts of the Asselersand cultivation is carried out in line with the nature conservation objectives, in many places such as the

Allwördene outer dyke use is very intensive. There are also some arable areas on the Krückkau.

- **Areas not affected by the tide**

Parts of the Krautsand have been completely cut off from the influence of the tide.

Industrial areas and the associated Elbe ports can be found in Stade-Bützfleth and Glückstadt. They are directly adjacent to the Natura 2000 sites. Glückstadt, Krautsand and Kollmar, which are also adjacent to this area, are focal points of recreational use.



▲ Fig. B3.9 Landscape in functional area 4

Top: Elbe islands Schwarztonnensand, Asselersand, in the background on the right is Drochtersen

Bottom: Haseldorf inner Elbe, Bishorst Sand, Pagensand, in the background on the left is the industrial area of Stade-Bützfleth

▼ Table B4.1

Selected abiotic parameters in functional area 4

Length	Km 650 (northern tip of Lühesand) to km 682 (line between the Brokdorf nuclear power station and the Freiburg tidal inlet harbour)
Total area	14,048 ha
River width	Cross section between Julsand and Twielenfleth: 1.3 km; cross section at Pagensand including the deposited islands: 3.3 km; cross section between the wildlife area at Blomesche and the Bramm bank: 3.7 km; Cross section between the nuclear power station at Brokdorf and the Freiburg tidal inlet harbour: 2.3 km
Length of the bank <sup>1</sup>	ca. 101.6 km, of which: <ul style="list-style-type: none"> <li>• unobstructed: ca. 67.3 km</li> <li>• Replenishments: ca. 0.7 km</li> <li>• only with groynes: ca. 7.2 km</li> <li>• with, revetments, with revetments and groynes: ca. 26.4 km</li> </ul>
Distribution of the landscape zones <sup>2</sup>	<ul style="list-style-type: none"> <li>• Dyked areas: 2,825 ha (18.5%)</li> <li>• Foreland: 3,302.3 ha (21.6%)</li> <li>• Mud flats (from average low tide level to average high tide level): 2,189.8 ha (14.4%)</li> <li>• shallow water areas from 2m below average low tide level to average low tide level: 977,2 ha (6,4%)</li> <li>• Water areas from 10m to 2m below average low tide level: 2964.4 ha (19.4%)</li> <li>• Water areas deeper than 10m below average low tide level: 2,997.7 ha (19.7%)</li> </ul>
Tidal range <sup>3</sup>	3.05m (Pegel Stadersand), 2.81m (Pegel Glücksstadt), 2.74m at the Stör flood barrage (outer level)
Chloride content <sup>4</sup>	0.5 to 5‰. (oligohaline) The limits of the mesohaline area (salt content over 5‰) is sporadically moving upstream up to approximately the line between Krautsand and Bielenberg.
WFD water body	Coordination area tidal Elbe: FA 4 section from km 650 to km 654.9 = Elbe (west) water body FA 4 section from km 654.9 to km 682 = Elbe transitional waters Both bodies of water are classified as HMWB

<sup>1</sup>: technical contribution waterways and ports 2010: Table 3    <sup>2</sup>: WSA November 2008    <sup>3</sup>: www.bsh.de/aktdat/wvd/elbepegel  
<sup>4</sup>: www.fgg-elbe.de

## B4 2 Natura 2000

The specific Natura 2000 targets for functional area 1 are determined using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs and the bird species of the SPAs which occur in the functional area, evaluation of their conservation status
- Evaluation of the strengths and weaknesses of the functional area from the perspective of species and habitats which are relevant for Natura 2000
- Analysis of the interaction with the other functional areas in the Lower Elbe
- Development of a Natura 2000 model for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

### B4 2.1 Natura 2000 status

In functional area 4, the Natura 2000 sites of the Elbe estuary in Lower Saxony and Schleswig-Hol-

stein are made up of two SACs and two SPAs.

▼ Table B4.2

Protected areas in functional area 4

Area category	Area designation
Special areas of Conservation (SACs)	DE 2018-331 Lower Elbe (LS)
	DE 2323-392 Schleswig-Holstein Elbe estuary surrounding area (SH)
Special Protection areas (SPAs)	DE 2121-401 Lower Elbe (LS)
	DE 2323-401 Lower Elbe to Wedel (SH)
IBA area	Pinnberg Elbe marshes DE025 (SH)
Ramsar area	7DE004 Lower Elbe between Barnkrug and Otterndorf (LS)
	7DE030 Schleswig-Holstein Wadden Sea and adjacent areas (SH)
Natura 2000 conservation areas	CA Haseldorf inner Elbe with Elbe forelshore (SH)
	CA Pagensand Elbe island (SH)
	CA Eschschallen in the Seestermühe foreland (SH)
	CA Rhinplate and banks of the Elbe south of Glückstadt (SH)
	CA Asselersand (LS)
	CA Schwarztonnensand (LS)
	CA Krautsand/Ostende water areas (LS)
CA Allwördene outer dyke/Brammersand (LS)	
Natura 2000 landscape protection areas	LPA Pinnberg Elbe marshes (SH)
	LPA Kollmar marsh(SH)
	Planned LPA "Stör river area" (SH)

Lower Saxony and Schleswig-Holstein have defined the habitats in annex I and the species in annex II of the Habitats Directive as objects of protection in the SACs and evaluated their conservation statuses. At the same time, the breeding and migrating bird species in the bird protection areas relevant for the area were also defined. The evaluation results given here take into account federal state-specific features and are based on the relevant information given by the two federal states.

An overview of the Natura 2000 protected items which are relevant for all of functional area 4 is given below. Additional information on the basis for the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the "Natura 2000" technical contributions in the federal states' contributions (see part C: materials).

### B4 2.1.1 SACs

The conservation status of the complex habitat "estuaries" (1130) is rated as unfavourable (C) in functional area 4. Despite the diversity in forms and the comparably high proportion of nearly natural and unused forelands and islands, the hydromorphological changes in the estuary are noticeable. The proportion of shallow water areas is very small, particularly along the main river. Even when including the tributaries, it still only makes up 6.4% of the total area within the functional area.

A lack of oxygen in the summer months primarily occurs in functional areas 2 and 3 which are positioned upstream, but when the oxygen levels are particularly low, the water body which is low in oxygen can reach functional area 4, depending on the tide.

The banks and mud flats which are subject to the main flow of the river are severely affected by wave action. As a result of the channelling of the flow, there is an intensive drift of sand in the small mud

flat and shallow water areas. Just as in functional area 3, the shallow tributaries which experience less flow are particularly important for maintaining species and habitat diversity. Sections of the Haseldorf inner Elbe, the Pagensander Nebanelbe and the Schwarztonnensander Nebanelbe can be identified by a nearly natural zoning of the habitats which are typical for the estuary.

Priority alluvial forests (\*91E0) occur in certain areas in the Haseldorf foreland and on the Pagensand and Schwarztonnensand islands. The limit of the distribution of tidal alluvial forests in the Elbe estuary runs roughly along the line between Glückstadt and Wischhafen. The tree populations are generally relatively young and are mostly replanted or in abandoned willow populations. In the course of the succession, a small and mostly undisturbed mosaic of forests, foreland stages, bushes, herbaceous bank vegeta-

tion (6430) and reeds has developed. The islands and forelands from Twielenfleth sand to the mouth of the Krückkau are the most natural sections of the Lower Elbe. Small but well developed alluvial forests are found on the foreland at Krautsand and Bielenberg. At Krautsand, some species of riparian forest (oaks, elms) are mixed in. An oak forest at Bishorst was classified as habitat type 91F0 – riparian forests.

Lowland hay meadows (6510) occur in functional area 4 on Asselersand and in small areas on Twielenfleth sand. The chequered lily populations on partial areas of the lowland hay meadow on the Asselersand are the largest in the Lower Saxony part of the Elbe estuary. In the remaining grassland areas from Asselersand to the Allwördene outer dyke, the local requirements for lowland meadows are actually met in many places, but the intensive agricultural use of the area prevents the development of this habitat.

▼ Table B4.3

Conservation statuses of habitats in annex I of the Habitats Directive

EU code	Species in annex II of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1130	estuaries	C <sup>3</sup>	C
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	B	B
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	B	C
91E0	* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	B	A B
91F0	Riparian mixed forests with <i>Quercus robur</i> , <i>Ulmus laevis</i> , <i>Ulmus minor</i> , <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> ( <i>Ulmion menoris</i> )	C <sup>4</sup>	B

\* priority habitat

<sup>1</sup> Elbe estuary IMP contribution Lower Saxony, part II, functional area 4, as of September 2011

<sup>2</sup> Standard data sheet, as of March 2009. For Schleswig-Holstein, the status evaluations are based on the evaluation of the status from the standard data sheet over the entire area from the mouth of the Elbe to the border of the city of Hamburg. The evaluation of the conservation statuses of the habitats is mainly based on the results of the first data capture from 2003. In summer 2010, more data was captured, the results of which are not yet available in an evaluated form.

<sup>3</sup> Elbe estuary IMP, part II, functional area 4, as of September 2011. In Lower Saxony, the habitat type 'estuaries' is currently evaluated using several individual components. The conservation status shown here is a composite view of these individual evaluations.

<sup>4</sup> According to most recent knowledge (standard data sheet, October 2010) riparian mixed forests no longer occur, in the partial contribution from Lower Saxony (September 2011), however, different assumptions are made.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B4.2

Tidal reeds made up of three-square bulrushes (habitat type 1130), lowland hay meadows on Asselersand (habitat type 6510), herbaceous bank vegetation made up of garden angelia (habitat type 6430)



▲ Fig. B4.3

Riparian mixed forest on the island of Auberg in the Haseldorf foreland (habitat type \*91E0)



▲ Fig. B4.4

The Bramm bank, which is north of the mouth of the Wischhafener Süderelbe is the most important resting place for seals in the Elbe estuary.

The Elbe water dropwort occurs at a few points in the limnic section of the tidal Elbe. In functional area 4, the species now only occurs sporadically. The limits of its distribution in the Elbe estuary correspond to

the limits of the tidal alluvial forests, and also run along the line between Glückstadt and Wischhafen. The previous population focus in the functional area 4 environment was in the tidal inlets in the marshes

at Haseldorf and Seestermühe, but they have been extinct since the dyking in the 1970s.

In the locations currently populated, there are small areas where the otherwise dominant reed beds are temporarily unable to develop. In the past ten years, individual plants have been identified on the Fährmannssand foreshore, on the Haseldorf inner Elbe

(foreshore section), on the mouth of the Krückkau and at Glückstadt. In 2009, some well developed samples were discovered for the first time on the Wischhafener Süderelbe. A few sterile plants were found in 2007 on the Stör at Borsfleth. Due to the small number of individuals, the conservation status of the Elbe water dropwort in functional area 4 is rated as unfavourable (C).

▼ Table B4.4

Conservation statuses of habitats in annex I of the Habitats Directive

EU code	Species in annex II of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	C	B
1103	Twaite shad ( <i>Alosa fallax</i> )	C	B <sup>2</sup> C <sup>3</sup>
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>4</sup>	D <sup>4</sup>
1130	Asp ( <i>Aspius aspius</i> )	-	B
1351	Harbour porpoise ( <i>Phocoena phocoena</i> )	C <sup>5</sup>	B
1365	Seal ( <i>Phoca vitulina</i> )	B <sup>5</sup>	A <sup>5</sup>
1601	*Elbe water dropwort ( <i>Oenanthe conioides</i> )	C	C

\* Priority species (M): The estuary is used by this species as a migration channel.  
<sup>1</sup> Elbe estuary IMP, part II, functional area 4, as of September 2011  
<sup>2</sup> Standard data sheet (as of March 2009)  
<sup>3</sup> Bioconsult 2010  
<sup>4</sup> The population of the houting was categorised as not significant in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (24-25 March 2009).  
<sup>5</sup> The conservation status of the species was only evaluated for the entire SAC, but not for the individual functional areas.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

Functional area 4 is part of the breeding and nursery area of the Elbe population of the twaite shad. The temporal and spatial distribution of the eggs and young larvae indicate that the breeding area extends from Schwarztonnensand to the Mühlenberger Loch. In the past few years, breeding activities have been concentrated in functional area 3 (Hahnöfer Nebenelbe, Hanskalbsand, Neßsand). Breeding activities take place in some locations in front of the Lower Saxony bank of the Elbe. On the right-hand side of the bank, there are some individual indications of breeding areals in the main Elbe at Pagensand and on the southern end of the Glückstädter Nebenelbe. The water areas around Lühesand, Bishorst sand, Pagensand and Schwarztonnensand can be viewed as nursery areas for the early development stages

of the twaite shad. In the south-eastern part of the functional area, low oxygen contents can decrease the success rate of recruiting in the late spring and summer.

The asp is a fresh water fish which only rarely penetrates into the oligohaline sections of the tidal Elbe. Functional area 4 is not particularly significant for the species.

Sea lamprey, river lamprey, salmon and houting use the Lower Elbe as a migration channel. For sea lamprey and salmon which occur in the Lower Elbe in the summer, low oxygen concentrations could be an obstacle to migration.

The Brammer Bank, which is north of the mouth of the Wischhafener Süderelbe, is one of the few nearly natural sand and mud flat banks which has not been changed considerably by sand deposits, and seals are regularly seen there. The Bramm bank is the only place in the Elbe estuary where seals reproduce,

even if this is to a comparatively small extent. The northern tips of Schwarztonnensand and Bishorster Sand are regularly used by seals as resting places. Harbour porpoises occasionally penetrate the Lower Elbe.

## B4 2.1.2 Bird protection areas

On the Lower Saxony side, the section from Abbenfleth to the Freiburg tidal inlet is entirely part of the "Lower Elbe" bird protection area. In functional area 4, the Schleswig-Holstein bird protection area "Lower Elbe to Wedel" comprises of the foreshore from Hetlingen to the northern tip of Pagensand and the foreland and the marshes at the mouth of the Stör.

The birdlife in the functional area reflects the diversity of the landscape structures. For breeding and/or migrating birds, the extensive grassland areas influenced by the tide with their typical tidal inlet and ditch systems, the reeds, the mud flats, the Elbe islands and the tributaries are all important bird habitats.

### Breeding birds

The birdlife on the islands of Auberg and Drommel (Haseldorf foreshore), Pagensand, Schwarztonnensand and Rhinplate are dominated by species of reeds and partially open meadow forests and bushes and deciduous forests. The bluethroat, Eurasian marsh harrier, hedge warbler and penduline tit are all characteristic, and the spotted crane also occasionally appears. Since the trees are mainly very young, the breeding burrows available are not particularly high. However, repeated mapping on the Haseldorf foreland has shown that more mature forest states are gradually forming. On the sandy nutrient-poor grassland in Pagensand and Schwarztonnensand, the skylark and the corncrake breed. Since agricultural activities were ceased here, the Eschschallen in the Seestermühe foreland area has developed into an extensive, connected land reed bed in which the bluethroat, Eurasian marsh harrier, red-backed shrike and in some years the white-tailed eagle and kingfisher breed.

Schleswig-Holstein side, there are large grassland areas on the Twielenfleth sand and on the mouth of the Stör. Characteristic breeding bird species of the extensively used grassland are the common snipe, lapwing, redshank, black-tailed godwit, skylark, yellow wagtail and corncrake.

Since the end of the 1970s, the breeding populations of many meadow breeders in the Elbe estuary have decreased significantly. Dyking and draining have created the conditions required for intensive agricultural uses, thereby causing a considerable worsening of the habitat conditions for meadow birds. Areas in which the tidal influence is being intensivised as part of the compensation measures (e.g. Twielenfleth sand) and in which the previous uses were intensivised may benefit from this general trend (e.g. Gauensieker sand, Allwördene outer dyke). Despite the generally negative trend in north-western Germany, the breeding populations of the species lapwing, common snipe, black-tailed godwit, redshank and skylark are increasing once again there. Progress can also be expected to be made for the corncrake and several species of duck.

Additional important bird habitats are the grasslands in the dyked marshes and the foreshore. The largest and most important areas in the functional area, Asselersand, Krautsand and the Allwördene outer dyke are all on the Lower Saxony side. On the

The biotope features of the open marshes include several landscape elements such as trench edges, reed beds, bushes and bodies of water which are

populated, among others, by the northern shoveller, hedge warbler, bluethroat, whinchat and Eurasian marsh harrier.

▼ Table B4.5

Conservation statuses of breeding bird species in functional area 4

Species	Annex I of the Birds Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
Common snipe ( <i>Gallinago gallinago</i> )	–	C	B
Penduline tit ( <i>Remiz pendulinus</i> )	–	–	B
White-spotted bluethroat ( <i>Luscinia svecica</i> )	•	C	B
Whinchat ( <i>Saxicola rubetra</i> )	–	C	–
Kingfisher ( <i>Alcedo atthis</i> )	•	–	B
Skylark ( <i>Alauda arvensis</i> )	–	B	–
Common tern ( <i>Sterna hirundo</i> )	•	C	–
Ruff ( <i>Philomachus pugnax</i> )	•	C	–
Lapwing ( <i>Vanellus vanellus</i> )	–	C	B
Garganey ( <i>Anas querquedula</i> )	–	C	–
Teal ( <i>Anas crecca</i> )	–	C	–
Gull-billed tern ( <i>Gelochelidon nilotica</i> )	•	C	–
Northern shoveller ( <i>Anas clypeata</i> )	–	C	–
Red-backed shrike ( <i>Lanius collurio</i> )	•	–	B
Bittern ( <i>Botaurus stellaris</i> )	•	C	–
Eurasian marsh harrier ( <i>Circus aeruginosus</i> )	•	C	B
Redshank ( <i>Tringa totanus</i> )	–	B	B
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	C	–
Hedge warbler ( <i>Acrocephalus schoenobaenus</i> )	–	B	B
Gadwall duck ( <i>Anas strepera</i> )	–	C	–
White-tailed eagle ( <i>Haliaeetus albicilla</i> )	•	–	B
Short-eared owl ( <i>Asio flammeus</i> )	•	C	–
Spotted crane ( <i>Porzana porzana</i> )	•	C	B
Black-tailed godwit ( <i>Limosa limosa</i> )	–	C	B
Corncrake ( <i>Crex crex</i> )	•	B	B
Peregrine ( <i>Falco peregrinus</i> )	•	–	B
Water rail ( <i>Rallus aquaticus</i> )	–	C	–
White stork ( <i>Ciconia ciconia</i> )	•	C	B
Yellowwagtail ( <i>Motacilla flava</i> )	–	B	–
Montagu's harrier ( <i>Circus pygargus</i> )	•	C	–

<sup>1</sup> Aggregate evaluations of the entire functional area 4 on the basis of the individual results for the partial areas Schwarztonnensand, Asselersand, Krautsand and the Allwörder Außendeich (for the individual results, see Elbe estuary IMP, part II, functional area 4, as of September 2011)

<sup>2</sup> Avifaunal Schleswig-Holstein 2007

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B4.5 Nests of typical breeding birds in functional area 4  
Lapwing nest on the ground in the grassland, warbler nest in the reeds, penduline tit nest in the alluvial forests

### Migrating birds

Functional area 4 offers extensive and important habitats which are spatially interconnected.

The most important grassland areas for Nordic geese and swans (including the tundra swan, the whooper swan, the white-fronted goose, the greylag goose and the barnacle goose) are Twielenfleth sand, Asselersand, Krautsand, the marshes on the lower reaches of the Stör and the Allwördene outer dyke. These areas offer timid birds a sufficient supply of nutrients and a wide open landscape with no limitations of vision. Before the dyke was built in 1970, the tundra swan achieved resting numbers on Asselersand and Krautsand which were internationally significant, but these numbers have now dropped sharply over the entire Lower Elbe. The populations of the barnacle goose and the greylag goose have increased and are now of international importance. Additional species such as the widgeon, Eurasian golden plover and common gull all rest on grassland areas.

The “dabbling ducks” such as teal, northern shoveller, pintail, mallard and gadwall are all found on water and mud flat areas, and in some cases on slightly flooded grasslands. The combination of wide mud flats and water areas which are less exposed makes the tributaries and the mouth of the Stör particularly attractive for gulls, ducks and mergansers. Quiet sections of the tributaries are used by ducks as moulting habitats in the summer.

In the structure of the areas used, one area comes to light in particular. This is the sleeping place, which is sought out by geese, swans, ducks and waders from the entire Elbe estuary. It comprises shallow water areas and mud flats in the triangle created between Pagensand, the mouth of the Pinnau and Bishorst Sand. This zone, which has low levels of disturbance in the winter, is unique in the entire estuary.

▼ Table B4.6 (Part 1)

Conservation statuses of migrating bird species in functional area 4

Species	Annex I of the Birds Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
White-fronted goose ( <i>Anser albifrons</i> )	–	B	B
Shelduck ( <i>Tadorna tadorna</i> )	–	B	B
Common tern ( <i>Sterna hirundo</i> )	●	–	B
Eurasian golden plover ( <i>Pluvialis apricaria</i> )	–	B	B
Greylag goose ( <i>Anser anser</i> )	–	B	B
Eurasian curlew ( <i>Numenius arquata</i> )	–	B	–

▼ Table B4.6 (Part 2)

Conservation statuses of migrating bird species in functional area 4

Species	Annex I of the Birds Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
White swan ( <i>Cygnus olor</i> )	-	B	-
Lapwing ( <i>Vanellus vanellus</i> )	-	B	-
Teal ( <i>Anas crecca</i> )	-	C	B
Black-headed gull ( <i>Larus ridibundus</i> )	-	B	B
Northern shoveller ( <i>Anas clypeata</i> )	-	C	B
Eurasian widgeon ( <i>Anas penelope</i> )	-	B	-
Whimbrel ( <i>Numenius phaeopus</i> )	-	B	-
Brent Goose ( <i>Branta bernicla</i> )	-	-	B
Redshank ( <i>Tringa totanus</i> )	-	B	-
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	-	B
Common ringed plover ( <i>Charadrius hiaticula</i> )	-	B	-
Whooper swan ( <i>Cygnus cygnus</i> )	•	B	B
Pintail ( <i>Anas acuta</i> )	-	C	B
Mallard ( <i>Anas platyrhynchos</i> )	-	C	-
Common gull ( <i>Larus canus</i> )	-	B	B
Black tern ( <i>Chlidonias niger</i> )	•	-	B
Barnacle goose ( <i>Branta leucopsis</i> )	•	A	B
Little gull ( <i>Larus minutus</i> )	-	-	B
Smew ( <i>Mergus albellus</i> )	-	-	B
Tundra swan ( <i>Cygnus columbianus</i> )	•	C	B

<sup>1</sup> Aggregate evaluations of the entire functional area 4 on the basis of the individual results for the partial areas Schwarztonnensand, Asselersand, Krautsand and the Allwördene outer dyke (for the individual results, see Elbe estuary IMP, part II, functional area 4, as of September 2011)

<sup>2</sup> Standard data sheet (as of March 2009). The evaluation is based on the entire bird protection area. Some of the species are only occasionally found in functional area 4

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B4.6 Migrating birds in functional area 4

The Eurasian curlew rests in the grassland areas on Asselersand and the Allwördene outer dyke. The mud flats in the tributaries with low levels of disturbance are important resting habitats for large numbers of migrating bird species.

### B4 2.1.3 Strengths and weaknesses of the functional area

Overall, the essential elements of a nearly natural estuary landscape (shallow water areas, mud flats, reeds, tidal alluvial forests and extensively used grasslands) are present in the functional area, but they have both qualitative and quantitative deficiencies which are mainly due to the loss of the flood plains and the channelling of the river.

The extensive succession areas on the islands and the foreland in Haseldorf and Seestermühe are some of the strengths of the functional area. In the current landscape in northern Germany, mainly unused areas on this side are valuable because of their rarity. However, the landscape, which particularly from aerial pictures seems to be original, is still not entirely free from damage which is due to the hydromorphic dynamic and the damaged sediment balance in the Lower Elbe.

The majority of the habitats important for breeding and migrating birds are affected by the tide. They are divided between forelands and dyked marshes which are outside of the closed areas of the flood barrages and influenced by the river. These areas have a high potential for the development of meadow habitats and valuable bird habitats, which is currently not being utilised because in many areas the cultivation is too intensive. There are concerns that the expansion of maize cultivation may lead to a worsening of the conservation statuses of grassland breeding and migrating bird species.

From the analysis and evaluation of the populations of species and habitats which are relevant to Natura 2000 in connection with the manifestation of location factors, the following strengths and weaknesses of the functional area should be taken into consideration in particular (Table B4.7):

▼ Table B4.7 (Part 1)

Overview of strengths and weaknesses in functional area 4

Particular strengths
<ul style="list-style-type: none"> <li>• Even though there is a lack of oxygen in the neighbouring functional area 3, oxygen concentrations in the tributaries are generally over 6mg/l all year round Oxygen concentrations in the main river from km 655 (mouth of the Schwinge) over 4mg/l, from km 668 (Kollmar, Schwarztonnensand) over 6mg/l (see Fig. B3.6 p. 133)</li> <li>• Comparatively moderate increase in the tidal range (around 20cm at Glückstadt and 70 cm at Lühesand in the past 100 years)</li> <li>• large island and branch complexes which have low levels of disturbance extensive biological continuity of the Elbe branches with diverse flow patterns: Haseldorf Binnenelbe, Pagensander Nebanelbe, Glückstädter Nebanelbe, Schwarztonnensander Nebanelbe with large shallow water areas and retreat areas for aquatic species diverse habitats for aquatic populations</li> <li>• Breeding area of the twaite shad (from functional area 3 to Schwarztonnensand) Main breeding and nursery area of the smelts (characteristic species for the estuary) (with functional area 3)</li> <li>• Particularly long river banks (102km for a stretch of the river which is 32km long), of which around 65% is unobstructed Well developed vegetation zones with extensive reeds in many parts of the functional area</li> <li>• Extensive land and reeds with a potential to develop into tidal alluvial forests and numerous, often small alluvial forests typical for the estuary</li> <li>• Large, undyked foreland areas of the planning area in the Allwördene outer dyke and on the Asselersand</li> <li>• Large grassland areas associated with the tide at the mouths of the tributaries</li> <li>• Very branched and extensive network of Elbe tributaries which is influenced by the tide on Krautsand, Asselersand and at the mouth of the Krückau</li> </ul>

## ▼ Table B4.7 (Part 2)

Overview of strengths and weaknesses in functional area 4

**Particular strengths**

- Highly significant mainland areas as breeding areas for meadow breeders, significant potential for development through extensivisation measures
- Internationally important winter resting place for species of Nordic geese with large resting numbers for the population in large grassland areas
- Bishorst Sand and the surrounding area: sleeping place and moulting area for water birds
- Seal resting place and the only seal breeding ground in the Elbe estuary on the Bramm bank

**Particular weaknesses**

- Water morphology which has been significantly altered, particularly by adapting the Lower Elbe to container shipping
- Shifting the brackish water boundary upstream
- Sand deposit areas with habitats typical for the estuary outside of the area affected by the tide (particularly Pagensand, Schwarztonnensand)
- Loss of large foreland areas after the dyke was built in the 1970s, particularly the former population focus of the Elbe water dropwort in the Haseldorfer Marsch
- Land use in the river mouths not entirely compatible with the conservation objectives of the Natura 2000 sites
- Intensive use of grasslands
- Increasing loss and fragmentation of habitats as grasslands turn to arable land (particularly Krautsand) within the dyke



▲ Fig. B4.7

Examples of areas which are particularly significant for Natura 2000

Reed beds and mud flats at Bishorst Sand, wide foreland under the influence of the tide in the Allwördener Aussendeich



▲ Fig. B4.8

Examples of areas with particular development potential for Natura 2000

Bank with revetments which is far from the natural use, intensively used grassland, division of the natural landscape at the Haseldorfer Marsch by the land protection dyke in 1978

## B4 2.2 Interactions with other functional areas

In addition to its general connecting function e.g. for migrating fish and cyclostomes, functional area

4 also interacts in a particular manner with the surrounding functional areas.

