

# WORKING GROUP ON THE EFFECTS OF EXTRACTION OF MARINE SEDIMENTS ON THE MARINE ECOSYSTEM (WGEXT; outputs from 2022 meeting)

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WORKING GROUP ON THE EFFECTS OF EXTRACTION OF MARINE SEDIMENTS ON THE MARINE ECOSYSTEM (WGEXT; outputs from 2022 meeting)

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# Contents

i	Executive summary .....	ii
ii	Expert group information .....	iii
1	Introduction.....	1
2	ToR A1: Review data on marine extraction activities and provide a summary on marine extraction for the OSPAR region to OSPAR .....	2
3	ToR A2: Review of developments in marine sediment resource mapping, legal regime and policy, environmental impact assessment, research and monitoring.....	3
4	ToR B: Finalize an ICES aggregate database comprising data on marine extraction activities .....	5
5	ToR C: Update ICES Guideline for Management of Marine Sediment Extraction .....	6
6	ToR D: Ensure outputs of the WGEXT are accessible by publishing as a group .....	6
Annex 1:	List of participants.....	7
Annex 2:	WGEXT resolution .....	9
Annex 3:	Tables/ ToR A1 .....	12

## i Executive summary

The Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT) develops the understanding to ensure that marine sand and gravel extraction is sustainably managed and in order to adopt mitigative measures.

WGEXT has been monitoring the rate of marine sediment extraction in the North Atlantic, including the Baltic and North Sea for almost 40 years. The group is developing a database and associated 'WGEXT Dredging Dashboard' to document current extractions by end use, leased areas and, where possible, the footprint of dredged areas, all in the perspective of the long-term trends since 1993. The Dashboard can be found at <https://rconnect.cefas.co.uk/content/26>. Although not all member countries provide annual data, the WGEXT inventories are representative of activity in the ICES region. Volumes extracted have shown a spectacular increase from a few hundred thousand m<sup>3</sup> per year in the early 1970s to millions m<sup>3</sup> in the 1990s and tens of millions m<sup>3</sup> in recent years. Over the last three decades, the demand for sand for beach nourishment and shore protection has increased substantially. Sand is now recognized as a critical, strategic resource.

Areas actually dredged in any year are much smaller than the areas licensed. The active areas and even the intensity of dredging can be determined either by Electronic Monitoring System (EMS) or Automatic Identification System (AIS) to define a dredging footprint. While still in the developmental stage, EMS data is suitable for training AIS algorithms to expand regional coverage.

The competition for access to marine resources, including space, continues to grow. Accommodation for marine sand not only impacts with fisheries and habitat concerns, but also the space needed to accommodate offshore windfarm and cable routes. Infrastructure of this nature has the potential to 'sterilise' areas of the sea floor such that the sediment resources are not available for exploitation.

## ii Expert group information

<b>Expert group name</b>	Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT)
<b>Expert group cycle</b>	Multiannual
<b>Year cycle started</b>	2020
<b>Reporting year in cycle</b>	3/3
<b>Chair</b>	Keith Cooper, UK
<b>Meeting venues and dates</b>	26 June 2020, online virtual (22 participants)
	27 April and 10 May 2021, online virtual (22 participants)
	26 and 28 April 2022, online virtual (19 participants)

# 1 Introduction

The main objective of WGEXT is to monitor activity on marine sediment extraction in member countries (ToRs A1 and A2 – see Annex 2). Contributions were provided in a new format and by correspondence from members who could not attend. ToR B focused on the development of a WGEXT aggregates database comprising data on marine extraction activities. Guidelines for the Management of Marine Sediment Extraction were reviewed in ToR C and, in ToR D, the WGEXT endeavoured to ensure outputs of the WGEXT are accessible by publishing as a group. These ToRs were discussed in the annual meetings of 2020, 2021 and 2022. Due to COVID restrictions, all meetings during this period were virtual.

Good stewardship requires good governance and a rigorous institutional structure. Sea level rise associated with climate change will lead to an intensification of coastal protection and marine aggregate is recognized as a critical national resource in this context, as well as for economic development. In the course of our deliberations, the growing potential for competition among uses of the EEZ brought increasing recognition of the need for plans for sustainable development and accommodation space for marine aggregate extraction. The sustainability of this resource must co-exist with the demands of marine renewable energies, fishing activities, etc. and is consistent with international efforts to establish frameworks for maritime spatial planning (e.g. Directive 2014/89/EU; <http://data.europa.eu/eli/dir/2014/89/oj>) in order to manage spatial conflict.

ToR E: focusing on the role of marine sediment extraction in cumulative impacts assessment was discontinued because an appropriate leader could not be identified.

