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Report of the Working Group on the effects of extraction of marine sediments on the marine ecosystem (WGEXT)

22-25 April 2013

Faial, Portugal

ICES International Council for the Exploration of the Sea

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Executive summary

The Working Group on the effects of extraction of marine sediments on the marine ecosystem (WGEXT) met in Faial, the Azores; Portugal between 22nd and 25th April 2013. Sixteen participants from nine ICES Member Countries attended the meeting.

The objective of WGEXT is to provide a summary of data on marine sediment extraction, marine resource and habitat mapping, changes to the legal regime, and research projects relevant to the assessment of environmental effects. The data on marine sediment extraction will be reported on a yearly base for OSPAR in an Interim Report. The other items will be addressed in the Final Report of the new ICES 3-year reporting period.

Research into the impacts and effects of marine sediment extraction continued across member countries and a mix of national / regional focused and multi-national programmes exist. Reports on extraction data were reviewed from 15 (of 20) member countries. Although five member countries did not provide reports, the available data are thought to provide a representative assessment of the overall total of material extracted from the member states.

New Terms of Reference have been defined on databases and harmonization of data, MSFD, publishing, deep-sea mining, cultural and geomorphologic values, thresholds for EIAs, mitigation and a cumulative assessment guidance.

ICES WGEXT agreed to meet again in Iceland in June 2014 as guests of the National Energy Authority.

1 Opening of the meeting

The Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT) was welcomed to the Azores by a representative of the Azores Government; Mr Luís Costa, Regional Director for Fisheries, as well as WGEXT member Rui Quartau (Instituto Português do Mar e da Atmosfera) who had organized the meeting in Faial. The chair of WGEXT, Ad Stolk, thanked the Regional Directorate for Sea Affairs for the help in the organization and all countries for providing national reports. The meeting included a tour to the Interpretation Center of Capelinhos Volcano Museum guided by Mrs. Salomé Meneses who gave an interesting overview of the geological history of the Azores and the Capelinhos volcano in particular.

Rebecca Walker continued as the rapporteur of the group and the chair thanked all WGEXT members who had data and information for inclusion in the annual report in advance of the meeting.

David Carlin (UK), Jean Paul Delpech (France), Brigitte Lauwaert (Belgium), Laure Simplet (France), Claude Augris (France) and Mark Russell (UK) all sent their apologies for being unable to attend.

2 Adoption of the agenda

The chair, Ad Stolk, explained to the group that ICES had changed the format for the annual reports. Rather than having Terms of Reference each year with an associated annual report, three year Terms of Reference are now required. This new procedure will entail two years of interim reports, with a final full report at the end of the three years

As a consequence, the 2013 annual meeting has become a transitional year for the WGEXT. Rather than adopt the 2012 Terms of Reference, the group decided to adopt the new procedure, and as part of the process, create new Terms of Reference for the three year period. As such, the 2012 Terms of Reference were only partially accepted, and the new ToRs and process were developed as part of the 2013 meeting and reported in Sections 3 and 5. The first Interim Report will be discussed at the Annual Meeting of 2014, the second Interim Report in 2015 and finally the Full Report will be discussed at the Annual Meeting of 2016.

From the 2012 ToRs the following were part of the 2013 agenda. These ToRs will continue to be yearly on the agenda to give OSPAR the requested information.

a) Provide a summary of data on marine sediment extraction for the OSPAR region that seeks to fulfil the requirements of the OSPAR request(s) for extraction data to be provided by ICES and evaluate any feedback or comments from OSPAR on the information submitted by WGEXT 2011.

b) Review data on marine extraction activities.

Other 2012 ToRs on developments in marine resource mapping, legal regime and policy and on environmental impact assessments, research and monitoring will not be abandoned but kept for a review in the Final Report. It was decided that the previous content of the annual reports would continue to be noted each year by each member country, but would only be reported within the Final Report.

WGEXT welcomes the new management and reporting process, but has concerns that the WGs will have to defend their future existence to ICES. However, WGEXT also notes that the WGs were created to help ICES fulfil their advising tasks. Therefore it can be expected that ICES should have a more active role in formulating its needs. Of course this can be done in close cooperation with the WGs and its members, who spend time and work to fulfil the Terms of References for ICES.

The new approach of ICES raises the question concerning the validity of producing a Cooperative Research Report every five years given the new requirement for a Final Report every three years. WGEXT suggests that the Final Report can act as a Cooperative Research Report, rather than duplicating work within the three year ToR reporting period. Moreover the Final Report is given direction if it also acts as the CRR. It was decided that the chair will bring this issue to ICES for discussion.

The ICES new approach of Interim Reports brings in a new character to the Annual Meeting. The meeting can be more focused more on discussion of the ToRs and discussion during presentations rather than compiling text for a full Annual Report each year. Therefore in the Agenda for 2013 more time was reserved for presentations and discussions. Presentations were given from Belgium, Finland, Portugal, France, The Netherlands, Sweden and the UK.

3 New Three year Terms of Reference

The chair described to WGEXT the new format required by ICES for the three year Terms of Reference. Recommendations were taken from the 2012 annual report, the 2013 Cooperative Research Report and from suggestions made at an interim meeting which took place in Lowestoft, UK, in October 2012.

Discussions took place during the annual meeting. The new ToRs for the period 2013 to 2016 that were produced and submitted for ICES approval are presented below, together with the way WGEXT will proceed and coordinate each ToR.

3.1 Terms of Reference for WGEXT 2013 – 2016.

1) **Create an ICES aggregate database comprising all aggregate related data, including scientific research and EIA licensing and monitoring data.** *Overall lead from WGEXT: Johan Nyberg*

This ToR is a large undertaking, therefore will take over three years to construct. In the first instance, WGEXT wish to create a database which allows users to contact relevant organizations in each country and see what data are available (rather than access the data themselves through the database). WGEXT will contact other WGs to look at how they have constructed/formatted their databases:

a. Year 1 (2013/14) – creation of a template with data required from each country. *Lead from WGEXT: Johan Nyberg, Ingemar Cato, Marcel Rozemeijer and Henry Bokuniewicz.*
b. Year 1 (2013/14) – Check with ICES options for WGEXT database linked to ICES database *Lead from WGEXT: Johan Nyberg*
c. Year 1 (2013/14) – Create an inventory of other WG contacted with regards databases of relevance to WGEXT to allow possible links to be created within the WGEXT database. *Lead from WGEXT: Marcel Rozemeijer*
d. Year 2 (2014/15) – template to be finalized and populated for each country and sent for approval to ICES. *Lead from WGEXT: All members, coordinated by Johan Nyberg*

2) **Incorporate the MSFD into WGEXT** Overall lead from WGEXT: Ad Stolk

e. Years 2 and 3 (2014/2016) - Bringing forward the interpretation of GES descriptors 4, 6, 7 and 11 of WGEXT to the EU *Lead from WGEXT: Ad Stolk*
f. Years 2 and 3 (2014/2016) - Collate the implications of GES descriptors 4, 6, 7 and 11 for marine sediment extraction. *Lead from WGEXT: Ad Stolk (with all members to provide country view)*
g. Year 3 (2016) - Review the 2003 ICES guidelines on Marine Aggregate Extraction, specifically in relation to the GES descriptors of the MSFD

in light of discussions concerning a and b above. *Lead from WGEXT: Ad Stolk*

3) **Ensure outputs of the WGEXT are accessible by publishing as a group and creating a webpage on the ICES website.** *Overall lead from WGEXT: Rui Quartau*

h. Years 2 and 3 (2014 - 2016) Publish outputs from ToR 6a concerning intensity *Lead from WGEXT: Annelies de Backer and Keith Cooper*

i. Years 1 to 3 (2013-2016) Investigate other outputs to publish. *Lead from WGEXT: Rui Quartau and Michel Deprez*

j. Year 1 (2013/14) Populate webpage on the ICES website. *Lead from WGEXT: Ad Stolk*

k. Year 3 (2015/16) Organize WGEXT session at 2016 ICES Annual Science Conference. *Lead from WGEXT: Ad Stolk and Rebecca Walker (plus other members to present)*

4) **Discuss the mitigation that takes place across ICES countries and where lessons can be learned or recommendations taken forward (years 2 and 3, 2014-2016)** *Overall lead from WGEXT: Rebecca Walker*

5) S**tudy the implications of the growing interest in deep-sea mining for the WGEXT (legislation/environmental/geological).** *Overall lead from WGEXT: Bryndis Robertsdottir.*

a. Year 1 and 2 (2013-2015) Produce summary paper concerning deep-sea mining (What is being mined, where this is occurring, techniques being developed etc). *Lead from WGEXT: Bryndis Robertsdottir, Jan van Dalfsen and Rui Quartau*

6) **Promote harmonization, where possible, of data across ICES countries.** *Overall lead from WGEXT: Jyrki Hamalainen*

l. Year 2 (2014) – Define the interpretation of intensity across ICES countries and the definition of 'low', 'medium' and 'high' intensity. *Lead from WGEXT: Annelies de Backer, Keith Cooper and Sander de Jong*

m. Years 1 – 3 (2013-2015) – Define where else data can be harmonized with regards to aggregate extraction *Lead from WGEXT: Jyrki Hamalainen*

7) Identify the way archaeological, cultural and geomorphological values are taken into account. *Overall lead from WGEXT: Michel Desprez*

n. Year 3 (2016) All countries to provide details of how cultural values are taken into account. *Lead from WGEXT: Michel Desprez*

8) **Cumulative assessment guidance and framework for assessment should be developed. It is acknowledged that this work may be being developed within another ICES or OSPAR WG and steps should be taken to investigate and align guidance as appropriate.** *Overall lead from WGEXT: Jan van Dalfsen*

o. Year 1 and 2 (2013 – 2015) WGEXT to collate and review outputs from other WGs for relevance to WGEXT. *Lead from WGEXT: Jan van Dalfsen*

9) **Identify threshold conditions and associated reasoning for EIAs in different countries, discuss whether similar thresholds could apply in other countries.** *Overall lead from WGEXT: Henry Bokuniewicz*

3.2 WGEXT resolution for multi-annual ToRs (Category 2)

A **Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT)**, chaired by Ad Stolk, The Netherlands, will meet in Reykjavik, Iceland, 2-6 June 2014, to work on ToRs and generate deliverables as listed in the Table below.

WGEXT will report on the activities of 2013/14 (the first year) by 30 June 2014 to SSGHIE.

ToR descriptors

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
A1	Review data on marine extraction activities. Provide a summary of data on marine sediment extraction for the OSPAR region to OSPAR.	a) OSPAR Requirements b) Advisory Requirements c) Inform other countries to optimize their policy and management	2.4, 3.4	yearly	Chapter in all Interim and Final Reports
A2	Review of development in marine resource mapping, legal regime and policy, environmental impact assessment, research and monitoring and the use of the ICES Guidelines on Marine Aggregate Extraction.	a) Advisory Requirements b) Inform other countries to optimize their policy and management	1.2, 1.3, 2.4, 3.3, 3.4	Year 3	Chapter in Final Report

B	Create an ICES aggregate database comprising all aggregate related data, including scientific research, EIA, licensing and monitoring data.	a) Advisory Requirements b) Inform other countries to optimize their policy and management c) Cooperation with other WG's d) Link to ICES database	2.4, 3.3, 3.4,	More than 3 years	Year 1: Draft template Year 1: Inventory other WG's Year 2: Template to member countries Year 3: Final template for approval to ICES
C	Incorporate MSFD into WGEXT	a) Advisory Requirements b) Inform other countries to optimize their policy and management c) Tuning WGEXT and ICES guidelines with EU guidelines	1.2, 1.3, 3.3, 3.4	Year 2 and 3	Chapter in 2nd Interim Report and Final Report Year 3: Review of ICES Guidelines on Marine Aggregate Extraction
D	Ensure outputs of the WGEXT are accessible by publishing as a group and creating a webpage on the ICES website.	a) Inform other countries to optimize their policy and management b) Contribute to the visibility and impact of ICES	2.4, 3.3, 3.4	Years 1,2,3	Year 1: Populate WGEXT webpage on ICES website Year 2 and 3: Publish outputs from inventory on intensity Year 3: Organise WGEXT session on 2016 ICES Annual Science Conference
E	Discuss the mitigation that takes place across ICES countries and where lessons can be learned or recommendations taken forward	a) Advisory Requirements b) Inform other countries to optimize their policy and management	1.2, 3.3, 3.4	Year 2 and 3	Chapter in 2nd Interim Report and Final Report