### Interactions in the aquatic area

In functional area 3 and in functional area 4 up as far as km 665 (Kollmar-Schwarztonnensand) the dominant conditions are limnic to slightly oligohaline. From a Natura 2000 perspective, the habitats of both functional areas have considerable overlaps. The connection between the section of the Elbe from Mühlenberger Loch to Glückstadt is expressed, among other ways, in the following communal functions:

- Breeding areal of the twaite shad and nursery areal for its early stages of development
- Main breeding and nursery areas for the smelt (the most important fish fauna in the Elbe estuary from a quantitative perspective, characteristic species for habitat type 1130 – estuaries)
- Natural areal of the Elbe water dropwort west of Hamburg
- Natural areal of the tidal alluvial forests west of Hamburg

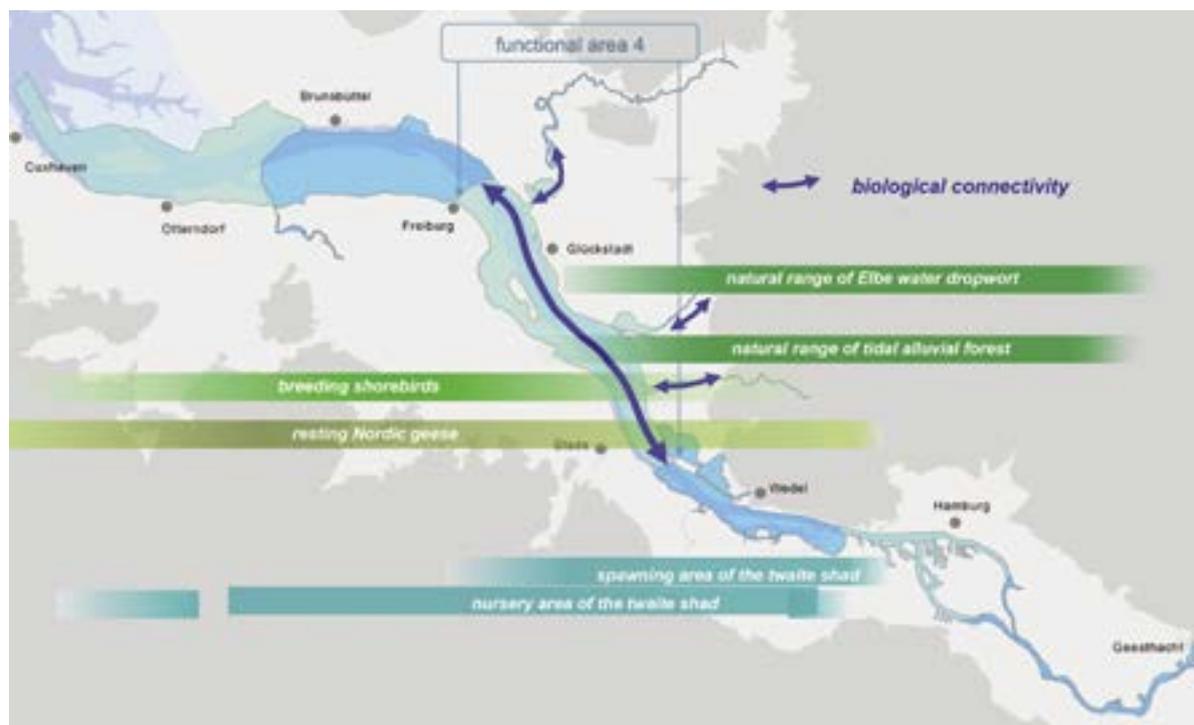
In contrast to functional area 3, acute lack of oxygen (below 4mg O<sub>2</sub>/l) generally does not occur in functional area 4, or only occurs at specific areas in the south-east. Due to its diverse range of flow patterns and sediments, functional area 4 is suitable to avert the deficits of functional area 3 for the foreseeable future, at least in part. The cross-functional area measure programme for the twaite shad therefore suggests developing breeding and nursery areas in functional area 4 (see p. 62 et. seq.).

The species of fish and cyclostome which breed in the Pinnau, the Krückau and in the river areas of the Stör swim up to the tributaries through functional area 4. The protection of the biological continuity from the flood barrages is therefore particularly important.

### Interactions from the perspective of bird protection

The largest meadow bird populations in the Elbe estuary are found in the neighbouring functional area 5 in the Lower Saxony Elbe marshes. The management of the significantly smaller grassland area in functional area 4 is designed to maintain and develop suitable breeding and nursery conditions for meadow breeders in spatial connection with Nordkehdingen. Due to its size and proximity to Nordkehdingen, the mouth of the Stör is key to the Schleswig-Holstein measure programme (see measure programme for meadow birds, p. 68 et. seq.).

Functional area 4 is part of the habitat network of water areas, mud flats and grasslands, which are used alternately by the migrating birds in the Elbe estuary. Functional relationships therefore exist with the resting areas from Hamburg to the mouth of the Elbe. The bird sleeping places and the moulting places in functional area 4 in reeds and on the water are used by birds from the entire estuary.



▲ Fig. B4.9

Situation at functional area 4 in connection with important focal points of Natura 2000-relevant functions

### B4 2.3 Natura 2000 models

When looking at the entire Lower Elbe together, the section of the Elbe between Lühesand and Freiburg has particular functions for Natura 2000 which cannot be achieved by any other functional area. The

maintenance and development of these functions is the focus of the model, which describes the target state of the essential landscape elements in the future.

#### Main river and forelands on the main river

Mud flats and water areas of different depths, flow intensities and substrate sensitivities are present in a nearly natural ratio. The twaite shad finds suitable breeding and nursery habitats in functional area 4, which can also be used when the oxygen levels in the neighbouring functional area 3 are particularly low.

The bank vegetation is dominated by reeds and alluvial forests typical for the location. Since some bird species (including meadow birds, Nordic geese and swans) avoid environments of wooded vegetation, the development of alluvial forests is avoided in important breeding and resting areas for these species.

#### Tributaries and islands

The landscape is made up of substantially undisturbed islands and water branches. The banks are populated with impenetrable reeds and tidal alluvial forests. From the Haseldorf foreland to the mouth

of the Krückau and on the islands of Pagensand and Schwarztonnensand, there is an extensive, connected, very nearly natural area.



▲ Fig. B4.10 Elements of the model for the main river  
 Twaite shad and smelt, mud flats and ditches in front of the Allwörden outer dyke, tidal alluvial forests on Schwarztonnensand

Similar but smaller landscapes are also formed in Rhinplate, Glückstädt deposit area and the Bielenberg forest.

The boundaries between land and water are unclear and dynamic. The intensive penetration of land and water maintains the location and species diversity. The long length of the bank promotes the exchange of materials. The sandy mud banks and reeds contribute to decreasing the nitrate damage in artificial waters.

In the tributaries and in the tidal inlets, mud flats and water areas of different depths, flow intensi-

ties and substrate sensitivities are found in a natural relationship. The plankton and benthic populations are diverse and contain large numbers of species. Young fish can find sufficient water zones which are rich in oxygen and nutrients and protected from the flow of the river. The extensive reeds offer them both food and protection. Influences and disturbances caused by human activities are maintained at an acceptable minimum. Resting birds and seals can find resting areas in the island environment.



▲ Fig. B4.11  
 Elements of the models for the islands and tributaries

Grassland areas of the marshes

The model is a connected landscape dominated by meadows and pastures which can be used by breeding and migrating birds from the open land if necessary. The grasslands, which are maintained by tidal inlets and nature-compatible ditches are grazed in some areas and cultivated mainly as meadows in others to develop lowland hay meadows (habitat type 6510) which are typical for the landscape. The dyked marshes and forelands are affected by the tide as little as possible. The traditional ditch system

is used particularly in complex areas run by public authorities or under contractual nature conservation to keep water in grassland areas and maintain a favourable soil moisture level for meadow waders even in dry years. In autumn, winter and spring, large groups of migrating birds gather in the open marshes. The large, adjacent water, mud flat and grassland areas which have low levels of disturbance means that the birds are always able to access the habitats they need at close proximity.



▲ Fig. B4.12 Model for grassland areas: meadows which are mowed late and have high numbers of species, moist meadow grassland

## B4 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based on the capture and evaluation of the current situation in the population. They implement the models in concrete spatial and protected item target formulations. These general management targets define the framework for the integrated target and measure concept for the functional area. The detailed, connected conservation objectives for the individual Natura 2000 sites can be found in the contributions from the federal states.

The following management targets apply to functional area 4:

- Improving the hydromorphological habitat conditions of the estuaries habitat, maintaining and restoring a dynamic which is typical for the estuary, as far as this is possible taking into consideration the framework conditions
- Maintaining and further developing populations of reeds, tall herbaceous vegetation (6430) and the priority tidal alluvial forests (\*91E0) which are typical for the estuary
- Maintaining, restoring and developing grassland areas with vegetation which is typical for the Elbe and lowland hay meadows (6510), taking into account their avifaunal functions
- Maintaining and in some cases restoring the population of the priority species Elbe water dropwort with a dynamic typical for the species in addition to the main population in functional areas 1 and 3

Developing additional habitats to improve the network of habitats

- Maintaining and restoring the importance of the functional area for twaite shad reproduction together with functional area 3
- Maintaining and in some cases restoring and developing the breeding function, particularly for species in the extensively used hydrophilous grassland, the large reed beds and the grassland-ditch complexes in the marshes in the relevant habitats
- Maintaining and developing the rest function, particularly for Nordic geese and swans and many wader species on extensive grassland areas which have low levels of disturbance

## B4 3 Uses and usage targets

In functional area 4, the Lower Elbe is mainly characterised by its use as a waterway. Important excavation works in the main river take place around Twielenfleth sand, Drommel, Pagensand and Rhinplate. Repositioning works can be found at Hetlingen, north Pagensand and in the area around the mouth of the Stör. The amount of working being carried out has decreased significantly in the past ten years (see technical contribution waterways and ports 2010, p. 99). Steinloch (a passageway around the mouth of the Pinnau between the southern tip of Pagensand and Bishorst Sand) is regularly maintained.

On the Schleswig-Holstein side, agriculture plays a less significant role on the foreshore. The islands are not used. Parts of Twielenfleth sand and the Bishorst foreland are maintained by grazing. On the land side of the flood barrage, the marshes on the Pinnau, the Krückau and the Stör are mainly used as grassland, but in some cases are also used as arable land and for fruit cultivation. For several years, the mouth of the Stör has been the focal point for compensation measures, with the aim of expanding the use of grassland areas there. On the remaining plots of land, intensive uses dominate.

With the exception of Schwarztonnensand, on the Lower Saxony side the areas are characterised by agricultural use on both the forelands and the areas behind the dykes. Overall, there is a high level of cultivation. In the area between the dyke at Krautsand, the proportion of arable land has increased in the past few years. On Asselersand and Krautsand, fruit is also cultivated.

Parts of Gauensiekersand and the Allwörden outer dyke are the property of the state, and parts of Krautsand and Asselersand belong to the federal state (fiscal domains).

The remaining areas are privately owned. In accordance with the Natura 2000 management targets, the public areas in the Allwördene outer dyke and on Gauensiekersand are cultivated.

In Stade and Glückstadt, power plants, commercial areas and industrial areas are found directly adjacent to the Natura 2000 sites. Most of the operations located there use the waters of the Elbe in their production flows and use the waterway to transport raw materials and products to and from the location. In Wewelsfleth on the Stör, there is a shipyard, and there is a ferry connection between Wischhafen and Glückstadt.

Some of the focal points of tourism and recreation are the holiday islands at Krautsand, the sandy banks between Bielenberg and Kollmar and the historical city centre in von Glückstadt. There are popular cycle paths and walkways on the Elbe dykes. In the past few years, ship spotting from the land protection dykes has developed into a popular leisure activity. There are many marinas on the left bank, including at Barnkrug, Ruthenstrom, Assel, Dornbusch, Wischhafen and Freiburg, on the right bank at Haseldorf, the barrage at Pinnau, the barrage at Krückau, Kollmar, Bielenberg, Glückstadt, the barrage at Stör and on the Stör in Wewelsfleth.

The following table gives an overview of the interests and uses which are relevant to Natura 2000 that are important in the functional area. Information on uses of local significance can be found in the relevant contributions from Schleswig-Holstein and Lower Saxony.

▼ Table B4.8

Current Natura 2000-relevant interests and uses in functional area 4

Natura 2000-relevant uses / interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>• Regional Planning Organisation (state): priority area for Natura 2000, shipping, motorway (crossing the Elbe), major transport link (B495, Elbe ferry); directly adjacent to Stade: commercial facilities focused around the port, sea ports/ inland ports, large power plant (LS)</li> <li>• Regional Planning Organisation (federal state): industrial facilities/ports (shipyard at Ruthenstrom), key agricultural area (Asselersand, outer dyke area in Krautsand, inner dyke area in Krautsand, Allwördene outer dyke); recreation (Krautsand); regionally important ports in Wischhafen, Ruthenstrom and Freiburg (Elbe); marinas in Freiburg (Elbe), Wischhafen, Dornbusch, Drochtersen Assel, Ritsch, Gauensiek, Barnkrug, Ruthenstrom (LS)</li> <li>• Area of particular importance for nature and recreation. Natura 2000 sites (SH)</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Ecological region 14 (central lowland); Elbe river area unit; surface water bodies: Elbe (transitional waters), classified as a heavily modified water body</li> <li>• Tributaries: Schwinge and Bützflether Süderelbe (both outside of the planning area), Ruthenstrom, Wischhafener Süderelbe, Freiburg Hafenpriel, Pinnau, Krückau, Stör classified as HMWB</li> <li>• Communal and industrial facilities</li> <li>• Irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Main dykes mainly protected by forelands, in some areas by dams. The dykes are mainly earth dykes, in some places as flood protection systems in areas where there are technical construction works</li> <li>• Second dyke line on the Lower Saxony side present throughout, on the Schleswig-Holstein side it is missing in some areas (Scholenfleth crossing dyke, Kollmar-Stör barrage)</li> <li>• Flood barrages: Schwinge, Abbenfleth, Ruthenstrom, Wischhafen, Freiburg, Pinnau, Krückau, Stör</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Sea shipping on the Elbe federal waterway</li> <li>• Federal waterways Stör, Krückau and Pinnau</li> <li>• Ports in Stade-Bützfleth, Drochtersen-Ruthenstrom, Wischhafen and Glückstadt (outside of the planning area)</li> <li>• Excavation areas on the main river at Twielenfleth sand, Drommel, Pagensand and Rhinplate. Repositioning works at Hetlingen, north Pagensand and in the area around the mouth of the Stör</li> <li>• Bank maintenance carried out by the Water and Shipping Administration WSA, revetments e.g. at Wischhafen and Stadersand</li> <li>• Radar towers, shipping signals etc.</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• LS: areas used for agriculture ca. 2,692 ha, various usage intensities within and outside of the dyke, increase in arable land cultivation within the dyke at Krautsand; keeping dairy cows and raising them, in some areas keeping horses and sheep</li> <li>• SH: areas used for agriculture ca. 1,072 ha; intensive use within the dykes mainly as grassland, outside of the dykes generally only for maintenance as part of nature conservation</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Commercial fishing: net fishing along the edge of the river, secondary fishing (weirs, anchor nets) in the bank region</li> <li>• Recreational fishing, angling on the banks and from boats in the Elbe and the tributaries</li> </ul>

Natura 2000-relevant uses / interests	Short description
Hunting	<ul style="list-style-type: none"> <li>• LS: 11 hunting areas, of which 7 are private hunting grounds; Elbe hunting between the average high tide level line and the Elbe navigation channel</li> <li>• SH: Hunting areas within the dyke and on Pagensand; in some areas water bird hunting is carried out by the Elbjägerbund e.V. (Elbe Hunting Association)</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Industry around Stade: including aluminium production, chemical industry, logistics, power stations (outside of the Natura 2000 sites)</li> <li>• Industry at Glückstadt: including paper manufacture, logistics (outside of the Natura 2000 sites)</li> <li>• Shipyard on the Stör in Wewelsfleth (outside of the Natura 2000 sites)</li> <li>• Ferry connection between Glückstadt and Wischhafen</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Nature and bird tourism (Vogelkieker bus and Tidekieker boat)</li> <li>• Model Maritime Landscape in the Lower Elbe project run by the metropolitan region of Hamburg, various tourism concepts</li> <li>• Water and beach tourism (Hetlingen entrenchment, Kollmar, Krautsand)</li> <li>• Water sports, motor boats: kayaking, canoeing, sailing, motor boating, jet skiing</li> <li>• Various marinas: Lower Saxony: Barnkrug, Ruthenstrom, Assel, Dornbusch and Wischhafen</li> <li>• Schleswig-Holstein: Haseldorf, barrage at Pinnau, barrage at Krückau, Kollmar, Bielenberg, Glückstadt, barrage at Stör, Wewelsfleth</li> <li>• Walking and cycling</li> </ul>



▲ Fig. B4.12 Uses in functional area 4

Industrial areas in Stade-Bützfleth, use of grassland on the Stör, marina and beach at Kollmar

The members of the planning groups defined their targets and intended uses for functional area 4 in their technical contributions, which are given below in short form. For additional information, see part C: materials.

The targets given generally consist of continuing existing activities, but in some cases there are intentions beyond this.

In accordance with the current situation, shipping and agriculture dominate the intended uses. The tributaries are a very attractive setting for water sports activities.

▼ Table B4.9

Usage targets in functional area 4

Uses	Short description of the targets for functional area 4
Regional planning	<ul style="list-style-type: none"> <li>• Coordinating the various usage requirements from a federal state and regional planning perspective as part of sustainable regional development</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential in terms of the biological quality components and the targets for hydromorphological and physical/chemical quality components in the surface water bodies Elbe (transitional waters) and in the marsh waters</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Taking into account future requirements to increase and strengthen flood protection throughout all planning activities.</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Economic maintenance as necessary of the channels and banks, minimising or stabilising maintenance expenditure</li> <li>• Continuing the use of the deposits</li> <li>• Minimising sediment damage</li> <li>• Implementing the river engineering and sediment management concept set out by the HPA and the WSV</li> <li>• Reducing the increased tidal range, if possible reversing the trend</li> <li>• Adapting the channels of the Lower and Outer Elbe for container ships which are 14.5m deep</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of productive agriculture in the various management forms in suitable production areas, maintaining the existence of agricultural operations</li> <li>• Cooperating with nature conservation, contractual nature conservation on cultivation in accordance with nature conservation of grasslands</li> <li>• Coordinating and implementing the compensation measures in a socially acceptable manner (LS)</li> <li>• Not using agricultural areas for compensation measures (SH)</li> <li>• Using the non-valuable straw from extensively used grasslands and other grassland areas to produce energy</li> <li>• Keeping horses</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> <li>• Limiting the yield losses of geese, ducks and swans in agricultural areas by dividing and breaking up populations in a targeted manner using hunting (LS)</li> <li>• Continuing cooperation on predator control (LS)</li> <li>• Carrying out water bird hunting on the Elbe and goose hunting in the marshes in Schleswig-Holstein</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development of operations (outside of the planning area)</li> <li>• Port expansion, innovative location and expansion of companies with high growth and employment potential, holistic management of industrial areas in the city and the county of Stade as part of stade.-project 2021 (outside of the planning area).</li> </ul>

Uses	Short description of the targets for functional area 4
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Tunnel crossing of the Elbe and the Elbe marshes between Glückstadt and Drochtersen by motorway A20</li> <li>• Operating the ferry connection between Glückstadt and Wischhafen</li> </ul>
Leisure, tourism and sports	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, particularly promoting nature tourism and natural experience opportunities</li> <li>• No further limitations on the area or other deterioration of water sports such as jet skiing and water skiing</li> <li>• Improving the supply of berthing locations for sailing and motor boats, particularly in the tributaries Pinnau, Krückau und Stör</li> <li>• Improving the offer of activities for ferry passengers, expanding excursion trips</li> <li>• Setting up house boat facilities in the Schleswig-Holstein tributaries</li> </ul>

## B4 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B4 4.1 Synergies and conflicts between Natura 2000 and usage targets, needed for action

Important synergies between Natura 2000 and usage targets can arise from river engineering measures which cause an expansion of the flood plain. This could occur, for example, by a partial removal of the islands created by sand deposits. At the same time, the proportion of habitats which are typical for the estuary will grow (e.g. the priority alluvial forests \*91E0). Further synergies can be expected by implementing the concept of bank maintenance set out by the WSA.

A high proportion of the grassland areas in the Natura 2000 sites are cultivated intensively. What is concerning from a nature conservation perspective is the decline of the grassland in the Lower Elbe bird protection area. Examples of grassland cultivation activities carried out by the agricultural operations in place which are compatible with Natura 2000 can

be found in Gauensiekersand and the Allwördene outer dyke. In principle, it has been established that cooperation is advantageous for both sides. On an individual basis, however, conflicts can arise between the requirements for nature conservation and the business considerations of the agricultural operations. Generally, individual solutions should be developed in this instance.

By reducing the pressure from hunting in the Natura 2000 sites and isolating feeding and resting areas for migrating birds in the large grassland areas and mud flats which are free from disturbances will increase the amount of time the migrating birds spend in the areas designed for their protection and minimise the grazing pressure of the geese and swans in neighbouring areas.

Both leisure and recreational activities and PR work for Natura 2000 benefit from the natural experience activities such as Vogelkieker bus and Tidekieker boat. On the one hand, the generally good use for recreation means that public communications regarding the significance of Natura 2000 could potentially reach large numbers of people, but on the other hand, many of the activities are also associated with disturbance and damage, which threaten, for example, the breeding success of sensitive bird species. In order to avoid conflicts between the Natura 2000 management targets and the continually changing types of leisure and recreational activities, a continual adaptation of the information and guidance measures is required.

## Conclusion

The analysis of the synergies and conflicts shows that in functional area 4 with its broad range of uses there is a particular need for coordination with various interest groups.

Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. If the uses are not adapted to conform with Natura 2000, the management targets set out (see chapter B4 2.4) will probably not be achieved. This applies to both the aquatic part and the grassland areas of the functional area.

### ▼ Table B4.10

Important tasks of cooperation between the uses and interest groups found in functional area 4

Natura 2000-relevant uses / interests	Focus of cooperation
Regional planning	<ul style="list-style-type: none"> <li>No specific need for action</li> </ul>
Water management/ Water Framework Directive	<ul style="list-style-type: none"> <li>Designing and implementing agreed measures from the range of suggested measures for the tidal Elbe</li> <li>Maintaining or restoring the ground water supply typical for the marshes and forelands through cultivation of the surface waters which is compatible with Natura 2000, if necessary using the sluices/pumping stations for water control in the area during dry periods, water management which preserves nature</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>Minimising disturbance of Natura 2000 protected items caused by maintenance work. The coordination carried out to date should be continued.</li> <li>When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary and its flood plains</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>Optimising maintenance and operation of the waterways taking into account Natura 2000: including minimising the amount of maintenance, taking into account the distribution of particular features and functions (particularly the breeding and nursery area of the twaite shad), reducing the wave action</li> <li>Cooperation especially to create additional flood plains</li> <li>Optimising the bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the protection of species and biotopes</li> <li>Cooperating on determining sections of water in which water activities that may cause disturbances (e.g. jet skiing) can be carried out without damaging the Natura 2000 sites</li> </ul>

Natura 2000-relevant uses / interests	Focus of cooperation
Agriculture	<ul style="list-style-type: none"> <li>Continuing cooperation with agricultural operations, especially in the case of protecting the grassland</li> <li>Protecting the grassland sections</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>Continuing cooperation to ensure hunting is carried out in a manner compatible with Natura 2000</li> <li>Creating feeding and resting areas for migrating birds in the large grassland areas and in the mud flats which are free from disturbances as part of the hunting use</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>Existing facilities: if there are negative effects on the neighbouring Natura 2000 sites, the aim should be to minimise these in accordance with current scientific knowledge</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>Using and if necessary expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerately as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> </ul>



▲ Fig. B4.12

Examples of the need for cooperation between Natura 2000 and uses in functional area 4

Agriculture compatible with nature, avoiding disturbances caused by leisure activities, nearly natural bank shapes

### B4 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level.

They are supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures (see chapter A5).

### B4 4.2.1 Suggested measures for functional area 4

At the measure level, the relevant planning responsibilities in the two federal states must be taken into account.

The two following lists contain the suggested measures for Lower Saxony and Schleswig-Holstein. Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been presented from the original contributions without being changed.

For Schleswig-Holstein spatial, concrete individual measures (FA 4 measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

For Lower Saxony, spatial, concrete measures and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

#### ▼ Table B4.11

Measure areas and suggested measures for functional area 3 in Hamburg and Schleswig-Holstein

Number	Title
<b>Relevant to the entire functional area</b>	
FA 4.1 HH/SH	Dealing with leisure activities which cause a great deal of disturbance on the Glückstädt Nebenelbe, the Pagensander Nebenelbe and on the Haseldorfer Binnenelbe and its tributaries
<b>Twielenfleth Sand</b>	
FA 4.2 HH/SH	Grazing on the Twielenfleth sand
FA 4.3 HH/SH	Strips of mud flats along the tidal inlet of the Twielenfleth Sand
FA 4.4 HH/SH	Maintaining the open landscape character of the Twielenfleth Sand
FA 4.5 HH/SH	Nearly natural bank shape at Twielenfleth Sand
FA 4.6 HH/SH	Removal of the revetments on the ditches parallel to the dyke
FA 4.7 HH/SH	Maintaining a tidal alluvial forest on the bank of the Elbe (Julsand)
FA 4.8 HH/SH	Planting the Elbe water dropwort
<b>Succession areas in the Haseldorf foreland</b>	
FA 4.9 HH/SH	Mud flats and tidal reed beds at Bishorst Sand and its surrounding area
FA 4.10 HH/SH	Succession areas in the Haseldorf foreland
FA 4.11 HH/SH	Tidal inlets on Auberg and Drommel
FA 4.12 HH/SH	Elbe water dropwort in Bauernloch
FA 4.13 HH/SH	Japanese knotweed at Dwarsloch and in the port at Haseldorf
FA 4.14 HH/SH	Pastorenberg information point
<b>Bishorst foreland</b>	
FA 4.15 HH/SH	Succession in the south and the north of the Bishorst foreland
FA 4.16 HH/SH	Bishorst: alluvial forests and woods which have agricultural historical significance
FA 4.17 HH/SH	Use of bulrushes and development of the reed north of Bishorst
FA 4.18 HH/SH	grassland north of the boulevard to the Bishorst wharf
FA 4.19 HH/SH	grassland south of the boulevard to the Bishorst wharf

Number	Title
<b>Eschschallen, Pagensand and Pagensander Nebelbe</b>	
FA 4.20 HH/SH	Eschschallen
FA 4.21 HH/SH	Side bay(s) on the eastern bank of Pagensand
FA 4.22 HH/SH	Nearly natural bank shape at Pagensand
FA 4.23 HH/SH	Pagensand Wildlife Project
FA 4.24 HH/SH	Foreland west of the mouth of the Krückau
<b>Kollmar to the mouth of the Stör</b>	
FA 4.25 HH/SH	Bielenberg beach: Elbe flora information point
FA 4.26 HH/SH	Rhinplate
FA 4.27 HH/SH	Glückstädter Nebelbe: breeding ground for the twaite shad
FA 4.28 HH/SH	Alluvial forest on the bank south of Glückstadt
FA 4.29 HH/SH	Deposit area south of Glückstadt
FA 4.30 HH/SH	Communication of the prohibition on entering the CA
FA 4.31 HH/SH	From the dyke into the Rhinplate and Elbe bank south of Glückstadt CA
FA 4.32 HH/SH	Mud flats north and south of the Glückstädt ferry dock
<b>Dyked, mouths of the tributaries</b>	
FA 4.33 HH/SH	Upgrading the grassland for waders on the mouths of the Stör, the Krückau and the Pinnau
FA 4.34 HH/SH	Predator control at the mouths of the Stör, the Krückau and the Pinnau
FA 4.35 HH/SH	Information on caring for the dykes at the mouths of the Stör and the Krückau
FA 4.36 HH/SH	Mouth of the Stör within the dyke, overview
FA 4.37 HH/SH	Maintaining and promoting the open landscape character at the mouth of the Stör
FA 4.38 HH/SH	Polder at Wewelsfleth, mouth of the Stör within the dyke
FA 4.39 HH/SH	Widening the mouths of the large ditches on the Stör
FA 4.40 HH/SH	Removing the debris on the banks of the Stör
FA 4.41 HH/SH	Lowland hay meadows, mouth of the Stör within the dyke
FA 4.42 HH/SH	Closed rows of trees on the B431 west of Wewelsfleth
FA 4.43 HH/SH	Recreational use, mouth of the Stör within the dyke
FA 4.44 HH/SH	mouth of the Krückau within the dyke, overview
FA 4.45 HH/SH	Lowland hay meadows and edge structures, mouth of the Krückau within the dyke
FA 4.46 HH/SH	Pond loaches, ditch flora and fauna, mouth of the Krückau within the dyke
FA 4.47 HH/SH	Shallow water areas at the mouth of the Ritt into the Krückau
FA 4.48 HH/SH	Village fauna, mouth of the Krückau within the dyke
FA 4.49 HH/SH	Alluvial meadows on the Pinnau: overview
FA 4.50 HH/SH	Lowland hay meadows, mouth of the Pinnau within the dyke
FA 4.51 HH/SH	Clay removal areas, mouth of the Pinnau within the dyke

## ▼ Table B4.12

Suggested measures for functional area 4 in Lower Saxony

<b>Sphere of action 1: Developing concepts/plans</b>	
1.1	Creating areas-specific Natura 2000 management concepts for partial areas
<b>Sphere of action 2: Research and environmental monitoring</b>	
2.2	Determining the significance of different mud flats in their function for bird species
<b>Sphere of action 3: Concrete habitat and species protection measures</b>	
3.1	Developing biotope types and species typical for the estuary by removing species from the Elbe islands
3.2	Opening or rebuilding summer dykes
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SACs in the Lower Elbe
3.6	Measures to promote the development of alluvial forests
3.7	Measures to promote/create tidal inlet systems
3.9	Permitting the growth and restoration of pioneer locations on the foreland and on the Elbe islands
3.11	Measures to maintain and promote the Elbe water dropwort population
3.12	Measures to maintain and promote the chequered lily population
3.18	Measures to promote connected resting areas in the grassland which have low disturbance levels
3.19	Measures to promote areas with low disturbance levels in the mud flats and shallow water areas
3.21	Measures to maintain/develop extensive use of grassland areas including turning arable land back into grassland
3.22	Improving the water supply in public areas
3.23	Creating tide water ponds in the dyked forelands and small inland waters
3.25	Maintaining protection zones free from disturbance as a breeding site for white-tailed eagles
3.26	Improving the breeding sites for the white stork

Additional information can be found in the federal state contributions (part I or A and texts on functional area 4).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Schleswig-Holstein part of the functional areas:
  - ↳ annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Maps can be found under ↳ Natura 2000 technical contribution ↳ Measure programme ↳ functional area 4

- Lower Saxony part of the functional area: ↳ annex of the Lower Saxony IMP contribution ↳ Annex: technical contributions ↳ technical contribution 01: Natura 2000 ↳ FB01 part B with the target maps C3 and C4.