ToR F: to discuss developments with implications for the management and the effects of marine sediment extraction was also discontinued; it will be replaced by a new ToR for the next 3-year term specifically looking at implications of expansion of offshore marine renewables for aggregate dredging.

## 2 ToR A1: Review data on marine extraction activities and provide a summary on marine extraction for the OSPAR region to OSPAR

WGEXT have again attempted to provide information for all ICES countries on the annual amounts of sand and gravel extracted. Although it continues to be difficult to obtain information from countries not regularly represented in person at ICES WGEXT meetings, the assembled information is considered to be representative of extraction activity in the ICES area. Tables of reported extraction statistics and designated areas for each year of the period have been compiled (see Annex 3, Tables 1–3 for dredging statistics and Tables 4–6 ‘areas involved’) and reported in annual e-evaluations. Current extractions categorised by end use, leased areas and, where possible, the footprint of dredged areas, are accessible in the WGEXT Dredging Dashboard at <https://rconnect.cefas.co.uk/content/26> (see ToR B). Volumes and areas of extraction were provided by Belgium, Denmark, Estonia, Finland, France, Germany, Iceland, Lithuania, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, the United Kingdom, and the United States. In this three-year period more than 195 348 387 m<sup>3</sup> were extracted from the EEZ of 16 member countries. The Netherlands accounted for 36% of the total followed by Denmark (18%) and the United Kingdom (15%). For the future the climate change and associated sea level rise may lead to an intensification of coastal protection and defence measures. In the current term almost half of the extraction volume (48%) relates to beach nourishment and shore protection. Information on licensed areas was representative of ICES member countries. Although data on areas actually dredged was sparse, dredged footprints were typically only a fraction of licensed areas. WGEXT again noted that information of dredged footprints 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 A1 concerns the collection of geospatial data on licensed and extraction locations in the form of shape files. WGEXT requests that shapefiles be provided on the WGEXT SharePoint site annually, even if values have not changed, from all ICES countries including those which are not in OSPAR, and reported also to < [Johan.nyberg@sgu.se](mailto:Johan.nyberg@sgu.se) >. In addition, OSPAR countries are asked to provide available shapefiles for 2019–2021 to OSPAR at < [Chris.moulton@ospar.org](mailto:Chris.moulton@ospar.org) > or < [Lucy.ritchie@ospar.org](mailto:Lucy.ritchie@ospar.org) >. Spatial data files (e.g. shapefiles) would be required for the pressure index analysis. Countries that have shapefiles are listed in Annex 3, Table 7.

### 3 ToR A2: Review of developments in marine sediment resource mapping, legal regime and policy, environmental impact assessment, research and monitoring

It is essential to have a good insight into the (regional) sea sand reserves for current and future use. ToR A2 focuses on a review of developments in marine sediment-resource mapping, legal regime and policy, environmental impact assessment, research, and monitoring. The United Nations Environment Program report titled 'Sand and Sustainability -10 strategic recommendations to avert crisis' (<https://owncloud.unepgrid.ch/index.php/s/au2a5f8e0n5w1fu>) recognises sand resources, including marine sand and gravel, are essential for economic development. Current approaches emphasise plans for sustainable development and accommodation space for marine aggregate extraction, marine renewable energies, fishing activities, etc. Long-term strategies are called for and are consistent with the EU directive establishing a framework for maritime spatial planning to prevent spatial conflict.

Progress and procedures for the sustainable use of marine aggregates to meet demands are, of course, different in each country. Reformation is in progress to bring it into conformity with national environmental requirements and the purpose of WGEXT is to help each country search for solutions to their problems, perhaps, based on what works in other countries. Such advice is embodied in the Guidelines provided by the WGEXT (ToR C). In this period, up-to-date reports were received from Finland, France, Germany, the Netherlands, Poland, United States and the United Kingdom.

#### **Finland**

The Geological Survey of Finland had mapped about 25 % of the territorial waters of Finland. Finland's Marine Strategy (2016–2021) promotes best management practices for the sustainable use of Marine aggregates with minimum adverse impacts.

#### **France**

In France, the Institut Français de Recherche pour l'Exploitation de la Mer (Ifremer) is in charge of mapping offshore aggregates. The French Naval Hydrographic and Oceanographic Service (SHOM) is in charge of bathymetric surveys dedicated to marine safety, and the Bureau de Recherches Géologiques et Minières (BRGM) maps seabed type, morpho-bathymetry, morpho-sedimentary, geology, sediment thickness, and bedrock morphology. The French Mining code reformation, led by Ifremer, is in progress to bring it into conformity with national environmental requirements. To assess the resilience of a former mining area of marine aggregate extraction, the RESISTE project (REsilience d'un Site Soumis à Travaux d'Extraction de granulats marins) is underway off the Loire estuary.