F	Study the implications of the growing interest in deep sea mining for the WGEXT (legislation, environmental, geological)	a) Initiate the incorporation of this coming issue within ICES b) Inform other countries to optimize their policy and management	1.5	Year 1 and 2	Year 2: Summary paper concerning deep sea mining
G	Promote harmonisation of data across ICES countries	a) Advisory Requirements b) Inform other countries to optimize their policy and management	2.4, 3.3, 3.4	Year 2 and 3	Year 2: Formulation of definition for interpretation and classification of intensity Year 3: Define other data that can be harmonised.
H	Identify the way archeological, cultural and geomorphological values are taken into account	a) Initiate the incorporation of a coming issue within ICES b) Inform other countries to optimize their policy and management	3.3, 3.4	Year 3	Year 3: Provide details of the manageging of these values by all member countries
I	Cumulative assessment guidance and framework for assessment should be developed.	Contribute and working together with possible other ICES WG's that are involved in this subject	1.2, 1.3, 2.4	Year 2 and 3	Review in 2e Interim Report
J	Identify threshold conditions and associated reasoning for EIA's in different countries whether similar tresholds could apply in other countries	a) Inform other countries to optimize their policy and management	3.3, 3.4	Year 3	Chapter in Final Report

Summary of the Work Plan

Year 1	A1, B, D, F
Year 2	A1, B, C, D, E, F, G, I
Year 3	A1, A2, B, C, D, E, G, H, I, J

Supporting information

Priority	The current activities of WGEXT will lead ICES into issues related to the ecosystem effects of marine aggregate extraction. Aggregate extraction is increasing in some countries and rather stable in others. This activity is connected to several Descriptors in the EU MSFD. The Report of WGEXT and the Guidelines are used in the management of this activity in the member countries. Consequently, these activities are considered to have a high priority.
Resource requirements	Notice that the activities of WGEXT are focussed on the use of existing research programmes (e.g. EIA monitoring) and data on extraction and management. The additional resource required to undertake additional activities in the framework of this group is negligible
Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a potentially working relationship with all the groups of SCICOM. The coming years a cooperation with other WG's is planned on the subjects of cumulation of effects and create and use a databese.
Linkages to other organizations	

4 Term of Reference (a) and (b1): Deliver to OSPAR annual data on marine extraction activities including tonnages, spatial areas and the collection of geospatial data on extraction locations in the form of shape files.

ICES WGEXT have again attempted to provide information for all ICES countries on the annual amounts of sand and gravel extracted but have still found difficulty in obtaining information from countries not regularly represented in person at ICES WGEXT meetings. WGEXT members again attempted to contact those countries who were unable to submit data for inclusion in the annual report.

Available information is included in Table 4.1 below.

Table 4.1 Summary Table of National Aggregate Extraction Activities in 2012.

Country	A) Construction/ industrial aggregates (m^3)	B) Beach replenishment (m^3)	C) Construction fill/ land reclamation (m^3)	D) Non-aggregate (m^3)	E) Total Extracted (m3)	F) Aggregate exported (m^3)	New Maps/Data available	New legislation	New Policy	EIA initiated	EIA ongoing	EIA finished	EIA published
Belgium (OSPAR)	2,180,000	1,036,000	0	0	3,210,000	635,000	Yes[1]	No	No	No	No	No	No
Canada	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Denmark2 (HELCOM)	1,800,000	100,000	1,100,000	N/d	3,000,000	350,000 142,000	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Denmark2 (OSPAR)	1,200,000	3,500,000	3,000,000		7,700,000	0	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Estonia (HELCOM)	0	0	0	0	0	0	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Finland (HELCOM)	5,800	0	0	0	5,800	0	Yes	No	No	No	No	No	No
France 3 (OSPAR)	10,336,000	N/d	N/d	282,000	10,618,000	N/d	Yes	No	No	No	Yes	No	No
France (Med)	0	N/d	N/d	0	N/d	N/d	No	No	No	No	Yes	No	No
Germany (HELCOM)	245988	114810	0	0	360798	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Germany (OSPAR)	66277	800034	0	0	866311	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Greenland and Faroes (OSPAR)	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Iceland (OSPAR)	145,070	N/d	N/d	71,580	216,650	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Ireland (OSPAR)	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Latvia (HELCOM)	0	0	0	0	0	0	N/d	N/d	N/d	N/d	N/d	N/d	N/d

Lithuania (HELCOM)	N/d	119,000	N/d	N/d	119,000	N/d	No	N/d	N/d	N/d	N/d	N/d	N/d
Netherlands4 (OSPAR)	2,893,967	8,649,000	22,761,325	190,423	41,899,2768	2,600,0005	Yes1	No	No	Yes	Yes	No	No
Norway (OSPAR)	N/d	N/d	N/d	A few thousand	A few thousand	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Poland (HELCOM)	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d	N/d
Portugal9 (OSPAR)	69,392	0	0	0	69,392	0	No	No	No	No	No	No	No
Spain (OSPAR)	0	0	0	0	0	0	Yes	Yes	No	Yes	Yes	No	No
Spain (Med)	0	0	0	0	0	0	Yes	Yes	No	Yes	Yes	No	No
Sweden (OSPAR)	0	0	0	0	0	0	Yes	No	No	No	No	No	No
Sweden (HELCOM)	0	0	0	0	0	0	Yes	No	No	No	No	No	No
UK (OSPAR)6	10,193,733	1,800,063	249,900	0	16,792,353	4,548,657	Yes	No	No	Yes	Yes	Yes	Yes
United States	778,007	1,211,163	0	7,747,000	8,736,1707	0	No	No	No	No	No	No	No

Table Definitions

A. Construction/industrial aggregates - marine sand and/or gravel used as a raw material for the construction industry for building purposes, primarily for use in the manufacture of concrete but also for more general construction products.

B. Beach replenishment/coastal protection – marine sand and/or gravel used to support large-scale soft engineering projects to prevent coastal erosion and to protect coastal communities and infrastructure.

C. Construction fill/land reclamation – marine sediment used to support large-scale civil engineering projects, where large volumes of bulk material are required to fill void spaces prior to construction commencing or to create new land surfaces.

D. Non-aggregates – comprising rock, shell or maerl.

E. Total Extracted – total marine sediment extracted by Member Countries

F. Aggregates Exported - the proportion of the total extracted which has been exported i.e. landed outside the country where it was extracted.

[1]Data continually updated and new maps available on demand from database

[2]The OSPAR area and the HELCOM area are overlapping in Denmark. The Kattegat area from Skagen to north of Fyn-Sjælland is included in both Conventions. Therefore the figures from the two Convention-areas cannot be added.

[3] Data relates to licensed amount rather than amount extracted, no extraction for construction and non aggregate in the Mediterranean, no information is available for extraction quantities for other sectors in the Mediterranean although sand extraction for beach replenishment is likely to have occurred.

[4] Total shell extraction including Western Scheldt and Wadden Sea

[5] Quantity estimated based on feedback from licence holders

[6] Conversion from reported tonnes to M^3 achieved using density / specific gravity conversion factor of 1.66

[7] Figures reported for USA pertain to northeastern Seaboard only

[8] Total sand-extraction figures exclude 190,423 m^3 of shells as non-aggregate material

[9] Relates to extraction from the Azores archipelago only.

WGEXT will again circulate a copy of the WGEXT 2012 annual report to contact points provided by OSPAR so that the accuracy of the information presented can be assured.

Similar to previous years, Table 4.2 provides information on countries with data adjustments or those who have never provided information to WGEXT.

Table 4.2 Specific matters highlighted in response to OSPAR request for ICES WGEXT to supply national data.

OSPAR COUNTRIES FOR WHICH DATA HAS NEVER BEEN RECEIVED (As of 2012)
GREENLAND AND FAROES (DENMARK) – Data for Denmark is reported separately
DATA ADJUSTMENTS FOR SPECIFIC COUNTRIES NECESSARY TO DISTINGUISH DATA FOR THE OSPAR REGION
SPAIN – Atlantic coast activities only (note separation of Mediterranean data)
FRANCE - Atlantic and Channel coast activities only (note separation of Mediterranean data)
GERMANY – North Sea activities only (exclude Baltic)
FINLAND – Exclude Baltic activities
SWEDEN - Delineate activities in the Baltic area (Kattegat) which fall within the boundaries of the OSPAR 1992 DENMARK - As for Sweden

Table 4.3 summarizes information, where available, for ICES WGEXT member countries. Although the data are incomplete at this time, it is important to note that the areas in which extraction occurred were much smaller than the areas licensed and, of course, the actual spatial footprint should be used to assess impacts.

Table 4.3 Licensed area and actual areas over which extraction occurs.

	Licensed Area Km²						Area in which extraction activities occur Km²					
Country	2006	2007/08	2009	2010	2011	2012	2006	2007/08	2009	2010	2011	2012
Belgium (Extraction Zone 1)	104	104	104	104	104	104	N/d	N/d	N/d	N/d	24.26	24.26
Belgium (Extraction Zone 2)	152	152	152	152	152	152	N/d	N/d	N/d	N/d	746	746
Belgium (Extraction Zone 4)	0	0	0	0	46	46	0	0	0	0	0	0
Belgium Total	256	256	256	256	302	302	N/d	N/d /1001	40	N/d	98.2	106.2
Denmark	N/d	429	430	789	650	700	N/d	N/d	N/d	N/d	N/d	N/d
France1	73.082	72.97/74.972	74.872	67.872	67.872	135.342	N/d	N/d	N/d	N/d	N/d	N/d
Lithuania	Nd	N/d	N/d	70.12	32.46	N/d	N/d	N/d	0.74	N/d	0.74	N/d
Netherlands 5	453	456/585	564	490	456	439	473	383/ 35.33	863	86	71	64
Sweden	0	0	0	0	9.70	0	0	0	0	0	9.70	0
UK	5767	556/5707	5367	5527	5677	3917	1414	135/138	124	105	114	97

Table Notes

[1] Most of French dredging vessels are fitted with EMS but the information is not treated to make area in which extraction activity occur available.

[2] Includes 58.46 sand-and- gravel extraction area and 14.62 non aggregate extraction area in 2006, 51.89 sand-and-gravel extraction area and 21.08 non-aggregate extraction area in 2007 and 2008, 53.89 sand-and-gravel extraction area and 21.08 non-aggregate extraction area in 2009. 46.79 sand and gravel extrac-

tion area and 21.08 non aggregate area in 2010 and 2011, 128.14 sand and gravel extraction area and 7.2 non aggregate area in 2012.

[3] 90% of material extracted in the Netherlands is taken from 7.5 km² (2006) and 9.2 km² (2007) and 8.3km² (2008), and 23 km² (2009), 38 km² (2010) and 23 km² (2011).

[4] 90% of material extracted in UK is taken from 46km² (2003) and 43km² (2004) and 49.2 km² (2006) 49.95 (2007)

[5] Excludes the non aggregate shell-extraction areas due to the very small operational areas on the North Sea and not really marine extraction in the Western Scheldt and Wadden Sea.

[6] Figures based upon internal report of COPCO of volume estimation in the BPNS. They are an overestimation, since the calculation is based on the sandbank surfaces

[7] Figures refer to 'Active Dredge Area Zone' rather than the area licenced.

WGEXT again noted that this type of information has to be taken from an analysis of electronic monitoring data and this is not a straightforward task to achieve and therefore not possible for all WGEXT members to provide.

The last part of the ToR A concerns the collection of geospatial data on extraction locations in the form of shape files. This is a 2013 request from OSPAR. As such, these shapefiles, as available, will be presented in the 2014 interim report and presented annually should there be any changes.

5 Terms of Reference B - J: Discussions of the new Terms of Reference.

Chapter 3 provides the WGEXT proposed new ToRs and how the WGEXT intends to meet each objective. The following chapter provides a narrative of discussions concerning each ToR and outputs from the meeting.

5.1 ToR B: Create an ICES aggregate database comprising all aggregate related data, including scientific research and EIA licensing and monitoring data.

The group agreed that such a database would be useful. However, questions were raised concerning:

- The level of data required,
- Whether it could be used with a GIS system?
- Encorporating black box/EMS data
- Means of contact for data
- Who would be responsible for maintenance?
- Future proofing – to allow extra fields to be added at a later date
- References/reports for licence specific areas
- Incorporation of grey literature
- Downloading data

It was decided that in the first instance, WGEXT should create a simple database, containing the statistics collected annually for OSPAR as well as contact details for relevant organizations in each country. In addition, details could be provided concerning the type of data that are available in each country (accessed through the contact organization, rather than through the database). In terms of maintenance, the OSPAR data could be updated as part of ToR A completed during each annual meeting.

WGEXT will contact ICES to see whether the WGEXT can link in with an ICES database rather than create their own. WGEXT will also contact other WGs to look at how they have constructed/formatted their databases (including future proofing).

WGEXT decided the following actions would be undertaken during 2013 and 2014:

- Creation of a template with data required from each country.
- Check with ICES options for WGEXT database linked to ICES database
- Create an inventory of other WG contacted with regards databases of relevance to WGEXT to allow possible links to be created within the WGEXT database.
- Template to be finalized and populated for each country and sent for approval to ICES.
- Determining possiblity of GIS system allowing certain information to be displayed graphically (potentially as part of the 2013 OSPAR request for provision of GIS shapefiles).

