Depositing of dredged material in the Baltic Sea

Key message

- The total amount of material deposited at the Baltic Sea is highly variable between years, depending on the large-scale capital dredging operations carried out by counties in particular years. Total amount of material deposited in 2020 was a bit less than 9 million tonnes which is 4 million tonnes less than in 2019. Dredged material was deposited at 106 depositing sites.

- In 2020, the amount of material deposited at sea originating from capital dredging operation was a bit higher as from maintenance operations. Capital dredging produced almost 5.1 million tonnes of the deposited material, which constitutes 56% of all dredged material deposited at sea in 2020. This amount is the lowest since 2017 (4.9 million tonnes) for capital dredging, and the third lowest for the whole assessment period. Most of the capital dredging in 2020 was reported by Russia, Denmark, Poland and Sweden.

- Maintenance dredging in 2020 produced 3.9 million tonnes of dredged material, which constitutes about 44% of all dredged material deposited at the Baltic Sea. The amount originating from maintenance dredging has been relatively stable from 2017 onwards, being around 4 million tonnes. The main contributors in 2020 were Russia, Latvia and Lithuania. Less than 1% of the material deposited was originating from unknown sources in 2020.

- 81% (7.3 million tonnes) of the material deposited at sea in 2020 was delivered from harbours and river estuaries and only 19% (1.7 million tonnes) originates from dredging operations at sea. This distribution is similar than in 2018 and 2019 but differs from 2017, 2015 and 2014 demonstrating reverse picture. Most of the material originating from harbours and rivers was reported by Russia, Lithuania and Poland, while dredging at sea was mainly reported by Russia.

- There were six major contaminants reported by countries in 2020: four heavy metals (mercury, lead, cadmium and copper), tributyltin and polycyclic aromatic hydrocarbons. More than 85% of contaminants originate from sediments transported from harbours and rivers.

- Large amount of dredged material in the Baltic Sea was utilized for various beneficial purposes including beach nourishment, habitat generation and other needs. Totally 0.75 million tonnes of dredged material were reported as for beneficial use, at 14 sites. This is almost 9 times less than in 2019. Most of that material, around 0.7 million tonnes, was utilized in southern and western parts of Sweden. The sites where dredged material was used for beneficial purposes are indicated on figure 1, but not included in the analysis.[1]

Results and assessment

Relevance of the BSEFS for describing developments in the environment

The depositing of dredged material fact sheet is relevant for seabed integrity and input of hazardous substances to the marine environment. The fact sheet enables to assess the level of physical disturbance to the marine environment caused by dredging/depositing operations at sea, as well as the level of

[1] National practices on how beneficial use is regulated and reported varies among the Contracting Parties, and the annual reporting to HELCOM is not giving a comprehensive picture of beneficial usage in the Baltic Sea region. Further, as the data on dredged material is stored in a spatial database at HELCOM, only beneficial events that have spatial component are stored, and the figures in the BSEFS only cover those events.

contamination of marine and costal sediments and the amount of priority pollutants entering the marine environment or resuspended in the marine environment with deposited material.

Policy relevance and policy references

There is a general prohibition of dumping in the Baltic Sea according to the Helsinki Convention, except for dredged material; however, dumping of dredged material containing harmful substances is only permitted according to HELCOM Guidelines for Management of Dredged Material at Sea. The Contracting Parties are obliged to regulate and report about the material that has been deposited in the Baltic Sea Area. Data on depositing of dredged material is to be reported annually by the end of September of the year following the year the activities have been taken place.

The updated HELCOM Baltic Sea Action Plan, adopted at the 2021 HELCOM Lübeck Ministerial Meeting, states that the management objective on minimizing loss and disturbance to seabed habitats is to be met in order to reach the desired state where activities affecting seabed habitats do not threaten the viability of species' populations and communities. Activities causing disturbance to the seabed also contribute to the potential release of harmful substances.

Activities such as mineral extraction and dredging but also installation of offshore wind farms, other forms of marine energy production, and laying of underwater cables and pipelines have negative effects on the marine environment. One of the effects from these activities is physical disturbance and loss of the seabed. About 40% of the Baltic Sea seabed is estimated to be potentially disturbed, with many underwater biotopes and species in unfavourable conservation status. Under the sea-based activities segment of the 2021 BSAP the theme on seabed loss and disturbance includes five actions addressing this.

Majority of HELCOM Contracting Parties are also parties to the global "Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972", the "London Convention" for short. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. London Convention is also collecting information on the depositing activities of its Contracting Parties, and HELCOM started a trial with 2017 data to perform consolidated reporting to the London Convention on behalf of HELCOM Contracting Parties.

Assessment

Reported data in 2020 data

HELCOM Recommendation 36/2 recommends that the Contracting Parties follow the HELCOM Guidelines for Management of Dredged Material at Sea, and that the Contracting Parties annually report national data on management of dredged material according to the Reporting Format of the HELCOM Guidelines. Data from 2020 were reported by all countries. As agreed by PRESSURE 5-2016 (Outcome, para 5.9), analysis of reported data have been made to illustrate deposition of dredged material and also the distribution of input of selected contaminants associated with it to the Baltic Sea marine environment.

