

**WADDEN SEA ECOSYSTEM No. 25**

**Quality Status Report 2009  
Thematic Report No. 3.7**

# **Extraction and Dredging**

**Georg Nehls**

**Sophia Witte**

**2009  
Common Wadden Sea Secretariat  
Trilateral Monitoring and Assessment Group**

## Colophon

### Publisher

Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany;  
Trilateral Monitoring and Assessment Group (TMAG).

### Editors

Harald Marencic, Common Wadden Sea Secretariat (CWSS)  
Virchowstr. 1, D - 26382 Wilhelmshaven, Germany

Jaap de Vlas, Rijkswaterstaat, Waterdienst  
NL - Lelystad, The Netherlands

### Language support

Seabury Salmon

### Lay-out and technical editing

Common Wadden Sea Secretariat

### Graphic support

Gerold Lüerßen

### Published

2009

ISSN 0946-896X

This publication should be cited as:

Georg Nehls and Sophia Witte, 2009. Extractoin and Dredging. Thematic Report No. 3.7. In: Marencic, H. & Vlas, J. de (Eds), 2009. Quality Status Report 2009. WaddenSea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.

## 3.7 Extraction and Dumping



Extraction of sand (Photo: RWS-DNN).

### 3.7.1 Introduction

Sand extraction has a long history as a traditional use of the area. The main purposes were the use of the material for building dikes, dwelling mounds and roads. During the past decades, this activity has steadily declined. Today, still a certain amount of sand is used only for purposes of coastal protection, e.g. beach nourishment, dike and dwelling mound (on the Halligen) reinforcement.

### 3.7.2 Extraction of sand and shells

This chapter gives a short overview about major changes in policy and practice regarding extraction of sand and shells from the cooperation area since 2005. For detailed statistics on sand extraction see 1999 QSR.

#### The Netherlands

##### Shells

Present policy on shell extraction was drafted in the document Shell Extraction Policy in 1998 and evaluated in 2004. The two most important changes have been a closing of areas where yields were low and limitation of shell extraction to three locations (Marsdiep, Vlie and Friese Zeegat). The total allowable amount of shells to be extracted in the Dutch Wadden Sea and the adjacent North Sea coast is based on a long-term average of natural calcimass production. Actually, 50% of this natural production are allowed to be extracted but with a maximum of 90,000 m<sup>3</sup>.

In the tidal inlets Eierlandsche Gat, Zeegat Ameland and Lauwers extraction is not allowed anymore because of absence of exploitable shell deposits. Any extraction in the Ems estuary remains subject to the Environment Protocol (1996) of the Ems-Dollard Treaty between the Netherlands and Germany.

An issue for further attention is the importance of subtidal shell deposits for epibenthic biodiversity. This is being studied in an area in the eastern Dutch Wadden Sea. The study will be evaluated not earlier than 2009.

##### Sand

Since 1999, extraction of sand is only allowed as a side product of regular maintenance of shipping lanes, incidental deepening of main shipping lanes or clearance for the sake of construction.

Commercial sand extraction was moved to the North Sea outside the 20 m depth contour.

#### Trilateral Policy and Management

The extraction of sand in the Conservation Area will be limited to the dredging and maintenance of shipping lanes. This sand can be used for, inter alia, sea defense purposes. In specific cases, sand may also be extracted for sea defense purposes. (WSP § 4.1.11)

The extraction of sand in the Wadden Sea Area outside the Conservation Area should make maximum use of sand generated by the maintenance of shipping lanes. It should be carried out in such a way that the environmental impact is kept to a minimum and permanent, or long lasting, effects are avoided and, if this is not possible, compensated. Permits for small scale extractions of sand will remain in force. Small scale extractions of mud and sea water for medical purposes will remain permitted. (WSP § 4.1.12) Increased attention will be given to the role of the offshore zone in the total Wadden Sea sand balance. (WSP § 7.1.2)

Sand extraction will only be carried out from outside the Wadden Sea Area. Exemptions for local coastal protection measures may be granted, provided it is the Best Environmental Practice for coastal protection. (WSP § 7.1.3)

With regard to the extraction of shells, the Wadden Sea Plan announces a study into the shell production in the Wadden Sea Area with the aim of obtaining information on natural accretion, on the basis of which new quota for sustainable shell extraction will be fixed. (WSP § 4.2.5) The impact of dumping dredged materials will be minimized. Criteria are, amongst others, appropriate dumping sites and/or dumping periods. (WSP §§ 4.1.15; 6.1.13).