During the next three years, WGEXT will also continue to discuss the feasibility of developing the complexity of the database.

5.2 ToR C: Incorporate the MSFD into WGEXT

Work will take place over the next three years to look at the impact of the MSFD descriptors 4, 6, 7 and 11 on the WGEXT by:

- Bringing forward the interpretation of GES descriptors 4, 6, 7 and 11 of WGEXT to the EU,
- Collate the implications of GES descriptors 4, 6, 7 and 11 for marine sediment extraction,
- Review the 2003 ICES guidelines on Marine Aggregate Extraction, specifically in relation to the GES descriptors of the MSFD in light of discussions concerning the above points.

5.3 ToR D: Ensure outputs of the WGEXT are accessible by publishing as a group and creating a webpage on the ICES website.

WGEXT would like to raise the profile of the WG and ensure outputs from the annual meetings are accessible. Therefore the group is in agreement that work should take place to publish in peer reviewed journals. As a first step, over the next two years, the WGEXT intend to write and publish a summary paper of the outputs from ToR G concerning intensity.

In addition, during the period 2013 - 2016, WGEXT will also investigate other outputs to publish. WGEXT discussed the possibilities of publishing papers concerning mitigation techniques, implications of the MSFD for aggregate extraction, amounts and trends of aggregate extraction and gaps in scientific knowledge.

WGEXT also intend to populate their webpage on the ICES website and look at the options for organising a WGEXT session at the 2016 ICES Annual Science Conference.

5.4 ToR E: Discuss the mitigation that takes place across ICES countries and where lessons can be learned or recommendations taken forward.

Chapter 5 in the 2013 Cooperative Research Report concerned mitigation. WGEXT would like to compile mitigation options and techniques from all ICES countries, to investigate the comparability of techniques used to determine whether they are site-specific, or could be applied in multiple countries, as certain countries do not apply mitigation to aggregate extraction. In addition, WGEXT intend to update the 2003 guidelines, should mitigation techniques have moved forward.

5.5 ToR F: Study the implications of the growing interest in deep-sea mining for the WGEXT (legislation/environmental/geological).

The issue of deep-sea mining was raised during the meeting, as it is becoming of greater interest in certain member countries (Iceland and Portugal). WGEXT intend to write a summary paper detailing the state of knowledge concerning deep-sea mining (what is being mined, where this is occurring, techniques being developed etc).

During the meeting, the group noted that during a workshop on deep-sea mining in Norway, five factors were considered important in determining the possibility of deep-sea mining:

- Geology: What do we have?
- Legal: Regimes for exploration and licensing?
- Environmental: What are the consequences?
- Technical: How to locate and investigate sites? How to mine and process?

- Commercial: Is it worth it? How will new deep-sea mines influence the product prices?

It is proposed that these factors form the basis for a WGEXT discussion paper on deep-sea mining.

5.6 ToR G: Promote harmonization, where possible, of data across ICES countries.

Define the interpretation of intensity across ICES countries and the definition of 'low', 'medium' and 'high' intensity.

This part of the ToR developed during discussions during the WGEXT 2012 annual meeting in France and became a recommendation in the 2013 CRR. It is apparent that in member countries, different approaches are adopted for measuring dredging intensity based on processing and interpretation of EMS/Black Box data. This clearly has implications for ongoing scientific evaluation of impacts and approaches to mitigation and monitoring of activities. WGEXT therefore agreed the need to collect data on how member countries measure and categorize dredging intensity to better inform discussion on how the impacts of extraction could be better compared and to allow for a detailed discussion on how to potentially set standardized threshold levels for 'low', 'medium' and 'high' intensity.

A first step to take this topic forward is to create an overview of how intensity data are collected in different countries. Therefore, during the meeting, WGEXT produced a questionnaire to be sent to each member country (step 1) in order to be able to discuss the possibilities for standardization of intensity data across countries (step 2).

Step 1: Overview of how the intensity data are collected in the different countries

Questionnaire to be sent to each member country:

1) What kind of system (e.g. black box, EMS,…) is used to monitor aggregate extraction in your country?

2) How long since this system is in operation and how long are the records kept?

3) Who is the owner of the data?

4) List the raw data fields that are recorded e.g. coordinates, navigation speed, time, status, vessel ID/draghead, type of material,… Please provide some example data for each field.

5) How is the raw data processed e.g. block/grid analysis and what units are used e.g. $h/km^2/yr$, $m^3/km^2/yr$?

6) Who is undertaking the data processing?

7) What do you consider the advantages and disadvantages of your system?

8) Is data freely accessible?

9) Is onboard screening going on?

10) What is data used for e.g. legislation, scientific research,…?

11) Are there issues of confidentiality?

12) Are there national limits set for dredging intensity?

13) Are there any reports/papers available in which intensity is mentioned. Please provide the paper or the reference.

14) Would it be possible to make the raw/processed data available to WGEXT? (Y/N)

Step 2: Review paper on different methods used in different countries and suggestions to promote harmonization.

Define where else data can be harmonized with regards to aggregate extraction

During the period 2013-2016 WGEXT also agreed to look at where other data could be harmonized to allow data to be used across member countries. It is thought this is an important issue, as EU Directives such as the MSFD require cooperation and data use and sharing between countries.

5.7 ToR H: Identify the way archaeological, cultural and geomorphological values are taken into account.

It has become apparent that different member countries have different values placed on their cultural heritage. The UK and The Netherlands have undertaken quite a lot of work concerning aggregate extraction and cultural heritge, and both now have protocols (not legislation) in place. Other countries have no such procedures in place, and it could be that these procedures could used as best practice in other countries. In addition, the group wish to explore the level of protection. For example, under the Malta Treaty, bones are not included under protection.

WGEXT will attempt to compile an inventory of procedures and legislation concerning aggregate extraction and cultural heritage for each member country.

5.8 ToR I: Cumulative assessment guidance and framework for assessment should be developed. It is acknowledged that this work may be being developed within another ICES or OSPAR WG and steps should be taken to investigate and align guidance as appropriate.

WGEXT recognize the importance of cumulative effects of human activities, however, also acknowledge that this work is being undertaken in a number of groups and fora. Therefore, in the period 2013 – 2016, WGEXT plan to collate and review outputs from other WGs and fora for relevance to WGEXT.

5.9 ToR J: Identify threshold conditions and associated reasoning for EIAs in different countries; discuss whether similar thresholds could apply in other countries.

Certain ICES countries (e.g. The Netherlands) have thresholds determining the need for an EIA. However, most countries do not. WGEXT intends to investigate what thresholds are in place in member countries, by compiling an inventory of thresholds that are currently used, before looking at the applicability of these thresholds for other countries.

6 Presentations given to the WGEXT

Presentations were given to WGEXT by eight members of the group and two invited speakers from the University of the Azores and the Regional Directorate of Sea Affairs. The abstracts are presented below.

6.1 Annelies de Backer - Foreshore nourishment in Ameland (Wadden Sea): T2 impact assessment on epibenthos and juvenile (demersal) fish.

The current Dutch policy aims at 'dynamic' maintenance of the coastline against coastal erosion with natural materials e.g. beach and foreshore nourishment. In recent years however, coastal management was faced with the fact that too little knowledge of ecological functioning of Dutch beaches and shallow coastal areas was available. This could result in insufficient expertise to assess potential impacts of large-scale nourishments. Therefore, an agreement was signed in 2009 between several nature organizations and the government (RWS) called 'Ecological suppletion now and in the future'. The goal is to assess the impact of suppletion on nature values and to find a balance between coastal safety and nature conservation.

In 2010/2011, a large-scale nourishment was undertaken in Ameland both on the beach (2 x 2 million m^3) and on the foreshore (4.7 million m^3). This forms an excellent case study to follow up the potential morphological and ecological effects in detail. Different ecosystem components and morphological changes have been studied, both on the beach and in the shallow coastal area. Here, the impact assessment of foreshore nourishment on epibenthos and juvenile (demersal) fish is presented one year after suppletion.

Sampling for the T2 situation occurred in September/Octobre 2012 in 6 depth strata parallel with the coast with a 3 m shrimp trawl (22 mm mesh size) both in the impact area and in an adjacent reference area on the island of Schiermonnikoog. Additionally, 2 transverse fishing tracks have been taken in the same area. Based on the multivariate and univariate analysis on both fish and epibenthos data, results indicate that one year after completion of the foreshore nourishment, there is no impact on neither ecosystem component. Subtle differences were found between the impact and the reference area but these seem to be caused by natural variation rather than by the impact. However, analysis of the time-series (T0-T1-T2) will provide conclusive evidence. Furthermore, there are no clear spatial trends within the shallow coastal area except for a somewhat higher diversity in the deeper strata. Besides, we find a higher dominance of flying crab (Liocarcinus holsatus) in the deeper strata and of pipefish (Syngnathus rostellatus) in the shallow strata. Moreover, we can conclude that the transverse fishing tracks form a sound, and especially time-efficient, alternative for the coast parallel fishing tracks.

6.2 Maarten de Jong - Demersal fish abundance and assemblage during and after large-scale and deep sand extraction

In the Netherlands, currently ~24 million m3 marine sand is used each year for nourishments and construction. The demand for sand can increase up to 40-85 million m3 for counteracting sea level rise effects. In general, only shallow sand extraction (-2 m) outside the 20 m isobath is allowed. For the seaward harbour extension of Port of Rotterdam (Maasvlakte 2) around 250 million m3 sand was extracted between summer 2008 and summer 2012. Deep sand extraction (-20m) was applied in order to decrease the surface area of direct impact. Biological and physical impacts of large-scale and deep sand extraction are not described at the moment. Moreover knowledge of

the response of demersal fish to sand extraction in general is almost fully lacking, let alone the response to deep sand extraction.

We investigated the response of demersal fish during and after large-scale and deep sand extraction combined with in- and epifaunal and sedimentological data. We observed a 16-fold increase of demersal fish biomass 2 years after extraction (sandpit = 344.67 kg ha-1, ref = 20.9 kg ha-1). Only small differences in species assemblage between sandpit and reference area were found, the most abundant species were plaice and dab. Differences in biomass and species assemblage between sandpit and reference area were explained by recovery time, benthic biomass indices and sediment characteristics. A quick scan on stomach contents supports the finding of the importance of benthos. Plaice, dab and shorthorn sculpin were very selectively feeding on certain prey items. Sediment, benthos and demersal fish characteristics are still changing so more research is needed to describe the long-term effects

6.3 Michel Desprez - VECTORS of change in European Marine Ecosystems and their Environmental and Socio-Economic Impacts

VECTORS is an EU funded research project investigating the increasing and diversifying human use of the European marine environment and how this is leading to new and challenging changes for marine life and society. VECTORS will examine how these changes may affect the range of goods and services provided by the oceans, the ensuing socio-economic impacts and some of the measures that could be developed to reduce or adapt to these changes.

VECTORS has reviewed the current understanding of drivers, pressures and vectors of change that are affecting ecosystems in the North, Baltic and western Mediterranean Seas, and has completed an overview of the current international and European law relating to these seas. Models are being used to investigate relationships between species distribution, growth and survival, and environmental conditions, as well as to analyse key drivers of fishers' behaviour, such as spatial constraints (maritime traffic, windfarms, protected areas, extraction activity etc) and management. Cross-sector modelling frameworks are being used to project the future changes and consequences of human activity in the marine environment under possible future scenarios.

VECTORS brings together more than 200 scientists from 38 institutes across 16 countries in Europe, as well as nine independant industry and policy experts and six senior scientific experts to provide guidance on aspects of VECTORS research, its integration across disciplines and the applicability of results.

6.4 Michel Desprez - Contribution of SIEGMA to the VECTORS project

The North Sea is one of the three research area selected for investigating the impacts of human activities and how multiple pressures can have combined and interacting effects for the marine environment, society and economy. Drivers of change include shipping, pollution, renewable energy generation, fishing, aquaculture, sand and aggregate extraction. These activities can result in changes in species distribution, impacts on biodiversity and ecosystem function and a decline in fishing revenue, resources and tourism.

The Eastern Channel, one of the busiest marine areas in the world, is a case study allowing more targeted investigation of the causes and impacts of these pressures in an area where there is increasing competition for space from traditional activities and threats as well as emerging pressures from new activities, including aggregate extrac-

tion, wind farms and marine protected areas. Increasing competition for space is leading to new and unique challenges for management.