Target maps C3 and C4 give an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

### B4 4.2.2 Interdisciplinary cooperation in implementing the measures

Central Natura 2000 targets for the aquatic area of functional area 4 will only be achieved if measures are implemented in the entire Elbe estuary (e.g. tidal range problem) or at the level of the Elbe RBC (e.g. reducing nutrient and harmful substance damage and thereby improving the oxygen content). For this latter category, mention is made of the cultivation plan in accordance with Article 11 WFD. The measures provided for this make a significant contribution to the implementation of the Natura 2000 targets.

Cooperation with the WSA and the HPA shows an additional focus, which can be combined from the following measures:

- Carrying out the necessary maintenance of the channels of the Elbe in a manner compatible with Natura 2000
- Limiting, and if possible reversing, the increase in the tidal range, particularly by creating new flood plains at hydromorphologically and ecologically suitable locations
- Developing solutions to create new shallow water areas. These should indicate ways in which the need for additional shallow water areas can be combined with protecting the irreplaceable functions of the remaining landscape units of the functional area

- Developing solutions to avoid leisure uses which cause great disturbance on the Glückstädter Nebenelbe, the Pagensander Nebenelbe and on the Haseldorf inner Elbe and its tributaries

Focuses for cooperation with the offices responsible for coastal protection are:

- Using the sluices and pumping stations for optimal water management in dyked areas (restoring the suitability of the habitat for meadow birds)
- Opening summer dykes in the foreland areas
- Tidal inlet and small water facilities in foreland areas

As a priority in the implementation of concrete measures, in many cases basic steps and concepts have to be developed which coordinate the leading administration closely with the relevant nature conservation authorities in the federal states.

Cooperation between agricultural activities and hunting organisations also plays a central role. In this instance, the focus is on the development of solutions to better coordinate uses and bird protection.

### B4 4.2.3 Information on studies and environmental monitoring

An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7). For functional area 4, the following aspects are particularly significant:

- Monitoring the change in the hydrological and morphological behaviour of the main Elbe and the tributaries
- Monitoring the changes in oxygen and nutrient content in the main Elbe and the tributaries
- Monitoring the changes in the twaite shad populations (e.g. additional assessment of the fish

larvae population in the functional area in spring)

- Monitoring the change in the Elbe water dropwort population
- Regular continuation of the long-term monitoring in the grassland areas
- Monitoring the change in the chequered lily population on Asselersand
- Monitoring the size and structural changes in the alluvial forests
- Continuing the regular assessment of populations of target species in the bird protection areas (breeding and migrating birds)

- Assessing the breeding colonies of gulls and terns
- Monitoring the hatching success of meadow birds
- Temporally condensed assessment of breeding populations of target bird species in areas with measure focus points



I Integrated  
M management plan  
P Elbe estuary

## Functional area 5



overleaf

Nature conservation area „Wildvogelreservat Nordkehdingen“

Oystercatchers

Foreland at St. Margarethen



## B5 1 Overview of functional area 5

Functional area 5 covers a river area of around 18 km (northern bank) or around 21 km (southern bank) from the line between the Brokdorf nuclear power station to Freiburg (km 682) to the line between Zweidorf (km 700) and the Oste barrage (km 703). It includes areas in the counties of Stade (Lower Saxony), Steinburg and Dithmarschen (Schleswig-Holstein).

Functional area 5 is the mesohaline section of the estuary. The salt concentration of the water in the mesohaline area of the estuary naturally has the greatest fluctuations and gradients over short distances. This is the central area in the naturally turbid section of the Elbe estuary, which oscillates between Brunsbüttel and the mouth of the Stör depending on the surface water runoff and strength of the tide. As a long-term average, the section between Freiburg and St. Margarethen (680km-690km) has the highest turbidity. Only a few organisms have evolved to deal with the major fluctuations in the hydrological parameters, which leads to a relatively low number of benthos and plankton species. The regular addition of sea water ensures that there is never any

shortage of oxygen. The oxygen concentration is generally between 7 and 13 mg O<sub>2</sub>/l all year round. Since 1970, the tidal range in functional area 5 has increased by 10 to 15cm. A large increase in the tidal range like that which occurred in the inner estuary has not taken place here.

The river in this section is a long curve. The distribution of landscape structures is characterised by the contrast between outer banks and inner banks. The Schleswig-Holstein bank is an inner bank. With the exception of the foreland at St. Margarethen, the land protection dyke is mostly not used or is only separated from the high tide level by a very small strip of land. The bank, which is 18km long, is almost completely fixed with groynes and revetments. The northern bank has traditionally been a section with a strong tendency for erosion. Over the entire length of the dyke line, the dyke built in the late Middle Ages is situated closer to the Elbe than the current dyke. Mud flats and shallow water areas are mostly missing from this area. The foreland at St. Margarethen is characterised by meadows, pastures and reed beds.

The tidal influence extends well beyond the tidal inlet system onto the foreland.

On the opposite outer bank, the situation is opposite. In the Lower Saxony area, there are wide mud flats and shallow water areas. Only around 5% of the 22km-long bank is fixed.

Recent history has been characterised by dyking, which was carried out from the end of the 1960s to the beginning of the 1980s, causing the loss of just under 4,500 ha of flood plains. Wide forelands also occur in Hullen on the mouth of the Oste.

The remaining forelands are between 200 and 500m wide. Around half of the foreland areas are used as grasslands, and the other half is made up of reed beds. The hinterlands are almost exclusively used for agriculture. While the northern part of the former outer dyke made up of a high proportion of state-owned conservation areas is dominated by grassland, the south part is dominated by arable land. With the exception of sluices and ditches, the former outer dyke areas, up to the second dyke line, are mainly free of constructions. The main recreational uses are cycling and nature tourism.



▲ Fig. B5.1 Nordkehdingen from above (here Schöneworth outer dyke)

In the foreland and in the first batch of vegetation between the dyke and the northern sluice ditch, grassland still dominates. Moving inland, however, arable land is now the main feature.

The most important industrial region and the central point for energy generation in Schleswig-Holstein is in Brunsbüttel in the Schleswig-Holstein part of the Elbe estuary (outside of the planning area). As in the other functional areas west of Hamburg, the Lower Elbe has been expanded for marine shipping. The approach to the North Sea-Baltic Sea channel is through the sluices at Brunsbüttel, which is particularly important in shipping. The sluice facility is also

a popular tourist attraction and is visited by around 80,000 people a year.

In Brokdorf, a sandbar at the base of the dyke is used as a beach. Large car parks and a motor home park mean that there is a concentration of motorised tourism here. Ship spotting has developed into a major attraction from this site in the past few years.



▲ Fig. B5.2 Landscape in functional area 5  
 Nearly natural bank with reeds and mud flats in the Nordkehdingen foreland at Balje  
 Foreland at St. Margarethen

▼ Table B5.1

Selected abiotic parameters in functional areas 5

Length	Km 682 (line between the Brokdorf nuclear power station and Freiburg tidal inlet) to km 700 (Zweidorf ferry dock west of Brunsbüttel) or km 703 (mouth of the Oste)
Total area	11,357 ha
River width	Cross section between Brokdorf and Freiburg port tidal inlet: 2.3 km Cross section between Scheelenkuhlen and Schöneworth outer dyke (km 687): 1.9 km Zweidorf ferry dock to Balje outer dyke (km 699): 2.8 km
Length of the bank <sup>1</sup>	ca. 40km, of which: <ul style="list-style-type: none"> <li>• unobstructed: ca. 21.2 km</li> <li>• with revetments, with revetments and groynes: ca. 18.8 km</li> </ul>
Distribution of the landscape zones <sup>2</sup>	<ul style="list-style-type: none"> <li>• Dyked areas: 5,432 ha (47.8%)</li> <li>• Foreland: 937 ha (8.2%)</li> <li>• Mud flats (average low tide level to average high tide level): 1,318 ha (11.6%)</li> <li>• Shallow water areas from 2m below average low tide level to average low tide level: 327 ha (2.9%)</li> <li>• Water areas from 10m to 2m below average low tide level: 1,301 ha (11.5%)</li> <li>• Water areas deeper than 10m below average low tide level: 2,042 ha (18.0%)</li> </ul>
Tidal range <sup>3</sup>	3.00 m in Brokdorf, 2.79 m in Brunsbüttel
Chloride content <sup>4</sup>	5 to 18‰ (mesohaline)
WFD water body	Coordination area tidal Elbe: Elbe transitional waters. Water body classified as HMWB

<sup>1</sup> technical contribution waterways and ports 2010    <sup>2</sup> WSA November 2008    <sup>3</sup> www.bsh.de/akt/dat/wvd/elbepegel    <sup>4</sup> www.fgg-elbe.de

## B5 2 Natura 2000

The specific Natura 2000 targets for functional area 1 are determined using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs and the bird species of the EU bird protection areas which occur in the functional area, evaluation of their conservation status
- Evaluation of the strengths and weaknesses of the functional area from the perspective of species and habitats which are relevant for Natura 2000
- Analysis of the interaction with the other functional areas in the estuary
- Development of a Natura 2000 model for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

## B5 2.1 Natura 2000 status

In functional area 5, the Natura 2000 sites of the Elbe estuary in Lower Saxony and

Schleswig-Holstein are made up of two SACs and two SPAs.

The SAC "Schleswig-Holstein Elbe estuary and surrounding area" comprises the entire functional area on the Schleswig-Holstein side, with the exception of the water areas in front of Brunsbüttel (km 691 to km 699).

The SPA "St. Margarethen foreland" encompasses the southern part of the foreland.

The SPA "Untere Elbe" comprises the entire functional area in Lower Saxony (outer and inner dyke areas), but the SAC "Untere Elbe" area is limited to the outer dyke areas.

### ▼ Table B5.2

Protected areas in functional area 5

Area category	Area designation
Special Areas of Conservation (SACs)	DE 2018-331 Lower Elbe (LS) DE 2323-392 Schleswig-Holstein Elbe estuary and surrounding area (SH)
Special Protection Areas (SPAs)	DE 2121-401 Lower Elbe (LS) DE 2121-402 St. Margarethen foreland (SH)
Ramsar area	7DE004 Lower Elbe between Barnkrug and Otterndorf (LS) 7DE030 Schleswig-Holstein Wadden Sea and adjacent areas (SH)
Natura 2000 conservation areas	CA Hullen bird protection area (LS) CA Nordkehdingen outer dyke I (LS) CA Nordkehdingen outer dyke II (LS) CA Nordkehdingen Wild Bird Reserve (LS)
Natura 2000 landscape protection areas	–

Lower Saxony and Schleswig-Holstein have defined the habitats in annex I and the species in annex II of the Habitats Directive as objects of protection in the SACs and evaluated their conservation statuses. At the same time, the breeding and migrating bird species in the bird protection areas relevant for the area were also defined. The evaluation results given here take into account federal state-specific features and are based on the relevant information given by the two federal states.

An overview of the Natura 2000 protected features which are relevant for all of functional area 5 is given below. Additional information on the basis for the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the "Natura 2000" technical contributions in the federal states' contributions (see part C: materials).

### B5 2.1.1 Special Areas of Conservation (SACs)

As a result of the contradiction between the inner and outer banks and the dyke line near to the bank on the Schleswig-Holstein side, the ecologically valuable aquatic habitats are almost all on the Lower Saxony side. The essential functions of the aquatic region are almost exclusively carried out in the southern half of the functional area (Table B5.3).

Due to the nearly natural bank shape, the complete separation of the bank vegetation into zones and the high proportion of nearly natural or extensively used biotopes in the foreland, functional area 5 is the only one in which the conservation status of the habitat type "estuaries" (1130) in Lower Saxony can be rated as favourable (B).

▼ Table B5.3

Distribution of the deep areas in functional area 5

Deep areas	Proportion in Lower Saxony	Proportion in Schleswig-Holstein
Mud flats (average low tide level to average high tide level)	95,1 %	4,9 %
Shallow water areas from 2m below average low tide level to average low tide level	83,7 %	16,3 %
Water areas from 10m to 2m below average low tide level	70,9 %	29,1 %
Water areas deeper than 10m below average low tide level	52,5 %	47,5 %

Source: technical contribution waterways and ports 2010

▼ Table B5.4

Conservation statuses of the habitats in annex I of the Habitats Directive in functional area 5

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		HH <sup>1</sup>	LS <sup>2</sup>
1130	Estuaries	B <sup>3</sup>	C
1140	Vegetation-free deposit, sand and mixed mud banks	B	C
1330	Atlantic salt meadow ( <i>Glauco-Puccinellietalia maritimae</i> )	C	4
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	B	4
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	B	4

<sup>1</sup> Elbe estuary IMP contribution from Lower Saxony, part II, functional area 5, as of September 2011  
<sup>2</sup> Standard data sheet, as of March 2009. For Schleswig-Holstein, the status evaluations are based on the evaluation of the status from the standard data sheet over the entire area from the mouth of the Elbe to the border of the city of Hamburg. The evaluation of the conservation statuses of the habitats is mainly based on the results of the first data capture from 2003. In summer 2010, more data was captured, the results of which are not yet available in an evaluated form.  
<sup>3</sup> Elbe estuary IMP, part II, functional area 5, as of September 2011. In Lower Saxony, the habitat type 'estuaries' is currently evaluated using several individual components. The conservation status shown here is a composite view of these individual evaluations.  
<sup>4</sup> The foreland at St. Margarethen was not assessed in 2003. The results of the initial data capture in 2010 are not yet available in an evaluated form.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

Grasslands, reeds, tidal inlets and shallow waters with periodic inflow of brackish water are characteristic for the forelands. The proportion of intensively used areas or areas which are not typical for the estuary on the foreland is low on both the foreland at St. Margarethen and in the Lower Saxony BHD areas. In Lower Saxony, extensive measures on the public areas were able to transform the conservation status of the estuary in the land area from unfavour-

able to favourable. On both banks, it was possible to achieve an improvement in the status of the forelands from a floral and avifaunistic perspective.

Salt meadows (habitat type 1330) can also be found at some points near to the North Sea in the west of the functional area (e.g. at Hullen). Due to the influence of brackish water, typical salt-tolerant plants are not found in this area or are only found in some places.

With the decreasing salt content of the ground, there is an eastwards transition to lowland hay meadows (habitat type 6510). The meadows on the foreland at St. Margarethen are home to the largest population of meadow caraway in the Schleswig-Holstein part of the Elbe estuary. This type of habitat only develops when the area is solely used as a meadow.

In amongst the tidal and land reed beds, tall herbaceous vegetation areas with large numbers of species are formed, which are categorised as the habitat type "hydrophilous tall herbaceous vegetation" (6430).



▲ Fig. B5.3: HD habitats in functional area 5

Left: reeds and tidal ponds with crowfoot flowers (habitat type 1130)

Centre: salt meadow with salt bulrushes (habitat type 1330), lowland hay meadows (habitat type 6510)

Right: Meadow caraway, a characteristic species of the lowland hay meadows of the Lower Elbe

The Elbe water dropwort and the habitat type alluvial forests (\*91E0) naturally do not occur in the meso-haline section of the Lower Elbe.

Sea lamprey, river lamprey, salmon and houting use the Lower Elbe as a migration channel. The change from marine to fluvial habitats requires physiological adaptations. The migrating species stop for longer in functional areas 5 and 6 than in the remaining functional areas in order to adapt the osmotic processes in their organism to the lower concentrations of important elements.

They gather in this section before swimming upstream to breed, which generally takes place in a concentrated manner over a short period of time. Young twaite shad from functional areas 3 and 4 remain in functional area 5 from high summer to early autumn.

The mud flats at Böschrücken (km 690, Lower Saxony) are used as a resting place by seals, but few animals regularly gather on the small sandbanks in front of St. Margarethen. Harbour porpoises occasionally penetrate into the estuary, but the species mainly lives in the North Sea.

▼ Table B3.5

Conservation statuses of the species in annex II of the Habitats Directive in functional area 5

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	C	B
1103	Twaite shad ( <i>Alosa fallax</i> )	C	B <sup>2</sup> C <sup>3</sup>
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>4</sup>	D <sup>4</sup>
1351	Harbour porpoise ( <i>Phocoena phocoena</i> )	C <sup>5</sup>	–
1365	Seal ( <i>Phoca vitulina</i> )	B <sup>5</sup>	A <sup>5</sup>

\* priority species (M): The estuary is used by this species as a migration channel.

<sup>1</sup> Elbe estuary IMP, part II, functional area 5, as of September 2011

<sup>2</sup> Standard data sheet (as of March 2009)

<sup>3</sup> Bioconsult 2010

<sup>4</sup> The population of the houting was categorised as not significant in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (24–25 March 2009).

<sup>5</sup> The conservation status of the species is only evaluated for the entire SACs, and not for the individual functional areas.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

## B5 2.1.2 Special Protection Areas (SPAs)

With a surface of 9,541 ha in functional area 5, the Lower Saxony "Lower Elbe" bird protection area plays a key role in bird protection not only on a functional area level but also in the entire estuary.

The foreland at St. Margarethen (244 ha) is designed as a stand-alone bird protection area. Functional area 5 comprises small areas of the "Lower Elbe to

Wedel" bird protection areas which lies across functional areas 3, 4 and 6. From an avifaunal perspective, both bird protection areas belong to the same habitat network. The target species of the "Lower Elbe to Wedel" bird protection area are therefore taken into consideration in functional area 5 when considerable populations use the St. Margarethen foreland.

### Breeding birds

Nordkehdingen is made up of two partial areas. The foreland and the inner dyke area between the dyke and the northern sluice ditch (north Nordkehdingen, Fig. B5.1, p. 182) are dominated by state-owned conservation areas. Cultivation and water management activities are mainly geared towards the needs of the breeding bird species in the moist grassland. The adjacent southern area of Nordkehdingen South comprises the former Nordkehdingen foreland from the northern sluice ditches to the old winter dyke, and is characterised by arable use.

North Nordkehdingen is the area with the largest diversity of bird species, the highest number and breadth of breeding birds in the entire planning area. In contrast to most other parts of the Elbe estuary, the breeding populations of many bird species of the moist grassland (e.g. corncrake, lapwing, black-tailed godwit, redshank, meadow pipit) are stable or increasing here. In the state-owned conservation areas, the comprehensive care and development measures, water supply management and intensive care of the area are all having an effect.

The extensive reeds on the dyke foreland offer favourable habitats for many species, including the Eurasian marsh harrier, water rail, spotted crane, Eurasian reed warbler, bluethroat, bearded tit and reed bunting. As a result of the expansion of fast-growing vegetation populations in the foreland, the breeding colonies of the common tern, gull-billed tern and black-headed gull have all left the area and have settled in the foreland at Neufelderkoog (functional area 6, Schleswig-Holstein).

The area of South Nordkehdingen which is now characterised by widespread arable use has a breeding population of particularly low numbers of species and individuals. The populations of the breeding bird species in the grassland and the populations of most species of duck are declining rapidly. The numbers of breeding pairs which used to have national significance e.g. those of the common snipe, redshank and black-tailed godwit have shrunk to small remaining populations. South Nordkehdingen has a cross-regional significance for species which can live in the small reed areas along the ditches, such as the bluethroat and hedge warbler. The majority of the remaining species have an unfavourable conservation status.

The grassland on the foreland at St. Margarethen is partially grazed, partially mowed. In the east of the area, reed beds have developed. The foreland is

filled with tidal inlets with a nearly natural flow. Near to the banks, shallow basins are formed which are flooded when water levels are high in the Elbe. Their moist sandy banks are important biotopes used to replace the lack of mud flats on the northern bank. Important breeding bird species here include the lapwing, redshank, black-tailed godwit, common snipe, skylark and corncrake.

Despite its comparatively small dimensions, the foreland at St. Margarethen is ranked the fourth best area for supporting the corncrake population in

Schleswig-Holstein and is one of the areas which are regularly inhabited by corncrakes in weak migration years. Reed bed breeders such as the bluethroat and hedge warbler often occur in the eastern area and in small strips of reed beds on the west of the foreland. Garganeys and other species breed on the clay removal areas. As in North Nordkehdingen, St. Margarethen has also shown that uses compatible with Natura 2000 and good contact with those cultivating the areas can be successful.

In terms of the numbers of breeding pairs, the area in North Nordkehdingen dominates all other areas in the Elbe estuary. Due to the fact that its value in connection with South Nordkehdingen, its particular significance is not expressed in Table B5.6.



▲ Fig. B5.3: Breeding birds in functional area 5

Yellow wagtail, ruff, black-tailed godwit

The yellow wagtail and black-tailed godwit are relatively common in Nordkehdingen and on the foreland at St. Margarethen. In the past few years, the ruff has stopped breeding in Nordkehdingen.

▼ Table B5.6

Conservation statuses of the breeding bird species in functional area 5

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
Common snipe ( <i>Gallinago gallinago</i> )	–	C	B
White-spotted bluethroat ( <i>Luscinia svecica</i> )	•	A	B
Whinchat ( <i>Saxicola rubetra</i> )	–	C	–
Skylark ( <i>Alauda arvensis</i> )	–	B	–
Common tern ( <i>Sterna hirundo</i> )	•	C	–
Ruff ( <i>Philomachus pugnax</i> )	•	C	–
Lapwing ( <i>Vanellus vanellus</i> )	–	C	B
Garganey ( <i>Anas querquedula</i> )	–	C	–
Teal ( <i>Anas crecca</i> )	–	C	–
Gull-billed tern ( <i>Gelochelidon nilotica</i> )	•	C	–
Northern shoveller ( <i>Anas clypeata</i> )	–	C	–
Bittern ( <i>Botaurus stellaris</i> )	•	C	–
Eurasian marsh harrier ( <i>Circus aeruginosus</i> )	•	C	B
Redshank ( <i>Tringa totanus</i> )	–	C	B
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	C	–
Hedge warbler ( <i>Acrocephalus schoenobaenus</i> )	–	B	B
Gadwall duck ( <i>Anas strepera</i> )	–	B	–
Short-eared owl ( <i>Asio flammeus</i> )	•	C	–
Spotted crake ( <i>Porzana porzana</i> )	•	C	–
Black-tailed godwit ( <i>Limosa limosa</i> )	–	C	B
Corncrake ( <i>Crex crex</i> )	•	C	B
Water rail ( <i>Rallus aquaticus</i> )	–	C	–
White stork ( <i>Ciconia ciconia</i> )	•	C	–
Yellow wagtail ( <i>Motacilla flava</i> )	–	B	–
Montagu's harrier ( <i>Circus pygargus</i> )	•	C	–

<sup>1</sup> Aggregate evaluations of the entire functional area 5 on the basis of the individual results for the partial areas North Nordkehdingen and South Nordkehdingen (for individual results, see Elbe estuary IMP, part II, functional area 5, as of September 2011)

<sup>2</sup> Avifaunal Schleswig-Holstein 2007

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

## Migrating birds

Functional area 5 offers migrating birds extensive and important habitats which are spatially interconnected. The most important grassland areas for Nordic geese and swans (barnacle goose, greylag goose, white-fronted goose, mute swan, whooper swan und tundra swan). These species use the grassland areas of the foreland and the grassland areas and arable areas in the former Nordkehdingen outer dyke to look for food. They prefer feeding in grassland areas

which are wide, open and have low levels of disturbance and no sight limitations. The lack of wooded areas in the current and former outer dyke makes the area valuable for migrating birds. The barnacle goose is present here with maximum resting numbers of up to 50,000 individuals.

The flat, flooded meadows, water areas and extensive mud flats offer resting and feeding habitats

which are particularly important for ducks (including the shelduck, Eurasian widgeon, gadwall, teal, mallard, pintail, garganey and northern shoveller) and for many other waders (including the pied avocet, common ringed plover, Eurasian golden plover, grey plover, lapwing, dunlin, ruff, black-tailed godwit,

bar-tailed godwit, whimbrel, curlew, spotted redshank, redshank, greenshank) and for gulls (including the little gull, black-headed gull, common gull and great black-backed gull).

In the foreland at St. Margarethen, shelducks and barnacle geese regularly rest with populations which, even when viewed individually, are of international importance.

The area plays an important role for these species in the network of geese resting places in the Elbe estuary. The largest resting population of ruffs identified in the past ten years was 324 birds (2006).

▼ Table B5.7

Conservation statuses of migrating birds in functional area 5

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
White-fronted goose ( <i>Anser albifrons</i> )	-	B	-
Shelduck ( <i>Tadorna tadorna</i> )	-	B	B
Spotted redshank ( <i>Tringa erythropus</i> )	-	C	-
Eurasian golden plover ( <i>Pluvialis apricaria</i> )	-	B	-
Greylag goose ( <i>Anser anser</i> )	-	A	B
Eurasian curlew ( <i>Numenius arquata</i> )	-	B	-
Greenshank ( <i>Tringa nebularia</i> )	-	B	-
Mute swan ( <i>Cygnus olor</i> )	-	B	-
Ruff ( <i>Philomachus pugnax</i> )	•	-	B
Lapwing ( <i>Vanellus vanellus</i> )	-	B	-
Teal ( <i>Anas crecca</i> )	-	B	B
Black-headed gull ( <i>Larus ridibundus</i> )	-	B	-
Northern shoveller ( <i>Anas clypeata</i> )	-	B	-
Eurasian widgeon ( <i>Anas penelope</i> )	-	B	-
Whimbrel ( <i>Numenius phaeopus</i> )	-	B	-
Redshank ( <i>Tringa totanus</i> )	-	B	-
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	B	-
Common ringed plover ( <i>Charadrius hiaticula</i> )	-	B	-
Whooper swan ( <i>Cygnus cygnus</i> )	•	B	-
Pintail ( <i>Anas acuta</i> )	-	B	-
Mallard ( <i>Anas platyrhynchos</i> )	-	B	-
Common gull ( <i>Larus canus</i> )	-	B	-
Barnacle goose ( <i>Branta leucopsis</i> )	•	A	A
Tundra swan ( <i>Cygnus columbianus</i> )	•	C	-

<sup>1</sup> Elbe estuary IMP, part II, functional area 5, as of September 2011

<sup>2</sup> Standard data sheet. The evaluation is based on the entire bird protection area. Some of the species only occur occasionally in functional area 5.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B5.2 Migrating birds in functional area 5  
Black-tailed godwits and dunlins on flat, flooded grassland, mute swans on a rapeseed field

### B5 2.1.3 Strengths and weaknesses of the functional area

As a result of the mixture of marine sediments, the pollutant content of the sediments in functional area 5 is generally harmless. Thanks to the sea water which penetrates the area, the supply of oxygen is favourable all year round.