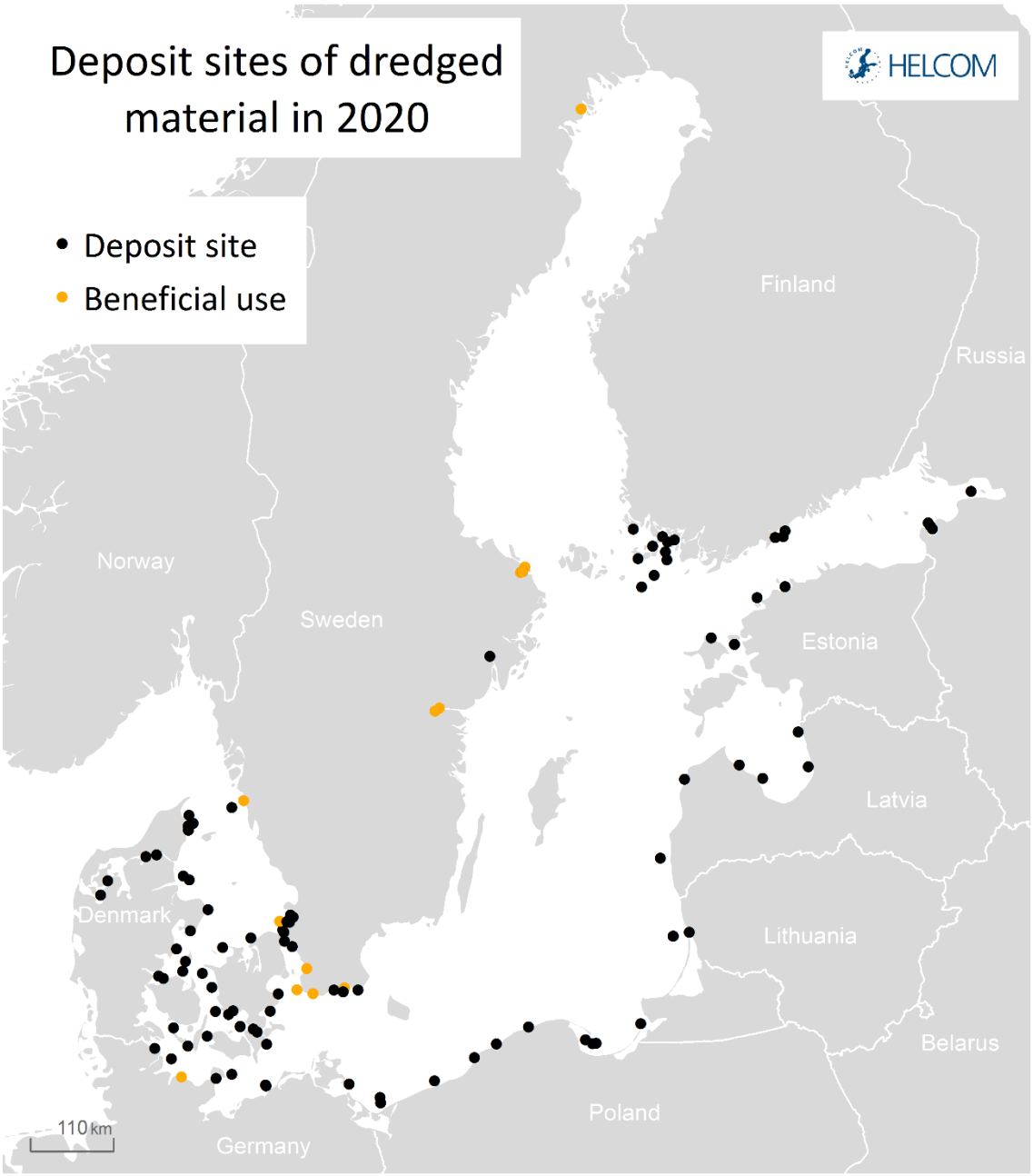

Figure 1. Location of depositing sites of dredged material in 2020 as well as locations where dredged material has been used for beneficial use.

Figure 1 illustrates the distribution of 106 locations where depositing of dredged material took place in 2020. The map also includes 14 locations where dredged material has been used for beneficial purposes, such as beach nourishment and habitat generation. As it can be seen from the map, the density of depositing sites is higher in the southern than northern Baltic Sea.