Ifremer will use modelling activities that consider the whole system to investigate the following processes in order to better understand the impacts of these multiple activities:

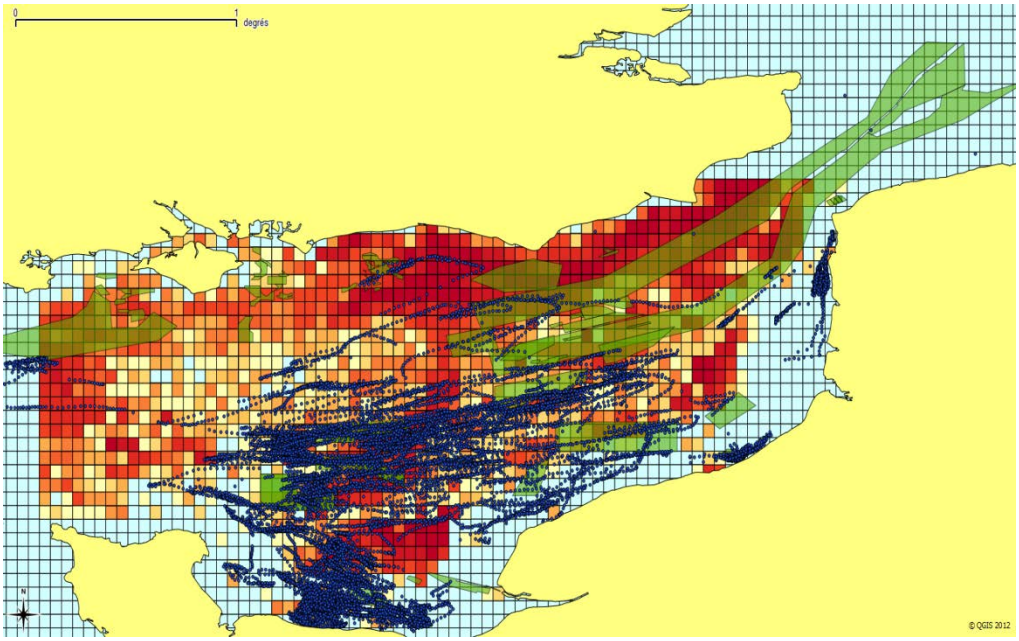
- Functional habitats
- Ecosystem indicators
- Fleet distribution dynamics
- Aggregate extraction impact

The programme SIEGMA is feeding several models with the information on impact of aggregate extractions on benthic and fish communities:

Changes in the distribution and productivity of living resources at the local scale of extraction sites in the eastern English Channel: an investigation is being carried out to evaluate the quantitative impact of aggregate extractions on the benthic compartment.

Mechanizms of change in the distribution of fish species during aggregate extractions: the processes unravelled by this investigation could liase with the generation of ecosystem pressure indicators (extraction intensity, benthic preys availability) and the development around the ISIS-Fish model.

Interactions between fishing activities, aggregate extractions and maritime traffic: work will include the development of dynamic discrete-choice models (Random Utility Models) to understand and forecast how fishing effort could be redirected following the closure of fishing areas and given spatial interactions with other sectors of activity, and coupling with holistic models including ATLANTIS and ISIS-Fish.



Trajectories of a sample of French fishing vessels (blue dots) mapped over English fishing vessels positions (red squares) and current/potential pressures from other sectors of activity – i.e. aggregate extractions, shipping, windfarms (green areas).

One of the many issues for decision-makers in charge of implementing ecosystem-based management in EU marine waters is to be able to understand and forecast how fishing effort could be redirected given spatial interactions with other sectors of activity, and how new effort allocation would subsequently affect the pressure exerted on ecosystem compartments.

6.5 Keith Cooper - Setting limits for acceptable change in sediment particle size composition: testing a new approach to managing marine aggregate dredging?

An extensive baseline dataset from 2005 was used to identify the spatial distribution of macrofaunal assemblages across the eastern English Channel. The range of sediment composition found in association with each assemblage was used to define limits for acceptable change at 10 licensed marine aggregate extraction areas. Sediment data acquired in 2010, four years after the onset of dredging, were used to assess whether sediment conditions remained within the acceptable limits. Results of a meta-analysis showed, within the primary impact zone treatment, an increase in fine sand and silt/clay, and a decrease in fine gravel. Within the secondary impact zone, there was a decrease in coarse sand and an increase in silt/clay. Despite the changes, the composition of sediments in and around 9 extraction areas remained within predefined acceptable limits. At the 10th site, the observed changes in sediment composition were judged to have gone beyond the acceptable limits. Implications of these changes are discussed, and appropriate management measures identified. The approach taken in this study offers a simple, objective and cost-effective method to assessing the significance of change, and could simplify the existing monitoring regime.

6.6 Jyrki Hämäläinen - Mapping and research of marine sediments in Finland

Marine aggregates in Finland are mainly sand and gravel found in glaciofluvial formations as eskers and end moraines. They were formed mainly during the termination of the last continental glaciation around 12 000 to 9 000 years ago. Eskers were formed in melt water channels under the retreating ice. They consist of sorted material, mainly sand and gravel. Eskers are long and narrow formations and they reflect the direction of the melting ice sheet. End moraines were formed when the edge of the glacier was stagnant so they are perpendicular to the eskers. The composition of end moraines is complex as they are formed partly under the glacier. Eskers and end moraines can be found throughout the country and their continuations can be detected from the seabed. Best known marine aggregate resources are the eskers in the Eastern Gulf of Finland and the Salpausselkä end moraines in the Archipelago Sea. There are also well known resources in the Bay of Bothnia.

Aggregates in Finland are mainly used for infrastructure construction (fill-inns and road construction) and concrete production. Marine aggregates can be used for fill-inns in embankment roads, harbours and wind parks, as well as for concrete production. Mapping of the aggregates is based on the marine geological mapping programme of the Geological Survey of Finland. After the initiation of the Finnish Inventory Programme for the Underwater Marine Environment (VELMU) in 2004 the focus has been more and more in marine habitat mapping. The EU Life+ funded FINMARINET project made inventories and modelling in 7 project areas focusing on Habitats Directives marine habitats such as sandbanks and reefs.

6.7 Johan Nyberg – Marine sand and gravel deposits in Sweden

One of the Swedish environmental objectives is good-quality groundwater. Glaciofluvial deposits including eskers on land and similar formations in the landscape are important sources of groundwater and consequently drinking water. These natural sand and gravel deposits are also of significance for energy supply, the natural and cultural landscape, and recreation. Therefore it is of importance to housekeep glaciofluvial material including eskers on land for e.g. future water supply. Marine sand and gravel deposits may instead be used for e.g. construction purposes. Here potential areas within the Swedish EEZ to be used for marine sand and gravel extraction are presented. These areas are chosen from a suitable geological and sediment dynamic perspective where a "continuous" accumulation of sand and gravel occurs. The sand and/or gravel deposits are wave washed accumulated material from glaciofluvial material (eskers) and till as well as the accumulated end in sediment transportation systems. The marine geological mapping, technique and produced information as well as knowledge used to find these deposits are also presented.

6.8 Fernando Tempera - Seabed Mapping Research around Faial Island

Fernando Tempera provided an overview of the seabed mapping research conducted around Faial island. This line of research has been boosted over the last decade at the University of the Azores as a result of the application of modern hydrographical and geophysical technologies like multibeam sonars and sub-bottom profilers. Surveys executed in 2003-2004 provided the first high-resolution topographic data collected on Azores island shelves and slopes. The ensuing analyses provided the first comprehensive effort to use high-resolution bathymetric and backscatter data for understanding the underwater geomorphology of some of the islands.

Faial Island

Shelf width and depth at shelf edge were shown to vary significantly around Faial, reflecting the distinct ages, tectonic histories and on-shelf sedimentation patterns of the geologic edifices composing the island. Analysis of the bathymetry and backscatter data collected on the Faial Island shelf showed that 66% of the seabed was composed of sediments. A series of sedimentary features associated with seabed scouring and sediment dynamics processes were also identified, including extensive current-induced bedforms. These features include large fields of straight crested sand wave, linguoid coarse lag waves, celled crest arrangements and scour furrows. Their geometry was used to infer bottom current patterns and sediment transport patterns on the inter-island passage. Partial recirculation of the sediments has been identified in the enclosed basin located in the southern part of the inter-island passage. Bedforms in this area extend to depths of 180 m with sand wave amplitudes reaching up to 18 m, suggesting high energy conditions. Morphological sharpness and surface freshness observed on in situ imagery indicate that oceanographic conditions may persist at present that maintain the bedforms, but the issue is still under investigation.

A complex pattern of on-shelf tectonic, volcanic and erosion features was also observed on hard bottoms. The most important elements were (i) tectonic faults expressed on the seabed surface, (ii) the submerged evidence of fissural volcanic activity associated with some of these faults, (iii) a variety of lava flow morphologies penetrating the present waterline, (iv) boulder slopes generated by coastal erosion, (v) a basin in the southern half of the Faial-Pico passage and (vi) cliff palaeoshorelines.

Condor seamount

The intensive research programme dedicated to mapping the seabed and associated biological communities of the Condor seamount was also introduced. This volcanic ridge is located 17km SW of Faial and rises more than 1800m from the surrounding seabed to a minimum depth of 185m. High-resolution dataset compiled from multibeam and acoustic backscatter surveys were used to produce fine-scale morphotectonic and seabed nature interpretations of the areas. 32% of the seamount surface presented a highly backscattering ground likely corresponding to consolidated substrata. The remaining 68% exhibited a low uniform backscatter interpreted as a cover of volcaniclastic deposits and biogenic sediments. A quantitative analysis suggests that highly reflective ground predominates down to 800m depth, with unconsolidated sediments dominating below that depth. Highly acoustically backscattering volcanic cones and hummocky terrain resulting from effusive eruptions dominate in deeper areas and remain well exposed on the seamount extremities. Contrastingly, the central sector is dominated by a low backscatter blanket of volcaniclastic particles produced by explosive Surtseyan eruptions on the shallowest parts of the ridge that smoothed out most of the underlying effusive relief.

Habitats of conservation importance, such as coral gardens and deep-sea sponge aggregations have been documented for the area and a qualitative zonation of the benthic assemblages based on the video surveys was presented.

6.9 Helena Cepeda - Marine Sand Extraction Activities in the Azores

Sand extraction activities are of great importance for social and economic development in the Azores. As sand is a scarce resource on land and is fundamental to construction, it has to be obtained from the marine environment. Over the past decade, sand has been extracted from some authorized areas around Azores islands. Most of this sand extraction areas were proposed following scientific research (GEMAS project). Availability and quality of the resource were considered together with environmental and coastal protection issues.

The presentation given during the workshop aimed at describing the licensing procedures for sand, pebble and gravel in the Azores and also to explain the legal framework of this activities and how it is supervised. In the Azores, over the past decade, the values of quotas issued were never overpassed and, apparently, this adequate management will provide enough sand for the next years. Sand extraction in the Azores seems to have a sustainable approach. Deep-sea mining theme was also briefly addressed as it may become a mineral extraction issue in the Azores and other Atlantic areas in the near future.

6.10 Marcel Rozemeijer - Monitoring and Evaluation programmes Rijkswaterstaat, LaMER and sand extraction Sand Engine

In order to obtain a Dutch license for sand extraction initiators are required to execute a monitoring and evaluation programme (MEP) to assess whether the estimates impacts are correct and also to fill some essential gaps in the knowledge field. Several sand extracting projects are in process: e.g. extracting beach nourishment sand (Rijkswaterstaat), construction sand (federation of Waterconstructors) and earlier sand extraction, Sand Engine. To achieve maximum coordination on the scientific and management level, these three initiators have unified in one MEP. The scope of this MEP is based on wishes for monitoring and gaps in knowledge as defined in the EIA, urgencies as addressed by the Committee of EIA and stakeholders, specific demands by the Legal Authority and precaution measures issued in the license to protect the

environment. Currently the MEP of Rijkswaterstaat 2007, and the combined MEP 2008-2012 of Rijkswaterstaat, LaMER and sand extraction Sand Engine are ending and an evaluation report is being written. The resulting gaps in knowledge and topics of the MEP are summarized below:

1) Silt and modelling. Two topics were addressed:

a) What is the behaviour of the plume that is generated by the extraction (nearfield and midfield effect) in order to derive settling rates of silt? Here is was concluded that plume measurements are not a suitable means for that. In addition the plume only represents 8-15% of the total silt mass assumed. The nearfield effect is small. Emphasis should be directed towards the far-field impacts.

b) What is the exchange coefficient of silt between water and bottom for impact modelling purposes? Based on both measurements and modelling exercises, an improved exchange coefficient was implemented in the impact modelling used for the new Environmental Impact Assessment sand extraction Rijkswaterstaat 2013-2017.

2) Impact of silt and algae on Benthos. Two main questions were posed:

a) What are the effects of the reduced food conditions on the growth of Ensis directus?

b) When does food limitation occur as a result of these changed conditions?