Nordkehdingen is particularly significant from an avifaunal perspective in the entire Elbe estuary, as the greatest diversity of species can be found here. The same is true for the numbers and breadth of breeding birds. The functional area is an internationally important winter resting place for species of Nordic geese and swans which have high resting populations in this area.

Among the strengths in this functional area, we can count the successful management in North Nordkehdingen and in the foreland at St. Margarethen. The measures implemented there give a fine example of the fact that cultivation which is compatible with Natura 2000 both in publicly-owned areas and in partnership with foundations and agricultural activities is both possible and successful.

Overall, the essential elements of a nearly natural estuary landscape (shallow water areas, mud flats, reeds and extensively used grasslands) can be found in the functional area, but they are almost exclusively found on the southern bank. Despite a qualitative-

ly good distribution, from a quantitative perspective there are deficiencies which are mainly due to the loss of the flood plains and the channelling of the river. When the area at Nordkehdingen was dyked, the entire planning area lost a significant proportion of its flood plains. The effects on the hydrology and the sediment supply in the tidal Elbe are now a priority in the functional areas located upstream.

In the land area, there are also considerable deficiencies as a result of the Nordkehdingen dyke which was installed in the 1970s. The optimised drainage system and the control of the sluices have made it possible for the land in the former outer dyke to be used as arable land. More than a fifth of the long-term grassland areas which were still present in 1989 have now transformed into arable land, which has taken a terrible toll on the breeding birds in the moist grassland and the species of duck. If this trend is continued and the cultivation of maize is expanded, there are concerns that this will lead to the continued deterioration of the conservation status of grassland breeding and migrating birds.

From an analysis and evaluation of the populations of species and habitats relevant for Natura 2000 in connection with the characteristic location factors, the following strengths and weaknesses of the functional area arise (Table B5.8):

## ▼ Table B5.8

Overview of the strengths and weaknesses in functional area 5

#### Particular strengths

- Sufficient oxygen supply all year round
- Low levels of sediment damage by harmful substances
- On the Lower Saxony side: the only functional area with an overall favourable conservation status for the habitat type estuaries (1130): extensive mud flats, nearly natural, unfixed banks with vegetation zones which are typical for the habitat, extensive tidal and land reed banks and the overall highest proportion of biotopes typical for the estuary in the entire Lower Saxony area
- Significant occurrence of lowland hay meadows (6510) with meadow caraway and rattle, increase as a result of successful care and development measures
- Increasing proportion of grassland areas cultivated in accordance with the goals in North Nordkehdingen and in the foreland at St. Margarethen
- Major significance of the mainland areas at North Nordkehdingen and the foreland at St. Margarethen as breeding areas for meadow breeders, stable or increasing populations, for example of the corncrake, lap-wing, black-tailed godwit and redshank
- Internationally important winter resting place for Nordic geese and swans with very high resting population numbers
- Flat, flooded meadows, shallow water areas and extensive mud flat areas as an internationally important resting and feeding place for ducks and many species of mud flat bird
- An example of successful nature conservation measures

#### Particular weaknesses

- Unsatisfactory status of fish fauna in the WFD Elbe transitional waters
- Northern bank: extreme lack of structure in the aquatic area and low potential for development: nearly natural banks, dammed dykes
- Loss of a significant proportion of the flood plains in the estuary caused by the dyke at Nordkehdingen
- Loss and fragmentation of habitats cause by a change in the grassland and arable use mainly in South Nordkehdingen, intensive use of grassland on the remaining privately-owned grassland areas, disrupted duck and meadow breeder populations
- Disturbances caused by leisure activities, hunting and agricultural scare tactics



▲ Fig. B5.6

Examples of areas which are particularly important for Natura 2000

Left: when the grassland areas are used in a suitable way, there is a potential for them to develop into lowland hay meadows

Centre: Extensively used meadows with high water levels

Right: the expansion of the landscape contributes to a particularly high ecological value or development potential in Nordkehdingen, not just within the dykes. The reed beds in the foreland are the largest connected occurrence of this biotope type which is typical for the estuary in the entire Elbe estuary.



▲ Fig. B5.7

Geese that flee because of disturbances have an energy requirement which is ten times higher than resting animals.

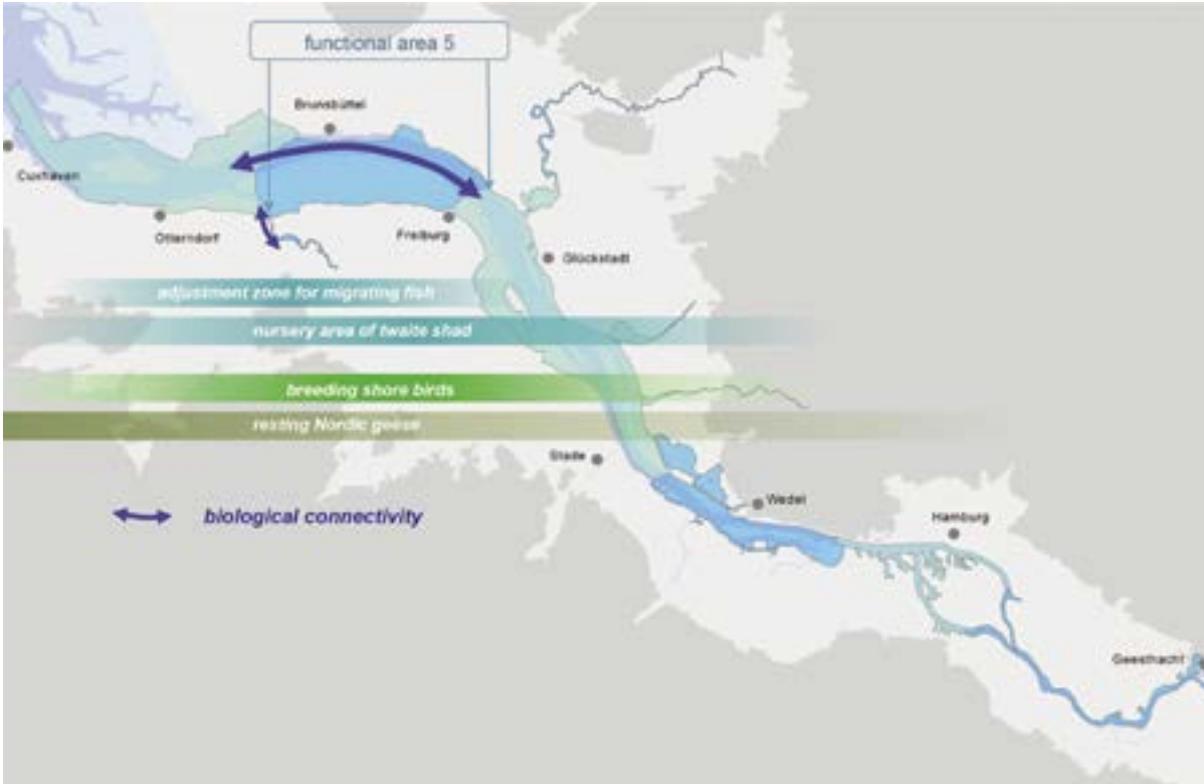
Maize cultivation in Nordkehdingen

Inner banks which are fixed with revetments in the foreland at St. Margarethen (in the background Elbe port and Brunsbüttel nuclear power station)

**B5 2.2 Interactions with other functional areas**

Due to its general connective function for migrating fish and cyclostomes, functional area 5 is particularly important as an adaptation and gathering area for these species. Accordingly, the species remain in the functional area and partly in the adjacent functional

area 6 significantly longer than in the upstream sections of the estuary which they pass through rapidly, provided there are favourable flow conditions and oxygen supply.



▲ Fig. B5.8

Significance of functional area 5 in the network of important focus points of functions relevant to Natura 2000

From an avifaunistic perspective, the foreland and inner dyke areas in Nordkehdingen and St. Margarethen form a connected habitats network with comparable areas in functional area 4 (Allwördene outer dyke, mouth of the Stör, Krautsand, Asselersand) and in functional area 6 (Hadeln and Belum outer dyke, foreland at Neufelderkoog).

### B5 2.3 Natura 2000 models

If the entire Lower Elbe is looked at together, the section of the Elbe from Freiburg/Brokdorf to the mouth of the Oste achieves particular functions for Natura 2000 which cannot be achieved by any other

#### Aquatic area and foreland

The mud flats and sandbanks which are typical for the outer bank are nearly natural. On the northern bank, mud flats and shallow water areas are formed on the groyne fields. With the exception of the channels, large parts of the river can be used as a habitat by aquatic species. The continuity of the functional area for migrating species of fish and lamprey can be achieved without being limited.

The typical succession of the biotope in the foreland is formed in both the cross section from the bank to the foot of the dyke and in the longitudinal section according to the salt gradient. Extensive reeds characterise additional sections of the bank. Flat,

The management of the significantly smaller Schleswig-Holstein grassland area in functional areas 4 and 5 is designed to maintain and develop suitable conditions for breeding and growth of meadow breeders in spatial connection with Nordkehdingen (see measure programme for meadow birds, chapter A5.2, p. 68et. seq.).

functional area. The maintenance and development of these functions is the focus of the model, which describes the target state of the essential landscape elements in the future.

lagoon-style waters and tidal ponds contribute to the diversity of the habitats.

The meadows and pastures on the forelands are home to significant populations of breeding birds, particularly waders. The grasslands are characterised by a high number of species which are maintained by the different uses of the area. Suitable areas are used as meadows. The cultivation rhythms promote the maintenance and development of blossoming lowland hay meadows and correspond to the needs of the breeding birds in the extensively used moist grassland.



▲ Fig. B5.9: Elements of the model of the foreland

Lagoon-style tidal ponds, hydrophilous tall herbaceous vegetation, hay meadows with rattle

Large, structurally rich reed beds are populated by a breeding bird population which is typical for this habitat. From autumn to spring, the forelands, which have a low levels of disturbance, are sought

out by large groups of migrating birds. On the small foreland edges on the northern bank, there are tall herbaceous vegetation and reeds.

### Grassland areas of the dyked marshes

The model is of a connected landscape dominated by meadows and pastures which are used taking into account the needs of the breeding and migrating birds in the open areas. The grassland, which is covered in tidal inlets and ditches that are maintained in a manner compatible with nature, is partially grazed and partially tended to develop into the hay meadows typical for the landscape. The dyked marshes are influenced by the tide as little as possible.

The traditional network of trenches is used to retain water and to maintain a favourable soil moisture level for meadow waders in the grassland even in dry periods.

In autumn, winter and spring, large groups of migrating birds gather in the open marshes. The large, adjacent water, mud flat and grassland areas which have low levels of disturbance means that the birds are always able to access the habitats they need at close proximity.



Fig. B5.10: Model for grassland areas of the dyked marshes  
Extensively grazed, structurally rich grassland, large and connective grassland areas which have low levels of wooded areas

## B5 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based on the capture and evaluation of the current situation in the population. They implement the models in concrete spatial and protected item target formulations. These general management targets define the framework for the integrated target and measure concept for the functional area. The detailed, connected conservation objectives for the individual Natura 2000 sites

can be found in the contributions from the federal states. The following management targets apply to functional area 5:

- Maintaining the relatively natural hydromorphological habitat conditions in the habitat type estuaries, maintaining and restoring a dynamic which is typical for the estuary, as far as possible taking into consideration the framework conditions

- Maintaining the wide mud flats and the nearly natural transitions between land and water with tidal inlets, reeds and tall herbaceous vegetation (6430)
- Maintaining, restoring and developing grassland areas with vegetation which is typical for the Elbe such as lowland hay meadows (6510) and salt meadows (1330), and of large reed beds in the outer dyke, taking into account the avifaunal functions
- Maintaining and in some cases restoring and developing the breeding functions, particularly for the species in the extensively used moist grassland, extensive reed beds and the grassland-ditch complexes in the marshes of the relevant habitats
- Maintaining and developing the rest function, particularly for Nordic geese and swans and many wader species on extensive grassland areas which have low levels of disturbance

## B5 3 Uses and usage targets

The Lower Elbe in functional area 5 is primarily characterised by its use as a waterway. The Brunsbüttel sluice which ensures a connection with the Baltic Sea via the North Sea-Baltic Sea Canal also contributes to the functional area's significance for shipping.

The most important excavation works are carried out on the shelf of the Oste. There are additional excavation areas at Brokdorf, St. Margarethen and Brunsbüttel. Between Brokdorf and St. Margarethen (km 684 to km 690), dredged material is being restored which comes, in part, from functional area 3. Material from the basin of the canal sluice is also put into the Elbe. The sandy bank at Brokdorf is caused by sand deposits.

The commercial area of Brunsbüttel makes up the largest connected industrial area in Schleswig-Holstein. Over 2,000 ha, large chemical and mineral companies have set up their plants. There are two nuclear power stations in functional area 5 in Brunsbüttel and Brokdorf. All of the facilities and the associated port in Brunsbüttel are outside of the Natura 2000 sites. The power stations and some of the industrial companies use Elbe water in their production processes, and the Elbe is used to transport raw materials and products.

The land areas are dominated for the most part by agricultural use. On the foreland at Nordkehdingen and in the northern areas of the former outer dyke at Nordkehdingen, large areas of the public-

ly-owned grasslands is cultivated in accordance with the Natura 2000 management targets. Within the dyke, the main uses are intensive, and the proportion of arable land is now significantly above the proportion of grassland. Contractual conservation measures are not particularly popular here. On the foreland of St. Margarethen, a large area is used extensively as grassland. The intensively used areas are exclusively areas of grassland which are found in sections on the west of the foreland and near to the dyke. Large areas are now owned by the Nature Conservation Foundation of Schleswig-Holstein or have been transformed for uses which are compatible with nature.

The Lower Elbe Natureum at the Oste barrage is the most important starting point for nature tourism and for groups of visitors in the section of the Elbe between Stade and Cuxhaven. In Nordkehdingen, excursions with the "Vogelkieker", a double decker bus used for this purpose, are offered. Another key tourism and recreation area is the sandy banks at Brokdorf. Large car parks and a motor home park at Brokdorf result in a concentration of motorised tourism in this area.

Walkways run along the dykes on both banks of the river. The marinas at Freiburg, an der Elbe and Brunsbüttel are directly adjacent to Natura 2000 sites. In summer, a passenger ship connects the mouth of the Oste with Cuxhaven and the Zweidorf dock west of Brunsbüttel.

The following table gives an overview of the interests and uses which are important at the functional area level for Natura 2000. Information on important local

uses can be found in the contributions from Schleswig-Holstein and Lower Saxony.

▼ Table B5.10 (part 1)

Current interests and uses relevant to Natura 2000 in functional area 5

Natura 2000-relevant uses / interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>Regional Planning Organisation (state): general priority area within the planning area for Natura 2000, the Elbe is also a priority area for shipping, main dyke in the Regional Planning Organisation (federal state) identified as to be fixed (LS)</li> <li>Regional Planning Organisation (federal state): area between the dyke a key area for agriculture, grassland cultivation, care and development and recreation (LS)</li> <li>Area of particular importance for the ecosystem and recreation. Natura 2000 sites (SH)</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>Ecological region 14 (central lowland); Elbe river area unit; tidal Elbe production area; surface water bodies: Elbe (transitional waters) classified as HMBW (heavily modified water body)</li> <li>Marsh waters (northern and southern sluice ditches in Nordkehdingen) classified as artificial water bodies</li> <li>Communal sewage works: Brokdorf, Brunsbüttel</li> <li>Industrial facilities: Brunsbüttel</li> <li>Irrigation/drainage of the hinterland</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>Main dykes protected in part by small foreland, in some areas with an elevation up to 60cm, two dyke lines along the southern edge of the planning area, Schöneworth and Nalje sluices</li> <li>Flotsam in the Kehdingen/Oste dyke network is mainly burned (LS)</li> <li>Main dyke only protected by wide foreland at St. Margarethen, individual sections with damming dyke systems; mainly earth dykes, in some areas flood water protection walls in areas where there are technical construction works (SH)</li> <li>Oste barrage</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>Marine shipping on the Elbe federal waterway</li> <li>North Sea-Baltic Sea Canal (north-east and north-west pathways in front of Brunsbüttel in the Natura 2000 area)</li> <li>Main excavation points at the Oste shelf, Brokdorf, St. Margarethen and Brunsbüttel; deposits between Brokdorf and St. Margarethen (km 684 to km 690)</li> <li>Ports in Freiburg, an der Elbe and Brunsbüttel (outside of the planning area)</li> <li>Shipping signals etc.</li> <li>Maintaining the bank (WSA)</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>LS: Nordkehdingen</li> <li>Foreland: exclusively grassland, relatively extensive use, cultivation in accordance with nature conservation is very much accepted within the dyke: 2,940 ha arable land, 1,907 ha grassland, 41 ha fruit High to very high natural yields from arable and grassland use, regulated drainage, favourable agricultural structure of the area; 103 companies with premises in the area: high agricultural demand for the land; mainly specialised arable land cultivation companies and food cultivation companies</li> </ul>

▼ Table B5.10 (part 2)

Current interests and uses relevant to Natura 2000 in functional area 5

Natura 2000-relevant uses / interests	Short description
Agriculture	<ul style="list-style-type: none"> <li>• SH: Foreland at St. Margarethen Grassland use, partly intensive, increasing proportion of the foreland cultivated in accordance with Natura 2000</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Commercial fishing: net fishing along the edge of the river, secondary fishing (weirs, anchor nets) in the bank region</li> <li>• Recreational fishing: angling on the banks</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• LS: 13 hunting areas, of which ten are private hunting grounds; water bird hunting mainly of ducks and geese, Elbe hunting between the average high tide level and the Elbe navigation channel</li> <li>• SH: Hunting in the foreland at St. Margarethen; Elbe hunting between the average high tide water level and the Elbe navigation channel</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Industrial areas in Brokdorf, Brunsbüttel (outside of Natura 2000)</li> <li>• Use of cold water in Brokdorf and Brunsbüttel</li> <li>• Power lines through the BHD area on the foreland at St. Margarethen</li> <li>• Use of wind energy in the directly adjacent marshes (SH)</li> <li>• Port in Freiburg an der Elbe</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Nature and bird tourism (Vogelkieker)</li> <li>• Model Maritime Landscape in the Lower Elbe project run by the metropolitan region of Hamburg, various tourism concepts</li> <li>• Water and beach tourism: bathing at Brokdorf</li> <li>• Water sports, motor boats: kayaking, canoeing, windsurfing, sailing, motor boating</li> <li>• Marinas in Freiburg and Brunsbüttel</li> <li>• Walking and cycling, Elbe cycling bus</li> <li>• Passenger ship trips: mouth of the Oste to Cuxhaven, mouth of the Oste to Zweidorf (SH)</li> <li>• Visiting the sluices in Brunsbüttel</li> <li>• Cultural heritage trails, including on the construction of dykes and drainage (LEADER+ project, <a href="http://www.brunsbuettel.de">www.brunsbuettel.de</a>)</li> </ul>

The members of the planning groups defined their targets and intended uses for functional area 5 in their technical contributions, which are given below in short form. For additional information, see part C: materials. The targets given generally consist of continuing existing activities, but in some cases there are intentions beyond this. In accordance with the current situation, shipping and agriculture dominate the intended uses. The tributaries are a very attractive setting for water sports activities.

In the aquatic area, in addition to deepening the channels the deposit of the sediment that is generated is also intended.

For agriculture, the dyked marshes in Nordkehdingen are a focal point for intensive use. The potential of the area for tourism is particularly geared towards nature tourism, which should be further promoted.



▲ Fig. B5.11: Uses in functional area 5

Sluice on the North Sea-Baltic Sea Canal in Brunsbüttel, agriculture on the Nordkehdingen foreland

The navigation channel of the Elbe runs a short distance away from the northern bank. Good observation points and associated tourist infrastructure attract lots of people with an interest in shipping to Brockdorf.

▼ Table B5.10 (part 1)

Usage targets in functional area 5

Uses	Short description of the targets for functional area 5
Regional planning	<ul style="list-style-type: none"> <li>• Coordinating the various usage requirements from a federal state and regional planning perspective as part of sustainable and resource-efficient regional development</li> <li>• Brunsbüttel as a focus point for trade and industry</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential and a good chemical status of the surface water bodies of the Elbe and the marsh waters</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Taking into account future requirements to increase and strengthen flood protection throughout all planning activities.</li> <li>• LS: removal of elevated areas, dyke plastering on the outer embankment, minimising the amount of debris which occurs</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Economic maintenance as necessary of the channels and banks, minimising or stabilising maintenance expenditure</li> <li>• Continuing the use of the deposits</li> <li>• Implementing the river engineering and sediment management concept set out by the HPA and the WSV</li> <li>• Adapting the channels of the Lower and Outer Elbe for container ships which are 14.5m deep</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>

▼ Table B5.10 (part 2)

Usage targets in functional area 5

Uses	Short description of the targets for functional area 5
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of productive agriculture in the various management forms in suitable production areas, maintaining the existence of agricultural operations</li> <li>• Cooperating with nature conservation, contractual nature conservation on cultivation in accordance with nature conservation of grasslands, avoiding unnecessary restrictions, not using agricultural areas for compensation measures (SH)</li> <li>• Outer dyke areas: maintain the current extensive use of grassland (LS)</li> <li>• Inner dyke areas: maintain the current mixed uses, slight increase in the animal population in accordance with stable measures, not using areas for compensation measures (LS)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> <li>• Limiting the yield losses of geese, ducks and swans in agricultural areas by dividing and breaking up populations in a targeted manner using hunting (LS)</li> <li>• Continuing cooperation on predator control (LS)</li> <li>• Carrying out water bird hunting on the Elbe and goose hunting in the marshes in Schleswig-Holstein</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development of operations</li> <li>• Maintaining and expanding the commercial area in Brunsbüttel, strengthening the port and the chemical industry and energy economy sectors</li> <li>• Constructing new power stations in Brunsbüttel using the Elbe to provide cold water</li> <li>• Expanding the Brunsbüttel port, planned as a priority: expanding the Elbe port eastwards; potential port development areas in the foreland at St. Margarethen (Natura 2000 area)</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, especially the promotion of forms of nature tourism</li> <li>• Infrastructural development of the bathing sites on the Lower Elbe</li> <li>• No further limitations on the area or other deterioration of water sports</li> <li>• Improving and better communicating the opportunity for passenger boat trips, expanding the excursion boat trips</li> </ul>

## B5 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B5 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

There are key conflicts which arise from a use which is particularly intensive, particularly in the dyked marshes in Nordkehdingen. From a nature conservation perspective, the advanced transformation of the grassland into arable land in the “Lower Elbe” bird protection area is a particular cause for concern. There are concerns that the expansion of maize cultivation may lead to a worsening of the conservation statuses of grassland breeding and migrating bird species. In contrast to the foreland, contractual nature conservation measures within the dyke are not popular for areas with highly productive, arable land. There is also a particular need for constructive cooperation with agricultural operations with the aim of maintaining and optimising the grassland locations (meadows and pastures) as a habitat, particularly for breeding and migrating birds. In contrast to this, on the foreland there are many cases of positive collaboration between agriculture and nature conservation.

By reducing the pressure from hunting in the Natura 2000 sites and isolating feeding and resting areas for migrating birds in the large grassland areas and mud flats, which are free from disturbances, will increase the amount of time the migrating birds spend in the areas designed for their protection and minimise the grazing pressure of the geese and swans in neighbouring areas.

The commercial area of Brunsbüttel comprises the largest interconnected industrial area in Schle-

swig-Holstein. The trade, industry and energy production sectors are highly represented and are key to commercial life in the region. The industrial area in Brunsbüttel is directly adjacent to the Natura 2000 sites. Target conflicts are possible here (e.g. port expansion in the foreland at St. Margarethen). The production processes of the operations based in the Elbe estuary are connected to the Elbe in different ways. They use an area which is of high ecological importance and is therefore a “natural capital” of public interest. From a Natura 2000 perspective, it would be welcome if this connection to the natural area could also be associated with a direct commitment to the maintenance and development of the Natura 2000 sites. By supporting nature conservation projects, the companies can show that they are not only interested in the Lower Elbe for commercial reasons, but they are also committed to maintaining the natural area.

There are not currently any relevant conflicts with water sports activities in the functional area. Both leisure and recreational activities and PR work for Natura 2000 benefit from the natural experience activities such as Vogelkieker bus and Tidekieker boat.

#### Conclusion

The analysis of the synergies and conflicts shows that in functional area 5 with its broad range of uses there is a particular need for coordination with various interest groups.

Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. If the uses are not adapted to conform

with Natura 2000, the management targets set out (see chapter B5 2.4) will probably not be achieved. This applies to both the aquatic part and the grassland areas of the functional area.

▼ Table B5.11

Important tasks of cooperation between the uses and interest groups found in functional area 5

Natura 2000-relevant uses/interests	Focus of cooperation
Regional planning	<ul style="list-style-type: none"> <li>• State Regional Planning Organisation (state): overlapping of the “priority area for nature and landscape” with the priority area for agriculture: checking whether this overlapping affects the entire or only partial area (particularly in the Lower Elbe BHD area), and if it could be cancelled or replaced, for example by creating a restricted area for grassland cultivation, care and development</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Designing and implementing agreed measures from the range of suggested measures for the tidal Elbe</li> <li>• Maintaining or restoring the ground water supply typical for the marshes and forelands through cultivation of the surface waters which is compatible with Natura 2000, if necessary using the sluices/pumping stations for water control in the area during dry periods, water management which preserves nature</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Minimising disturbance of Natura 2000 protected features caused by maintenance work. The coordination carried out to date should be continued. The practical agreement carried out to date should be continued.</li> <li>• Facilities to remove soil to create clay in areas in which, from a nature conservation perspective, the aim it to increase the proportion of water areas; not using the areas with populations of Natura 2000 habitat types and habitats; nearly natural design of potential cultivation sites.</li> <li>• Minimising conflict when debris accumulates can, for example, be carried out by taking into account the local spatial structures and agreeing measures on-site.</li> <li>• When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary with its flood plains</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Optimising maintenance and operation of the waterways taking into account Natura 2000</li> <li>• Optimising bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the protection of species and biotopes</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Continuing cooperation with agricultural operations, especially in the case of grassland care</li> <li>• Ensuring a landscape area and section of the grassland which is free from settlements</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and expanding the areas affected by hunting against a backdrop of the insufficient conservation statuses of various species of water bird.</li> <li>• Continuing cooperation on predator control</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Existing facilities: if there are negative effects on the neighbouring Natura 2000 sites, the aim should be to minimise these in accordance with current scientific knowledge</li> <li>• Natura 2000 sponsoring, cooperation on specific projects</li> </ul>

Natura 2000-relevant uses/interests	Focus of cooperation
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>Using and if necessary expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerably as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> </ul>

## B5 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level.

They are supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures in functional area 5 (see chapter A5).

### B5 4.2.1 Suggested measures for functional area 5

At the measure level, the relevant planning responsibilities in the two federal states must be taken into account.

presented from the original contributions without being changed.