Table 3.7.1:  
Extracted Sand in the  
Dutch Wadden Sea. All  
quantities are hopper cubic  
meters. \*In 2007, 320,000  
m<sup>3</sup> of the 625,000 m<sup>3</sup> is  
dredged for the inciden-  
tal deepening Harlingen  
– Noordzee (pers. comm.  
RWS-DNN, 2009).

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007*	2008
m <sup>3</sup>	79,000	86,000	95,000	363,000	436,000	452,000	525,000	556,000	625,000	462,000

## Germany

### Shells

The extraction of shells in the German National Parks is not allowed. For the Ems-Dollard area, policies with regard to shell extraction will be laid down in the Environmental Protocol of the Ems-Dollard Treaty between The Netherlands and Germany.

### Sand

Commercial sand extraction is not allowed in the Niedersachsen National Park. Sand is only extracted for dredging of shipping lanes and coastal defence purposes.

In the Hamburg National Park sand extraction is not allowed.

In the Schleswig-Holstein National Park, no sand for commercial purposes is extracted, but for coastal defence purposes or for dredging of navigational channels. In the period 1999-2003, on average 1.1 million m<sup>3</sup> per year was extracted for coastal defense purposes ((NPG § 2 (2)).

West of the island of Sylt, one of the largest marine sand extraction areas of the world named 'Westerland II' is used to obtain material for coastal protection of the island. 24 million m<sup>3</sup> sand have been extracted from that area until the end of 2006.

A new sand extraction area, called 'Westerland III', is now in a planning procedure. It is located 5 km<sup>2</sup> west of Sylt and encompasses the area of 'Westerland II' which, in turn, will be closed in April 2009. It is planned to extract about 20-25 million m<sup>3</sup> sand from an area of about 55 km<sup>2</sup> until 2030. An environmental sustainability survey showed that 'Westerland III' will not have any serious effect on the fauna of the sea. Although this area

seems to be a considerable rearing area for harbour porpoises (*Phocoena phocoena*) the effect of the ship is negligible, as the porpoises are only affected temporarily while the ship is working. In contrast to that, common scoter (*Melanitta nigra*) will definitely be affected by sand extraction by displacing. In addition to that, the bottom of the sea will be reduced from 11 to 23 m. Thus, the diving depth of the birds will be exceeded (GFN, 2008).

Adjacent to the Wadden Sea, two sand extraction areas (HBH 1, Brewaba 1) are in a planning procedure. They are located near Nordergründe outside of the Wadden Sea Area. At the moment, there are no extraction activities, but it is planned to extract about 20 million m<sup>3</sup> of sand from an area of about 900 ha.

## Denmark

### Shells

In the Danish part of the Wadden Sea Area the extraction of shells is not allowed.

### Sand

The extraction of sand for commercial purposes is not allowed in the Danish part of the Wadden Sea Area. Permission for the extraction of sand for sea defense purposes may be granted if such material cannot be found behind the dike or can not be collected in combination with the deepening of shipping lanes. In the past years, the possibility of using dredged material for sea defense purposes has not been used.

Sand extracted for deepening of shipping lanes to Esbjerg and Fanø and is dumped back into the system (see chapter 3.7.3).

### 3.7.3 Dumping of dredged materials

Material dumped into the Wadden Sea mainly originates from dredged material removed for the maintenance of shipping lanes. In specific cases, dredged material may be used for sea defense purposes.

During the period 2004–2006 (average 23.9 million t/yr) the amounts of dredged material dumped into the whole Wadden Sea Area varied between about 13–30 million t/yr (dry weight) (see Table 3.7.2 and Figure 3.7.1). On average, 18.5 million t/yr (dry weight) were dumped into the German part of the Wadden Sea, 3.4 million t into the Dutch and 2.9 million t into the Danish Wadden Sea. The dumping sites and the average amount for each region are shown in Figure 3.7.2.