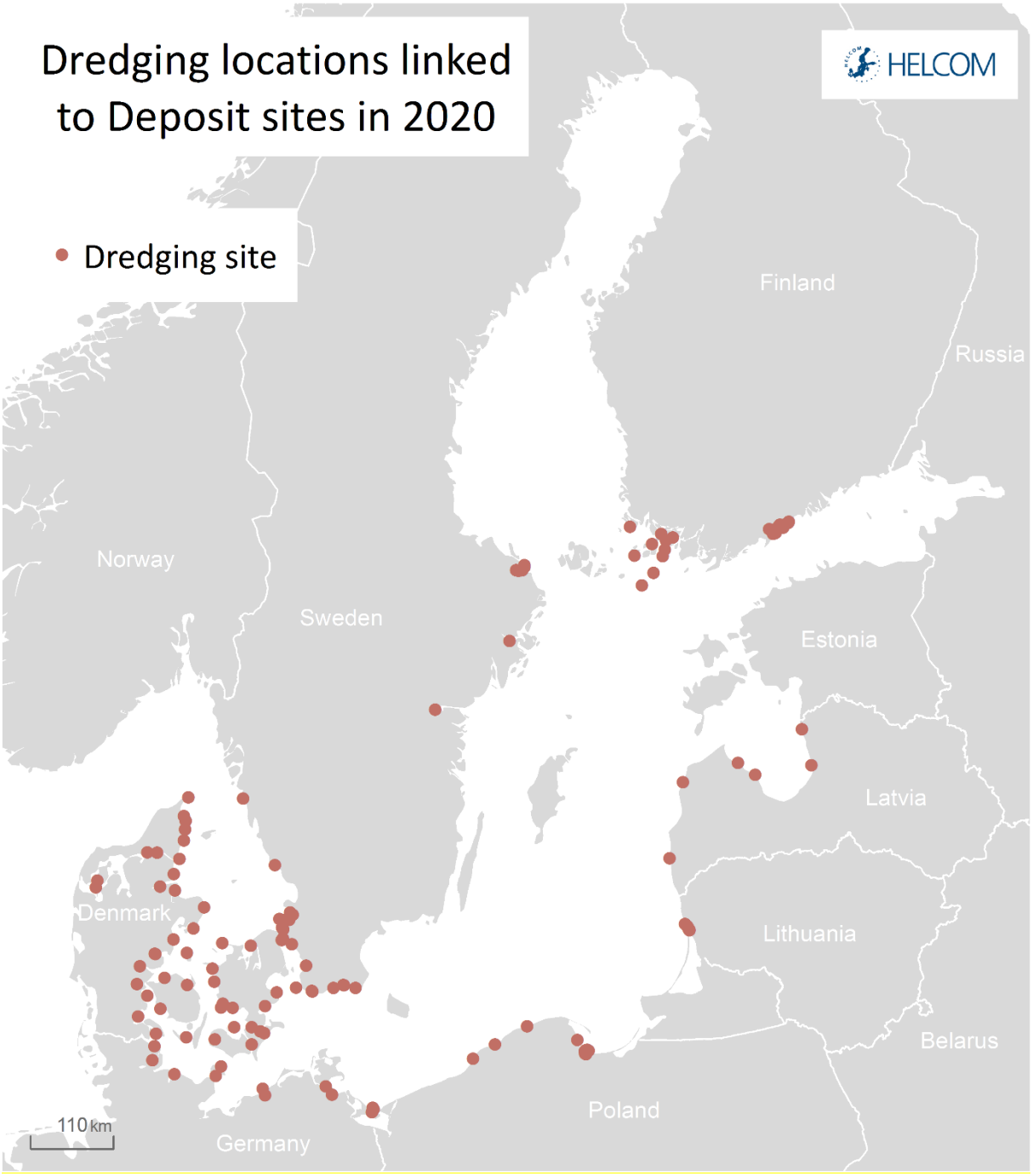

Figure 2. Location of dredging sites that are linked to depositing sites reported for 2020. Reporting of dredging sites is optional in HELCOM guidelines, and therefore not all dredging sites are reported and indicated on the map. Please also note that only dredging sites that are linked to depositing operations are reflected and the data doesn't give a comprehensive picture of dredging in the Baltic Sea.

The reporting format also includes information on dredging areas in the Baltic Sea and their link to the areas where dredged material was deposited. Figure 2 illustrates the distribution of 172 sites of dredging operations in the Baltic Sea in 2020 according to the information reported by the Contracting Parties. Reporting of dredging is optional according to HELCOM Guidelines.

Deposited material originated from maintenance and capital dredging operations

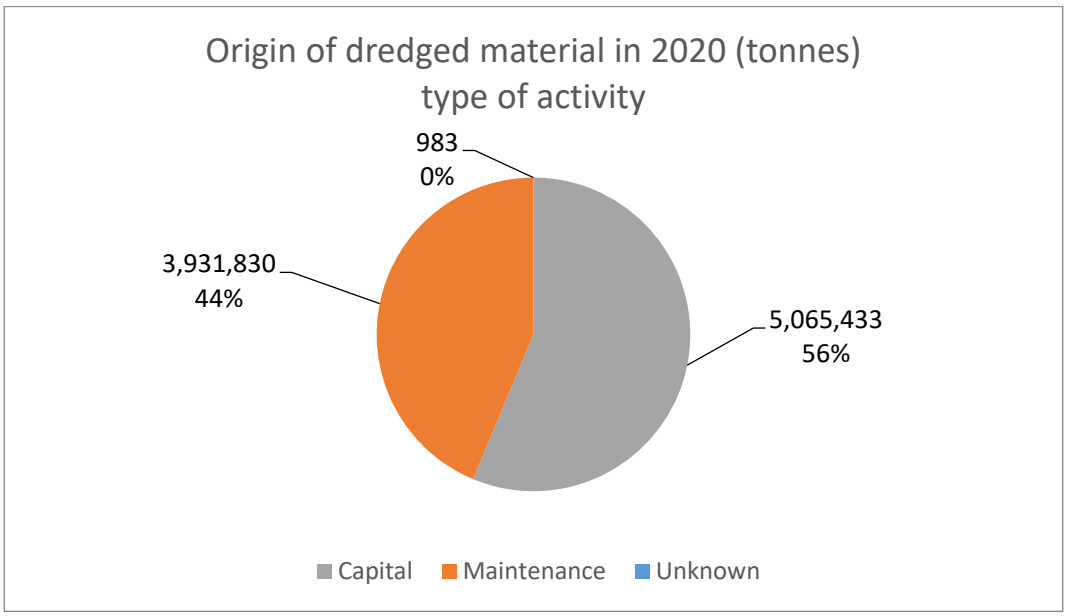

Figure 3. Proportions of material originating from maintenance dredging, capital dredging, and unknown operations in the total amount of dredged material deposited at the Baltic Sea in 2020.