#### **Germany**

Marine aggregate extraction in Germany is carried out for the purpose of coastal defence is carried out the German EEZ in the North Sea with restrictions to reduce the pressure and environmental impact.

## The Netherlands

The Netherlands has implemented a new approach: the Mineral Information System (Delfstoffen Information systeem, DIS) using seismic data and a geological layer model supplemented with boreholes <https://publicwiki.deltares.nl/display/BOK/Delfstoffen+Informatie+Systeem>. Sand extraction is included in the legal regime for excavations. A permit can include requirements to maintain the amount of sand removed locally. Of particular concern is the construction of off-shore wind farms and electricity cables through the areas with the most cost-effective sand reserves.

## Poland

The Polish Geological Institute is in the process of preparing a geological map of the Polish EEZ. A spatial development plan for the Polish EEZ was developed (adopted 2022) to implement a coordinated, integrated and cross-border approach, including in particular an ecosystem approach for the sustainable development and growth of maritime and coastal economies, and the sustainable use of marine and coastal resources.

## USA

Four federal agencies are engaged in management or offshore sediment resources in the United States: the United States Geological Survey (USGS), the Bureau of Ocean Energy Management (BOEM), United States Army Corps of Engineers (USACE), and the National Oceanic and Atmospheric Administration (NOAA). The Bureau of Ocean Energy Management (BOEM) is the sole steward of the U.S. Federal Outer Continental Shelf (OCS) Marine Minerals (e.g. sand and gravel) while in nearshore water the U.S. Army Corps of Engineers is engaged in a Regional Sediment Management (RSM) is an approach for managing projects involving sand and other sediments to advance sustainability of the resource.

## UK

In many cases, the area available to be dredged within a licence area will be restricted through zoning. This may be as a result of a licence condition or as a voluntary initiative introduced by the dredging operator. The value of such zoning lies in minimising the spatial footprint of marine aggregate dredging activity, which in turn can reduce the potential footprint of environmental impact, and reduces the potential for spatial impacts with other users of the sea. Zoning also allows operators to manage their resources more effectively. Since 2003, BMAPA and The Crown Estate have undertaken to produce Regional Active Dredge Area (RADA) charts for all dredging regions on a bi-annual basis. These charts provide a snapshot of the extent of active dredge areas on 31 January and 31 July, with any changes to working areas highlighted in red. Where there is a need to highlight regional changes to existing marine aggregate production licence areas, the industry will occasionally also issue updated RADA charts outside of the biannual cycle. This ensures that the most up-to-date information on active dredge areas is available to other marine users. The charts are distributed to the fishing industry through the District offices of the Marine Management Organisation, and the latest versions can also be downloaded here: [http://www.bmapa.org/issues/other\\_sea\\_users.php](http://www.bmapa.org/issues/other_sea_users.php). The UK continues to pursue a regional approach to standard licence compliance monitoring, with multiple benefits in terms of consistency of approach, efficiency and lower costs.

## 4 ToR B: Finalize an ICES aggregate database comprising data on marine extraction activities

The ICES WGEXT Aggregate Dredging Dashboard is a database of marine extraction activities in the ICES area from 1993 to 2021. Work continues to address national data gaps, particularly concerning spatial data (i.e. shapefiles for license areas and area dredged), but the working version can be found at <https://rconnect.cefas.co.uk/content/26>. For background information see: <https://sway.office.com/orIuJoHSruYfhy09?ref=Link>.

A screenshot of the app is shown in Figure 1.



Figure 1. Screenshot from the WGEXT Dredging Stats Dashboard.

## 5 ToR C: Update ICES Guideline for Management of Marine Sediment Extraction

The WGEXT Guidelines were originally prepared in the 1980s focused, in part, on avoiding conflict with fisheries. In 2003 the Guidelines were updated and accepted by OSPAR. The Guidelines are intentionally 'higher level', and do not specify methods; countries are free to implement strategies in their own way. Although the guidelines are not often involved directly, the management of aggregate dredging typically conforms to the guidelines. For example, French technical guidelines for the preparation of impact studies for exploration and extraction of marine aggregates are consistent with the principles as set out in the Guidelines.