The two following lists contain the suggested measures for Lower Saxony and Schleswig-Holstein. Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been

For Schleswig-Holstein spatial, concrete individual measures (FA 5 measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

For Lower Saxony, spatial, concrete measures and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

#### ▼ Table B5.12

Measure areas and suggested measures for functional area 5 in Schleswig-Holstein

Number	Title
FA 5.1 HH/SH	Reed beds and herbaceous vegetation between Brokdorf and Scheelenkuhlen
FA 5.2 HH/SH	Maintaining the hay meadows and the corncrakes on the foreland at St. Margarethen
FA 5.3 HH/SH	Protection programme for the meadow caraway on the foreland at St. Margarethen
FA 5.4 HH/SH	Promoting the salt meadow and maintaining the wader population on the foreland at St. Margarethen
FA 5.5 HH/SH	Maintaining the garganey on the foreland at St. Margarethen
FA 5.6 HH/SH	Reed beds east of the St. Margarethen port tidal inlet on the foreland at St. Margarethen
FA 5.7 HH/SH	Bank shape on the foreland at St. Margarethen: revetments to be maintained as a jetty
FA 5.8 HH/SH	Permitting the spontaneous relocation of the tidal inlet at St. Margarethen
FA 5.9 HH/SH	Defusing the risk of birds colliding with the power lines on the foreland at St. Margarethen
FA 5.10 HH/SH	Visitor guides for the foreland area at St. Margarethen

## ▼ Table B5.13

Suggested measures for functional area 5 in Lower Saxony

<b>Sphere of action 1: Developing concepts/plans</b>	
1.1	Creating areas-specific Natura 2000 management concepts for partial areas
<b>Sphere of action 2: Research and environmental monitoring</b>	
2.2	Determining the significance of different mud flats and their function for bird species
<b>Sphere of action 3: Concrete habitat and species protection measures</b>	
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the BHD area in the Lower Elbe which currently have lower surface proportions (supralittoral)
3.5	Measures to promote salt meadows
3.9	Permitting the growth and restoration of pioneer locations on the foreland and on the Elbe islands
3.17	Measures to maintain the large, open character of the landscape
3.18	Measures to promote connected resting areas on the grasslands which have low disturbance levels
3.19	Measures to promote areas with low disturbance levels on the mud flats and shallow water areas
3.21	Measures to maintain/develop extensive use of grassland areas including turning arable land back into grassland
3.22	Improving the water supply in public areas
3.23	Creating tidal water ponds in the dyked foreland and small inland waters
3.26	Improving the breeding sites for the white

Additional information can be found in the federal state contributions (part I or A and texts on functional area 5).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Schleswig-Holstein part of the functional areas:
  - ↳ annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Maps can be found under ↳ Natura 2000 technical contribution ↳ Measure programme ↳ functional area 5

- Lower Saxony part of the functional areas:
  - ↳ annex of the Lower Saxony IMP contribution
  - ↳ annex: Technical contributions ↳ technical contribution 01: Natura 2000 ↳ FB01 part B with target map C5.

Target map C5 gives an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (here in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

### B5 4.2.2 Interdisciplinary cooperation in implementing the measures

Cooperation with the agricultural operations and those with permission to hunt is central to avoiding further deterioration of the conservation status of many breeding and migrating bird species in the "Lower Elbe" bird protection area. The focus here is on the development of solutions to better agree on uses and bird protection. Focuses for cooperation with the offices responsible for coastal protection are:

- Using the sluices and pumping stations for optimal water management in dyked areas (restoring the suitability of the habitat for meadow birds)
- Facilities to remove soil to create clay in areas in which, from a nature conservation perspective, the aim is to increase the proportion of water

areas, not using the areas with populations of Natura 2000 habitat types and habitats, nearly natural design of potential cultivation sites.

A focus for cooperation with the offices responsible for water management/WFD is:

- Natural maintenance of the marsh waters including the ditches

As a priority in the implementation of concrete measures, in many cases basic steps and concepts have to be developed which coordinate the leading administration closely with the relevant nature conservation authorities in the federal states.

### B5 4.2.3 Information on studies and environmental monitoring

An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7). For functional area 5, the following aspects are particularly significant:

- Monitoring the change in the hydrological and morphological behaviour of the Elbe
- Regular continuation and expansion of the long-term monitoring of the vegetation in the grassland areas

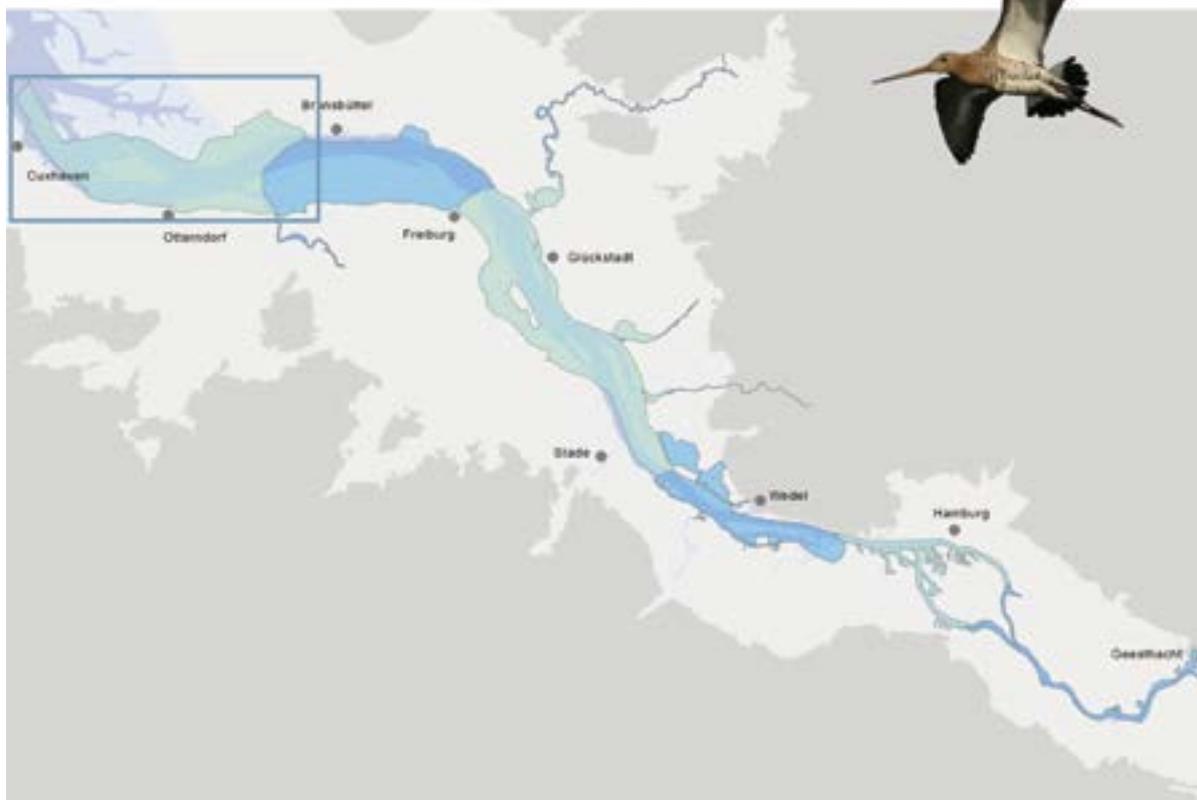
- Continuing the regular assessment of populations of target species in the bird protection areas (breeding and migrating birds)
- Monitoring the hatching success of meadow birds
- Temporally condensed assessment of breeding populations of target bird species in areas with measure focus points





I Integrated  
M management plan  
P Elbe estuary

# Functional area 6

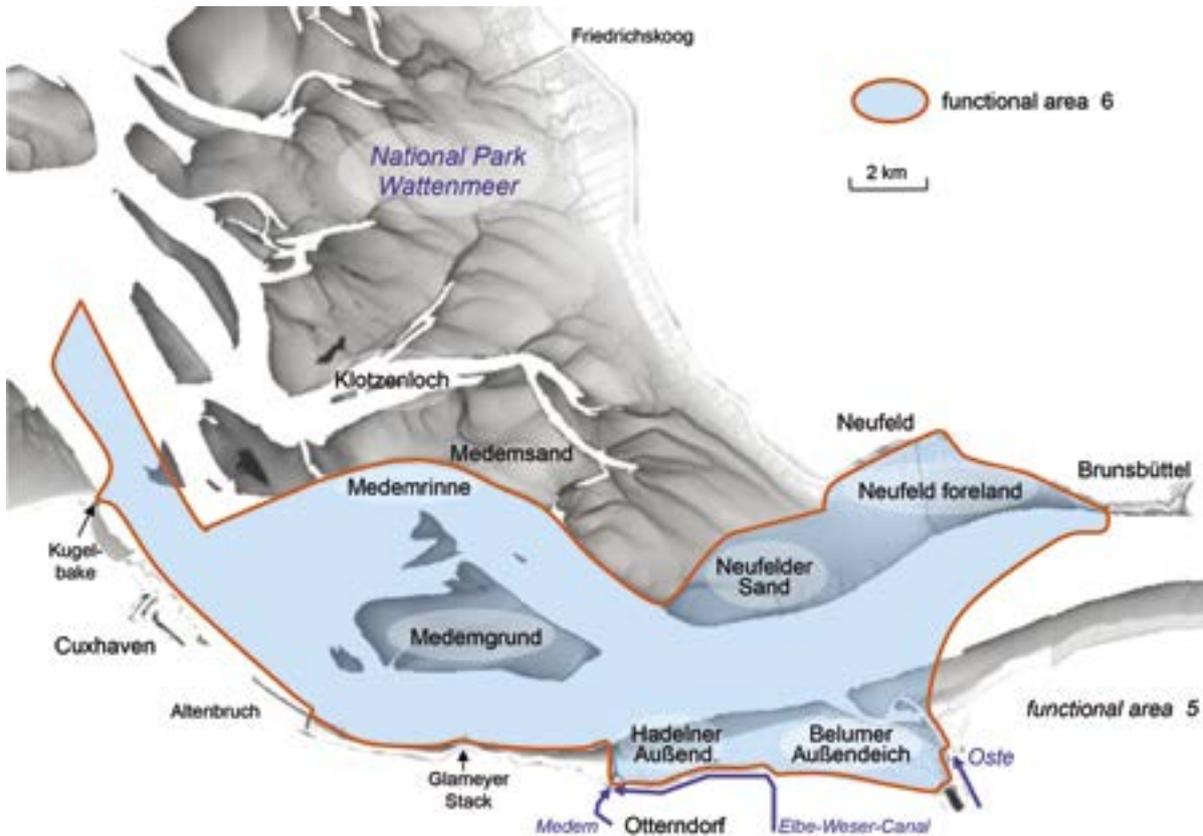


overleaf

Mud flats at the mouth of the Elbe (aerial photograph)

Gull-billed tern

Neufeld foreland east of the port tidal inlet



## B6 1 Overview of functional area 6

Functional area 6 extends over a length of around 27km in Schleswig-Holstein from Zweidorf (km 700) to the line between Friedrichskoog point and Kugelbake in Cuxhaven (km 727). In Lower Saxony, a 24km-long stretch of the river from the mouth of the Oste (km 703) to Cuxhaven (km 727) is allocated to functional area 6. To the north, the Schleswig-Holstein Wadden Sea National Park is directly adjacent. The Natura 2000 sites include areas in the counties of Cuxhaven (Lower Saxony) and Dithmarschen (Schleswig-Holstein) and areas which are not part of any communes which are below the average high tide level.

Sea levels and the tidal range have been increasing in the German Bight since the end of the Ice Age. The associated increase in energy input into the mouth of the Elbe leads to a continuous expansion of the estuary. In the past century, the cross section

of the mouth of the Elbe has doubled in some areas. The large sandbanks and channels at the mouth of the Elbe are due to an intensive dynamic and natural shift in cycles from 100 years to several hundreds of years. The original three channel system at the mouth of the Elbe was brought together into two channels in order to protect the shipping lanes by constructing the training dyke at Kugelbake. The navigation channel uses the stabilised, main southern channel which runs right in front of the Lower Saxony bank.

North of the main channel, the adjacent area is known as Medemgrund, after the Lower Saxony Nebeneibe Medem. North of these large mud flats runs the Medem channel, the second remaining channel in the mouth of the Elbe. The northern border of the functional area runs along the northern edge of the Medem channel. Medemsand, which is

above the area in the north, belongs to the Schleswig-Holstein Wadden Sea National Park. On the southern edge of Neufeld Sand, any movements of the channels or mud flats are limited by a training dyke. Despite interventions for water constructions, the western section of functional area 6 is, from a morphological perspective, the most natural part of the Elbe estuary.

Functional area 6 is on the crossover between the mesohaline and the polyhaline section of the estuary. With chloride contents under 18‰, the entire Schleswig-Holstein foreland is still in the mesohaline areas, while the forelands on the Lower Saxony side are polyhaline (18 to 28‰).

The eastern, mesohaline section of the functional area comprises the Neufeld foreland and the upstream mud flats. Today, the foreland is between 500 and 900m wide. The salt meadows transform into the sandy to muddy areas of the Neufeld mud flats. The Neufeld foreland is divided into two by a tidal inlet, which serves as an entrance to the port and as an outlet channel for the internal drainage of the polder on the land side. West of the port tidal inlet, the foreland is intensively drained and grazed by sheep. East of the tidal inlet, reed beds have developed in some areas due to the agricultural use. On the east of the forelands, the dyke in front of the dam is supported by the formation of a fence construction.

North of the navigation channel, the western, polyhaline section of the functional area comprises the

Neufeld Sand, the Medemgrund and the Medem channel. The Medemgrund is a large mud flat, and lies between the two remaining channels at the mouth of the Elbe.

On the southern bank, mud flats and foreland extend, which get gradually smaller from the mouth of the Oste to the Glameyer Stack (200m-long transverse structure at km 716). In the Belum outer dyke, the foreland is 1,500m wide, in the adjacent western Haldeln outer dyke, it is only 500m, and at the Glameyer Stack the main dyke is dammed. Since the construction of a summer dyke in 1955, most of the Belum outer dyke is now only very slightly influenced by the tide. The areas on the Belum and Haldeln outer dykes are used as grassland. The crossover between foreland and mud flat is nearly natural throughout the entire area from the mouth of the Medem to Otterndorf.

From the Medem to Cuxhaven, the bank is protected by stone ballasts. On this inner section of the bank (Altenbruch curve), erosion processes have always dominated. The Glameyer Stack was constructed in 1802 in order to direct the river away from the bank. Upstream along the Elbe from Altenbruch, the boundary of the SAC "Lower Elbe" of the river runs at a distance of 200 to 500m from the bank. The bank and the surrounding areas in Otterndorf, Altenbruch and Cuxhaven are focus points for intensive recreational use. In the section between Altenbruch and Cuxhaven, industrial areas and port facilities dominate.



▲ Fig. B6.1: Landscape on the southern bank  
Belum outer dyke, exposed inner bank with revetments, Glameyer Stack



▲ Fig. B6.2: Landscape on the northern bank

Foreland development between Brunsbüttel and Neufeld, Neufeld port tidal inlet at the transition to mud flats, mud flat channels at the crossover to the Wadden Sea (aerial photograph)

▼ Table B6.1

Selected abiotic parameters in functional areas 6

Length	Km 700 (Zweidorf ferry dock west of Brunsbüttel) or km 703 (mouth of the Oste) to around km 727 (line between Friedrichskoog point and Kugelbake in Cuxhaven)
Total area	13,564 ha
River width	Cross section between Zweidorf ferry dock and Balje outer dyke (km 699): 2.8km Cross section between the mouth of the Oste and Neufelderkoog point (km 707): 5.8 km Cross section between Friedrichskoog point and Kugelbake in Cuxhaven (km 727): 16.5 km
Length of the bank <sup>1</sup>	around 34km, of which: <ul style="list-style-type: none"> <li>• unobstructed: ca. 8 km</li> <li>• with revetments: 1 km</li> <li>• with revetments and groynes: ca. 11 km</li> <li>• with revetments and deposits: ca. 6 km</li> <li>• with fences: 8km</li> </ul>
Distribution of the landscape zones <sup>2</sup>	<ul style="list-style-type: none"> <li>• Dyked areas: –</li> <li>• Foreland: 1,208 ha (8.9 %)</li> <li>• Mud flats (average low tide level to average high tide level): 3,803 ha (28%)</li> <li>• Shallow water areas from 2m below average low tide level to average low tide level: 1,398 ha (10.4 %)</li> <li>• Water areas from 10m to 2 m below average low tide level: 4,901 ha (36.1%)</li> <li>• Water areas deeper than 10 m below average low tide level: 2,254 ha (16.6%)</li> </ul>
Tidal range <sup>3</sup>	2.8 m at Brunsbüttel, 2.7 m at Cuxhaven
Chloride content <sup>4</sup>	Zweidorf to Neufelderkoog point: 5 to 18 ‰ (mesohaline) Neufelderkoog point to the edge of the estuary: 18 to 28 ‰ (polyhaline)
WFD water body	Coordination area tidal Elbe, Elbe transitional waters Water body classified as HMWB

<sup>1</sup> In the technical contribution waterways and ports (2010), the northern border of the functional area which runs from Neufelderkoog point through open mud flats is recognised as an unobstructed bank. If the boundary between mud flat and mainland were classified as a bank, the bank length on the Schleswig-Holstein side would be reduced by 23km and the total bank length in the functional area would reduce from 57km to 34 km.

<sup>2</sup> WSA November 2008    <sup>3</sup> www.bsh.de/aktdat/wvd/elbepegel    <sup>4</sup> www.fgg-elbe.de

## B6 2 Natura 2000

The specific Natura 2000 targets for functional area 1 are determined using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs and the bird species of the SPAs which occur in the functional area, evaluation of their conservation status

- Evaluation of the strengths and weaknesses of the functional area from the perspective of species and habitats which are relevant for Natura 2000
- Analysis of the interaction with the other functional areas in the estuary
- Development of a Natura 2000 model for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

### B6 2.1 Natura 2000 status

In functional area 6, the Natura 2000 sites of the Elbe estuary in Lower Saxony and

Schleswig-Holstein are made up of two SACs and two SPAs.

The SAC Unterelbe comprises the entire functional area in Lower Saxony, while the “Lower Elbe” bird protection area is limited to the foreland and the

mud flats between the mouths of the Oste and the Medem. The Neufeld foreland as far as the average low tide level line and to the west as far as the edge of the Schleswig-Holstein Wadden Sea national park is part of the “Lower Elbe to Wedel” bird protection area. The SAC Schleswig-Holsteinisches Elbästuar- und angrenzende Flächen comprises the entire functional area on the Schleswig-Holstein side.

▼ Table B5.2

Protected areas in functional area 5

Area category	Area designation
Special Areas of Conservation SACs	DE 2018-331 Lower Elbe (LS) DE 2323-392 Schleswig-Holstein Elbe estuary and surrounding area (SH)
Special protection areas (SPAs)	DE 2121-401 Lower Elbe (LS) DE 2323-401 Lower Elbe to Wedel (SH)
Ramsar area	7DE004 Lower Elbe between Barnkrug and Otterndorf (LS) 7DE030 Schleswig-Holstein Wadden Sea and adjacent areas (SH)
Natura 2000 conservation areas	CA mouth of the Oste (LS) CA Hadeln and Belum outer dyke (LS)
Natura 2000 landscape protection areas	–

Lower Saxony and Schleswig-Holstein have defined the habitats in annex I and the species in annex II of the Habitats Directive as objects of protection in the SACs and evaluated their conservation statuses. At the same time, the breeding and migrating bird species in the bird protection areas relevant for the site were also defined. The evaluation results given here take into account federal state-specific features and are based on the relevant information given by the two federal states.

An overview of the Natura 2000 protected features which are relevant for all of functional area 6 are given below. Additional information on the basis for the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the “Natura 2000” technical contributions in the federal states’ contributions (see part C: materials).

### B6 2.1.1 Special Areas of Conservation (SACs)

The conservation status of the “estuaries” habitat type (1130) in functional area 6 is rated as unfavourable (C). East of the Neufeld port tidal inlet and in the Belum and Hadeln outer dykes, a nearly natural zoning of the bank vegetation occurs, but in the remaining sections of the bank various disturbances are noticeable. Between Neufeld and Brunsbüttel, the foreland development is accelerated with the help of fences and trenches in front of the dammed dyke. West of the Neufeld port tidal inlet, the foreland is intensively drained and grazed as far as the mud flats. From the mouth of the Medem to Cuxhaven, the bank from Altenbruch onwards, which is outside of the planning area and is exposed to the flow of the river, is significantly changed through revetments, groynes and sand deposits. In terms of its biological cycle, the upstream functional areas is characterised by significant marine influence. In contrast to the naturally nutrient-rich estuary, similarly to in the artificial

waters in the Wadden Sea in functional area 6, the high nutrient content is a particular burden.

The shallow water areas north of the navigation channel are assigned to the habitat type “sandbanks with only slight flooding by sea water” (1110). Due to the diversity of fish, the areas have a high ecological value.

The habitat type “vegetation-free mud, sand and mixed mud flats” (1140) is formed in large areas in the Neufeld bay, from the Glameyer Stack to the mouth of the Oste and in the areas of the Medemgrund. Mud flats populated with common glasswort (1310) are formed in the west of the Neufeld bay on the crossover between the open mud flats (1140) and the lower salt meadow. Since the end of the 1980s, the invasive, alien species common cordgrass (*Spartina anglica*) has been growing in this vegetation zone.



▲ Fig. B6.3: HD habitat types

Left: mud flats and shallow flooded sandbanks (habitat types 1140 and 1110)

Centre and right: common glasswort mud flats (1310), common glasswort (*Salicornia europaea*)



▲ Fig. B6.4: Typical plant species of the brackish water salt meadow of the Elbe estuary (1330)

Sea Aster (*Aster tripolium*), sea milkwort (*Glaux maritima*), crowfoot funnel weed (*Cotula coronopifolia*)

East of the Neufelder Hafen tidal inlet, some areas have been taken out of use, and quick-growing reeds have developed. In the complex with the tidal and land reeds, tall herbaceous vegetation edges form, which are classified as the habitat type "hydrophilous tall herbaceous vegetation" (6430). A nearly natural bank zone with wide tidal and land reeds is also formed in the Hadeln outer dyke.

In the Elbe estuary, salt meadows (1330) only occur, where there is grazing. Due to the low salt content of the water and the soil, unless the areas are used, reed beds will grow. The salt meadows in the Neufeld

bay mostly have low species numbers. They are intensively drained and grazed by sheep. In the Belum and Hadeln outer dykes, salt meadows mainly occur outside the summer polder.

As in the Neufeld foreland, the high proportion of arable boar thistle indicates a current or previous intensive use.

The areas in the Belum summer polder are mostly cut off from the regular influence of the tide. Instead of salt meadows, small lowland hay meadows (6510) form there.

▼ Table B6.3

Conservation statuses of the habitats in annex I of the Habitats Directive in functional area 6

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1110	Sandbanks which are slightly covered by sea water all the time	-	C
1130	Estuaries	C <sup>3</sup>	C
1140	Vegetation-free mud, sand and mixed mud flats	B	C
1310	Pioneer vegetation with <i>Salicornia</i> and other annuals colonising mud and sand ( <i>common glasswort mud flats</i> )	-	A
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	B	B
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	C	B
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )	B	-

<sup>1</sup> Elbe estuary Lower Saxony IMP contribution, part II, functional area 6, as of September 2011  
<sup>2</sup> Standard data sheet, as at March 2009. For Schleswig-Holstein, the status evaluations in the standard data sheet are based on the entire area from the mouth of the Elbe to the Hamburg city limits. The evaluation of the conservation statuses of the habitats is mainly based on the results of the first data capture from 2003. In summer 2010, more data was captured, the results of which are not yet available in an evaluated form.  
<sup>3</sup> Elbe estuary IMP, part II, functional area 6, as of September 2011. In Lower Saxony, the habitat type 'estuaries' is currently evaluated using several individual components. The conservation status shown here is a composite view of these individual evaluations.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

Sea lamprey, river lamprey, salmon and houting use the Lower Elbe as a migration channel. The change from marine to fluvial habitats requires physiological adaptations. The migrating species stop for longer in functional areas 5 and 6 than in the remaining functional areas in order to adapt the osmotic processes in their organism to the lower concentrations of important elements. They gather in this section before swimming upstream to breed, which generally takes place in a concentrated manner over a short period of time.

The usage patterns of the twaite shad are more complex. The mouth of the Elbe is a transit section for adults who swim up to the breeding area between Schwarztonnensand and the Mühlenberger Loch (functional areas 3 and 4) in the period between April and May swim back to the North Sea after breeding. The young twaite shad (age group 0) grow for a few weeks in the limnic to slightly brackish section of the estuary, and then move downstream in the course of the summer. They reach functional area 6 in the pe-

riod from August to September, stay there until October, and spend the winter in the southern reaches of the North Sea. The following spring the twaite shad, which are just under a year old ("pre-adults", age group 1) come back into the mouth of the Elbe. Since the fish are not yet fully mature, they do not swim up to breed. Research shows that the majority of the pre-adult twaite shad spend most of the time from May to October in the areas near the mouth of the Elbe. In the first year of life, functional area 6 carries out the important function of a nursery area for the first two years of a twaite shad's life.

Three marine mammal species come into the outer Elbe and the mouth of the Elbe: the seal, the grey seal and the harbour porpoise. While only a few individual animals of the two latter types have been identified, there are important living areas for the seal in functional area 6. There, they find suitable resting places and sufficient food. Particularly in winter, seals are attracted by increasing numbers of smelt in the mouth of the Elbe. The edge area of the Neufeld channel, the Medemgrund, the Medemsand and the Kratzsand are all used by seals as resting places. On the Medemgrund, around 50 animals can regularly be found relaxing. The litter areas are further north in the Schleswig-Holstein Wadden Sea National Park.

▼ Table B6.4

Conservation statuses of the species in annex II of the Habitats Directive in functional area 6

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	C	B
1103	Twaite shad ( <i>Alosa fallax</i> )	C	B <sup>2</sup> C <sup>3</sup>
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	C
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>4</sup>	D <sup>4</sup>
1351	Harbour porpoise ( <i>Phocoena phocoena</i> )	C	-
1365	Harbour Seal ( <i>Phoca vitulina</i> )	B <sup>5</sup>	A <sup>5</sup>

\* priority species (M): The estuary is used by this species as a migration channel.  
<sup>1</sup> Elbe estuary IMP, part II, functional area 6, as of September 2011  
<sup>2</sup> Standard data sheet (as of March 2009)  
<sup>3</sup> Bioconsult 2010  
<sup>4</sup> The population of the houting was categorised as not significant in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (24-25 March 2009).  
<sup>5</sup> The conservation status of the species is only evaluated for the entire SACs, but not for the individual functional areas.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

### B6 2.1.2 Special Protection Areas (SPAs)

The mud flat and foreland areas in functional area 6 are found between the Wadden Sea and the large bird protection areas in Nordkehdingen. This transitional character is reflected in the birdlife. In accordance with the landscape character, other

breeding and migrating bird species are defined for the Neufeld foreland part than in the other sections of the "Lower Elbe to Wedel" bird protection area (Schleswig-Holstein).

#### Breeding birds

The forelands which are used as grasslands (Neufeld foreland, Belum and Hadeln outer dyke) are used by

meadow breeders such as the redshank, black-tailed godwit and lapwing as breeding habitats.

The reed bed edges along the ditches are populated by the bluethroat and hedge warbler. In large areas of land reeds (e.g. in the east of the Neufeld foreland), the Eurasian marsh harrier also breeds. The conservation status of the meadow birds is limited in particular in the summer polder of the Belum outer dyke by intensive use. Pied avocets breed in large colonies on the crossover between salt meadows and mud flats.

The western Neufeld foreland is home to one of the largest colonies of common tern and the last breeding colony of the gull-billed tern (around 40 breeding pairs) in north-western and central Europe. The gull-billed tern mainly breeds in southern Eu-

rope. A small, stand-alone population has formed in north-western Europe. Since the breeding colonies in Denmark died out, the colony on the Neufeld foreland is currently the last regular breeding population. Fluctuations in the numbers of breeding pairs are not unusual in tern colonies. On the other hand, what is concerning is the low reproduction success, which since 2009 has been entirely non-existent. The colonies are situated on low lying lands near the average high tide level. In the past few years, the young terns have been completely wiped out in the floods in May and June of up to 1.5m above the average high tide level, which have occurred more frequently than in the past. Considerable disturbance of use can also be noted in the colony locations.