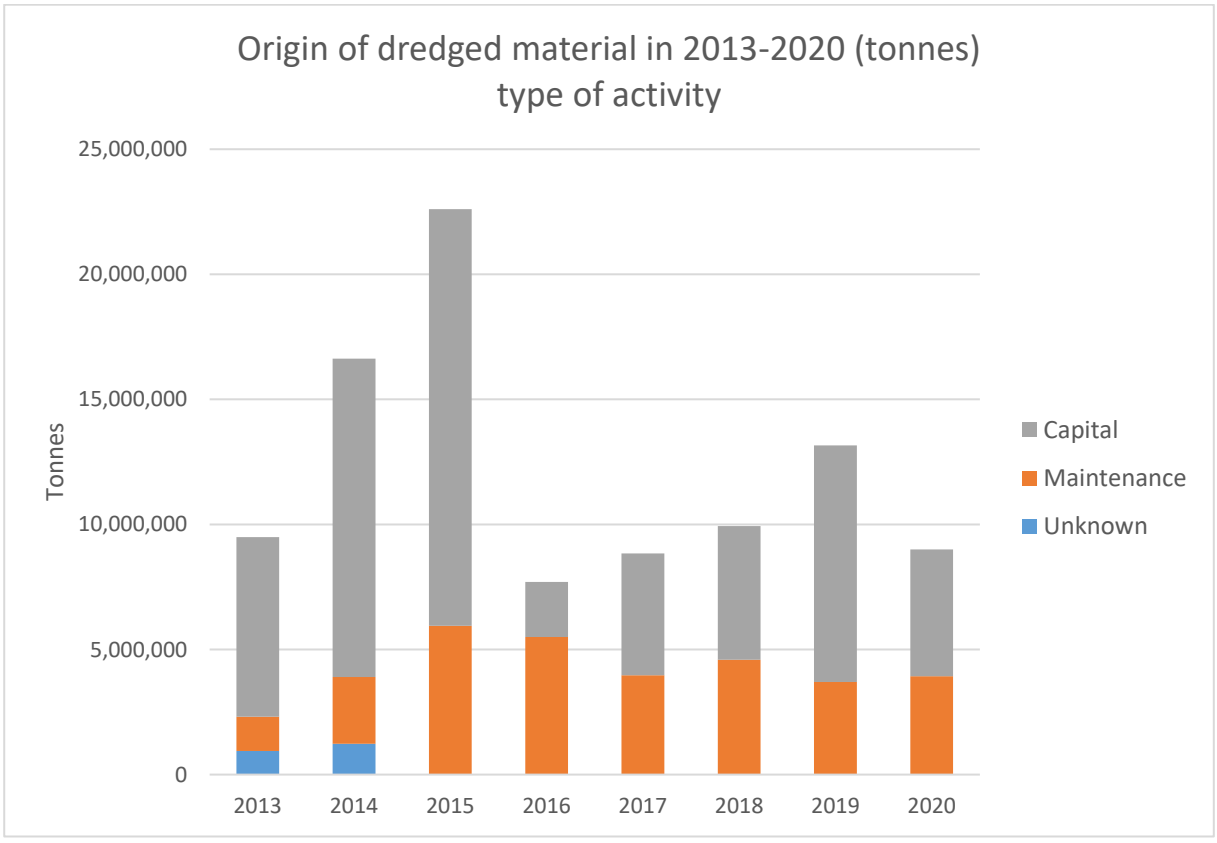

Figure 4. Amount of the material originating from maintenance dredging, capital dredging, and unknown operations in total of the amount of dredged material deposited at the Baltic Sea in the period from 2013 to 2020.

Most material (56%) deposited at sea in 2020 originates from capital dredging which is considerably less than the proportion reported in 2019 (72%). Meanwhile the proportion of maintenance dredging in 2020 constitutes 44%. Prevailing of capital dredging over maintenance is a typical picture in the region except for the year 2016 when capital dredging activities were minimal (Figure 4). In 2013-14 the material of unknown origin constituted a remarkable part, since 2015 the percentage of the material of unknown origin reported by countries has been negligible (Fig. 4).

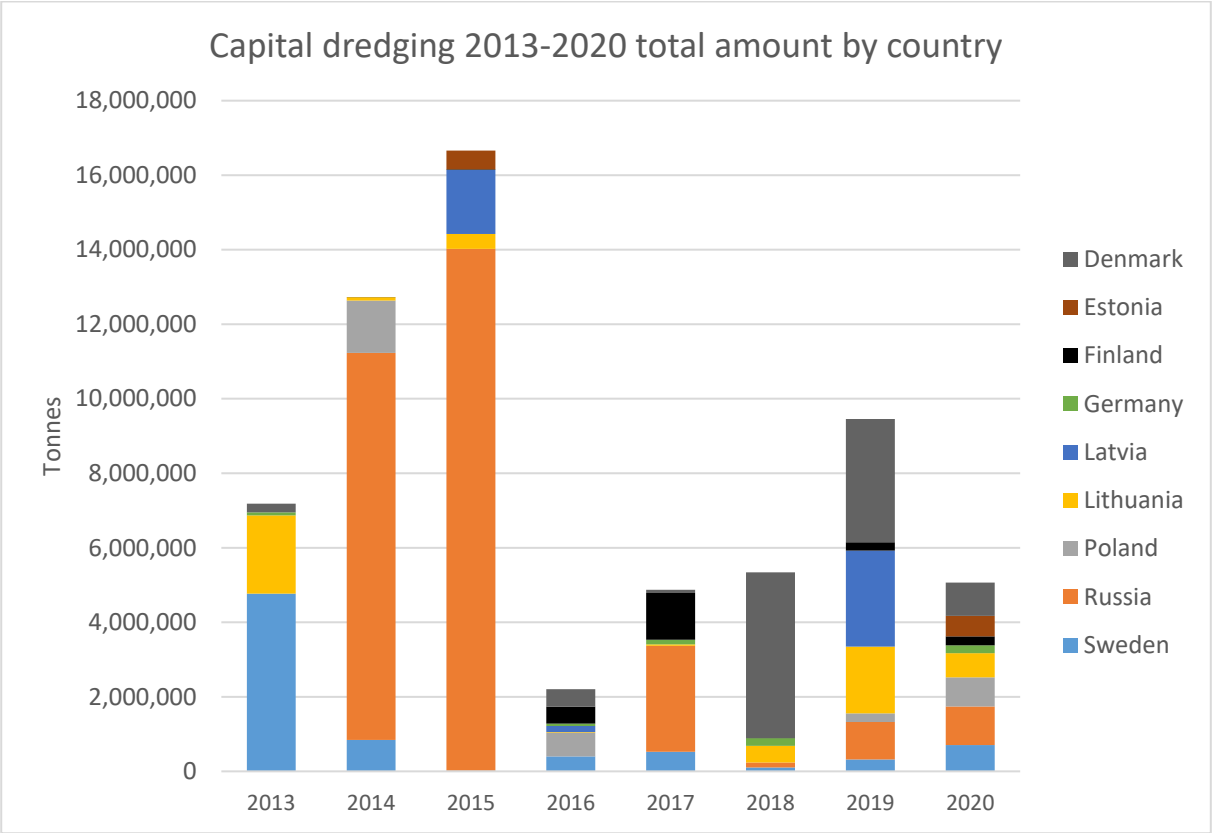

Figure 5. Deposition of material from capital dredging operations by country for the period 2013-2020.