## 6 ToR D: Ensure outputs of the WGEXT are accessible by publishing as a group

The WGEXT Cooperative Research Report has been published and is available on the ICES website: [https://iceslibrary.figshare.com/articles/report/Marine\\_aggregate\\_extraction\\_and\\_the\\_Marine\\_Strategy\\_Framework\\_Directive\\_A\\_review\\_of\\_existing\\_research/19248542](https://iceslibrary.figshare.com/articles/report/Marine_aggregate_extraction_and_the_Marine_Strategy_Framework_Directive_A_review_of_existing_research/19248542)

## Annex 1: List of participants

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## Annex 2: WGEXT resolution

**2019/FT/HAPISG09 Working Group on the Effects of Extraction of Marine Sediments on the Ecosystem (WGEXT)**, chaired by Keith Cooper, UK, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2020	27–30 April	Online meeting		physical meeting cancelled - remote work
Year 2021	27 April; 10 May	Online meeting		
Year 2022	26–29 April	Online meeting	Final report by 15 June to SCICOM	

### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
A1	Review data on marine extraction activities and provide a summary on marine extraction for the OSPAR region to OSPAR	a) OSPAR requirements b) Advisory requirements	2.1, 6.4	Year 1, 2, 3	Annual extracted amounts and areas as a chapter in all Interim and Final Reports
A2	Review of developments in marine sediment resource mapping, legal regime and policy, environmental impact assessment, research and monitoring	a) Advisory requirements b) Inform other countries (ICES, EU) to optimize their policy and management	2.1, 6.4	Year 3	Chapter in Final Report
B	Finalize an ICES aggregate database comprising data on marine extraction activities	a) Advisory requirements b) Cooperation with ICES Data Centre	2.1, 6.4	Year 1,2,3	Year 1: finalize template Year 2: incorporate historical data in ICES database Year 3: streamline the dataflow from ICES countries to database
C	Update ICES Guideline for Management of Marine Sediment Extraction	a) Advisory requirements b) Inform other countries (ICES, EU) to optimize their policy and management	2.1, 6.4	Year 1,2,3	Year 1: review the Guidelines Year 2: formulate revised guidelines Year 3: revised guidelines accepted by OSPAR

D	Ensure outputs of the WGEXT are accessible by publishing as a group	a) Inform other countries (ICES, EU) to optimize their policy and management b) Contribute to the visibility and impact of ICES	2.1, 6.4	ongoing	Publish results of the WG on intensity of extraction, on MSFD and on cumulative impacts as journal papers. Distribute Annual Reports to networks outside ICES
E	Include marine sediment extraction in cumulative impact assessment	Contribute and working together with other ICES and OSPAR WGs that are involved in this subject.	2.1, 2.2	Year 1,3	Year 1: intensify the contacts with other WGs in OSPAR and ICES. Year 3: define in cooperation with other WGs a Best Practise to include marine extraction in cumulative impact assesments.
F	Review developments with implications for the management and the effects of marine sediment extraction.	a) Advisory requirements b) Contribute to the update of the ICES guidelines	2.7, 6.4	Year 3	Chapter in Final Report

### Summary of the Work Plan

Year 1	The data on marine extraction are published each year and send to OSPAR (ToR A1). To put the data in the ICES data base a template will be finalized (ToR B). The inventory for revised ICES Guidelines is ready (ToR C). A theme session on extraction will be held at ASC 2020 and the essay on dredging intensity will be submitted to a journal (ToR D). Contacts with other ICES and OSPAR WGs on cumulative effects will be established (ToR E).
Year 2	The data on marine extraction are published each year and send to OSPAR (ToR A1). The historical data (1986-2018) will be put in the ICES data base (ToR B). The text for the actualization of the ICES Guidelines will be ready (ToR C). The review on Extraction and MSFD and the review on Cumulation of Effects will be submitted to a journal (ToR D)
Year 3	The data on marine extraction are published each year and send to OSPAR (ToR A1). A review of developments in marine sediment extraction in the ICES countries will be published in the Final Report (ToR A2).The gathering of extraction data will find its way to the ICES data base (ToR B). The revised ICES Guidelines will be accepted by ICES and OSPAR (ToR C and F). An overview of ToR A1 and A2 will be submitted to a journal (ToR D and F). Together with other ICES an OSPAR WGs a Best Practise to include marine extraction in cumulative impacts assessments will be formulated (ToR E).

### Supporting information

Priority	The activities of WGEXT will lead into issues related to the effects on the ecosystem of marine sediment extraction. Sediment extraction is increasing in some countries and rather stable in others. This human activity is connected to several descriptors in the EU MSFD. The report of WGEXT and the ICES Guidelines are used in the management of extraction in the member countries. Consequently, the activities of WGEXT are considered to have a high priority.
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Resource requirements	The activities of WGEXT are focussed on the use of existing research programmes (e.g. EIA monitoring) and data on marine extraction and management. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Annual Meeting of WGEXT is normally attended by some 12-20 members and guests. Besides that several members contribute by correspondence.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	ACOM
Linkages to other committees or groups	There is a direct linkage to the ICES Data Centre and a potential working relationship with WGs in SCICOM and OSPAR who are involved in cumulative effects and spatial planning.
Linkages to other organizations	Data on marine extraction are delivered to OSPAR.