The approach taken is to describe and explain the growth in the field together with high frequency (a)biotic measurements. Also a physiological growth model was developed for Ensis directus: a DEB (Dynamic Energy Budget) model, using field measurement and dedicated laboratory experiments. Currently, the DEB model was linked to the output of a water-quality-model to apply for the EIA of Rijkswaterstaat for 2013-2017. The results show that sand extraction in the amounts of the regular Rijkswaterstaat programme (12 Mm3/year) yield only temporal minor effects but that extracting large volumes (100 Mm3/year) on a regular basis will result in larger impact on growth, reproduction and population dynamics of bivalves. In future field measurements will be used to improve both DEB model as well as its coupling with water-quality-models. Major questions arise about the actual population dynamics of Ensis.

3) Impact of extra silt on the predation efficiency of the greater tern: On the basis of measurements and observations in the field a visibility vs.capture efficiency curve was established which was translated into a silt concentration vs capture efficiency curve. The anticipated change in silt concentration is expected to cause a minor reduction in vs capture efficiency which can easily be compensated. It is expected that the greater tern has both time and stamina to compensate the change in efficiency. Impacts near a TSHD are expected to be small since there is only a small plume.

4) Disturbance by transport and above water presence of TSHDs for:

a) Seals: attention was focused the direct behavioural response of Harbour Seals and Grey Seals during haul out. For several locations and types of disturbances, both species seem rather imperturbable. Only when disturbances (e.g. TSHD) come really near and make more noise, reactions are observed. However, for TSHDs, habituation can occur.

b) Common Scoter: regular airplane flights are performed to describe their distribution near the Waddensea Islands coastal zone, in addition with the presence of other bird species and potential factors of disturbance (e.g. fishing boats). At spots with large numbers of scooters, benthos samples are taken for both quantity and quality of the shells. Results show that commons scoter chooses specific locations along the coast correlated with both high benthos biomasses and/or not to deep nor too shallow waters.

5) Disturbance of seals by underwater sound:

A feasibility study was performed to develop the appropriate method for testing the disturbance dose effect relationship in a controlled environment. It was concluded that a spacious enclosure is needed to accommodate the lower frequencies of the dredging underwater sound. In addition it was shown in another study that TSHD sound is not one of the main problems. This research has been halted till its urgency is evaluated.

6) Quick Scan methods for shell banks. Four methods have been tried so far to assess the presence of shell banks in planned extraction areas. In addition a fith method was evaluated by others:

a) Medusa: this measure device uses a radiometric signal for silt. In addition an acoustic signal is measured that detects e.g. shells. In the end the signal appears to be too unspecified: both live shells and shell debris are measured. More additional boxcores are necessary to control the signal.

b) Sidescan sonar: an area was described with van Veen grabes and SSS. The resolution of the SSS was not able to distinguish concentrations of Ensis (>160 small individuals/m2 or Echinocardium cordatum(>20 individuals/m2). More extra calibrations are necessary to correlate large-scale signals vs. actual concentrations and communities of Benthos.

c) Camera: Hauled by a ship, large stretches of bottom can monitored easily and frequently. The images also enable to generate an indicative idea of biological activity. One is also able to distinguish shell banks. Disadvantages are the fact that clear waters are necessary, not too much wave action and that biomass cannot be assessed and numbers of individuals are less accurate.

d) Dredge: the regular programme of shell fish surveys uses dredge-methods hauling 100-150 m, it is more accurate than the camera method but less dynamic and flexible.

e) Multibeam: an area was described with benthos samples (dredge) and multibeam. It has higher resolution than SSS and is less vulnerable for weather condition than a camera. First promising results reveal correlations between benthos densities and multibeam. The acoustic signal of Ensis sp. could be detected, but because of a high variation the predictive power and therefore generic applicability was still low. This may be improved using more advanced techniques for preprocessing of the backscatter data, and post-processing of both depth and backscatter data. Before acoustic techniques can be applied routinely, several steps need to be taken.

7) Trend analysis on Benthos. Trend analysis on the species levels have been performed based on both the boxcore sampling programme of Rijkswaterstaat and dredge sampling programme of Imares. The results show that for the boxcore method, species in general lack continues presence in the time

lines whereas for the dredge samples they are continuous. Also on more aggregated levels like species diversity and other the boxcore method is lacking resolution due to just sampling one boxcore and not the minimum area. The observed trends correlate mostly with natural pressures and in some cases also with human pressures (fisheries). In the later cases the trends are both positive and negative depending on the species.

8) Recolonization of the Zeeland banks. The Zeeland banks represent an area that has been scarcely monitored. In 2009-2012, more outspread monitoring campaigns have been done in order to assess the natural dynamics of the potential reference areas (showing e.g. a slight overall decline in number of species). The communities found represent transition between the communities found at the Flemish Banks (related to the Nephtys- and Ophelia communities there) and coastal zone and Southern Bight communities. In 2012 the first year of recolonization is monitored revealing already communities in the recolonization area that are close to the reference area.

7 Closure of the Meeting and Adoption of the Report

The group moved to adopt the final draft annual report and the meeting was formally closed by the chair. He thanked members of WGEXT for attending and again offered thanks to Rui Quartau of the Instituto Português do Mar e da Atmosfera for hosting the meeting.

The Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT), chaired by Ad Stolk, will meet again in Reykjavik, Iceland, 2nd to 6th June l 2014 as guests of the National Energy Authority.

It is proposed by WGEXT that the 2015 meeting will be held in Belgium, as guests of the Institute for Agricultural and Fisheries Research.

WGEXT will report by 30 June 2013 (via SSGHIE) for the attention of SCICOM.

Annex 1: List of participants

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Annex 2: Agenda

Monday 22 April	
09.30	Meet in Hotel do Canal, Horta, Faial
09.45	Meeting begins Welcome by MrLuís Costa, Regional Director for Fisheries in the Azores Regional Government
	Welcome by WGEXT Chair
	Apologies for absence
	Terms of Reference
	Adoption of Agenda
10.30	Coffe break
10.45	Term of Reference (a): OSPAR Summary of Extraction Statistics
12.30	Lunch break
13.30	Complete Term of Reference (a)
15.00	Coffee break
15.15 -18.00	Term of Reference (b1): Review data on marine extraction activities
	Aim to complete (a) and (b1) by the end of day 1
Tuesday 23 April	
08.30	Introduction to Multi-Annual Management of ICES Working Groups
09.00	Formulating of Multi-Annual Terms of Reference for WGEXT and establish 3-year planning for WGEXT
10.30	Coffee break
10.45	Continuing
11.45	Presentations on research and monitoring
12.30	Lunch break
13.30	Field Trip
Wednesday 24 April	
08.30	Discussion on new Terms of Reference, define actions and appoint coordinators for each ToR
10.30	Coffee break
10.45	Presentations on research and monitoring
12.30	Lunch break
13.30	Field Trip
Thursday 25 April	
08.30	Discussion on new Terms of Reference, define actions and appoint coordinators for each ToR
10.30	Coffee break
10.45	Agree initial text for WGEXT Annual Report 2013
12.30	Lunch break
13.30	Outstanding presentations
15.30	Coffee break
15.45	Completion of outstanding action items Aim to complete Annual Report 2013 by end of day 4
17.00	Close of meeting

Annex 3: Review of National Marine Aggregate Extraction Activities

1 A detailed breakdown of each country's sediment extraction dredging activities

1.1 Belgium

In Belgium, the sectors of the Belgian continental shelf where sand can be extracted are defined and limited by law (KB of 1 September 2004). In 2012, extraction was granted in sectors 1a, 1b (March to May), 2ab (excluding the closed areas of the central and northern depressions), 2c, 3a and 4a, 4b, 4c and 4d (Figure 1.1). In sectors 1b, no extraction is taking place, and neither in the sectors 3a, 4a, 4b and 4d, and sector 3b is still closed as this is also the largest dredge disposal site. Due to the above factors the extraction was limited to zones 1a, 2ab, 2c, and 4c in 2012.

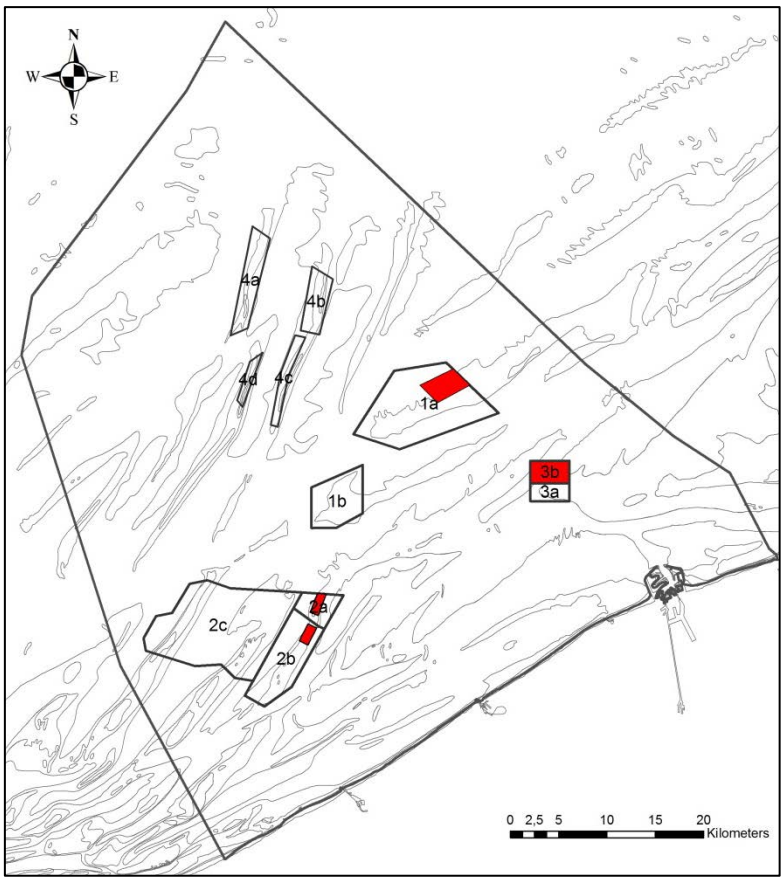

Figure 1.1 Map of permitted exploitation areas for sand and gravel on the Belgian continental shelf as defined in KB of 1 September 2004 (last adapted in 2010) and MB of 24 December 2010 (for exploitation zone 4a-d) with indication of closed areas in red.

In 2012, 2.157 Mm³ sand and no gravel was extracted by the private license holders. This sand is mainly used for industrial purposes. Two licenses were also granted to the Flemish Region, Coastal Division and Division Maritime Access. The licenses for the Flemish Region have the same conditions (reporting, black-boxes, etc.) as licenses for the private sector with the exception that they are exempted from the fee system. The Flemish Region-Coastal Division extracted 1.036 Mm³ sand, which was used solely for beach nourishment. In total 3.211 Mm³ of sand was extracted on the Belgian continental shelf in 2012.

Table 1.1 Marine aggregate extraction figures for 2012 from FOD Economie, KMO, Middenstand en Energie. (Includes aggregate extraction for beach nourishment).

Dredging area	Amount (m³)
Thorntonbank (1a)	852 000
Gootebank (1b)	0
Kwintebank (2ab)	33 000
Buiten Ratel (2c)	1 480 000
Oostdyck (2c)	97 000
Sierra Ventana (3a)	0
Hinderbanken (4)	749 000
TOTAL	3 211 000

Table 1.2 Export of marine aggregates in 2012.

Landing country	Amount (m³)
France	173 000
UK	7000
Netherlands	455 000
TOTAL	635 000

Sand extraction on the Belgian continental shelf started in 1976 and data are available since then. An overview is given in Figure 1.2.

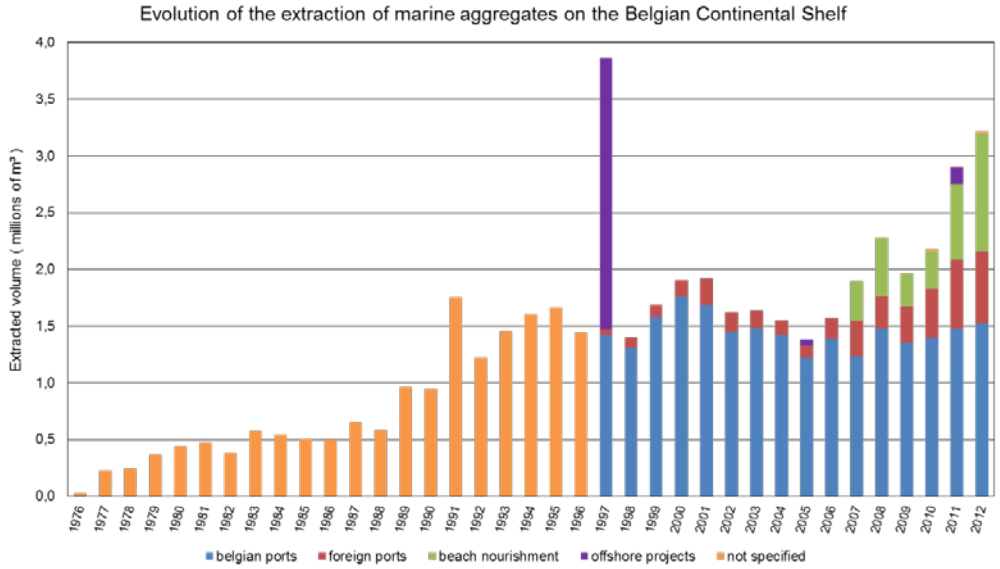

Figure 10.2 Volumes of sand and gravel extracted from the Belgian continental shelf since 1976.