Because maintenance dredging is the main source of dumped material, the amounts depend mainly on natural variation of sedimentation and resuspension processes. In general, no clear trend in the amounts of dredged material dumped into the Wadden Sea can be observed. During the period 1999–2003, yearly amounts have been decreased in the Elbe, Jade and Weser areas (Figure 3.9.3.1) compared to the years before. However, in the following years yearly amounts have been increased considerably. A comparison with earlier data before is difficult to be made because the reporting requirements to OSPAR changed from tons wet weight of dredged material to tons dry weight in 1995.

Reference values of dredged material, so-called 'Action list levels', have been developed by different Contracting Parties. An overview on national action levels for dredged material is given by OSPAR (OSPAR Commission 2004a). Most countries use a '3 category action level' approach in which two discriminatory concentration levels are used.

Concentrations of contaminants in the material falling below the lower limit represent those of little concern. Those falling between the lower and the upper concentration level may trigger further investigation of the material proposed for dumping. Those concentrations above the upper level generally mean that dumping of the material at sea is not permitted. Where action levels have not been developed, a 'case by case' approach is taken for each application considered individually (OSPAR Commission, 2004a).

As Contracting Parties to the OSPAR Convention of 1992, The Netherlands, Germany and Denmark are obliged to report each year to the OSPAR Secretariat on all dumping operations of the previous year. The 'OSPAR Guidelines for the Management of Dredged Material' were adopted in 1998, revised in 2004 and are being implemented in national guidelines (OSPAR Commission, 1998, 2004b).

#### The Netherlands

The amounts of dredged material dumped into the Dutch Wadden Sea showed significant changes during the period 2004–2006 varying between 0.3–7.5 million t (dry weight) per year (see Table 3.9.3.1). With an annual average of 3.4 million t there is a slight increase compared to the period 1998–2003 when an annual average of 1.4 million t was reported in the 2005 QSR.

In the Fourth National Policy Document on Water Management of 1998, the Dutch government agreed to the development of a new assessment system. Thus, during period 1998–2002, scientific research was performed which resulted in an alternative method of testing dredged material, the so-called Chemical-Toxicity-Test (CTT).

In order to get a better insight into the combined toxic effects of contaminants in dredged material, so-called levels for three sediment bioassays