▲ Fig. B6.5: Breeding birds in functional area 6  
Pied avocet, redshank, gull-billed tern

▼ Table B6.5

Conservation statuses of the breeding bird species in functional area 6

Species	Annex I of the Birds Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
Common snipe ( <i>Gallinago gallinago</i> )	-	C	-
White-spotted bluethroat ( <i>Luscinia svecica</i> )	•	B	B
Whinchat ( <i>Saxicola rubetra</i> )	-	C	-
Skylark ( <i>Alauda arvensis</i> )	-	B	-
Common tern ( <i>Sterna hirundo</i> )	•	C	B
Ruff ( <i>Philomachus pugnax</i> )	•	C	-
Lapwing ( <i>Vanellus vanellus</i> )	-	B	B
Garganey ( <i>Anas querquedula</i> )	-	C	-
Teal ( <i>Anas crecca</i> )	-	C	-
Gull-billed tern ( <i>Gelochelidon nilotica</i> )	•	C	C
Northern shoveller ( <i>Anas clypeata</i> )	-	C	-
Eurasian marsh harrier ( <i>Circus aeruginosus</i> )	•	C	B
Redshank ( <i>Tringa totanus</i> )	-	B	B
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	C	B

Species	Annex I of the Birds Directive	Conservation status	
		HH <sup>1</sup>	SH <sup>2</sup>
Hedge warbler ( <i>Acrocephalus schoenobaenus</i> )	–	B	–
Gadwall duck ( <i>Anas strepera</i> )	–	B	–
Short-eared owl ( <i>Asio flammeus</i> )	•	C	–
Black-tailed godwit ( <i>Limosa limosa</i> )	–	B	B
Corncrake ( <i>Crex crex</i> )	•	C	–
Water rail ( <i>Rallus aquaticus</i> )	–	C	–
Yellow wagtail ( <i>Motacilla flava</i> )	–	B	–
Montagu's harrier ( <i>Circus pygargus</i> )	•	C	–

<sup>1</sup> Elbe estuary IMP, part II, functional area 6, as of September 2011  
<sup>2</sup> Avifaunal Schleswig-Holstein 2007

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

## Migrating birds

Functional area 6 offers migrating birds extensive habitats which are interconnected.

One special feature is the moulting populations of shelducks in front of the mouth of the Elbe. In July and August, around 200,000 shelducks from the entire North Sea area and some from the Baltic Sea area gather to moult in front of the mouth of the Elbe. The minimum level to be classified as having international importance is 3,000 individuals. This group is unique in Europe. The centre of the moulting area comprises both areas in functional area 6 and areas in the adjacent Wadden Sea National Park. In the past few years, this centre has been south of the island of Trischen.

On the transition to the Wadden Sea, of the migrating birds, the pied avocet, common ringed plover and species of stint dominate. The following migrating bird species have significant resting populations in functional area 6 and have a clear focus point in the Elbe mouth region within the Wadden Sea:

- Spotted redshank (*Tringa erythropus*)
- Redshank (*Tringa totanus*)
- Curlew sandpiper (*Calidris ferruginea*)
- Broad-billed sandpiper (*Limicola falcinellus*)
- Temminck's stint (*Calidris temminckii*)
- Little stint (*Calidris minuta*)

On the narrow Elbe foreland between Otterndorf and Cuxhaven (outside of the bird protection areas and the functional area), the resting populations of the grey plover, great knot, sanderling and black turnstone regularly exceed the levels required for international importance.

Of all of the migrating birds that stop on the foreland to look for food, Nordic geese (greylag geese, barnacle geese) dominate in functional area 6. The Eurasian golden plover, lapwing, dunlin, black-tailed godwit and Eurasian curlew prefer to use the grasslands with short grass.

Shallow, flooded tidal ponds and the extensive mud flats offer particularly important resting and feeding habitats for ducks (including teal, mallard and northern shoveller). The combination of water areas and flood resting places on the foreland attracts large numbers of gulls and terns.

▼ Table B6.6

Conservation statuses of migrating bird species in functional area 6

Species	Annex I of the Birds Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
Dunlin ( <i>Calidris alpina</i> )	-	-	B
White-fronted goose ( <i>Anser albifrons</i> )	-	B	-
Shelduck ( <i>Tadorna tadorna</i> )	-	B	B
Spotted redshank ( <i>Tringa erythropus</i> )	-	C	B
Common tern ( <i>Sterna hirundo</i> )	-	-	B
Eurasian golden plover ( <i>Pluvialis apricaria</i> )	•	B	B
Greylag goose ( <i>Anser anser</i> )	-	A	B
Eurasian curlew ( <i>Numenius arquata</i> )	-	B	-
Greenshank ( <i>Tringa nebularia</i> )	-	B	-
Mute swan ( <i>Cygnus olor</i> )	-	B	-
Ruff ( <i>Philomachus pugnax</i> )	-	-	B
Lapwing ( <i>Vanellus vanellus</i> )	-	B	-
Grey plover ( <i>Pluvialis squatarola</i> )	-	-	B
Teal ( <i>Anas crecca</i> )	-	B	B
Black-headed gull ( <i>Larus ridibundus</i> )	-	B	-
Gull-billed tern ( <i>Gelochelidon nilotica</i> )	•	-	B
Northern shoveller ( <i>Anas clypeata</i> )	-	B	-
Eurasian widgeon ( <i>Anas penelope</i> )	-	B	-
Bar-tailed godwit ( <i>Limosa lapponica</i> )	-	-	B
Whimbrel ( <i>Numenius phaeopus</i> )	-	B	-
Brant ( <i>Branta bernicla</i> )	-	-	B
Redshank ( <i>Tringa totanus</i> )	-	B	-
Pied avocet ( <i>Recurvirostra avosetta</i> )	•	B	B
Sanderling ( <i>Calidris alba</i> )	-	-	B
Common ringed plover ( <i>Charadrius hiaticula</i> )	-	B	B
Curlew sandpiper ( <i>Calidris ferruginea</i> )	-	-	3
Whooper swan ( <i>Cygnus cygnus</i> )	•	B	-
Pintail ( <i>Anas acuta</i> )	-	B	B
Mallard ( <i>Anas platyrhynchos</i> )	-	B	-
Common gull ( <i>Larus canus</i> )	-	B	-
Broad-billed sandpiper ( <i>Limicola falcinellus</i> )	-	-	3
Temminck's stint ( <i>Calidris temminckii</i> )	-	-	3
Black tern ( <i>Chlidonias niger</i> )	•	-	B
Barnacle goose ( <i>Branta leucopsis</i> )	•	A	B
Tundra swan ( <i>Cygnus columbianus</i> )	•	C	-
Little stint ( <i>Calidris minuta</i> )	-	-	3

<sup>1</sup> Elbe estuary IMP, part II, functional area 6, as of September 2011  
<sup>2</sup> Standard data sheet (as of March 2009). The evaluation is based on the entire bird protection area.  
<sup>3</sup> There is still no evaluation of the conservation status of the species in the "Lower Elbe to Wedel" bird protection area.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor



▲ Fig. B6.6: Migrating birds in functional areas 6  
Barnacle geese, shelducks, dunlins, spotted redshanks

### B6 2.1.3 Strengths and weaknesses of the functional area

Despite interventions through draining dykes and the loss of one of the three original branches of the mouth, the areas which are north of the navigation channel are some of the most natural sections of the estuary in terms of their morphological dynamic. They form a unit with the adjacent Wadden Sea. On the southern bank, the prevention of the bank dynamic and the large degree of lining of the bank which occurs between Otterndorf and Cuxhaven should be highlighted as major problem. There are only small pioneer locations left on the bank.

The functional area has an excellent avifaunistic significance for breeding and migrating birds. The breeding colonies of the gull-billed tern and the moulting populations of the shelduck are unique in Europe. Some migrating birds (particularly species of stint) have a clear focus point in the mouth of the Elbe within the Wadden Sea. Even in the greater context of the Wadden Sea, the functional area is particularly important. For the Nordic geese and swans which always have high resting numbers, the extensive grassland and mud flat areas are interna-

tionally significant resting and feeding areas. Many parts of the forelands are still intensively used for agriculture. Since the summer polder was set up in the Belum outer dyke, the ground has been drained significantly and the grassland has been intensively cultivated. The usage intensity is in stark conflict with the needs of the meadow birds. The desalination of the soil in the polder prevents the formation of salt meadows. In parts of the Hadeln and Belum outer dykes, a cultivation in line with nature conservation and biotope-forming measures were able to be introduced in order to improve the habitats of the breeding and migrating birds. In the Neufeld foreland, the upper and lower salt meadows form, due to intensive grazing by sheep, which in some cases stray as far as the common glasswort zone.

From the analysis and evaluation of the populations of species and habitats which are relevant to Natura 2000 in connection with the manifestation of location factors, the following strengths and weaknesses of the functional area should be taken into consideration in particular (Table B6.7):

## ▼ Table B6.7

Overview of strengths and weaknesses in functional area 6

**Particular strengths**

- Sufficient oxygen supply all year round
- Low levels of sediment damage by pollutants
- Despite the training dykes, narrowing of the mouth through dyking and expanding the channels, comparatively natural dynamic of the channels and sands
- Best occurrence of salt meadows in the Lower Saxony area of the Elbe estuary
- Last regularly used breeding ground for the gull-billed tern in central and north-west Europe
- Major significance as a breeding area, including for meadow breeders
- Largest European gathering of shelducks during moulting (alternating with the adjacent national park areas)
- Particularly important resting and feeding area for the species spotted redshank and curlew sandpiper (particularly important even against the backdrop of the entire population of these species in the Wadden Sea)
- Forelands with meadows and pastures, shallow water areas and extensive mud flats as an internationally significant resting and feeding area for Nordic geese and many waders

**Particular weaknesses**

- Intensive use in part of the forelands and therefore an unfavourable conservation status of specialised breeding bird species
- Expansion of the invasive common cordgrass (*Spartina anglica*) in the common glasswort zone
- Large areas of foreland with summer dykes (Belum outer dyke)
- High proportion of banks which are far from natural (revetments, fences, trenches, dammed dykes, intensive grazing)
- Concerning decline of the gull-billed tern, use-related disturbances of the breeding colonies during the breeding time



▲ Fig. B6.7: Examples of strengths and development potential for functional area 6

Left: Despite anthropogenic interventions, the dynamic in the mud flats of the mouth of the Elbe is mainly characterised by natural processes.

Right: Even intensively used salt meadows can regenerate when the drainage is intensified.



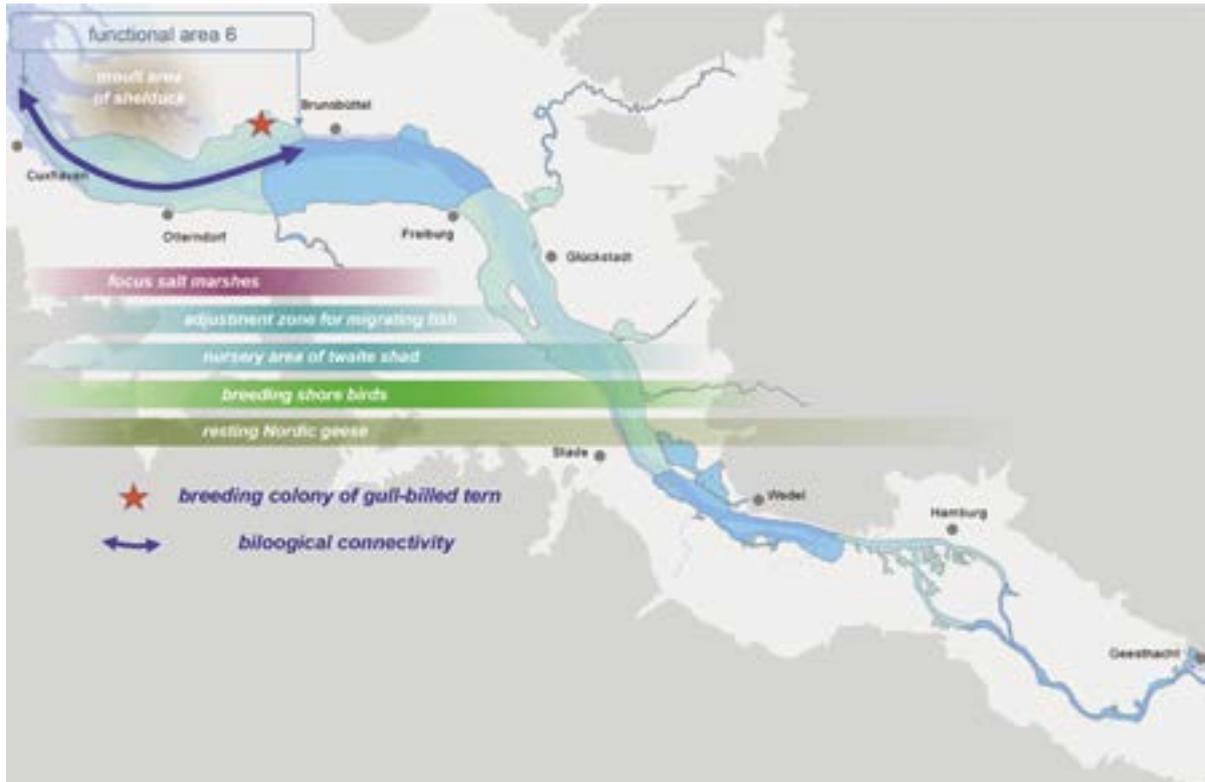
▲ Fig. B6.8: Examples of weaknesses in functional area 6

Bank at Otterndorf, intensive use of grassland in the Belum summer polder, deep-rooted drainage and degradation of the salt meadows on the Neufeld foreland

### B6 2.2 Interactions with other functional areas

Both the aquatic fauna and the bird populations alternate in using the mouth of the Elbe and the Wadden Sea, depending on the wind and water quality. Close interactions are visible, particularly from an avifaunal perspective.

Due to the spatial proximity, an exchange with the bird populations in Nordkehdingen on the Lower Saxony bank and in the foreland at St. Margarethen (functional area 5) takes place.



▲ Fig. B6.9

Significance of functional area 6 in the network of important focus points of functions relevant to Natura 2000

### B6 2.3 Natura 2000 models

If the entire Lower Elbe is looked at together, functional area 6 achieves particular functions for Natura 2000 which cannot be achieved by any other functional area. The maintenance and development

of these functions is the focus of the model, which describes the target state of the essential landscape elements in the future.

#### Aquatic area

With its mud flats, shallow flooded sand banks, tidal inlets, channels and shallow water areas, the mouth

of the Elbe forms a continuum with the adjacent Wadden Sea.

Protection of processes is an over-arching goal, and is the focus here. The mouth of the Elbe is naturally formed of systems made up of several channels. This characteristic remains.

The benthic communities of the mud flats, shallow water areas and channels are formed in a nearly natural manner. The nutrient-rich water areas at the

mouth of the Elbe are used by various species of fish as a nursery area.

The water areas and mud flats of the mouth of the Elbe offer breeding, moulting and resting waders and water birds habitats which have low levels of disturbance and are rich in nutrients. The Medemgrund is regularly used by seals as a resting place.



▲ Fig. B6.10: Elements of the model for the aquatic area  
Extensive mud flats and shallow water areas with dynamic channels

### Foreland

The typical succession of the biotope on the foreland is formed in both the cross section from the bank to the foot of the dyke and in longitudinal section according to the salt gradient. The formation and erosion of the foreland are, as far as possible, nearly natural processes.

For the foreland, the model is for a balanced interaction between half-open succession areas with reed beds and a traditionally open meadow landscape. In the west of the Neufeld foreland, open grasslands dominate. Salt meadows with large numbers of species have regenerated. The complete zoning from the

common glasswort mud flats to the upper salt meadows is constructed. The foreland is grazed extensively by cattle and sheep. The maintenance of the grassland is designed to maintain favourable breeding conditions for waders and terns and favourable resting habitats for waders and geese. Shallow, lagoon-style waters contribute to the habitat diversity.

The breeding colonies of the terns over a measured large area are strictly free from disturbances in the breeding period. From autumn to spring, the forelands which have low levels of disturbance are sought out by groups of migrating birds.



▲ Fig. B6.11: Elements of the model for the foreland  
Mud flats and reeds, salt meadows with nearly natural ground structures, extensively grazed complexes made up of salt meadows, tall herbaceous vegetation and reed beds

## B6 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based in the capture and evaluation of the current situation in the population. They implement the models in concrete spatial and protected item target formulations. These general management targets define the framework for the integrated target and measure concept for the functional area.

The detailed, connected conservation objectives for the individual Natura 2000 sites can be found in the contributions from the federal states.

The following management targets apply to functional area 6:

- Maintaining the relatively natural hydromorphological habitat conditions in the habitat type 'estuaries', maintaining and restoring a dynamic which is typical for the estuary, as far as possible taking into consideration the framework conditions
- Maintaining the wide mud flats and the nearly natural transitions between land and water with tidal inlets, reeds and tall herbaceous vegetation (6430); restoring a strong tidal influence in the Belum summer polder
- Maintaining, restoring and developing grassland areas with vegetation which is typical for the Elbe such as lowland hay meadows (6510) and salt meadows (1330), and of large reed beds in the outer dyke, taking into account the avifaunal functions
- Maintaining the function as the nursery area of the twaite shad
- Stabilising the populations of the gull-billed tern and the common tern
- Maintaining and developing the breeding function, particularly for species in the extensive moist grassland and the grassland-ditch complexes in the marshes within the relevant habitats
- Maintaining and developing the rest function, particularly for the Nordic geese and swans and many species of wader on extensive grassland areas which have low levels of disturbance

## B6 3 Uses and usage targets

The Lower Elbe in functional area 6 is characterised by its use as a waterway. The navigation channel of the Elbe runs very close to the southern bank on the Lower Saxony side. Maintenance excavations are carried out in the channel areas from the mouth of the Oste to Cuxhaven. The largest excavation sites are at the Oste shelf in the Lower Saxony part of the Elbe. Dredged material is deposited on the eastern end of the Medem channel (km 711), along the navigation channel at km 714 and km 716 (Glameyer Stack) and downstream of Cuxhaven. The three roads for shipping (eastern Neufeld road, western Neufeld road, Medem road) are limited by waters in Schleswig-Holstein.

The significant maritime commercial and logistics location in Cuxhaven is directly adjacent to the functional area. All of the facilities are outside of the Natura 2000 sites.

The most important use in the Schleswig-Holstein waters of the mouth of the Elbe is for crab fishing. The Medem channel is an important fishing area for fishing operations from Cuxhaven and Friedrichskoog.

East of Neufeld, foreland development is operated by the dammed dyke with fences and trenches for coastal protection reasons.

On the foreland, intensively used grasslands dominate. In the Belum summer polder, the summer dyke enables a more intensive cultivation than in the undyked areas.

The focal points for tourism and recreation are on the southern bank, particularly in Otterndorf, Altenbruch and Cuxhaven. In addition to water-related sports, activities such as walking and cycling are also very popular. The small Neufeld port is mainly used as a marina. The facilities located there are a starting point for experiencing the landscape (there are car parks, restaurants, mooring places, cycle paths and walkways on the dyke).

Excursion trips to the seal banks on the Medemsand are offered from Brunsbüttel and Cuxhaven. The water areas north of Cuxhaven (Medem road) are particularly prized by water sports enthusiasts for their location set apart from the navigation channel of the Elbe.

The following table gives an overview of the interests and uses which are important at the functional area level for Natura 2000. Information on important local uses can be found in the contributions from Schleswig-Holstein and Lower Saxony.

▼ Table B6.8

Current interests and uses relevant to Natura 2000 in functional area 6

Natura 2000-relevant uses / interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>• LS: entire planning area is a priority area for Natura 2000, the Elbe is also a priority area for shipping</li> <li>LS: outside of the planning area, regional planning/urban land use-protected areas for port industrial/commercial use in Cuxhaven and tourism</li> <li>Regional Planning Organisation (state): recreational area and tourism areas in Cuxhaven, Cuxhaven-Altenbruch and Otterndorf directly adjacent to the planning area, Otterndorf with particular development goals for recreation and tourism</li> <li>• SH: area of particular significance for the ecosystem and recreation. Natura 2000 sites</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Ecological region 14 (central lowland); Elbe river area unit; surface water bodies: Elbe (transitional waters), classified as a heavily modified water body</li> <li>• Drainage of the hinterland</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• LS: main dyke in the east of the planning area protected by foreland, Belum outer dyke also protected by the summer dyke, various sluices, pumping stations and locks</li> <li>• SH: land protection dyke only protected by wide foreland in the west</li> <li>Foreland development in front of the sections with dammed dyke systems by fences and trenches, mainly earth dykes, in some cases as flood protection walls in areas where there are technical construction works</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Marine shipping on the Elbe federal waterway</li> <li>• Medem road, western Neufeld road, eastern Neufeld road</li> <li>• Maintenance excavations in the channels from the mouth of the Oste to Cuxhaven, focal point at the Oste shelf. Deposit locations on the eastern end of the Medem channel (km 711), at the edge of the navigation channel at km 714 and km 716 (Glameyer Stack) and above Cuxhaven</li> <li>• Port in Cuxhaven (outside of the planning area)</li> <li>• Radar station, shipping signals etc.</li> <li>• Bank maintenance carried out by the WSA:</li> <li>• Southern bank: revetments, groynes, deposits between Otterndorf and Cuxhaven</li> <li>Northern bank: revetments and groynes in the east of the functional area</li> </ul>

Natura 2000-relevant uses/interests	Focus of cooperation
Agriculture	<ul style="list-style-type: none"> <li>• LS: foreland with grassland; used as a meadow for young cattle, but also for dairy cows, cattle stocks, mother cows and sheep (total of 73 operations with premises in the functional area), if necessary giving up operations if there is demand for cultivation in accordance with nature conservation finds high levels of acceptance, contracts as part of the programme to promote biological diversity (Nordic migrating birds).</li> <li>• SH: intensive sheep grazing on the forelands at Neufelderkoog</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Flat fishing and crab fishing</li> <li>• Net fishing, secondary fishing (weirs, anchor nets) in the bank region</li> <li>• Fishing with hand-held equipment, particularly on the southern bank</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• LS: eight hunting areas, of which 3 are private hunting grounds; water bird hunting mainly of ducks and geese, Elbe hunting between the average high tide level and the Elbe navigation channel</li> <li>• SH: water and mud flat areas: carrying out water bird hunting between the average high tide level and the Elbe navigation channel; foreland: only protected hunting</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Cuxhaven maritime commercial area, particularly for port economy, logistics, offshore wind energy, pharmaceuticals and biotechnology, many wharfs (outside of the planning area)</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Leisure and recreation centres in Cuxhaven, Altenbruch and Otterndorf</li> <li>• Nature tourism: Lower Elbe Natureum on the Oste barrage</li> <li>• Excursions to the seal banks on the Medemgrund and the Medemsand from Brunsbüttel and Cuxhaven, excursions to the mouth of the Oste from the Natureum</li> <li>• Model Maritime Landscape in the Lower Elbe project run by the metropolitan region of Hamburg, various tourism concepts</li> <li>• Water sports, motor boating: kayaking, canoeing, windsurfing, sailing, motor boating</li> <li>• Walking and cycling, Elbe cycling bus, North Sea coast cycle path</li> </ul>



▲ Fig. B6.11: Uses in functional area 6  
 The industrial area in Cuxhaven (in front of Kratzsand), deposit areas for the free flushing of the Neufeld port, fences to develop the foreland in the east of the Neufeld bay

The various user and interest groups defined their targets and intended uses in their technical contributions, which are given below in short form. For additional information, see part C: materials. The targets given generally consist of continuing exist-

ing activities, but in some cases there are intentions beyond this.

As part of a Federal Institute for Hydrology study commissioned by WSA and the HPA (2008), it was

determined that from an eco-toxicological and commercial point of view, functional area 6 and the adjacent outer Elbe are suitable for the deposit of slightly contaminated sediments from the Hamburg section of the Lower Elbe. As in other European estuaries, as part of sediment cultivation, the material removed should be replaced in the mouth area. The river engineering and sediment management concept for the tidal Elbe set out by WSA and the HPA mentions

the restriction of the built-up tidal energy for river engineering measures in the Elbe-mouth area (see technical contribution waterways and ports: part C, materials).

The industrial and commercial development goals are particularly important at the Cuxhaven location, which is however mainly outside of the planning area.

▼ Table B6.9

Usage targets in functional area 6

Uses	Short description of the targets for functional area 6
Regional planning	<ul style="list-style-type: none"> <li>• Coordination of the various usage requirements from a federal state regional and construction planning perspective in terms of a sustainable and resource-efficient development of the area</li> <li>• Cuxhaven as a focal point for development for trade, industry and port economy/logistics</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential and good chemical status of the surface water bodies of the Elbe</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Taking into account future requirements to increase and strengthen flood protection throughout all planning activities.</li> <li>• LS: Minimising the amount of debris caused</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Necessary Economic maintenance of the channels and banks, minimising or stabilising maintenance expenditure</li> <li>• Continuing use of the deposit areas</li> <li>• Implementing the river engineering and sediment management concept set out by the HPA and the WSV</li> <li>• Adapting the banks of the Lower and Outer Elbe for container ships which are 14.5m deep</li> <li>• High traffic security and effective care in the case of accidents</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Long-term protection and promotion of productive agriculture in the various management forms in suitable production areas, maintaining the existence of agricultural operations</li> <li>• LS: maintaining the current extensive use of grassland</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> <li>• Limiting the yield losses of geese, ducks and swans in agricultural areas by dividing and breaking up populations in a targeted manner using hunting (LS)</li> <li>• Continuing cooperation on predator control (LS)</li> <li>• Carrying out water bird hunting on the Elbe</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Ensuring the location conditions, production capacities and production potentials required to achieve competitiveness and development of operations</li> </ul>

Uses	Short description of the targets for functional area 6
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Outside of the functional area in Cuxhaven: developing new ports and wharfs (this latter category is located partially inside the functional areas); growth is expected in the coming years mainly by the harnessing of offshore wind energy components, vehicles and roll-on, roll-off traffic.</li> </ul>
Leisure, tourism and sports	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, particularly promoting nature tourism and natural experience opportunities</li> <li>• Valorisation of maritime cultural monuments (historical ships, ports, sea signals etc.)</li> <li>• Ecological optimisation of sports activities in terms of orientation to the principle of the sustainable use of nature</li> <li>• No further limitations on the area or other deterioration of water sports</li> </ul>

## B6 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B6 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

Both from a Natura 2000 perspective and for the commercial use of the waterways and the port, stopping the increase in the tidal range within the estuary is urgently needed. In their river engineering and sediment management concepts for the tidal Elbe, WSA and the PA suggest carrying out measures in the Elbe-mouth area to decrease the tidal energy which enters the estuary, which should decrease the tidal range in the Elbe estuary (see part C, materials: technical contribution waterways and ports 2010). Currently, neither the concrete implementation nor the effects of such measures have been sufficiently researched. It is therefore not yet possible to estimate the synergies and conflicts.

The measures in the management plan in accordance with Article 11 of the WFD are an essential condition for achieving a favourable conservation

status for the habitat type “estuaries”.

The certification of MSC standard aimed at by the Federal Association of Fishing and the voluntary avoidance of the shelduck moulting areas during moulting times are welcome measures.

Foreland development accelerated by breakwaters is generally viewed as an intervention in the natural sedimentation processes. On the condition that new fence areas in the north-east of the functional area are left to succession and only drained as much as is really necessary for dyke safety, they can contribute in a concrete way to the habitat diversity in the functional area.

On the exposed southern bank between Otterndorf and Cuxhaven, there is hardly room to act to improve

the unfavourable conservation status of the habitat type “estuaries” within the Natura 2000 boundaries. The deep water areas which are directly in front of the bank and the inner bank which is fixed all the way along severely limit the development potential. A worsening of the current situation should therefore be avoided.

Due to the relatively low salt content in the water and the soil, grassland use in the foreland is required to maintain the open landscape character of the estuary. Otherwise, the salt meadows and important breeding and migrating bird habitats will be suppressed by land reeds. Such a development, which would be acceptable at other locations, would not be compatible with the specific conservation objectives of the Natura 2000 sites in functional area 6. The current usage intensity, however, is too high and is, to a large extent, responsible for the unfavourable conservation status of several target species and target habitats. Parallels should be drawn with the positive examples of cooperation between landscape and nature conservation.