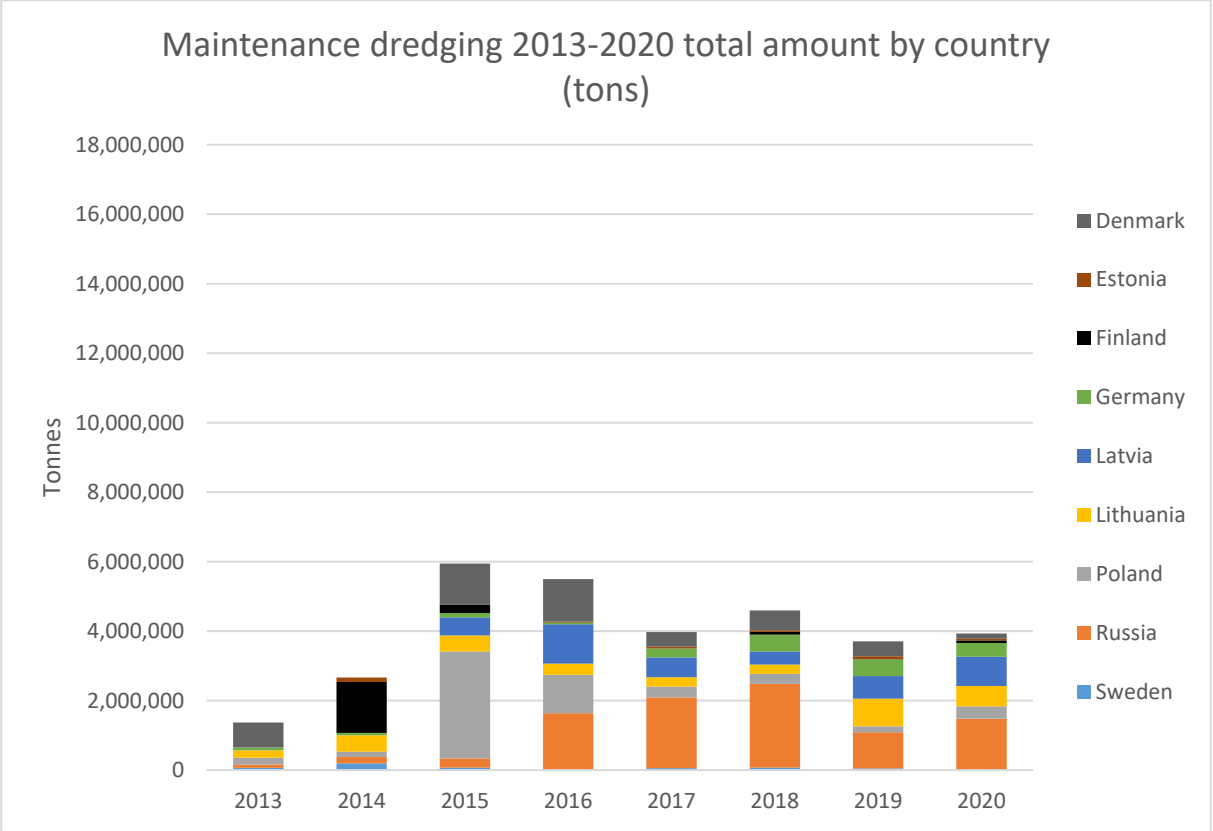

Figure 6. Amount of material deposited from maintenance dredging operations by country for the period 2013-2020.

The bar diagrams (Figures 5 and 6) illustrate the depositing of material produced by capital and maintenance dredging activities per country. The diagrams show that a large amount of dredged material deposited at sea in 2020 was produced by capital dredging in Russia, Denmark, Poland and Sweden. As regard to maintenance dredging the largest volume of deposited material was produced by Russia, Lithuania and Latvia.

Total amount of dredged material deposited

In 2020 a bit less than 9 million tonnes of dredged material were disposed at in the Baltic Sea which is about 4 million tonnes less than in 2019 (Fig. 4). In addition, 0.75 million tonnes of dredged material were used for construction purposes (beneficial use). In the given assessment period, the total amounts of deposited material varied between 7 000 000 and 23 000 000 tonnes. Such a large variation is caused by the large amount of depositing reported by Russia in 2014-2015. Completeness of the data reporting in the last 6 years is 100% (Figure 7).

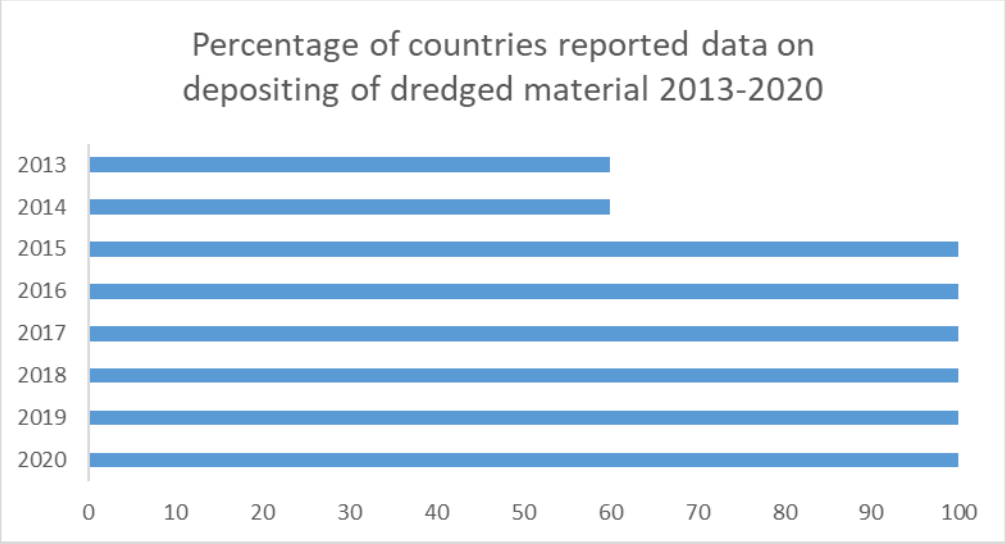

Figure 7. Completeness of reporting by the Contracting Parties in 2013-2020.

Spatial distribution of depositing sites is illustrated by Figures 8 and 9. Density of depositing sites is higher in the south-west part of the Sea. There are fewer depositing sites in the eastern Baltic Sea. The amount of dredged material deposited at these sites is rather high which indicates intensive dredging operations there. This spatial distribution of depositing sites is characteristic for the Baltic Sea area and is observed throughout the whole observation period since 2013.