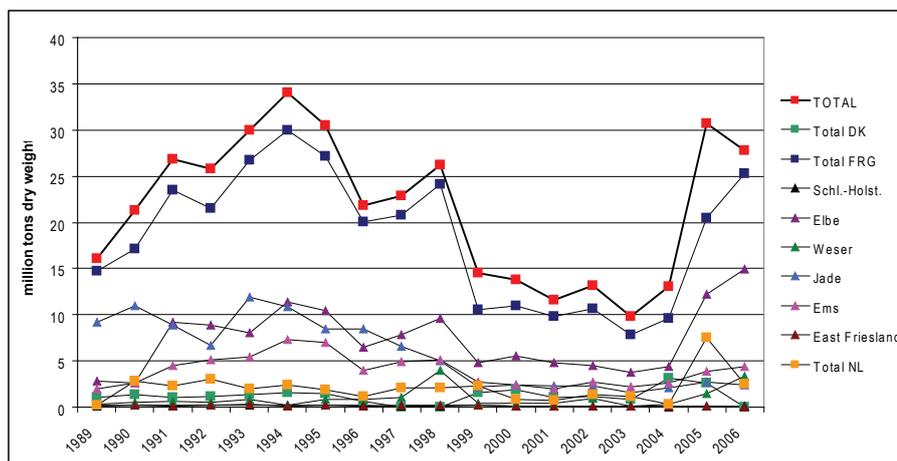
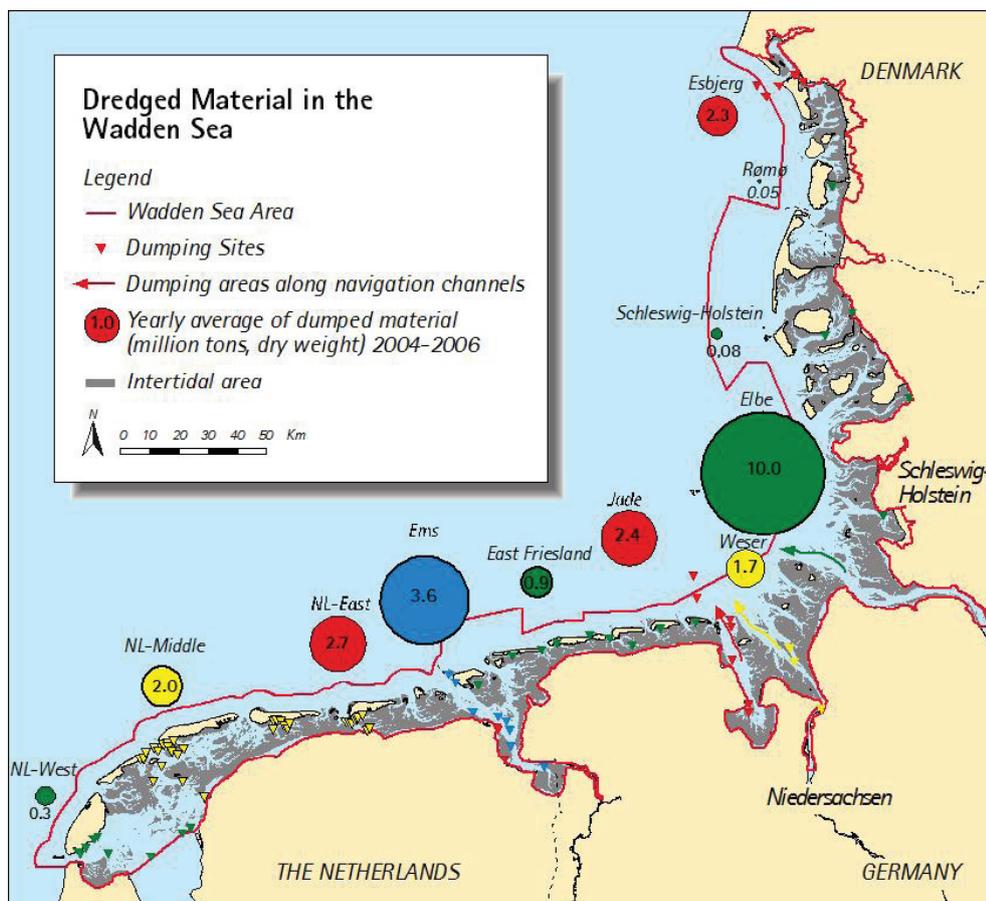


Figure 3.7.1: Amounts of dumped dredged material in the Wadden Sea (tons dry weight) (period 1989 – 2006 (dumping areas see Table 3.9.3.1). Data source: OSPAR Annual Reports, 1999, 2005 QSR. Until 1997 (for NL until 1994), data were reported as tons dry wet weight; for comparison, the figures before 1998 (for NL before 1995) have been converted to dry weight (wet weight/1.97).

Figure 3.7.2: Map of dumping sites and yearly average amount of dumped dredged material in the Wadden Sea in the period 2004–2006. Data source: OSPAR.



were selected and implemented into the Dutch legislation (Schipper et al., 2003, Stronkhorst et al., 2004). Since bioassays represent a new element in assessment of dredged material, there is at this stage no representative dataset available to develop quality standards for dumping of dredged material within the Surface Water Contamination Act (Wvo) and Maritime Water Contamination Act (Wvz), in the sense of test values that when they are exceeded leads to disqualification of a particular batch of dredged material.

As such, use is still being made of a measurement obligation and signal function for bioassays.

In the Netherlands, all measured contaminant contents, except PAHs, are normalized to a 'standard soil' composition. Sediment quality criteria have been developed for selected heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn), mineral oil (C10–40), sum of 10 PAH compounds, sum of 7 PCBs (PCB 28, 52, 101, 118, 138, 153, 180), HCH-isomers, Heptachlor Heptachlorepoxide, Aldrin, Dieldrin, Endrin, DDT incl. derivatives, HCB, TBT; additionally, levels for 3 bio-assays (only valid for the North Sea) were defined (OSPAR Commission, 2004b).