Reducing the pressure from hunting in the Natura 2000 site, and isolating feeding and resting areas for migrating birds utilising the large grassland and mud flats which are free from disturbances will increase the amount of time the migrating birds spend in the areas designed for their protection and minimise the grazing pressure of the geese and swans in neighbouring areas.

### Conclusion

The analysis of the synergies and conflicts shows that in functional area 6 with its broad range of uses there is a particular need for coordination with various interest groups. Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. If the uses are not adapted to conform with Natura 2000, the management targets set out (see chapter B6 2.4) will probably not be achieved.

▼ Table B6.10

Important tasks of cooperation between the uses and interest groups found in functional area 6

Natura 2000-relevant uses / interests	Focus of cooperation
Regional planning	<ul style="list-style-type: none"> <li>No specific need for action</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>Designing and implementing agreed measures from the range of suggested measures for the tidal Elbe</li> <li>Maintaining or restoring the ground water supply typical for the marshes and forelands through cultivation of the surface waters which is compatible with Natura 2000, if necessary using the sluices/pumping stations for water control in the area during dry periods, water management which preserves nature</li> </ul>
Coastal protection	<ul style="list-style-type: none"> <li>Minimising disturbance of Natura 2000 protected items caused by maintenance work. The coordination carried out to date should be continued.</li> <li>When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary with its flood plains</li> <li>Facilities to remove soil to create clay in areas in which, from a nature conservation perspective, the aim is to increase the proportion of water areas; not using the areas with populations of Natura 2000 habitat types; nearly natural design of potential cultivation sites.</li> <li>Minimising conflict when debris accumulates can, for example, be carried out by taking into account the local spatial structures and agreeing measures on-site.</li> <li>Increasing the foreland drainage taking into account the requirements for dyke security</li> </ul>

Natura 2000-relevant uses / interests	Focus of cooperation
Coastal protection	<ul style="list-style-type: none"> <li>• Foreland development only in areas where it is necessary to protect the dammed dykes, checking the possibility of dyke foot drainage as an alternative to trenches, avoiding agricultural use on the foreland development areas</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Optimising maintenance and operation of the waterways taking into account Natura 2000</li> <li>• Developing solutions to reduce the tidal range inside the estuary. Methods should be indicated for how this target can be achieved while simultaneously protecting the Natura 2000 conservation objectives in the mouth of the Elbe</li> <li>• Optimising the bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the protection of species and biotopes</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Continuing cooperation with agricultural operations in caring for the grassland, particularly taking into account the avifaunal functions of the area</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation objectives</li> <li>• Improving the compatibility of flat fishing and crab fishing</li> <li>• Adhering to the voluntary avoidance of shelduck moulting areas during moulting times</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and expanding areas where hunting is not carried out against the backdrop of the insufficient conservation status of various species of water bird.</li> <li>• Continuing cooperation on predator control</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Existing facilities: if there are negative effects on the neighbouring Natura 2000 sites, the aim should be to minimise these in accordance with current scientific knowledge</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Using and if necessary expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>• Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerately as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> <li>• Implementing the regulations applicable in the adjacent protection areas in the Wadden Sea National Park for water sports activities in the areas to the north of the navigation channel</li> <li>• Excursions to the seal banks: taking on behaviour regulations which are application in the adjacent Wadden Sea National Park.</li> </ul>

## B6 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level.

They are supplementary to the measures which were presented as a result of the overall view in part A of the IMP, or they implement these measures in functional area 6 (see chapter A5).

### B6 4.2.1 Suggested measures for functional area 6

At the measure level, the relevant planning responsibilities in the two federal states must be taken into account.

presented from the original contributions without being changed.

The two following lists contain the suggested measures for Lower Saxony and Schleswig-Holstein. Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been

For Lower Saxony, spatial, concrete measures, and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

For Schleswig-Holstein spatial, concrete individual measures (FA 6 measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

#### ▼ Table B6.11

Suggested measures for functional area 6 in Lower Saxony

<b>Sphere of action 1: Developing concepts/plans</b>	
1.1	Creating area-specific Natura 2000 management concepts for partial areas
<b>Sphere of action 2: Research and environmental monitoring</b>	
2.2	Determining the significance of different mud flats in their function for bird species
<b>Sphere of action 3: Concrete habitat and species protection measures</b>	
3.2	Opening or rebuilding summer dykes
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SACs in the Lower Elbe which currently have lower surface proportions (supralittoral)
<b>Sphere of action 3: Concrete habitat and species protection measures</b>	
3.5	Measures to promote salt meadows
3.7	Measures to promote/create tidal inlet systems
3.9	Permitting the growth and restoration of pioneer locations on the foreland and on the Elbe islands
3.17	Measures to maintain the large, open character of the landscape
3.18	Measures to promote connected resting areas in the grassland which have low disturbance levels
3.19	Measures to promote areas with low disturbance levels in the mud flats and shallow water areas
3.21	Measures to maintain/develop extensive use of grassland
3.22	Improving the water supply in public areas
3.23	Creating tide water ponds in the dyke foreland and small inland waters

▼ Table B6.12

Measure areas and suggested measures for functional area 6 in Schleswig-Holstein

Number	Title
FA 6.1 HH/SH	Restoring the salt meadows in the Neufeld foreland west of the port tidal inlet
FA 6.2 HH/SH	Protecting the tern breeding grounds on the Neufeld foreland
FA 6.3 HH/SH	Maintaining the meadow-reed bed complex east of the Neufeld port tidal inlet
FA 6.4 HH/SH	Deposit area east of the Neufeld port
FA 6.5 HH/SH	Succession on the foreland between Mühlenstraßen and Hermannshof

Additional information can be found in the federal state contributions (part I or A and texts on functional area 6).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Schleswig-Holstein part of the functional area:
  - ↳ annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Maps can be found under ↳ Natura 2000 technical contribution ↳ Measure programme ↳ functional area 6

- Lower Saxony part of the functional area:
  - ↳ annex of the Lower Saxony IMP contribution
  - ↳ annex Technical contributions ↳ technical contribution 01: Natura 2000 ↳ FB01 part B with target map C6.

Target map C6 gives an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

## B6 4.2.2 Interdisciplinary cooperation in implementing the measures

Cooperation with agricultural operations is key to avoiding any further deterioration of the conservation status of many breeding and migrating bird species in the bird protection areas. The development of solutions to better combine uses and bird protection are the focus here. This applies in particular to the care and maintenance of the salt meadows (habitat 1330) and the cultivation of the areas with breeding populations of meadow birds and terns.

The development of solutions to reduce the tidal range inside the estuary requires close cooperation with the Water and Shipping Administration. Methods should be developed for how to achieve this target while at the same time protecting the conservation objectives for the Natura 2000 sites of the mouth of the Elbe.

Focuses for cooperation with the offices responsible for coastal protection are:

- Foreland development between Neufeld and Brunsbüttel: checking whether, as an alternative to trenches, a sufficient drainage of the foot of the dyke can be achieved by digging ditches parallel to the dyke
- Foreland west of the Neufeld port tidal inlet: increasing the drainage taking into account the need for dyke security
- Belum summer polder: key to improving the conservation status of the habitat types "estuaries" (1130) and salt meadows (1330) is the opening or rebuilding of the summer dyke.

Focuses for cooperation with the fishing industry are:

- Improving the compatibility of flat fishing and crap fishing with the aim of sustainable maintenance and use of the populations.
- Voluntarily avoiding the shelduck moulting areas during the moulting period

As a priority in the implementation of concrete measures, in many cases basic steps and concepts have to be developed which coordinate the leading administration closely with the relevant nature conservation authorities in the federal states.

### B6 4.2.3 Information on studies and environmental monitoring

An overview of studies and research needs for the entire planning area is given in part A of the IMP (see chapter A7).

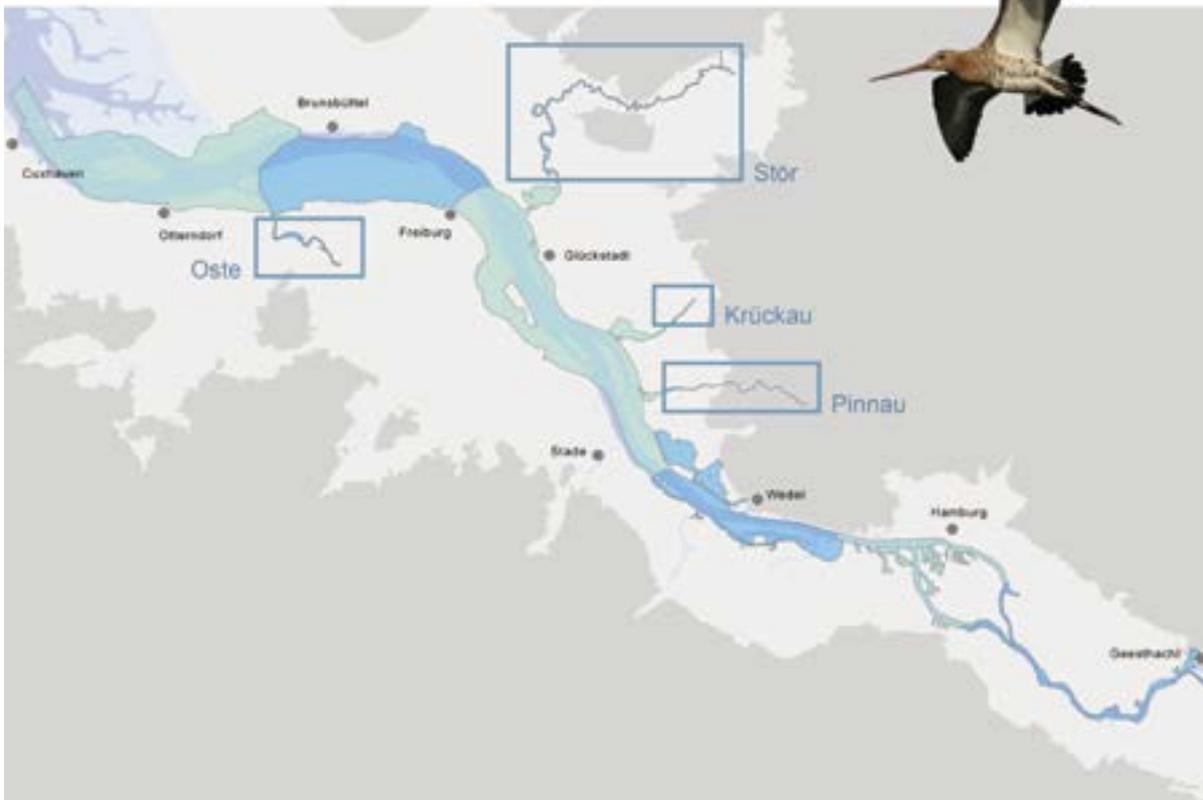
For functional area 6, the following aspects are particularly significant:

- Monitoring the hydrological and morphological behaviour of the ditch and sand system at the mouth of the Elbe
- Continuing the regular assessment of populations of target species in the bird protection areas (breeding and migrating birds)
- Monitoring the hatching success of meadow birds
- Temporally condensed assessment of breeding populations of target bird species in areas with measure focus points
- Monitoring the tern colony in the Neufeld foreland, researching the reasons for the decline in reproduction success, developing a comprehensive concept for maintaining the last gull-billed tern colony in northern Europe
- Continuing cooperation with the administration of the Wadden Sea National Park on monitoring tasks (breeding and migrating birds, marine mammals, assessing biotopes on the foreland).



I Integrated  
M management plan  
P Elbe estuary

## Functional area 7



overleaf

Reed belt on the Oste

Stör at Breitenburg

Wrigg ferry at Kronsnest on the Krückau

Grassland on the Pinnau at Neuendeich



## B7 1 Overview of functional area 7

Functional area 7 is made up of the outer reaches of the Pinnau, the Krückau, the Stör and the Oste. The dyked estuaries at Pinnau, Krückau and Stör are looked at as part of functional area 4. Functional area 7 comprises a total area of around 872 ha, which is divided into the following river sections (for the location see p. 233):

- Pinnau upstream of Neuendeich (eastern edge of the "Lower Elbe to Wedel" bird protection area) to Pinneberg (km 15, Schleswig-Holstein)
- Krückau upstream of Kronsnest to Elmshorn (sewage works) (6km along the river, Schleswig-Holstein)
- Stör upstream of Wewelsflether Uhrendorf (north-east edge of the "Lower Elbe to Wedel" bird protection area) to Wittenbergen (flows together with the Bramau) (km 36 along the river, Schleswig-Holstein)
- Oste upstream from the Oste barrage to Laak (km 11, Lower Saxony).

The functional area comprises areas in the counties of Pinneberg and Steinburg (Schleswig-Holstein) and Cuxhaven and Stade (Lower Saxony).

The four river sections are all influenced by the tide. When the tide is low, small areas at the edges of mud flat dry out. At their mouths, there are flood barrages, which were built in the period between 1968-1969 (Pinnau, Krückau, Oste) and 1975 (Stör). Outside of the closed areas of the barrage, there is biological continuity between the Lower Elbe and the tributaries. The banks were fixed with stone revetments many years ago. Although the Stör and the Oste have maintained their meanders, their output is just as channelled as in the straightened sections of the Pinnau and the Krückau. The expansion and the dyking, which is narrow throughout, have led to a deep-rooted structural deficit in the waters. The four rivers in functional area 7 are classified according to the WFD as heavily modified water bodies. Decisive for this classification are the expansion-related morphological structural deficiencies and the separation from the natural flood plains and the tributaries.

The **Pinnau** has its source at Henstedt-Ulzburg and is around 41km long. Its headwaters are registered as the SAC "Pinnau – Gronau" (DE 2225-303). Functional area 7 begins in Pinneberg. Between Pinneberg and Uetersen, the SAC is made up of a 10m wide strip of the bank on each side of the river. West of Uetersen, the Pinnau runs between high dykes. The area between the dykes belongs to the area and is mainly used as grassland. The lower reaches of the Pinnau is classified as a federal waterway and is the responsibility of the WSA in Hamburg.

The **Krückau** has its source in Kisdorfer Wohld and is around 40km long in total. Its headwaters are registered as the SAC "Obere Krückau" (DE 2224-306). The underflow through the Elbe marshes begins at Elmshorn. Here, the Krückau loses its near-natural character and becomes a dyked marsh river which is affected by the tide. In the section between Elmshorn and east of Spiekerhörn, the area between the dykes is narrow and structurally deficient. Upstream of Spiekerhörn, the area between the dykes widens out somewhat. The river is therefore just as

expanded here as in the eastern section. The outer reaches of the Krückau, which is influenced by the tide, is classified as a federal waterway and is the responsibility of the WSA in Hamburg. No maintenance measures have been carried out for some time.

With a total length of around 87km, the **Stör** is the longest tributary of the Elbe in Schleswig-Holstein. Its headwaters and some of the tributary waters are registered as SACs ("Rantzautal", (DE 2023-303), "Zentrale Stör", "Bramau und Bünzau" (DE 2024-391) und "Osterautal" (DE 2026-303)). The river reaches sea level at Kellinghusen 48km before it enters the Elbe. From there to the mouth, tides characterise the drainage. Between Kellinghusen and Breitenberg (12km along the Stör) there are no tide-related changes in the flow directions of the river, but there are fluctuations in the water level due to the backflow of the river when there is a flood. The lower Stör flows from Wittenbergen to Itzehoe through a wide, moored lowland which is today is intensively as grassland. The river dykes mainly run at a distance of a few meters from the banks. At the mouths of the tributaries Hörner Au, Mühlensbarker Au, Rantzau and Breitenburg Canal, there are sluices. Where the river broke through between the Itzehoe Geest and the Münsterdorf Geestinsel, the Stör continues to meander. From Itzehoe, the river flows through the Elbe marshes. The first bank dykes were built in the 12th and 13th centuries. Although the Stör has kept its meanders, they were regulated in 1875-1905. The drainage of the adjacent polders and the mouths of the large tributaries Bekau, Wilster Au and Kremper Au are all regulated by pumping stations, sluices or locks. Downstream of Itzehoe, the distance between the dyke banks increases somewhat in places. Where they are present, the strips of foreland are grazed by sheep and some cattle.

The total length of the Stör in functional area 7 is classified as a federal waterway. Significant shipping traffic utilises the river below Itzehoe.

While in the three Schleswig-Holstein tributaries limnic conditions prevail, the out reaches of the **Oste** are brackish (mesohaline to oligohaline). In

the section of just under 11km from Laak to the Oste barrage, the meandering river is 100 to 200m wide. River dykes along the Oste were built in the 18th century (Kurhannoversch topographical survey). The grassland use stretches until right in front of the banks in many places, so the reed belt is narrowed to a small strip. Of the areas of wide foreland be-

tween the dykes (e.g. CA Schnook, outer dyke area at Geversdorf), only the small areas at Geversdorf are actually part of the functional area. Most of the grassland areas are intensively used. The water areas of the Oste are owned by the federal state and are federal state waterways, all of the other areas are privately owned.



▲ Fig. B7.1: Landscapes in functional area 7  
Top: Stör bight at Hodorf, Krückau at Kronsnest  
Bottom: Oste at Dingwörden, second dyke line along the tidal river

▼ Table B7.1

Selected abiotic parameters in functional areas 7

	Pinnau	Krückau	Stör	Oste
Length in the functional area	Around 15km	Around 6km	Around 36km	Around 11km
Total area	640km			232km
	52%			76%
River width	10 to 40m	25 to 70m	30 to 200m	100 to 200m
Tidal range <sup>1</sup>	2.1m at Uetersen 3.0m at the barrage	2m in Elmshorn 2.95m at the barrage	1.5m at Kellinghusen 1.8m at Itzehoe 2.75m at the barrage	2.3m at Oberndorf (around 4km above the functional area) 2.7m at the barrage
Chloride content <sup>2</sup>	Limnic	Limnic	Limnic	Oligohaline to mesohaline
WFD water body	Type 22 "Marsh wa- ters" HMWB pi_09	Type 22 "Marsh wa- ters" HMWB kr_09	Type 22 "Marsh waters" HMWB mst_16_a	Type 22 "Marsh waters" HMWB

<sup>1</sup>: [www.bsh.de/akt/dat/wvd/elbepegel](http://www.bsh.de/akt/dat/wvd/elbepegel) <sup>2</sup>: [www.fgg-elbe.de](http://www.fgg-elbe.de)

## B7 2 Natura 2000

The specific Natura 2000 targets for functional area 1 are determined using several evaluation steps, some of which are federal state-specific. These can be found in the federal state contributions in question. The joint results are shown here according to the following system:

- Inventory of the species and habitats of the SACs which occur in the functional area, evaluation of their conservation status
- Evaluation of the strengths and weaknesses of the functional area from the perspective of species and habitats which are relevant for Natura 2000
- Analysis of the interaction with the other functional areas in the Lower Elbe
- Development of a Natura 2000 example for the functional area
- Definition of functional area-specific Natura 2000 conservation objectives

### B7 2.1 Natura 2000 status

▼ Table B5.6

Protected areas in functional area 5

Area category	Area designation
Special Areas of Conservation (SACs)	DE 2018-331 Lower Elbe (LS) DE 2323-392 Schleswig-Holstein Elbe estuary and surrounding area (SH)
Conservation areas which are part of Natura 2000	Some areas of CA Schnook, outer dyke area at Geversdorf (LS)
Landscape conservation areas which are part of Natura 2000	Pinnberg Elbe marshes (Krückau, Pinnau) (SH) Planned LCA "Stör river area" (Wewelsfleth Uhrendorf to Itzehoe) (SH)

### B7 2.1.1 Special Areas of Conservation (SACs)

The technical authorities in Lower Saxony and Schleswig-Holstein have defined the habitats in annex I and the species in annex II of the Habitats Directive as objects of protection in the SACs and evaluated their conservation statuses. The evaluation results given here take into account federal state-specific features and are based on the relevant information given by the two federal states.

An overview of the Natura 2000 protected features which are relevant for all of functional area 7 are given below. Additional information on the basis for the data, the evaluation methods (criteria, specifications) and detailed descriptions of the functional area can be found in the "Natura 2000" technical contributions in the federal states' contributions (see part C: materials).

▼ Table B7.3

Conservation statuses of the habitats in annex I of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1130	Estuaries	C <sup>3</sup>	B C
1140	Vegetation-free mud, sand and mixed mud flats	C	4
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	C	C
91E0	*Alluvial forests with <i>Alnus glutinosa</i> und <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	B	-

<sup>1</sup> Elbe estuary Lower Saxony IMP contribution, part II, functional area 7, as of September 2011  
<sup>2</sup> Assessment of habitats (2003). In summer 2010, more data was captured, the results of which are not yet available in an evaluated form.  
<sup>3</sup> Elbe estuary IMP, part II, functional area 7, as of September 2011. In Lower Saxony, the habitat type 'estuaries' is currently evaluated using several individual components. The conservation status shown here is a composite view of these individual evaluations.  
<sup>4</sup> The evaluation is done together with the habitat type estuaries.

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

The habitat type "estuaries" (1130) comprises all of the water areas, reeds and the adjacent biotopes of the flood plains. It stretches as far as the foot of the dyke banks. The upper sections of the Stör and the Pinnau have submerged plant growth made up of European bur-reed (*Sparganium emersum*), fennel pondweed (*Potamogeton pectinatus*) and floating pondweed (*Potamogeton natans*) among others. In the downstream areas of the estuary, there is no submerged vegetation due to the change in flow direction as a result of the tide and the associated deposits. The few suitable fish habitats (shelters, small wider areas or bays, mouths of tributaries) fall dry in large parts when water levels are low. Only the structurally deficient channels with high levels of de-

posits have a continual flow, which has faster-flowing water because of the tide.

The banks of the four rivers are mainly fixed with stone packing and artificially steepened. Reeds therefore rarely grow here. The total proportion of nearly natural biotope in the remaining flood plains is low. In the section from Wittenbergen to Uhrendorf, large reed beds form on the Stör. Upstream of Itzehoe, the area between the dykes is not used (conservation status B). In the remaining sections of the river in functional area 7, the conservation status of the habitat type "estuaries" is rated unfavourable (C).

Nearly natural alluvial forests (habitat type \*91E0) have not been identified on the Pinnau, the Krückau or the Stör. Small forests are found in sections there, which were classified as a highly degraded manifestation of the habitat type. In the mesohaline section of the Oste, the salt content of the water prevents the development of alluvial forests. At the mouth of the Laaker Fleths into the Oste, a small, well maintained alluvial forest can be found (conservation status B).



The remaining alluvial forest fragments occur in some areas downstream of Geversdorf and have an unfavourable conservation status (C).

Hydrophilous tall herbaceous vegetation (6430) is formed in small areas connected to the reed beds. It grows in the bank revetments and only has a small number of species which are typical for the habitat. These fragmented areas on the four rivers have a conservation status of C (unfavourable).



▲ Fig. B7.2: HD habitats in functional area 7

Mud flats and reeds (habitat type estuaries 1130), hydrophilous tall herbaceous vegetation (habitat type 6430)

As a migration channel for fish and cyclostomes which reproduce in upstream breeding areas, the sections of the four Elbe tributaries which are influenced by the tide provide an important connective function. Outside of the closed areas of the flood barrage, the stretches of the river in the functional areas can be passed through freely by aquatic species. Obstacles to migration still occur in some cases in stretches of the river which are further upstream outside of the planning area.

The areas of the Elbe tributaries which are influenced by the tide are migration channels for the two lamprey species the sea lamprey and the river lamprey. Since the breeding areas of the headwaters can be reached by lamprey in Schleswig-Holstein, it can be assumed that the status of the migration channel is favourable. For salmon, the Federal Agency for Nature Conservation matrix developed specially to evaluate migration channels was used, and the sta-

tus of the salmon migration channel was classified as favourable (B). The accessibility of the breeding areas in the headwaters of the Oste and its tributaries is limited outside of the planning area by transverse structures (conservation status C).

Breeding populations of the asp occur in the limnic tributaries of the Pinnau, the Krückau and the Stör. As a result of the lack of suitable habitats, however, there are untypically low numbers of settlements. The species is not found in the brackish outer reaches of the Oste.

In research on fish fauna carried out in the past few years, the twaite shad was not found in the Pinnau, the Krückau and the Stör. Even in the past, the twaite shad only ventured upstream of the mouth of the Stör very occasionally. The Elbe tributaries are not part of their habitat.

▼ Table B7.4

Conservation statuses of the species in annex II of the Habitats Directive

EU code	Habitats in annex I of the Habitats Directive	Conservation status	
		LS <sup>1</sup>	SH <sup>2</sup>
1095	Sea lamprey ( <i>Petromyzon marinus</i> ) (M)	C	B
1099	River lamprey ( <i>Lampetra fluviatilis</i> ) (M)	C	B
1106	Salmon ( <i>Salmo salar</i> ) (M)	C	B
1113	*Houting ( <i>Coregonus maraena</i> ) (M)	D <sup>4</sup>	-
1365	Asp ( <i>Aspius aspius</i> )	-	C

\* priority species (M): The estuary is used by this species as a migration channel.  
<sup>1</sup> Elbe estuary IMP, part II, functional area 7, as of September 2011  
<sup>2</sup> BIOTA 2008  
<sup>4</sup> The existence of the houting was categorised as not significant (D) in agreement with the federal states HH, SH and LS, see "Communication from the Government of the Federal Republic of Germany to the Commission of the European Community of 10 July 2009, GZ: N I 2-70162/9.4" on the results of the marine Atlantic conference in Galway (24–25 March 2009).

Conservation status (see p.17) **A** favourable/very good **B** favourable/good **C** unfavourable/average to poor

### B7 2.1.2 Strengths and weaknesses of the functional area

The stretches of the estuary in the Elbe tributaries are mainly significant as migration channels for salmon, lamprey and houting. One positive aspect is the lack of obstacles to migration in the functional area itself and in the adjacent sections of the estuary. The biological continuity is only interrupted when the flood barrage is closed.

One problem, however, is the very low habitat diversity in the aquatic area. The flow speeds and the substrate are more or less uniform. Nearly natural hiding places and resting places on deadwood or tree roots are almost completely lacking. When water levels are low, the majority of the stone revetments in which the lamprey could live and retreat to when there is a heavy flow and a lack of natural habitats, dry out. The increase in the tidal range and the sedimentation of the few side areas which rise as a result worsens the lack of habitats from the point of view

of migrating species and has a negative effect on the conservation status of the asp.

The intensive grassland use in many places prevents the development of nearly natural bank reed beds and of potentially occurring HD habitat types such as hydrophilous tall herbaceous vegetation (6430), lowland hay meadows (6510) and alluvial forests (\*91E0). In the brackish water section of the Oste, the operation of the flood barrage limits flooding. The associated desalination of the soil prevents the development of salt meadows (1330).

From the analysis and evaluation of the populations of species and habitats which are relevant to Natura 2000 in connection with the manifestation of location factors, the following strengths and weaknesses of the functional area should be taken into consideration in particular (Table B7.5):

▼ Table B7.5 (part 1)

Overview of strengths and weaknesses in functional area 7

Particular strengths
<ul style="list-style-type: none"> <li>• Sufficient supply of oxygen all year round</li> <li>• No obstacles to migration for fish and lamprey species between the North Sea and the upper limits of the functional area</li> </ul>

## ▼ Table B7.5 (part 2)

Overview of strengths and weaknesses in functional area 7

#### Particular weaknesses

- Very low habitat diversity in the aquatic area: channelled flow with more or less uniform flow speeds and substrates
- Anthropogenously increased tidal hub, which leads to increased deposits and drying out of fish habitats when water levels are low
- Mainly very unnatural banks (revetments, steep profile, intensive grazing)
- After expansion and dyking, almost no alluvial areas remain
- Flood barrages result in a desalination of the land habitats on the Oste and to minimises flooding of the alluvial areas
- Mainly intensive grassland use
- Significant lack of the tidal alluvial forests which could potentially be present
- Low development potential in the small areas between the dykes



▲ Fig. B7.3: Examples of weaknesses in the functional area

Left: Kasenort sluice at the mouth of the Wilsterau into the Stör. The four main rivers in functional area 7 are biologically continuous, but there are often no open connections with their tributaries.

Right: the area between the dykes is often very small and does not really have the potential for ecological development (Pinnau at Neuendeich).