## Annex 3: Tables/ ToR A1

Table 1. Summary Table of National Marine-sediment Extraction Activities in 2019.

Country	A) Construction/ industrial aggregates (m <sup>3</sup> )	B) Beach replenishment (m <sup>3</sup> )	C) Construction fill/land reclamation (m <sup>3</sup> )	D) Non aggregate (m <sup>3</sup> )	E) Total Extracted (m <sup>3</sup> )	F) Aggregate exported (m <sup>3</sup> )
Belgium (OSPAR)	2,859,000	537,000	0	0	3,490,000 <sup>a</sup>	1,075,000 <sup>b</sup>
Denmark (OSPAR)	1,895,342	2,541,632	2,548,354	0	6,985,328	348,844
Denmark (HELCOM)	2.226,995	58,300	5.239,637	0	7.524,932	572,446
Denmark (All)	3,871,843	2,588,542	5,246,434	0	11,706,819 <sup>c</sup>	914,572
Finland (HELCOM)	0	0	0	0	0	0
France (OSPAR)	3,511,255 <sup>d</sup>	No data <sup>e</sup>	No data	200,800 <sup>f</sup>	3,712,055 <sup>g</sup>	N/A
France (ICES – Med)	0	No data <sup>2</sup>	No data	0	0	N/A
Iceland (OSPAR)	73,200	0	93,600	127,573 <sup>h</sup>	294,373	0
Lithuania (HELCOM)	0	0	0	0	0	0
Netherlands (OSPAR)	0	12,156,489	8,268,147	114,700	20,539,336	1,919,667
Norway (OSPAR)	0	0	0	Few thousand tons (shell)	0	0
Poland (HELCOM)	707,604	943,628	0	0	1,651,232	No data <sup>i</sup>
Portugal (Azores)	38,859 <sup>j</sup>	0	0	0	38,859	0
Portugal (Madeira)	107,660	0	0	0	107,660	0
Portugal (OSPAR)	0	1,000,000	0	0	1,000,000	0
Portugal (All)	146,519	1,000,000	0	0	1,146,519	0
Spain (OSPAR) <sup>k</sup>	-	78,421 <sup>l</sup>	-	-	0 <sup>m</sup>	-
Spain (Med) <sup>k</sup>	-	686,451 <sup>n</sup>	-	-	114,950 <sup>n</sup>	-
Spain (Canary Islands) <sup>1</sup>	-	0	-	-	0	-
Sweden (HELCOM)	0	0	0	0	0	0

United Kingdom (OSPAR)	7,915,216	2,583,658	0	0	10,498,874	2,700,791
United States (ICES)	0	8,023,949	399,337	0	8,423,286	0
<p><sup>a</sup> Sand only.</p> <p><sup>b</sup> Material exported to France (196,000 m<sup>3</sup>), UK (205,000 m<sup>3</sup>) and the Netherlands (674,000 m<sup>3</sup>).</p> <p><sup>c</sup> Note that the sum of OSPAR and HELCOM figures is not equal to the total for Denmark as the two areas overlap in the Kattegat.</p> <p><sup>d</sup> Breakdown of figure by location: 1,182,506 m<sup>3</sup> (Channel), 2,328,748 m<sup>3</sup> (Atlantic), 0 m<sup>3</sup> (Brittany).</p> <p><sup>e</sup> Whilst France does extract sand for beach replenishment, data are unavailable because these extractions are in the jurisdiction of the local/regional authorities. An environmental assessment has to be performed but a mining license is not required.</p> <p><sup>f</sup> Shelly sand (Brittany). Figure is for maximum permitted amount because extracted data is subject to statistical confidentiality.</p> <p><sup>g</sup> Included licensed data (maximum permitted) for non-aggregate (Brittany) because extracted data is subject to statistical confidentiality.</p> <p><sup>h</sup> 116,433 m<sup>3</sup> (Mäerl), 11,140 m<sup>3</sup> (Shells, 80-90%).</p> <p><sup>i</sup> Information not available (trade secret).</p> <p><sup>j</sup> Azores extraction by island: Faial (3,672 m<sup>3</sup>), Pico (4,860 m<sup>3</sup>), S. Jorge (864 m<sup>3</sup>), Flores(0 m<sup>3</sup>), Corvo (0 m<sup>3</sup>), Terceira (15,036 m<sup>3</sup>), Graciosa (1,404 m<sup>3</sup>), Ponta Delgada (9,660 m<sup>3</sup>), Santa Maria (3,363 m<sup>3</sup>).</p> <p><sup>k</sup> Spanish legislation allows marine extraction activities from marine deposits only in the cases that the sediment extracted is used for the purpose of beach nourishment.</p> <p><sup>l</sup> 75,255 m<sup>3</sup> come from dredged materials (ports) and 3,166 m<sup>3</sup> come from in-beach redistribution.</p> <p><sup>m</sup> No dredging from marine deposits other than dredged material from ports.</p> <p><sup>n</sup> 114,950 m<sup>3</sup> come from marine deposits, 455,498 m<sup>3</sup> come from dredged materials (ports), 67,348 m<sup>3</sup> come from in-beach redistribution and 48,655 m<sup>3</sup> come from other non-marine sources (i.e. rivers, terrestrial quarries).</p>						