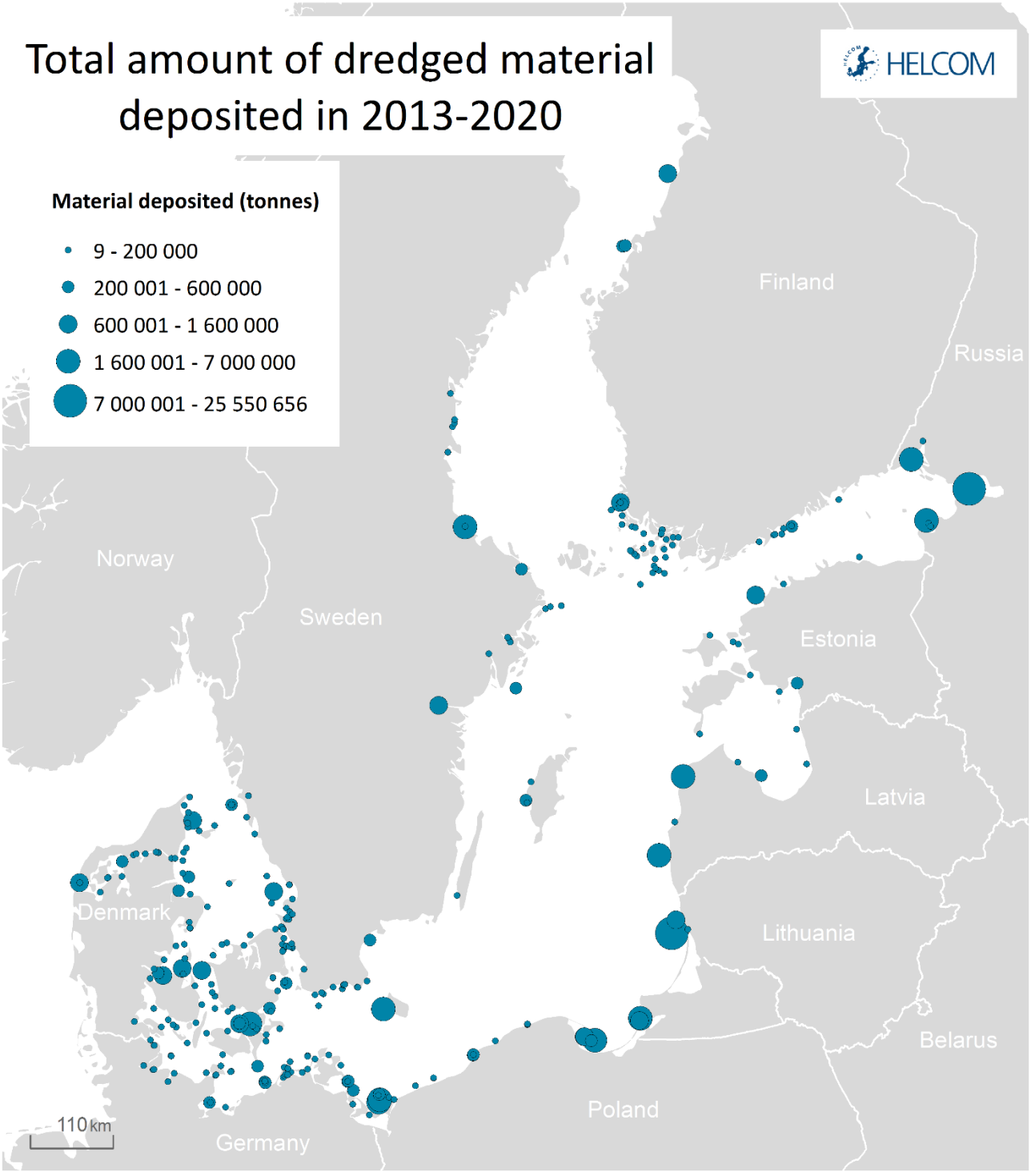

Figure 8. Total amount of dredged material deposited during the observation period 2013-2020.