▲ Fig. B7.4: Weaknesses in the functional area: bank revetments on the Stör and on the Oste

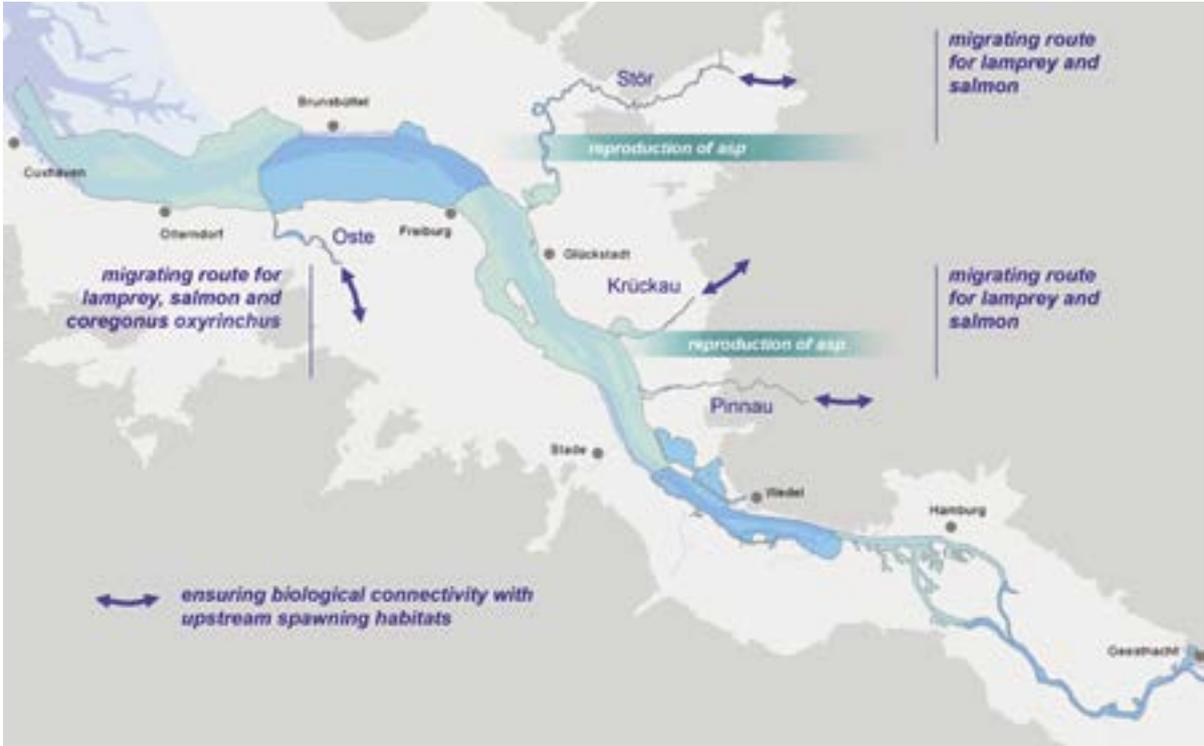


▲ Fig. B7.5: Examples of areas which are particularly important or have high development potential  
 Left: the flood barrages at the mouths of the river only cause comparatively short interruptions to the biological continuity.  
 Right: if the bank revetments cease to be maintained, nearly natural banks (here on the Krückau) can regenerate.

**B7 2.2 Interactions with other functional areas**

Stretches of the Stör, Krückau and Pinnau rivers extend into functional area 4. The Oste flows into the Lower Elbe at the crossover between functional areas 5 and 6. The areas of the river in functional area 7 are registered as Natura 2000 sites mainly due to their connective function for migrating fish and

lamprey species. Within the Natura 2000 network, they also form connections to additional SACs in the headwaters in which the breeding and nursery areas of the fish and cyclostomes which swim up the river can be found.



▲ Fig. B7.6: Significance of functional area 7 in terms of important focal points of functions relevant for Natura 2000

As part of Blaues Metropolnetz (Blue Metropolis Network) model project in the metropolitan region of Hamburg, the core population of the marine otter found in Mecklenburg-Vorpommern, eastern Lower Saxony and Denmark and the population in eastern

Schleswig-Holstein are being reconnected. The estuary sections from the Pinnau, the Stör and the Oste are parts of this network, which is made up of Natura 2000 sites and connecting landscape structures.

### B7 2.3 Natura 2000 model

There are only small alluvial forests habitats in functional area 7. Within this limitation, the ecological development potential is low. The Natura 2000 model has been developed for the migration channel which is registered. The neighbouring areas have to be included in the plans in order to generate a noticeable improvement in the current status of the habitats type 'estuaries' (1130) in the Elbe tributaries in Schleswig-Holstein (see Fig. B7.3, right).

The sections of the Pinnau, the Krückau, the Stör and the Oste which are affected by the tides can be passed by fish and lamprey swimming up and down the river all year round. Structurally rich banks offer places for species to hide all the way along the stretch. The stone revetments are gradually being removed in selected areas or are being overgrown by nearly natural vegetation. Tree roots contribute to the stability and the structural diversity of the banks.

In the sections through the Elbe marshes, the model is orientated towards the structures which are typical for the landscape. In the area between the dykes there are reeds and moist grasslands. In some sections, wooded areas have formed on the banks. In the lowland sections through the geest (in the Stör upstream of Itzehoe and in the Pinnau upstream from Uetersen) the rivers flow through an extensively used grassland and moorland landscape. In collaboration with other programmes (e.g. implementing the WFD) and institutions (e.g. Schleswig-Holstein Nature Conservation Foundation), parts of the alluvial areas are being reconnected to the rivers, taking into account economic, social, cultural and regional needs. In these areas, the Natura 2000 site and its surrounding areas form an ecological unit once again.



▲ Fig. B7.7:

Elements of the model for the tributaries: bank reed beds, alluvial forest areas, nearly natural banks with reed beds and mud flats

### B7 2.4 Natura 2000 management targets

The following management targets for the Natura 2000 sites and protected items are based in the capture and evaluation of the current situation in the

population. They implement the models in concrete spatial and protected item target formulations.

These general management targets define the framework for the integrated target and measure concept for the functional area. The detailed, connected conservation objectives for the individual Natura 2000 sites can be found in the contributions from the federal states.

The following management targets apply to functional area 7:

- Maintaining and developing nearly natural bank and alluvial forest habitats, e.g. hydrophilous tall

herbaceous vegetation (habitat type 6430) in a complex with reeds and priority alluvial forests (\*91E0)

- Maintaining the biological continuity of the migration channels for fish and lamprey; restoring the continuity as far as the upstream breeding areas (outside of the planning area)
- Improving the range of habitats for the asp (SH) and the characteristic fish fauna of the habitat type 'estuaries' (1130)

## B7 3 Uses and usage targets

In functional area 7, the Pinnau, the Krückau and the Stör are classified as federal waterways and the Oste is classified as a federal state waterway. On the Pinnau and the Stör, the only noticeable transport of materials is from Uetersen and Itzehoe. Maintenance measures have not been carried out in the remaining stretches of the river for a long time. The four rivers are primarily used for water sports activities and for angling. Passenger boats run on the mouth of the Oste and on the Stör in the summer. Along the river, there are several marinas of different sizes.

Intensive uses or uses which are far from natural characterise the area between the dykes on the four rivers. The intensively used agricultural areas

are mainly grassland. Meadows with scattered fruit trees and garden areas line the Krückau. Upstream of Itzehoe and Uetersen, the river dykes are just a few meters from the bank. Since it is not possible to use these small areas, reed bed and individual trees dominate.

The following table gives an overview of the interests and uses which are relevant to Natura 2000 and are important in the functional area. Information on uses of local significance can be found in the relevant contributions from Schleswig-Holstein and Lower Saxony.

### ▼ Table B7.6 (part 1)

Current interests and uses relevant to Natura 2000 in functional area 7

Natura 2000-relevant uses/interests	Short description
Regional planning	<ul style="list-style-type: none"> <li>• LS: entire functional area: priority area for Natura 2000</li> <li>• Regional Planning Organisation (state): priority area for recreation between Geversdorf and Neuhaus, representation of the port in Neuhaus</li> <li>• SH: area which is particularly important for the ecosystem and recreation. Natura 2000 sites</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Ecological region 14 (central lowland); Elbe river area unit; Pinnau, Krückau, Stör and Oste classified as a heavily modified water bodies in the functional area</li> <li>• Irrigation/drainage of the hinterland: outlet channel for drainage into the adjacent marshes and moors</li> </ul>

## ▼ Table B7.6 (part 2)

Current interests and uses relevant to Natura 2000 in functional area 7

Natura 2000-relevant uses / interests	Short description
Coastal protection/flood protection	<ul style="list-style-type: none"> <li>• LS: protective dyke, Oste barrage</li> <li>• SH: second dyke line (foot of the dyke is the edge of the Natura 2000 area)</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Internal shipping on the Oste, Stör and Pinnau</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Grassland use: grazing with sheep and cattle</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Secondary and recreational fishing</li> <li>• Fishing with hand-held equipment in the entire functional area</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• LS: 2 hunting areas</li> <li>• SH: the rivers are used for hunting along within the adjacent hunting areas</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• Trade and industry in Uetersen, Elmshorn and Itzehoe, transport of agricultural products to Beidenfleth</li> <li>• Sailing ships at Beidenfleth (Stör)</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Model project: Maritime Landscape of the Lower Elbe run by the Hamburg metropolitan region, various tourism concepts</li> <li>• Water sports, motor boating: kayaking, canoeing, windsurfing, sailing, motor boating</li> <li>• Many marinas</li> <li>• Passenger ships</li> <li>• Walking and cycling</li> </ul>



▲ Fig. B7.8: Uses in functional area 7

Grassland on the Stör, loading plants for basic agricultural commodities and products in Beidenfleth on the Stör



▲ Fig. B7.9: Uses in functional area 7  
Internal shipping on the Pinnau, marinas on the Stör

The members of the planning groups defined their targets and intended uses for functional area 7, which are given below in short form. For additional information, see part C: materials.

The targets given generally consist of continuing existing activities, but in some cases there are intentions beyond this. For many uses, no separate targets are given in the technical contributions for the functional areas.

▼ Table B7.7 (part 1)  
Usage targets in functional area 7

Uses	Short description of the targets for functional area 7
Regional planning	<ul style="list-style-type: none"> <li>• Coordination of the various usage requirements from a federal state, regional and construction planning perspective in terms of a sustainable and resource-efficient development of the area</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Achieving a good ecological potential in terms of the biological quality components and the targets for hydromorphological and physical/chemical quality components in the surface water bodies, particularly achieving biological continuity of the river systems</li> <li>• Ensuring the irrigation/drainage of the hinterlands</li> </ul>
Coastal protection/flood protection	<ul style="list-style-type: none"> <li>• Long-term and ecologically sustainable protection of people, materials and cultivation goods from high tides and the effects of flood waters</li> <li>• Achieving dyke safety (protective dyke/second dyke line)</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Adapting the banks of the Lower and Outer Elbe for container ships which are 14.5m deep: planned implementation of compensation measures on the Stör</li> <li>• Avoiding maintenance of stretches of the Pinnau, the Krückau and the Stör for which there is no commercial need arising from shipping</li> <li>• Economic maintenance as necessary of the Oste as an internal shipping channel</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• SH: Not using agricultural areas for compensation measures</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Maintaining and developing the economically usable fish populations and continuing fishing</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Maintaining and developing the population of species which can be hunted and using the wild populations by continuing to hunt in accordance with the federal cultivation status</li> </ul>
Trade, industry, infrastructure	<ul style="list-style-type: none"> <li>• No information</li> </ul>

## ▼ Table B7.7 (part 2)

Usage targets in functional area 7

Uses	Short description of the targets for functional area 7
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Maintaining and developing the tourism potential of the natural and cultural environment as a basis for agricultural, natural and particularly water-related forms of recreation and activities, especially promoting nature tourism and nature experiences</li> <li>• Ecological optimisation of the sports activities in terms of the orientation to the principle of the sustainable use of nature</li> <li>• No further limitations on the area or other deterioration of water sports, particularly maintaining the ports covered with deposits, improving the availability of mooring places for sailing boats and motor boats</li> <li>• Ensuring and developing the usable potential for tourists of the natural and cultural environment</li> </ul>

## B7 4 Integrated target and management concept

The “integrated target concept” shows the result of the combination of all of the intended uses for the area, which have been evaluated in terms of their synergies and conflicts with the Natura 2000 targets (see chapter A4.3).

Building on this, a measure programme is being set up which takes into account the interaction between Natura 2000 management targets and usage targets (integrated measure concept).

### B7 4.1 Synergies and conflicts between Natura 2000 and usage targets, need for action

Due to the unfavourable status of the habitat type “estuaries” (1130) in functional area 7, improvements are particularly important in both the aquatic and land areas. The sections of the estuary in the tributaries carry out their function as a migration channel for aquatic species as far as possible, but as estuary habitats they have significant deficiencies, which are primarily due to the degradation and the dyking of the rivers, and the lining of their banks.

In the areas between the dykes registered as Natura 2000 sites, there is some potential for development. Substantial improvements, however, can only be achieved by a nearly natural use and shape of the landscapes adjacent to the Natura 2000 sites, particularly in Schleswig-Holstein. The use of synergies with other programmes and actors is therefore particularly important.

Both from a Natura 2000 perspective and from the commercial use of waterways and ports, there is an urgent requirement for a decline in the increase in the tidal range inside the estuary. In the tributaries influenced by the tide, an increasing proportion of the fish habitats are drying out or disappearing when water levels are low due to accelerated sedimentation of the few remaining side areas. In their river engineering and sediment management concept for the tidal Elbe, WSA and the HPA suggest various measures which are designed to limit the tidal range in the Elbe estuary (see part C, materials: technical contribution waterways and ports 2010). Synergies for the sediment levels in the tributaries could arise from this.

The stretches of the estuary of the Pinnau, the Krückau, the Stör and the Oste can be passed by fish and lamprey swimming up the river in the Natura

2000 sites of the Elbe estuary. The planned removal of obstacles to migration in the headwaters will strengthen the populations of migrating fish species and lamprey in the Elbe estuary.

In Schleswig-Holstein, the land areas in functional areas 7 and further parts of the surroundings are some of the areas which were identified in the general plan on internal flood protection and flood water reserves published in 2007 as areas at risk of flooding. The general plan describes guidelines for flood protection strategies. The approach presented in the plan has several action goals, the implementation of which may have a positive effect from a Natura 2000 perspective. The following aspects should be mentioned in particular:

- Restoring and expanding natural wetlands and detention areas in the catchment area
- Reclaiming former flood plains in order to include these as natural retreat areas
- Checking the possibility of moving existing dyke lines back in order to create regional peak levels of flood water runoff and to create additional retention areas

- Providing areas in regional and urban planning in order to retain potential flood plains and retention areas.

Measures to prevent flooding and to promote the natural water retention may contribute to increasing the height of the dyke and to reduce or avoid using the areas in the Natura 2000 site, which is small in functional area 7.

### Conclusion

The analysis of the synergies and conflicts shows that in functional area 7 with its broad range of uses there is a particular need for coordination with various interest groups. Against the background of the existing need for action, the limits of the classical conservation tools (e.g. measures related to the form of the biotopes) become clear. If the uses are not adapted to conform with Natura 2000, the management targets set out (see chapter B7 2.4) will probably not be achieved.

▼ Table B7.8 (part 1)

Important tasks of cooperation between the uses and interest groups found in functional area 7

Natura 2000-relevant uses / interests	Focus of cooperation
Regional planning	<ul style="list-style-type: none"> <li>• Providing areas in regional and urban planning in order to protect the potential as a flood plain and retention area (general plan on internal flood protection and flood water reserves, Schleswig-Holstein 2007)</li> </ul>
Water management/Water Framework Directive	<ul style="list-style-type: none"> <li>• Implementing measures from the list of measures, particularly measures to reduce hydromorphological damage, to restore nearly natural water structures and to maintain/restore the continuity of the stretches of water in the headwaters (above the planning area)</li> </ul>
Coastal protection/flood protection	<ul style="list-style-type: none"> <li>• When planning new coastal protection systems, early agreements on water management, waterway operation and nature conservation are particularly important for the future development of the estuary with its flood plains</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Optimising maintenance and operations in the waterways with regard to Natura 2000</li> </ul>
Waterways and ports	<ul style="list-style-type: none"> <li>• Optimising bank maintenance: checking the necessity of revetments and approach piers, reducing or removing those revetments and approach piers which are not necessary, minimising bank maintenance, particularly along important stretches for the protection of species and biotopes/habitats</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Continuing cooperation with agricultural operations, especially in the case of grassland maintenance</li> </ul>

## ▼ Table B7.8 (part 2)

Important tasks of cooperation between the uses and interest groups found in functional area 7

Natura 2000-relevant uses / interests	Focus of cooperation
Fishing	<ul style="list-style-type: none"> <li>• Minimising the disturbance caused by fishing by coordinating those who wish to fish with nature conservation objectives</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>• Continuing cooperation to ensure hunting is carried out in a manner compatible with Natura 2000</li> </ul>
Leisure, tourism and sport	<ul style="list-style-type: none"> <li>• Using, and if necessary, expanding the natural experience offer from natural conservation authorities and nature conservation groups</li> <li>• Adhering to voluntary obligations set out by water sports groups to use the natural landscape of the Elbe and its tributaries as considerately as possible and in keeping with nature; no use of sensitive areas to anchor, clear allocation of landing places</li> </ul>

## B7 4.2 Measures

The following suggested measures help to implement the Natura 2000 management targets and are designed in response to the need for action determined on a functional area level. They are supplementary to the measures which were presented as

a result of the overall view in part A of the IMP, or they implement these measures in functional area 7 (see chapter A5).

### B7 4.2.1 Suggested measures for functional area 7

At the measure level, the relevant planning responsibilities in the two federal states must be taken into account.

For Lower Saxony, spatial, concrete measures, and for certain measure types, search areas (functional area or part) are given which are suitable for the implementation of the suggested measures.

The two following lists contain the suggested measures for Lower Saxony and Schleswig-Holstein. Each suggested measure is supported by a measure information sheet. In order to make the link between the list and the detailed information from the contributions submitted by the relevant IMP planning groups simpler, the table structures and the measure numbers have been presented from the original contributions without being changed.

For Schleswig-Holstein spatial, concrete individual measures (FA 7 measures) are suggested. General measures (GM) are applicable to all functional areas and therefore are not listed separately here.

▼ Table B7.9

Suggested measures for functional area 7 in Lower Saxony

Sphere of action 3: Concrete habitat and species protection measures	
3.4	Measures to increase the proportion of areas with biotopes which are typical for the estuary or individual habitat types in certain areas of the SACs in the Lower Elbe which currently have lower surface proportions (supralittoral)
3.6	Measures to promote the development of alluvial forests
3.8	Measures to promote nearly natural banks with hydrophilous tall herbaceous vegetation
3.21	Measures to maintain/develop extensive use of grassland areas including turning arable land back into grassland
3.25	Maintaining protection zones free from disturbance as a breeding site for white-tailed eagles

▼ Table B7.10

Suggested measures for functional area 7 in Schleswig-Holstein

Number	Title
FA 7.1 HH/SH	Removal of revetments and debris
FA 7.2 HH/SH	Developing alluvial forest areas along the Elbe tributaries
FA 7.3 HH/SH	Expanding the mouths of the large ditches
FA 7.4 HH/SH	Information on the care of the second dyke line
FA 7.5 HH/SH	Developing lowland hay meadows along the Stör
FA 7.6 HH/SH	Neuenkirchen, Bahrenfleth and Hodorf polders on the Stör
FA 7.7 HH/SH	Upgrading the Krückau between Elmshorn and Spiekerhörn
FA 7.8 HH/SH	Cultural landscape between Spiekerhörn and Kronsnest
FA 7.9 HH/SH	Pinnau between Klevendeich and the clay removal area (FA 4)

Additional information can be found in the federal state contributions (part I or A and texts on functional area 7).

Measure information leaflets with a detailed description can be found in part C: materials under:

- Hamburg part of the functional areas: ↳ annex of the HH/SH IMP contribution ↳ HH SH IMP measures. Maps can be found under: ↳ Natura 2000 technical contribution ↳ measure programme ↳ functional area 7 (measure sheet and maps)

- Lower Saxony part of the functional area: ↳ annex of the LS IMP contribution ↳ annex: technical contributions ↳ technical contribution 01: Natura 2000 ↳ FB01 part B with target map C5.

Target map C5 gives an overview of all of the measures relevant to the functional area, the overall scope taking into account the general measures (in particular measures in the aquatic area of the Elbe) and on the spatial focus for the implementation of the measures.

### B7 4.2.2 Interdisciplinary cooperation in implementing the measures

Cooperation with the offices responsible for flood protection is particularly important. A flood water protection strategy aimed at preventing high water levels and promoting natural water retention is suitable to reduce the requirement for areas to increase the height of dykes in the small Natura 2000 sites. Through a corresponding design and use of flood polders, there is a potential to create nearly natural

biotopes connected to the Natura 2000 sections of the river.

As a priority in the implementation of concrete measures, in many cases, basic steps and concepts have to be developed which coordinate the leading administration closely with the relevant nature conservation authorities in the federal states.

### B7 4.2.3 Information on studies and environmental monitoring

An overview of the studies and research requirements for the entire planning area is given in part A of the IMP (see chapter A7).

In addition to continuing and intensifying cooperation with institutions, authorities and groups on the

assessment and documentation of fish and cyclostomes in annex II of the Habitats Directive, no special indications of research or environmental monitoring to be carried out in functional area 7 are given.

# Abbreviations used

Fig.	Figure
AWB	artificial water body
HD	Habitats Directive = Directive on the conservation of natural habitats and of wild fauna and flora
ha	hectare
HH	Hamburg
HMWB	heavily modified water body
HPA	Hamburg Port Authority
IBA	Important Bird Area
IMP	Integrated Management Plan
IUCN	International Union for Conservation of Nature and Natural Resources
km	kilometre
l	litre
m	metre
mg	milligram
MSC	Marine Stewardship Council
A.D.	anno domini (modern era)
LS	Lower Saxony
CA	Conservation Area
OSPAR	Oslo/Paris (in the OSPAR Agreement on the Protection of Particularly Sensitive Marine Areas)
p.	page
SH	Schleswig-Holstein
etc.	etcetera
BD	Birds Directive = Directive on the conservation of wild birds
WFD	Water Framework Directive
e.g.	for example
BHD	Birds- and Habitats Directive
WSV	Federal Administration for Waterways and Shipping
WSA	Federal Agency for for Waterways and Shipping
SAC	special are of conservation
SPA	special protection area
RBC	river basin community





# Illustration credits

## Logos, maps, plans, satellite images

The graphics of the planning area were generated using digital topographical maps with the approval of the federal states of Hamburg, Lower Saxony and Schleswig-Holstein.

Natura 2000 logo: <http://ec.europa.eu/environment/life/toolkit/comtools/resources/logos.htm>

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Map overview: compiled from official aerial photographs	89, 109, 123, 149, 181, 235
Map overview of Europe: compiled from satellite images from the Natura 2000 viewer owned by the European Environment Agency, <a href="http://natura2000.eea.europa.eu">http://natura2000.eea.europa.eu</a>	1
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<a href="http://www.portal-tidelbe.de">www.portal-tidelbe.de</a> : Representation of the tidal range by: river engineering project group (2007): Report on the Holistic River Engineering and Sediment Management Concept for the Lower and Outer Elbe.	133
<a href="http://www.portal-tidelbe.de">www.portal-tidelbe.de</a> : Sediment capture Federal Institute for Hydrology (2009): Monitoring the morphological, ecological and conservation effects of sediment deposit above Wedel in the tidal Elbe. Report No. 1692, on behalf of the Hamburg Port Authority	142

## Photos

Aerial photographs: Heiko Grell (Free Biologists' Association) on behalf of the Kieler Institute for Landscape Economy for the Elbe estuary IMP

Andreas, U. (Stade county)	16 (above centre), 25 (left), 26 (pied avocet, short-eared owl), 29 (barnacle geese, tundra swans, common ringed plover, Eurasian golden plover, black-tailed godwits), 49 (centre), 55, 68 (titlark), 131 (white stork), 159 (left, centre), 165 (above right), 179 (centre), 183 (left), 186 (above left), 188 (left), 191 (left, right), 213 (bottom left), 216 (left), 219 (above)
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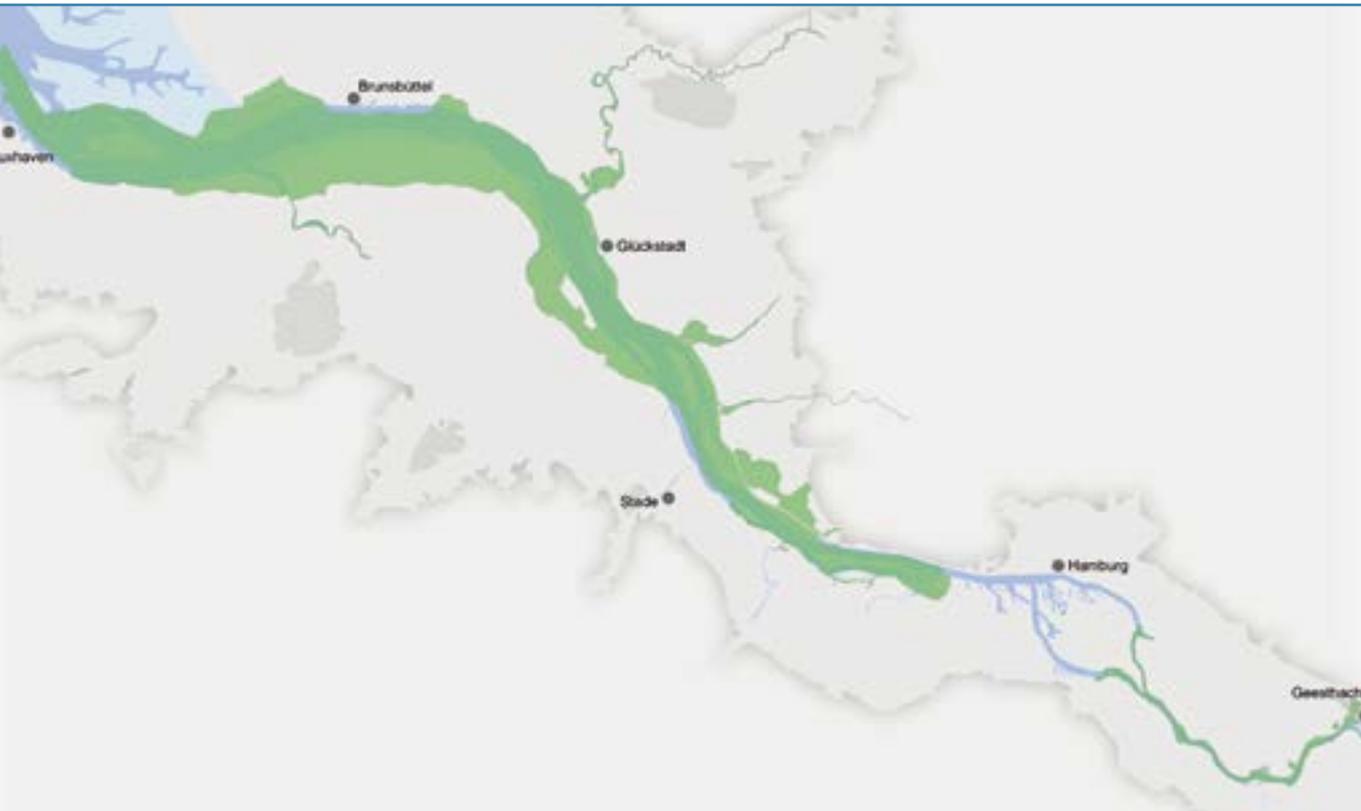
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Ziegentom *	68 (corncrake)

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The Integrated Management Plan for the Elbe estuary (IMP) is used to maintain and develop the Natura 2000 sites of the Lower Elbe in harmony with the various activities carried out in the estuary.

The Elbe estuary IMP was produced by the federal states of Hamburg, Lower Saxony and Schleswig-Holstein and by the Federal Water and Shipping Administration and the Port Authority.

[www.natura2000-unterelbe.de](http://www.natura2000-unterelbe.de)