### Germany

In 1998, the so far highest value of 24 million tons of dredged material (dry weight) was reported. The amounts decreased in the following years to values between 7.8–11 million tons (dry weight) per year. In 2005 there was a significant increase to a value of 20 million tons (dry weight) and in 2006 a value of 25 million tons was reported.

In 1999, the 'Directive for dredged material management in Federal Coastal Waterways' entered into force which incorporates the relevant provisions of the latest guidance provided under the London, OSPAR and Helsinki Conventions (HABAK, 1999).

These guidelines are set up for the Federal Waterway and Shipping Administration and are therefore only applicable to Federal waterways and not to waterways under the responsibility of the federal states. A working group with members of federal and state authorities has been installed to develop common guidelines regarding dumping operations in German coastal waters, estuaries and rivers.

Permits for dredging/dumping of dredged material are issued by the competent authorities of

Area	OSCOM Code	2004	2005	2006	Average/year
<b>Germany</b>					
Schl.-Holst.	D10-13,40,49,52,53	48,000	104,000	82,000	78,000
Elbe	D14,47	4,376,000	12,186,556	14,949,000	10,503,852
Weser	D15,16,39,46	334,000	1,451,097	3,369,000	1,718,032
Jade	D17-20,41,42	2,119,000	2,735,829	2,452,000	2,435,610
East Friesland	D21-28,30-33,36,43-45,50	122,000	106,000	40,000	89,333
Ems	D34,37-38	2,614,000	3,890,755	4,431,000	3,645,252
<b>Total FRG</b>		<b>9,613,000</b>	<b>20,474,237</b>	<b>25,323,000</b>	<b>18,470,079</b>
<b>Netherlands</b>					
West	NL13	307,532	352,996	267,972	309,500
Middle	NL14	n.i.	2,787,502	1,233,697	2,010,600
East	NL15	n.i.	4,417,194	979,452	2,698,323
<b>Total NL</b>		<b>307,532</b>	<b>7,557,692</b>	<b>2,481,121</b>	<b>3,448,782</b>
<b>Denmark</b>					
Esbjerg	RIB01-08	3,104,800	2,662,800	1,240,000	2,883,800
Rømø	RIB01-04	56,320	n.d.	43,500	56,320
Fanø	SJ-09	n.i.	16,800	31,800	
<b>Total DK</b>		<b>3,161,120</b>	<b>2,662,800</b>	<b>n.d</b>	<b>2,911,960</b>
<b>TOTAL</b>		<b>13,081,652</b>	<b>30,694,729</b>	<b>27,804,121</b>	<b>23,860,167</b>

Table 3.7.2: Amounts of dumped dredged material (tons dry weight) per area and country (period 2004–2006) (source: OSPAR reports, for the period 1989–1997 see 1999 QSR Table 2.10, for the period 1998–2003 see 2005 OSR Table 2.11.1).

the Federal States ('Länder'). Permits are not issued for dredging/dumping activities of the German Federal Waterway and Shipping Administrations (the responsible Directorate does not issue permits for its own activities). However the dredging/dumping activities of the Federal Waterway and Shipping Administrations are governed by national regulations which are in accordance with OSPAR and London Convention requirements.

Action levels for trace metals and organic contaminants in dredged material applied to dredged material from German federal waterways for trace metals and organic contaminants represent 'management' values. They were introduced in 1992 and 1997, respectively. The action levels are neither ecotoxicological quality criteria nor quality targets. These action levels are not applied to dredged material from waters under the responsibility of the federal states (Länder).

Action levels are related to the sediment fraction < 20 µm, dry weight and exist for selected heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) and organic compounds (PCB 28, 52, 101, 118, 138, 153, 180, HCHs, HCB, Pentachlorobenzene, Octachlorostyrene, DDT, DDD, DDE, six PAH compounds and mineral oil).

For TBT, action levels were implemented in 2001. They were agreed between the Federal Authorities and the federal states (Länder) and are applicable to dredged material from all coastal

waterways. The implementation of action levels is tiered in three phases according to the schedule of IMO for the ban of TBT in antifouling coatings of ships, although with a time lag of two years. Action levels for tributyltin (TBT) in dredged material (in µg TBT/kg total sediment) were defined with a lower level of 20 and an upper level of 600.