From 2007 onwards the extra quantities extracted by the Flemish Region are included in the graph. The total amount of almost 3.21 Mm³ sand extracted in 2012 from the Belgian continental shelf is an increase of 10 % compared to 2011 and it is the second highest amount ever landed in Belgium (Figure). The increase in the extraction of the Flemish Region (beach nourishment) is in the framework of the Integrated Coastal Protection Plan. From the industrial sand, 635 000 m³ was exported to neighbouring countries in 2012 (Table 1.), while 1.522 Mm³ was allocated to the Belgian market.

Most of the industrial sand allocated to the Belgian market was landed in the coastal harbours of Brugge (including the harbour of Zeebrügge), Oostende and Nieuwpoort.

1.2 Canada

No information has been provided this year.

1.3 Denmark

Table 1.3 Total extracted 2012

DREDGING AREA	AMOUNT *
Denmark total	10,5 mio. m³
(1)OSPAR area	7,7 mio. m³
(1)HELCOM area	3,0 mio. m³

(1)The OSPAR area and the HELCOM area are overlapping in Denmark. The Kattegat area from Skagen to north of Fyn-Sjælland is included in both Conventions. Therefore the figures from the two Convention-areas can not be added.

Table 1.4 Construction industrial aggregate (sand and gravel) extraction figures for 2012

DREDGING AREA	AMOUNT *
Denmark total	2,9 mio. m³
(1)OSPAR area	1,2 mio. m³
(1)HELCOM area	1,8 mio. m³

Table 1.5 Amount of material extracted for beach replenishment projects in 2012.

DREDGING AREA	MATERIAL	AMOUNT *
Denmark total	sand	3,6 mio. m3
(1)OSPAR area	sand	3,5 mio. m³
(1)HELCOM area	sand	0,1 mio. m³

Table 1.6 Construction fill/ land reclamation (m³) extraction figures for 2012

DREDGING AREA	MATERIAL	AMOUNT *
Denmark total	sand	4,0 mio. m³
(1)OSPAR area	sand	3,0 mio. m³
(1)HELCOM area	sand	1,1 mio. m³

Non-aggregate (e.g. shell, maerl, boulders etc) extraction figures for 2012.

No activity in 2012

Table 1.7 Exports of marine aggregate in 2012

PORT (landing)	AMOUNT*
Sweden	0,04 mio. m^3
Germany	0,0 mio. m^3
The Netherlands	0,1 mio. m^3
Belgium	0,002 mio. m^3

Summary of current licence position and forecasts for future exploitation of marine aggregates

There are currently app. 130 dredging areas in Denmark with a total area of app. 700 km^2. Only app. 60 areas are dredged on an annual basis. There are currently 5 active exploration licences. A limited number of exploitation applications are under consideration.

1.4 Estonia

No extraction activities to report

1.5 Finland

Table 1.8 Marine aggregate (sand and gravel) extraction figures for 2012

DREDGING AREA	AMOUNT
Loviisa, the Eastern Gulf of Finland	5800 m3

Description of aggregate extraction activities in 2012

Morenia Ltd. conducted an experimental dredging of 5800 m^3 in the Loviisa area, Eastern Gulf of Finland. The aim was to assess the exploitability of the site and the feasibility of the material for concrete production.

Non-aggregate (e.g. shell, maerl, boulders etc) extraction figures for 2012.

No activity in 2012

Exports of marine aggregate in 2011

No Exports in 2012

Amount of material extracted for beach replenishment projects in 2012.

No activity in 2012

Table 1.9 Historic patterns of marine aggregate extraction (m3)

EXTRACTION AREA	Gulf of Finland	EXTRACTION AREA	Gulf of Finland
2000	0	2007	0
2001	0	2008	0
2002	0	2009	0
2003	0	2010	0
2004	1,600,000	2011	0
2005	2,388,000	2012	5 800

2006	2,196,707	Total (1996-2012)	6 190 507

Description of historic extraction activities for 1995-2011

Sand and gravel extraction from Finnish coastal areas between 1995 and 2004 was negligible. The Port of Helsinki extracted 1.6 million m3 off Helsinki (Gulf of Finland) in 2004, 2.4 million m3 in 2005 and 2.2 million m3 in 2006. Since then there has been only a small experimental dredging operation in 2010 and a 5 800 m^3 test extraction in 2012 in the Loviisa area, Eastern Gulf of Finland.

Summary of current licence position and forecasts for future exploitation of marine aggregates

There are two valid licenses issued by the Regional State Administrative Agencies (AVI).

A permission to extract 8 million m^3 of marine sand from the Loviisa-Mustasaari area was accepted in April 2007 by the Environment Permit Authority to Morenia Ltd. However there was a complaint against the decision and the case was under hearing of Administrative Court of Vaasa. The decision on 31.12.2008 was favourable for the extraction. Extraction has not yet started besides a small experimental dredging exercise in May 2010 and another feasibility test exercise of 5800 m^3 in 2012. The license is valid until 30th of April 2017.

In 2010 The Regional State Administrative Agency of Southern Finland issued a license to Morenia Ltd. for extracting 5 Mm^3 marine sand and gravel in the Itä-Tonttu and Soratonttu areas off the city of Helsinki. The license is valid until 31st of August 2020.

One license application was sent by Morenia Ltd. to authorities in December 2011 concerning the extraction of 10 Mm^3 of material within the next 15 years in the Yppäri area (1,1 km^2), the Bay of Bothnia. After the request by the authorities Morenia Ltd. has conducted additional studies and delivered further information concerning the application in 2012. At the moment the license application is still pending.

1.6 France

Table 1.10 Construction industrial aggregate (sand and gravel) extraction figures for 2011/2012

DREDGING AREA	AMOUNT *
Channel	4,367,000 m3
Atlantic	5,969,000 m3
Brittany	0 m3

Description of construction industrial aggregate (sand and gravel) extraction in 2011/2012

These figures are not extracted quantities but licence quota figures (maximum permitted).

Amount of material extracted for beach replenishment projects in 2011/2012.

No data available for beach replenishment

Construction fill/ land reclamation (m^3) extraction figures for 2011/2012

No data available for construction fill or land reclamation in France

Table 1.11 Non-aggregate (e.g. shell, maerl, boulders etc) extraction figures for 2011/2012.

DREDGING AREA	MATERIAL	AMOUNT *
Brittany	Maerl	90,000 m3
Brittany	Shelly sand	192,000 m3

Description of non-aggregate extraction activities in 2012

These figures are not extracted quantities but licence quota figures (maximum permitted).

End of maërl extraction is scheduled by the end of 2013.

Exports of marine aggregate in 2011/2012

No data available for exports of marine aggregate

Table 1.12 Historic patterns of marine aggregate extraction.

DREDGING AREA	SITE NAME	EXTRACTED VOLUMES (m^3) in red Quotas permitted, in black Quantity really extracted											
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Atantic	Le Pilier	2124326	2271760	2092038	2163848	2491514	2465909	2358107	2466751	2239033	2267000	2267000	2267000	2267000
	Les Charpentiers	149851	199041	1500000	1500000	1500000	1500000	1500000	1500000	1500000	1500000	1500000	1500000	1500000
	Sables d'Olonne	No extraction		2349	No extraction	3387	330000	330000	330000	330000	330000	330000	330000	330000
	Chassiron B	Non permitted			330000	330000	330000	330000	330000	330000	330000	330000	330000	330000
	Chassiron C	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000
	Chassiron D	Non permitted			330000	330000	330000	330000	330000	330000	330000	330000	330000	330000
	Chassiron E	Non permitted							482000	482000	482000	482000	482000	482000
	Platin de Grave	117000	143000	174000	103000	400000	400000	400000	400000	400000	400000	400000	400000	400000
Channel	Graves-de-l'estuaire	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000	330000
	Granulats Marins de Dieppe	179575	193673	167690	314857	161477	165850	347828	471200	470588	470588	470588	470588	375000
	Griz Nez	64287	51266	36260	35746	39388	72000	72000	72000	72000	72000	72000	72000	72000
	Manche orientale	Non permitted												3000000
	Côte d'Albâtre	Non permitted												590000
	Baie de Seine	Non permitted					330000	330000	330000	330000	330000	330000	330000	330000
Brittany	Golfe de Saint-Malo	No extraction											License fallen due	
	Ilot Saint-Michel	78081	76360	76644	75553	76680	68364	56780	75048	74955	79000	79000	End of extraction	
	Lost Pic	130000	129625	130598	131346	123654	124077	60300	130515	129329	169500	169500	169500	90000
	Phare de la Croix	15100	12500	11300	12700	11500	11500	11750	12308	10461.5	11500	11500	11500	11500
	La Horaine	76150	68600	86205	75450	76590	71154	76754	75261.5	76558	83000	83000	83000	83000
	La Cormorandière	19066	21454	22322	16067	24370	22259	16126	18885	15308	22000	22000	22000	22000
	Le Paon	No extraction												
	Jaudy	6062	21233	10709	8070	9034	10464	12688	2110	0	End of extraction			
	Beg an Fry		15308	22111.5	22231	34446	31400	6440	20100	0	0	0	End of extraction	
	Les Duons	23031	19825	25465	27801	20271	28940	10732	20913	22807	30000	30000	50000	50000
	Le Petit Minou		21808	21496	19315	22275	19300	22700	2272	20450	33000	33000	End of extraction	
	Le Grand Minou													
	Kafarnao	7700	12100	7300	8500	5249	6900	6100	4140	1292	20000	20000	20000	20000
	Les Pourceaux		8050	1700	6385	3000	2600	600	0	300	6000	5000	End of extraction	
	Les Glénan	87000	80710	67000	63000	55195	52000	46140	35700	39900	25000	15000	5000	End of extraction
	Aber Benoît	21600	17058	No extraction									End of extraction	
	Aber Ildut	No extraction											End of extraction	
	Plateau des Fourches		1230	667	1500	1000	667	500	No extraction				End of extraction	

Summary of current licence position and forecasts for future exploitation of marine aggregates

20 extraction licences, 1 research license and 1 prospection authorization have been issued by local administration (Préfectures).

17 applications (2 for exploration, 7 on actual extraction area for a renewal of license, 8 on new extraction perimeter) for aggregate extraction are being considered by Environment Ministry (MEEDDM). It represent 863.83 km² for research perimeters and 86.26 km² for extraction sites, with a potential increase for new licensed area of 69.96 km²

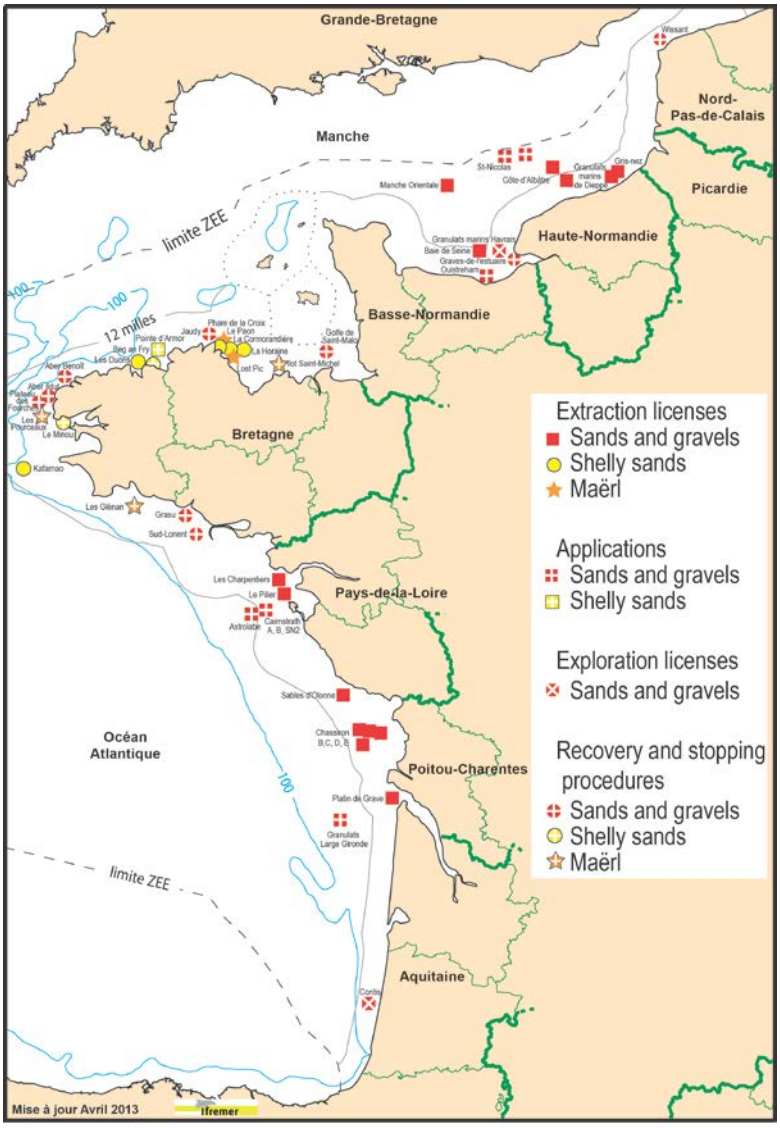

Figure 1.3 **Extraction licences**

Table 1.13 **Licensed area compared to area in which extraction occurs**

	Licensed Area Km2*				Area in which extraction activities occur Km2			
Country	2008	2009	2010/ 2011	2012	2008	2009	2010/ 2011	2012
France	1238.22	212.572	109.872	230.61	No data	No data	No data	No Data

1.7 Germany

Extraction area	Replenishment	Construction	Total
OSPAR Area	800034	66277	866311
HELCOM Area	114810	245988	360798

1.8 Greenland and the Faroes

No information has been provided this year.