Table 2. Summary Table of National Marine-sediment Extraction Activities in 2020.

Country	A) Construction/ industrial aggregates (m <sup>3</sup> )	B) Beach replenishment (m <sup>3</sup> )	C) Construction fill/ land reclamation (m <sup>3</sup> )	D) Nonaggregate (m <sup>3</sup> )	E) Total Extracted (m <sup>3</sup> )	F) Aggregate exported (m <sup>3</sup> )
Belgium (OSPAR)	3,177,000	757,000	0	0	3,930,000	1,441,000 <sup>a</sup>
Canada	No report	No report	No report	No report	No report	No report
Denmark (HELCOM)	1,552,924	1,905,881	564,354	9,080	4,023,159	0
Denmark (OSPAR)	1,992,703	3,729,314	117,844	144,714	5,839,861	320,420
Denmark (total) <sup>b</sup>	3,373,521	3,787,976	645,961	153,794	7,807,458	320,420
Estonia (HELCOM)	0	0	0	0	0	0
Finland (HELCOM)	0	0	0	0	0	0
France (OSPAR)	3,618,649	No data	No data	200 800 <sup>c</sup>	3,819,449 <sup>d</sup>	No data
France (Med)	0	No data	No data	0	0	No data
Germany (HELCOM)	No report	No report	No report	No report	No report	No report
Germany (OSPAR)	No report	No report	No report	No report	No report	No report
Greenland (OSPAR)	No report	No report	No report	No report	No report	No report
Faroes (OSPAR)	No report	No report	No report	No report	No report	No report
Iceland (OSPAR)	9,130	0	466,300	102,222 <sup>e</sup>	577,652	0
Ireland (OSPAR)	No report	No report	No report	No report	No report	No report
Latvia (HELCOM)	No report	No report	No report	No report	No report	No report
Lithuania (HELCOM)	0	0	0	0	0	0
Netherlands (OSPAR)	0	10,738,926	11,841,651	135,767	22,716,344	3,143,593
Norway (OSPAR) <sup>f</sup>	No data	No data	No data	No data	No data	No data
Poland (HELCOM)	0	0	1,093,548	0	0	No data
Portugal (Mainland)	0	0	0	0	0	0
Portugal (Azores)	-	-	-	-	85,658	-

Portugal (Madeira)	No report	No report	No report	No report	No report	No report
Spain (OSPAR)	0	193,421	0	0	193,421	0
Spain (MED)	0	900,583 <sup>g</sup>	0	0	900,583	0
Spain (Canary Islands)	0	0	0	0	0	0
Sweden (OSPAR)	0	0	0	0	0	0
Sweden (HELCOM)	0	81,203	0	0	0	0
United Kingdom (OSPAR)	7,110,705	1,080,111	0	0	8,190,817	2,511,487
United States <sup>h</sup>	0	8,023,949	3,99,337 <sup>i</sup>	0	8,423,286	0

<sup>a</sup> Of this figure, 338,000 m<sup>3</sup> was exported to France in 2020, 200,000 m<sup>3</sup> to the UK and 903,000 m<sup>3</sup> landed in the Netherlands but returned to Belgium.

<sup>b</sup> 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. The total for Denmark has been reported separately.

<sup>c</sup> Licensed data for France (maximum permitted) because extracted data is subject to statistical confidentiality.

<sup>d</sup> Included licensed data for France (maximum permitted) for non-aggregate because extracted data is subject to statistical confidentiality.

<sup>e</sup> 93,702 m<sup>3</sup> (Mäerl), 8,520 m<sup>3</sup> (Shells, 80-90%). Total 102,222 m<sup>3</sup> Nonaggregate

<sup>f</sup> Extraction in Norway is minor.