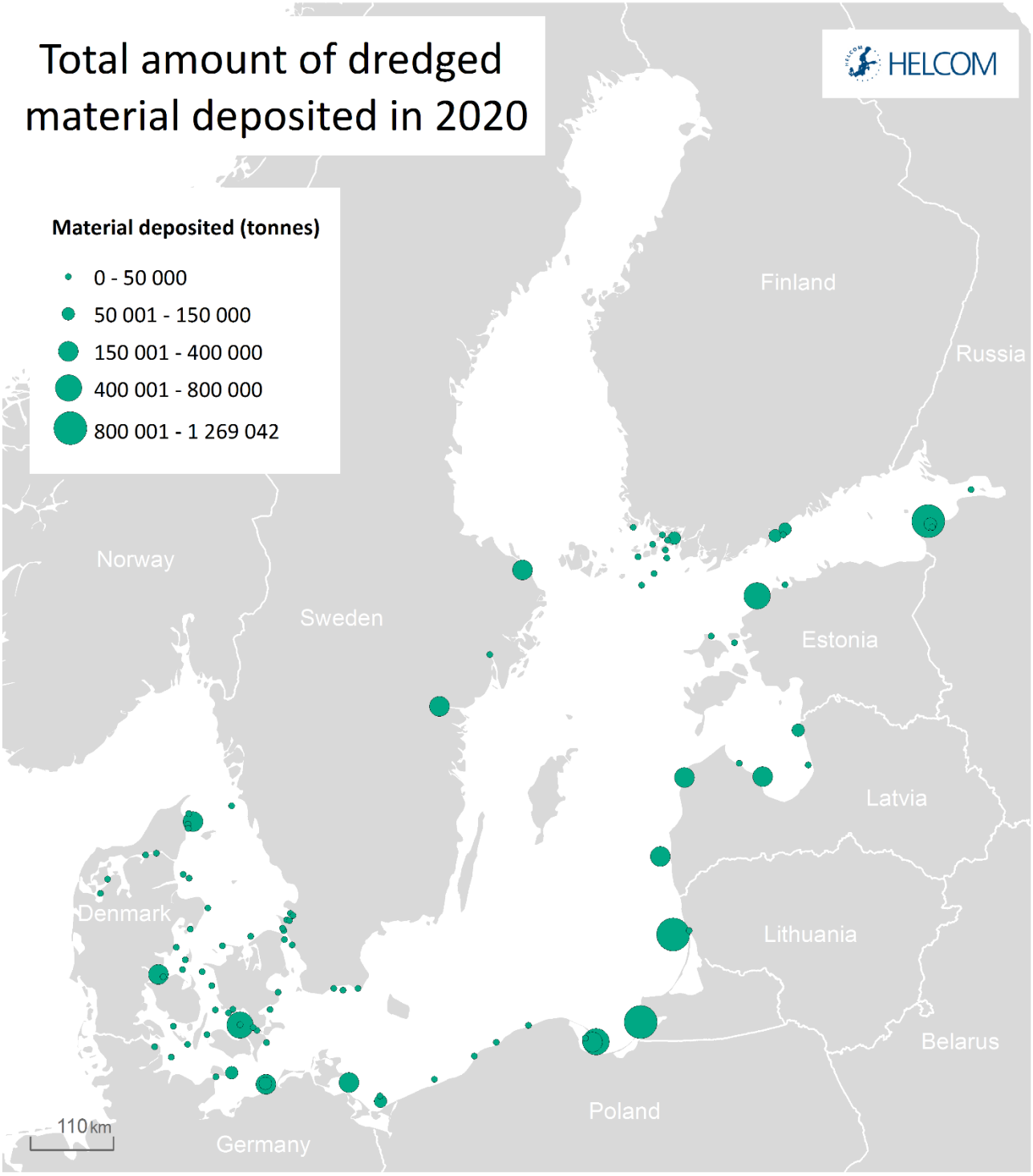

Figure 9. Total amount of dredged material deposited in 2020.

Deposited material originating from operations at sea or coastal and river waters.

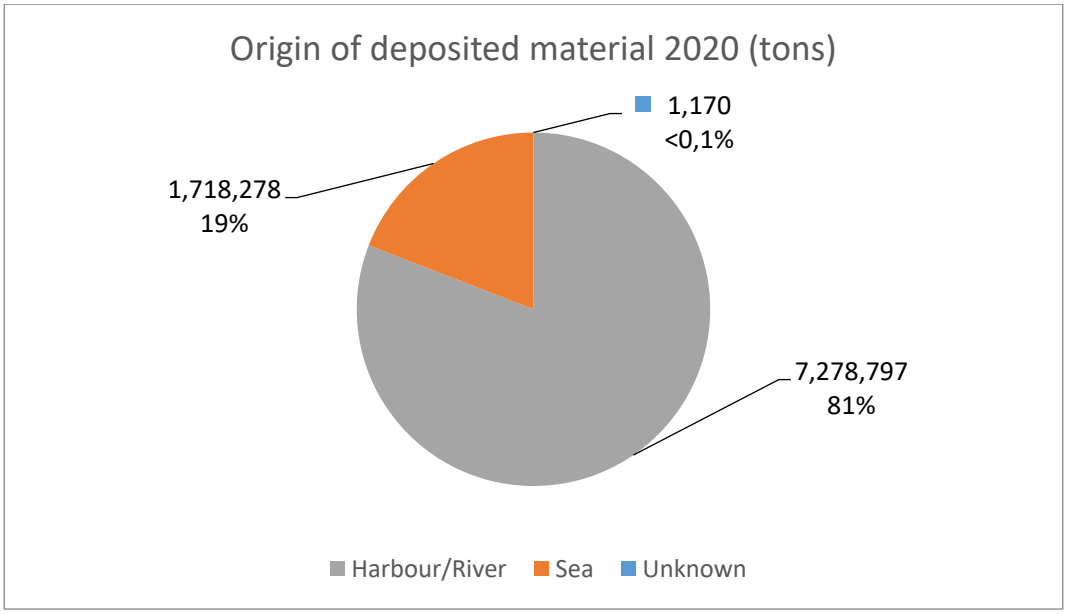

Figure 10. Proportions of the material originating from harbour/river, sea and unknown sources in total amount of dredged material deposited at the Baltic Sea in 2020.

Figure 11. Proportions of the material originating from harbour/river, Sea and unknown locations in total amount of dredged material deposited at the Baltic Sea in the period from 2013 to 2020.

Figures 10 and 11 illustrate the amount of deposited material originating from sea and harbour/river environments in the last reported year and in the entire reporting period, respectively. The term “harbour/river” includes all dredged material which was transported to the sea from harbors, estuaries and inland waterways. The term “sea” includes all areas outside harbours, i.e. in open, coastal and offshore areas.

More than three fourths of dredged material deposited in the Baltic Sea in 2020 were transported to the sea from dredging at harbors and rivers. A bit less than a quarter of the reported amounts originate from dredging operations at sea. The distribution is similar to last years but differ from the pattern observed in 2013-2015 and 2017 when most of the deposited material was originating from sea.

Figures 12 and 13 illustrate the amount of material deposited at sea originating from sea and harbour/river environments for the whole reporting period per country.

In 2020 Russia was the country reporting the highest amount of deposited material originating from the sea, and remains the country reporting the highest amount of deposited material with sea origin since 2014. Russia, Poland and Lithuania are the main contributors to the deposition of the material originating from rivers and harbors in 2020.