The upper level decreases from 600 µg TBT/kg in 2001 and 300 µg TBT/kg in 2005 to 60 µg TBT/kg in 2010.

### Denmark

Dredged material dumped in the Danish Wadden Sea mainly originates from maintenance dredging of navigation channels and harbors of Esbjerg (about 2.6–3.1 million t dry weight/yr) and Rømø (about 56,000 t dry weight/yr) and Fanø (about 10.–30,000 t dry weight/yr) resulting in a total annual average of 2.9 million t dry weight for the period 2004–2006.

In 2005 a 3-category system with 2 levels of actions values was developed, and published the 1<sup>st</sup> of October 2005 as Guideline No. 9607 on dumping of dredged materials – later revised in Guideline No. 9702 from the 20th October 2008 on dumping of dredged material by the Agency for Spatial and Environmental Planning, Ministry of the Environment.

The Danish action values have been based on data from the Netherlands and Finland. Some

adjustments to Danish circumstances have been made. The lower action levels correspond to background levels or levels of expected no-effect. The upper action levels are based on international recognised levels, which mean that ecotoxicological data are taken into account:

1. If chemical analysis of the material to be dumped shows concentrations below the lower action levels a permit for dumping can be given without further specific evaluations - taking into account proper site selection.

2. If the chemical analysis shows concentrations of contaminants between the two action levels a more comprehensive study and evaluation has to be carried out, based on the amount to be dumped and the concentrations of contaminants.

3. If the chemical analysis shows concentrations above the upper action levels dumping at sea will normally not be permitted, pending a throughout evaluation of the case, and the material must be deposited at land.

4. Besides the evaluation based on chemical concentrations an evaluation of the amount of contaminants - especially TBT and copper - are also carried out.

Permits for dumping of dredged material are given by the three Environment Centres in Århus, Roskilde and Odense, the Agency for Spatial and Environmental Planning, Ministry of the Environment. In the Wadden Sea area this means the Environment Centre in Odense.

The general principles the system developed in Denmark for dumping of dredged material have been laid down following the guidelines from the global London Convention 1972 and the regional marine conventions OSPAR and HELCOM. The following contaminants are evaluated against action levels: Cu, Hg, Ni, Zn, Cd, As, Pb, Cr, TBT, PCBs, PAHs

## References

GFN, 2008. Sandentnahme Westerland III. FFH-Verträglichkeitsprüfung Artenschutzrechtliche Prüfung.

HABAK, 1999. Directive for dredged material management in Federal Coastal Waterways (HABAK-WSV). Second revised revision, June 1999. BfG-No. 1100, Bundesanstalt für Gewässerkunde, Koblenz, 32 pp.

OSPAR Commission, 2006. Dumping of Wastes at Sea in 2004 Publ.-No: 277/2006.

OSPAR Commission, 2007. Dumping of Wastes at Sea in 2005 and Assessment of the Annual Reports 2003-2005 Publ.-No: 322/2007.

OSPAR Commission, 2008. Dumping of Wastes at Sea in 2006 Publ.-No: 361/2008.

OSPAR Commission, 2004a. Overview of Contracting Parties' National Action Levels for Dredged Material. Biodiversity Series, 22 pp.

OSPAR Commission, 2004b. Revised OSPAR Guidelines for the Management of Dredged Material. Ref.-No. 2004-08.

Reijngoud TT, 2001. Eindrapport Vervolgonderzoek Schelpenwinning. Rijkswaterstaat, Directie Noord-Nederland, Leeuwarden. Rapport nr: DNN 826/2001.

Van der Meulen, MJ (Ed.), 2004. Evaluatie Landelijke Beleidsnota Schelpenwinning, Rijkswaterstaat, Dienst Weg- en Waterbouwkunde, Delft.

VenW, 1998. Landelijke Beleidsnota Schelpenwinning. Ministerie van Verkeer en Waterstaat, Den Haag.

VenW,, 2001. Partiële herziening Landelijke Beleidsnota Schelpenwinning. Ministerie van Verkeer en Waterstaat, Den Haag.