<sup>g</sup> This figure for Spain includes, 106.950 m<sup>3</sup> from marine deposits, 87.086 m<sup>3</sup> come from dredged materials (ports), and 706.547 m<sup>3</sup> from in-beach redistribution. In addition to this amount, 300,789 m<sup>3</sup> were placed on beaches from nonmarine sources.

<sup>h</sup> Figures reported for USA pertain to northern areas of the eastern seaboard only (North of Cape Hatteras)

<sup>i</sup> Used as cover material on an (old) offshore disposal site.

Table 3. Summary Table of National Marine-sediment Extraction Activities in 2021.

Country	A) Construction / industrial aggregates (m <sup>3</sup> )	B) Beach replenishment (m <sup>3</sup> )	C) Construction fill/ land reclamation (m <sup>3</sup> )	D) Nonaggregate (m <sup>3</sup> )	E) Total Extracted (m <sup>3</sup> )	F) Aggregate exported (m <sup>3</sup> )
Belgium (OSPAR)	3,735,103	1,839,021	0	0	5,574,124	1,835,000
Denmark (OSPAR)	2,378,662	6,049,931	0	0	8,428,593	555,286
Denmark (HELCOM)	1,980,232	797,877	625,369	0	3,277,968	0
Denmark (ICES) <sup>a</sup>	4,089,681	6,574,853	625,369	0	11,164,393	555,286
Estonia	0	0	0	0	0	0
Finland	2400	0	0	0	2400	0
France (OSPAR)	4,190,425	ND <sup>b</sup>	ND	200,800 <sup>c</sup>	4,391,225 <sup>d</sup>	ND
Germany (OSPAR)	28,153	2,433,696	0	0	5,071,071	0
Germany (HELCOM)	2,031,254	577,968	0	0		0
Iceland (OSPAR)	38,020	0	0	127,792	165,812	0
Lithuania (HELCOM)	0	194,000	0	0	194,000	0
Netherlands (OSPAR)	0	18,574,771	7,536,104	135,965	26,246,840	3,197,289
Poland (HELCOM)	969,264.52	177,330.05	0	0	1,1465,94.57	ND
Spain (OSPAR)	0	0	0	0	0	0
Spain (MED)	0	125,197	0	0	125,197	0
Spain (Canary Islands)	0	0	0	0	0	0
UK	8,388,920	1,371,077	0	0	9,759,997	2,494,019
USA	0	1,002,181	0	1,434,305	2,436,486	

ND – No data

<sup>a</sup> Total quantities extracted for Denmark cannot be calculated from the addition of OSPAR and HELCOM figures due to an overlap of jurisdictions in the Kattegat; total figures are reported under Denmark (ICES).

<sup>b</sup> France does extract sand for beach replenishment, but data is not available because these extractions are in the jurisdiction of the local/regional authorities. An environmental assessment has to be performed, but a mining license is not required.

<sup>c</sup> Licensed data (maximum permitted) because extracted data is subject to statistical confidentiality.

<sup>d</sup> Included licensed data (maximum permitted) for non-aggregate (Brittany) because extracted data is subject to statistical confidentiality.

<sup>e</sup> 117,852 m<sup>3</sup> (Mäerl), 9,940 m<sup>3</sup> (Shells, 80-90%)

**Table 4. Spatial extent of areas 'licensed' and 'dredged' in 2019.**

Country	Area Licensed (km <sup>2</sup> )	Area Dredged (km <sup>2</sup> )
Belgium (OSPAR)	203	59
Denmark (All)	617	No data
Finland (HELCOM)	7.7	0
France	192.87 <sup>a</sup>	151.16 <sup>b</sup>
Iceland (OSPAR)	19.82	8.11 <sup>c</sup>
Lithuania	No report	0 <sup>d</sup>
Netherlands (OSPAR)	548	95
Norway (OSPAR)	No data	No data
Poland (HELCOM)	48.59 <sup>e</sup>	No information <sup>f</sup>
Portugal	No report	No report
Spain (OSPAR)	Not available	0 <sup>g</sup>
Spain (Med)	Not available	0.216 <sup>h</sup>
Sweden (HELCOM)	9.99	0
United Kingdom (OSPAR)	1079	105
United States (ICES)	No report	No report

<sup>a</sup> 185.29 km<sup>2</sup> for sand and gravel and 7.58 km<sup>2</sup> for shelly sand.

<sup>b</sup> Estimated value. Whilst French dredging vessels are fitted with EMS, the information is not used to determine area dredged. Reported value corresponds to the maximum area where extraction took place in 2019, taking into account any exclusion zones and dredging sites where no extraction was reported.