1.9 Iceland

Table 1.14 Historic pattern of aggregate extraction

	Marine Aggregate Extraction	Marine Non-Aggregate Extraction		Total Extraction
Year	gravel and sand	shell sand	maerl	
2000	1435665	147280	0	1582945
2001	1189950	133640	0	1323590
2002	861315	114250	0	975565
2003	1155485	83920	0	1239405
2004	1412430	118340	0	1530770
2005	1259157	143780	13740	1416677
2006	1253464	151460	20535	1425459
2007	1145390	158300	21666	1325356
2008	921000	134680	50445	1106125
2009	374885	69360	25435	469680
2010	125800	39760	54450	220010
2011	138700	40740	n/d	n/d
2012	145070	12780	58800	216650

1.10 Ireland

No information has been provided this year.

1.11 Latvia

No aggregate production took place during 2012

1.12 Lithuania

Table 1.17 Marine aggregate extraction figures presented in m^3.

Year	Beach nourishment
2010	110 000
2011	119 000
2012	119,000

1.13 The Netherlands

Table 1.18 Marine aggregate (sand) extraction figures for 2012

DREDGING AREA	AMOUNT Mm3
Euro-/Maas access-channel to Rotterdam	326,606
IJ-access-channel to Amsterdam	830,008
Channels Voordelta	46,134
Dutch continental shelf	16,794,985
Dutch continental shelf / Maasvlakte 2 project	23,947,677
Total	41,945,410

Most of reported quantities are in m3. If reported in tonnes, 1 T = 0.667 m3

Table 1.19 Non-aggregate (shell) extraction figures for 2012.

DREDGING AREA	MATERIAL	AMOUNT m3
Wadden Sea	Shells	16,740
Wadden Sea inlets	Shells	88,508
Western Scheldt	Shells	0
Voordelta of the North Sea	Shells	16,560
North Sea	Shells	68,615

Description of non-aggregate extraction activities in 2012:

On basis of the Second National Policy Note and EIA for shellextraction (31 august 2004) there are maximum permissible amounts defined from 2005 until 2013.

These permissible amounts (in m^3) of shells to be extracted yaerly from:

- the Wadden Sea max. 85,000 (but no more than 50% of the total quantity (The Wadden Sea and Sea Inlets)
- the Sea Inlets between the isles until a distance of 3 miles offshore 85,000 up to 2013
- the Voordelta 40,000
- the Western Scheldt 40,000
- the rest of the North Sea until a distance of 50 km offshore unlimited.

Table 1.20 Exports of marine aggregate in 2012

DESTINATION/(landing)	AMOUNT (m3)*
Belgium	2,500,000
France	10,000

* **Approximate figures**

There is a continuous flow of sand extracted out of the extraction areas in the southern part of the Dutch sector of the North Sea, used for landfill and for concrete and building industries

Table 1.21 Amount of material extracted for beach replenishment projects in 2012:

DREDGING AREA	MATERIAL	AMOUNT in Mm3
L17G (coast of Friesland)	sand	2,348
L14D (coast of Friesland)	sand	0,806
L14B1 (coast of Noord-Holland)	sand	1,281
Q5B' (coast of Noord-Holland)	sand	0,081
Q11C (coast of Noord-Holland)	sand	0,830
Q2D (coast of Noord-Holland)	sand	0,859
S5G (coast of Zeeland)	sand	0,136
S5H (coast of Zeeland)	sand	2,099
S7U (coast of Zeeland)	sand	0,242
Galgeput 184 (coast of Zeeland)	sand	0,001

Sardijngeul (coast of Zeeland)	sand	0,045
Total	sand	8,649

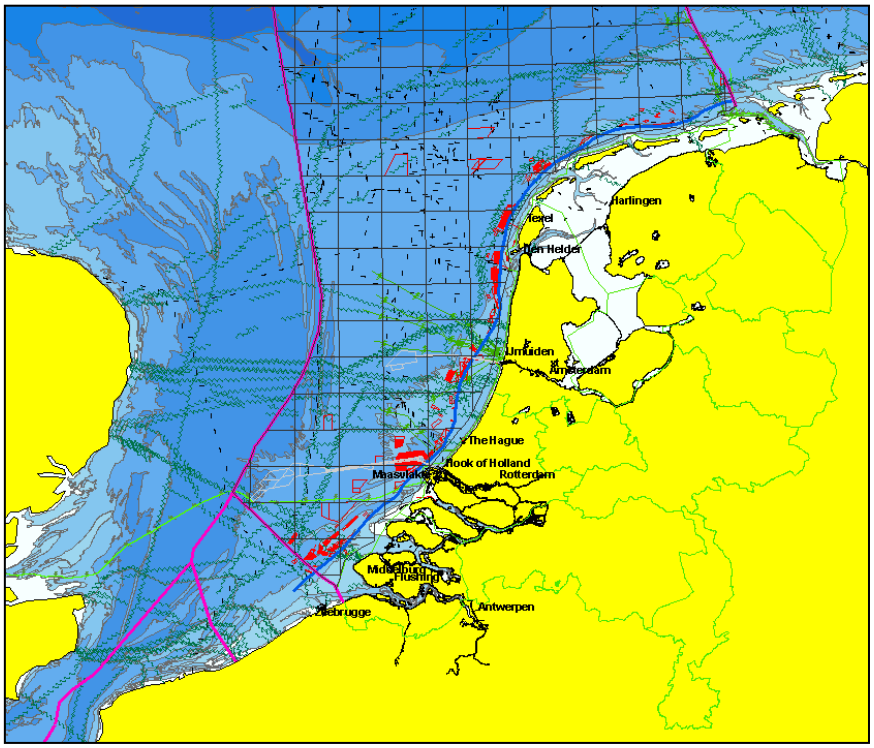

Figure 1.4 Licensed sand extraction areas 2012

Table 1.22 Historic patterns of marine aggregate extraction in Mm³.

Extraction Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Euro-/Maas channel	10,32	3,90	2,94	1,23	2,32	0,49	0,65	1,94	1,22	0,06	0,32	0
IJ-channel	2,31	1,41	0,87	1,06	4,31	0	0	0	0	0	0,75	0,83
Channel Voordelta	-	-	-	-	-	-	-	-	-	-	-	0,05
Dutch continental shelf	23,81	28,53	20,07	21,31	22,13	22,88	28,25	24,53	119,59	122,47	68,88	66,89
Total extracted	36,44	33,84	23,88	23,59	28,76	23,37	28,90	26,47	120,81	122,53	69,95	67,87

Table 1.23 Dutch sand extraction 1974 - 2012

YEAR	TOTAL EXTRACTED m3	YEAR	TOTAL EXTRACTED m3
1974	2.787.962	1994	13.554.273
1975	2.230.889	1995	16.832.471
1976	1.902.409	1996	23.149.633
1977	757.130	1997	22.751.152
1978	3.353.468	1998	22.506.588
1979	2.709.703	1999	22.396.786
1980	2.864.907	2000	25.419.842
1981	2.372.337	2001	36.445.624

1982	1.456.748	2002	33.834.478
1983	2.252.118	2003	23.887.937
1984	2.666.949	2004	23.589.846
1985	2.724.057	2005	28.757.673
1986	1.955.491	2006	23.366.410
1987	4.346.131	2007	28.790.954
1988	6.954.216	2008	26.360.374
1989	8.426.896	2009	120.700.339
1990	13.356.764	2010	122.532.435
1991	12.769.685	2011	62,948,704
1992	14.795.025	2012	41,899,276
1993	13.019.441		

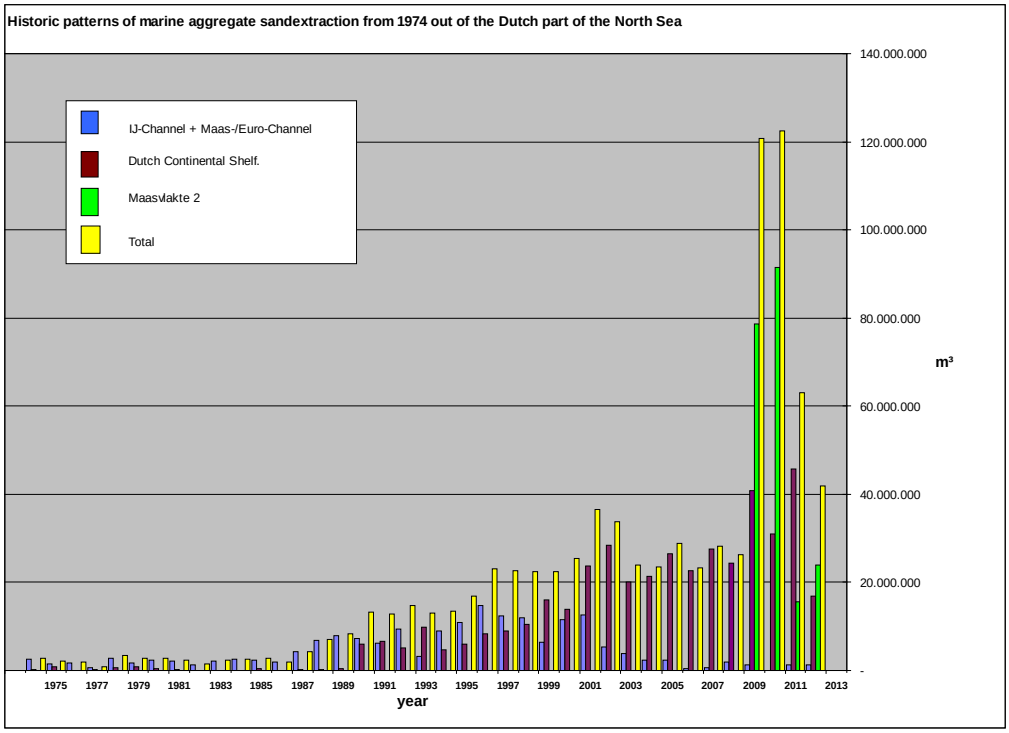

Figure 1.5 Historic patterns of marine aggregate extraction in the Netherlands

Table 1.24 Licences considered and issued licences Rijkswaterstaat North Sea

In the year:	Amount		
1998	35	2006	33
1999	30	2007	24
2000	25	2008	38
2001	25	2009	23
2002	42	2010	15
2003	26	2011	26
2004	20	2012	10
2005	33		

Table 1.25 2012 licensed area and actual area over which extraction occurs.

Country	Licensed Area	Area in which extraction activities occur	Area in which over 90% of extracted material is taken
The Netherlands (data 2012)	439 km2	64 km2	36 km2

1.14 Norway

Table 1.26 Historical dredge tonnages 1992 - 2012

Year	Carbonate (shell) Sand	Total Aggregates
1992	n/d	0
1993	n/d	100 000 - 150 000
1994	n/d	100 000
1995	n/d	100 000 -150 000
1996	n/d	155 000
1997	n/d	100 000 -150 000
1998	n/d	n/d
1999	n/d	n/d
2000	n/d	n/d
2001	n/d	n/d
2002	n/d	n/d
2003	115,000	115,000
2004	n/d	n/d
2005	n/d	n/d
2006	n/d	n/d
2007	A few thousand	A few thousand
2008	A few thousand	A few thousand
2009	A few thousand	A few thousand
2010	n/d	n/d
2011	n/d	n/d
2012	A few thousand	A few thousand

1.15 Poland

No information has been provided this year.