<sup>c</sup> Dredging occurred in 10 licensed areas in 2019. The size of these 10 licensed areas is 8.11 km<sup>2</sup>. No data for actual area dredged within these 10 licensed areas is available.

<sup>d</sup> Based on no extraction taking place in 2019.

<sup>e</sup> 4.44 km<sup>2</sup> (Beach replenishment), 44.15 km<sup>2</sup> (Construction/industrial).

<sup>f</sup> Probably similar to spatial extent of areas licensed for extraction (for beach replenishment). No data available in relation to construction/industrial.

<sup>g</sup> None in marine deposits. 0.067 (ports), 0.003 (beach).

<sup>h</sup> figure relates to marine deposits only. Also 0.470 km<sup>2</sup> (ports), 0.055 km<sup>2</sup> (beach).

**Table 5. Spatial extent of areas 'licensed' and 'dredged' in 2020.**

<b>Country</b>	<b>Area Licensed (km<sup>2</sup>)</b>	<b>Area Dredged (km<sup>2</sup>)</b>
Belgium (OSPAR)	204.32	55.77
Denmark (All)	647	No data
Finland (HELCOM)	10	0
France	192.87	No data
Germany (OSPAR)	No report	No report
Germany (HELCOM)	No report	No report
Iceland (OSPAR)	20.69	2.46
Lithuania	Figure not supplied	0
Netherlands (OSPAR)	No report	No report
Norway (OSPAR)	No report	No report
Poland (HELCOM)	45	7
Portugal	No report	No report
Spain	10	7
Spain (Med)	Not available	0.207
Sweden (HELCOM)	No report	No report
United Kingdom (OSPAR)	1,056	101
United States (ICES)	No report	No report

**Table 6. Spatial extent of areas 'licensed' and 'dredged' in 2021.**

Country	Area Licensed (km <sup>2</sup> )	Area Dredged (km <sup>2</sup> )
Belgium (OSPAR)	153,82	44
Canada	No report	No report
Denmark (All)	605	Data not available
Estonia	No report	No report
Finland (HELCOM)	No report	Data not available <sup>a</sup>
France	192.87 <sup>b</sup>	154.66 <sup>c</sup>
Germany (OSPAR)	406	Data not available
Germany (HELCOM)	No report	No report
Greenland and the Faeroes	No report	No report
Iceland (OSPAR)	22.93	10.82 <sup>d</sup>
Ireland	No report	No report
Lithuania	Not reported	~2.5
Netherlands (OSPAR)	560	98
Norway (OSPAR)	No report	No report
Poland (HELCOM)	78.8 <sup>e</sup>	25.3 <sup>f</sup>
Portugal	No report	No report
Spain	No report	No report
Sweden (HELCOM)	No report	No report
United Kingdom (OSPAR)	1068	105
United States (ICES)	No report	No report

<sup>a</sup> Extraction took place on one of the licensed areas with a grab dredger

<sup>b</sup> 185.29 km<sup>2</sup> for sand and gravel and 7.58 km<sup>2</sup> for shelly sand

<sup>c</sup> Maximum area over which dredging could have occurred (NB French dredging vessels are fitted with EMS but the information is not treated to make area in which extraction activity occur available).

<sup>d</sup> Dredging occurred in six licensed areas in 2021. The size of these six licensed areas is 10.82 km<sup>2</sup>. No data for actual area dredged within these six licensed areas is available.

<sup>e</sup> Beach replenishment: 34.3 km<sup>2</sup> Construction/industrial: 44.5 km<sup>2</sup>

<sup>f</sup> Probably similar to spatial extent of areas licensed for extraction (for beach replenishment). Construction/industrial: Only one deposit was extracted this year - "Południowa ławica Środkowa" Bałtyk Południowy (25,3 km<sup>2</sup>).

Table 7. Geospatial Shapefile information.

Country	Shapefiles licensed			Shapefiles extracted		
	2019	2020	2021	2019	2020	2021
Belgium (OSPAR)	Yes	Yes	Yes			
Canada						
Denmark (All)	Yes					
Estonia						
Finland (HELCOM)	Yes	Yes	Yes			
France	Yes	Yes	Yes			
Germany	Yes	Yes	Yes			
Greenland and the Faeroes						
Iceland (OSPAR)	Yes					
Ireland						
Lithuania						
Netherlands (OSPAR)	Yes		Yes			
Norway (OSPAR)						
Poland (HELCOM)	Yes	Yes				
Portugal						
Spain		Yes				
Sweden (HELCOM)						
United Kingdom (OSPAR)	Yes	Yes	Yes	Yes	Yes	Yes
United States (ICES)						