1.16 Portugal

Please note that the new data for this year report only comprises 2012 from the Azores archipelago. The remaining data has already been published in previous WGEXT reports.

There has also been extraction in the Madeira archipelago at least since 2000 with yearly average values of 500.000 m^3 during the 2000/2010 period for construction purposes. In 2012 the extraction was around 150.000m^3. These values were taken from an official document of the Madeira Government but no detailed numbers were given to the WGEXT Portuguese representative until now.

In the northern continental shelf there were no extraction activities in 2012, but there is no information on whether there has been extraction previously.

Table 1.27 Portuguese aggregate extraction 1998 - 2012

	Volumes (m3)														
Extraction	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Area															
Azores archipelago		6083	145519	146791	115613	176285	197636	159968	181691	141991	144647	134021	124132	126381	69392
Madeira archipelago															
Administração da região hidrográfica do Norte (northern continental shelf)															
Administração da região hidrográfica do Centro (central continental shelf)															
Administração da região hidrográfica do Tejo (southern central continental shelf)										500000	1000000	1000000			
Administração da região hidrográfica do Alentejo (southwestern continental shelf)															
Administração da região hidrográfica do Algarve (southern continental shelf)	1285000								370000				1250000	600000	
	No detailed data available at the moment														
	Beach nourishment														
	civil construction														

1.17 Spain

During 2012 no extraction activities have been carried out from marine sand deposits in Spain.

However, a total amount of 616,773 m^3 of sand was placed on beaches (228,765 m^3 in the OSPAR area, 365,968 m^3 in the Mediterranean area and 2000 m^3 in the Canary Islands). The sources of these materials were essentially the dredging activity in harbours with a navigational purpose or the sand redistribution within the beach. The distribution of the material source in both coastal sides is shown below:

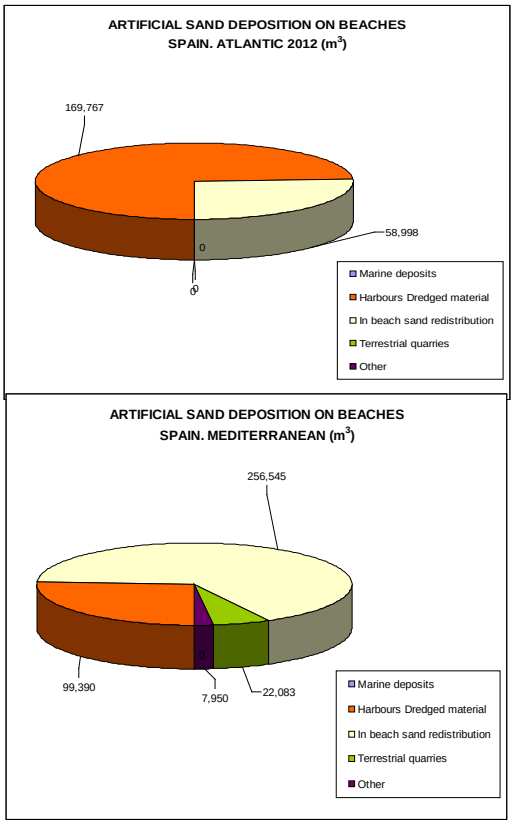

Figure 10.6 Distribution of harbour and navigational dredged material

1.18 Sweden

No extraction to report in 2012

1.19 United Kingdom

All UK statistics reported as tonnes.

Table 1.28 Marine aggregate (sand and gravel) extraction figures for 2011 from The Crown Estate ownership ***(Includes aggregate and material for beach replenishment and fill contract)***

Dredging Area	Amount (tonnes)
Humber	2,309,833
East Coast	3,564,464
Thames Estuary	1,090,559
East English Channel	3,764,185
South Coast	4,360,518
Southwest	1,067,526
Northwest	635,268
Rivers and Miscellaneous	0
TOTAL	16,792,353

Extraction tonnages for fill contracts and beach replenishment were as follows -

Contract Fill 349,900 tonnes

Beach Replenishment 1,800,063 tonnes

Non-aggregate (e.g. shell, maerl, boulders etc.) extraction figures for 2012

None during 2012 from The Crown Estate ownership.

Table 1.29 Exports of marine aggregate in 2011 from The Crown Estate ownership:

Port (landing)	Amount (tonnes)
Amsterdam	922,924
Antwerp	402,331
Bruges	274,428
Calais	60,159
Dieppe	17,786
Dunkirk	204,939
Fecamp	49,309
Flushing	772,276
Gent	52,240
Honfleur	36,357
Le Havre	541,245
Le Treport	14,351
Ostend	392,162
River Seine Wharves	268,451
Rotterdam	315,313
Sluiskil	19,362
Zeebrügge	205,042
TOTAL	4,548,675

Table 1.30 Amount of material extracted for beach replenishment and reclamation fill projects in 2011 from The Crown Estate ownership

Dredging Area	Amount (tonnes)
Brighton	4,917
Deal	309,402
Eastbourne	17,380
Lincshore	858,091
Pevensey	14,925
Selsey	595,348
Wellington Dock, Liverpool	349,900
TOTAL	2,149,963

Table 1.31 **Historic patterns of marine aggregate extraction (tonnes) from The Crown Estate ownership** ***(Figures exclude beach replenishment and fill contracts)***

Extraction Area	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Humber	2,694,977	2,840,261	3,122,080	2,933,623	2,710,881	2,928,366	3,031,699	3,392,015	3,521,737	3,184,814	3,154,070	2,524,328	2,622,126	2,175,846	1,451,742	42,288,565
East Coast	8,923,562	9,131,512	9,129,635	9,636,697	9,011,323	8,611,199	8,538,073	7,881,670	8,006,736	7,715,428	6,075,899	5,637,296	4,871,443	5,275,569	3,564,464	112,010,506
Thames Estuary	862,834	971,960	854,483	909,141	1,291,103	838,185	758,257	696,012	899,852	977,027	1,735,141	405,485	518,881	664,629	1,090,559	13,473,549
East English Channel	2,180,099	1,958,476	1,387,450	875,030	1,163,892	1,212,951	457,102	474,553	323,824	1,961,035	2,443,367	2,256,919	2,409,476	4,317,153	3,553,379	26,974,706
South Coast	3,641,602	3,926,856	4,226,088	4,752,978	4,235,188	4,445,311	4,691,857	4,914,793	5,127,989	4,752,843	3,934,692	3,492,424	3,430,463	3,917,315	3,629,352	63,119,751
Southwest	1,886,289	1,719,803	1,602,394	1,549,431	1,467,122	1,515,241	1,633,383	1,591,610	1,545,275	1,769,197	1,470,719	1,019,174	931,951	956,102	1,067,526	21,725,217
Northwest	275,590	355,044	316,090	421,068	482,270	470,962	558,398	611,983	608,314	633,405	432,889	271,598	307,509	314,098	285,368	6,344,586
Rivers and Misc	6,238	6,273	46,120	73,047	78,597	85,153	99,079	124,506	111,687	109,399	87,787	92,263	39,458	0	0	959,607
Yearly Total	20,471,191	20,910,185	20,684,340	21,151,015	20,440,376	20,107,368	19,767,848	19,687,142	20,145,414	21,103,148	19,334,564	15,699,487	15,131,307	17,620,712	14,642,390	286,896,487

Table 1.32 Summary of current licence position and forecasts for future exploitation of marine aggregates within The Crown Estate ownership

TYPE	STATUS	No.
Production Agreements	Extraction licences	67
Applications*	New applications	26
Prospecting	Prospecting licences	To be announced shortly

*** Applications excludes current licences which have a renewal application submitted**

1.20 United States

Table 1.33 Marine aggregate (sand and gravel) extraction figures for 2012

DREDGING AREA	AMOUNT *
New York Harbour(Ambrose Channel), New Jersey	778,007 cubic meters
New York Harbour navigation channels	7,747,000 cubic meters

Description of aggregate extraction activities in 2012.

The only active operating for the extraction of marine sand to be used for aggregate continues to be that done by a private company, Amboy Aggregates, which removes sand from the seaward section of the main shipping channel into New York Harbour (the Ambrose Channel). This commercial operation extracted 778,007 cubic meters of sand in 2012. An additional 7,747,000 cubic meters of sand was dredged from navigation channels in New York Harbour and used as submarine capping material in the restoration of a former, offshore disposal site known as the Historic Area Remediation Site (HARS), approximately 22 km outside on New York Harbour.

Table 1.34 Non-aggregate (e.g. shell, maerl, boulders etc) extraction figures for 2012.

DREDGING AREA	MATERIAL	AMOUNT Cubic Meters
New York Harbour	Clay	1,797,000 cubic meters
New York Harbour	Silt/clay	484,000 cubic meters
New York Harbour	Rock	1,382,300 cubic meters
New York Harbour	Sand	4,198,000 cubic meters

Description of non-aggregate extraction activities in 2012.

This material was dredged from navigation channels in New York Harbour both for routine maintenance and channel-deepening. The dredged material used to cap an abandoned, offshore, dredged sediment disposal site. The site is on the shelf 22 km outside on New York Harbour. The disposal site, when active, was referred to as the "Mud Dump" site. It is now the HARS (Historic Area Remediation Site).

Exports of marine aggregate in 2012:

No activity to report

Table 1.35 Amount of material extracted for beach replenishment and breach closure projects in 2012

DREDGING AREA	MATERIAL	AMOUNT
Assateague Inlet, MD	sand	123,206 m3 cubic meters
Cupsogue, NY	sand	127,739 m3 cubic meters
Smith Point, NY	sand	42,050 m3 cubic meters
Shinnecock Inlet, NY	sand	256,124 m3 cubic meters
Tiana Beach, NY	sand	47,402 m3 cubic meters
Monmouth, NJ	sand	313,467 m3 cubic meters
Sea Bright, NJ	sand	298,175 m3 cubic meters

Description of beach replenishment schemes in 2012

Hurricane Sandy hit the northeast coast of the US on October 29, 2012. A record storm surge flooded subways and tunnels around Manhattan and produced unprecedented beach erosion along the ocean shoreline of New York and New Jersey. Three inlets opened. Two were closed (Cupsogue and Smith Point in the above table). One remains open. Beach nourishment along the NY coast alone may require between 5 and 20 million cubic meters of sand. The total volume of marine sand extracted and placed as beach nourishment and breach closure in 2012 was 1,211,163 cubic meters.

Table 1.36 Historic patterns of marine aggregate extraction in millions of cubic yards

YEAR	AMOUNT m3	YEAR	AMOUNT m3
1990	0.2	2005	1.4
1991	0.8	2006	1.2
1992	0.8	2007	1.2
1993	1.5	2008	1.0
1994	1.7	2009	0.7
1995	1.4	2010	0.8
1996	c1.4	2011	0.8
1997	c1.4	2012	0.8
1998	c1.3		
1999	1.3		
2000	1.1		
2001	1.3		
2002	1.1		
2003	1.4		
2004	1.6		

Annex 4: OSPAR National Contact Points for Sand and Gravel Extraction

List of national contact points for ospar reporting on sand and gravel extraction	
Belgium	Ms Brigitte Lauwaert Management Unit of the North Sea Mathematical Models Gulledelle 100 B-1200 Brussels BELGIUM Tel: 00 32 2 773 2120 Fax: 00 32 2 770 6972 E-mail: B.Lauwaert@mumm.ac.be
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France	M. Claude Augris Ifremer Département Géosciences Marines Technopôle Brest-Iroise BP 70 29280 PLOUZANÉ FRANCE Tel : 00 33 2 98 22 42 42 Fax: 00 33 2 98 22 45 70 E-mail: Claude.Augris@ifremer.fr
Germany	Mr Kurt Machetanz Landesamt für Bergbau, Energie und Geologie (LBEG) An der Marktkirche 9 D-38678 Clausthal-Zellerfeld GERMANY Tel: 00 49 5323 7232 50 Fax: 00 49 5323 7232 58 E-mail: kurt.machetanz@lba.niedersachsen.de
Iceland	Mr Helgi Jensson The Environment and Food Agency Sudurlandsbraut 24 IS-108 Reykjavik ICELAND Tel: 00 354 591 2000 Fax: 00 354 591 2020 E-mail: helgi@ust.is
Ireland	To be confirmed

The Netherlands	Mr Sander de Jongn Ministry of Infrastructure and the Environment Rijkswaterstaat Sea and Delta P.O. Box 5807 2280 HV Rijswijk THE NETHERLANDS Tel: 00 31(0)652562719 E-mail: sander.de.jong@rws.nl
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