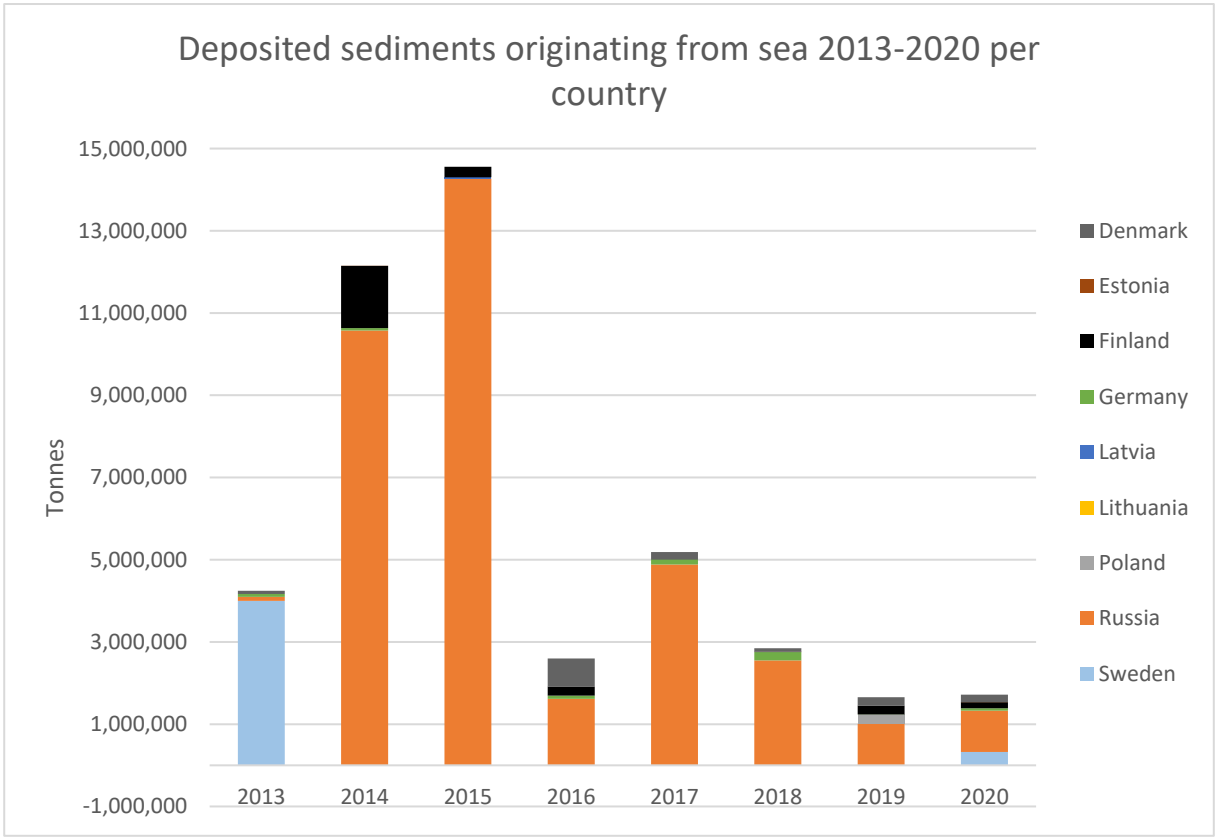

Figure 12. Amount of material originating from sea by country for the period 2013-2020.

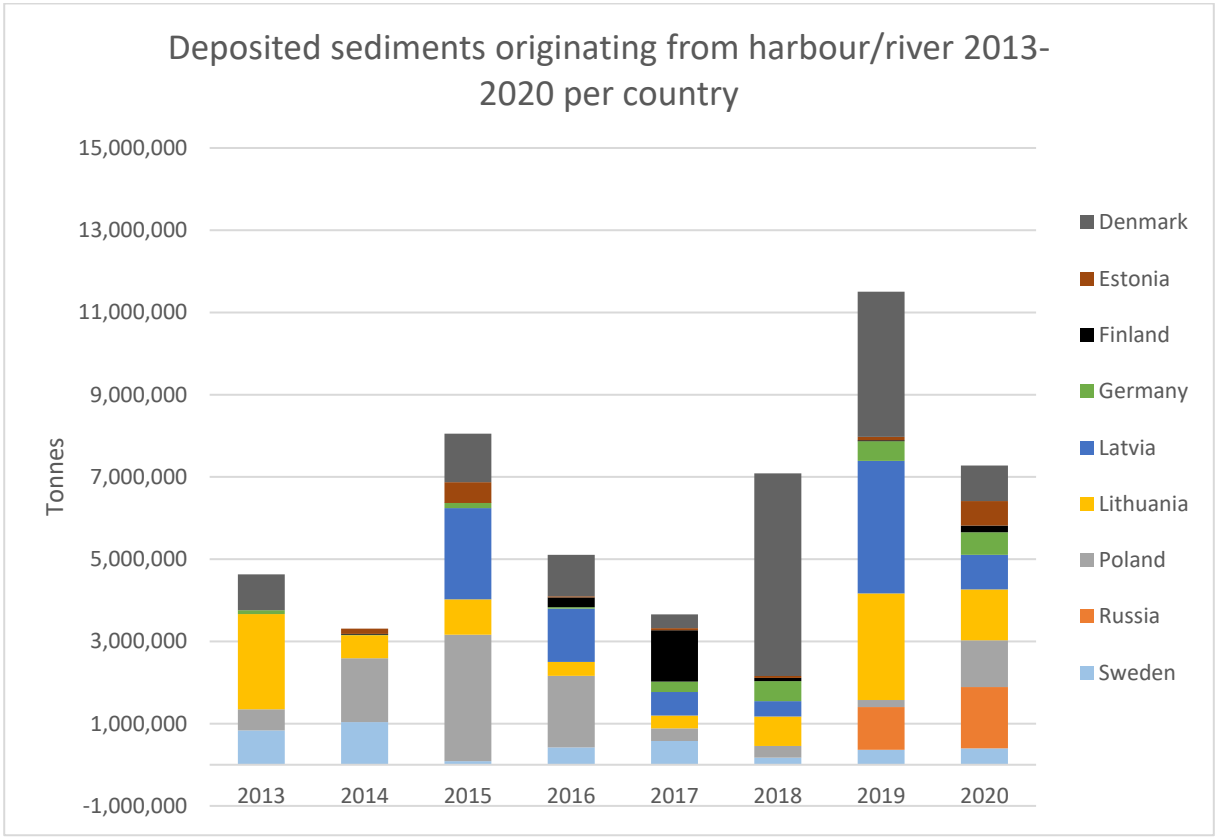

Figure 13. Amount of material originating from harbour/river environments by country for the period 2013-2020.

Country-specific values

Figures 14-31 illustrate the character of dredged material deposited in 2013-2020 per country. The upper figure illustrates the amount of material originating from different dredging operations and the lower figure illustrates sources of deposited material. Please note that the scale on the y-axis (amount material deposited in tonnes) is different for each country.

Denmark

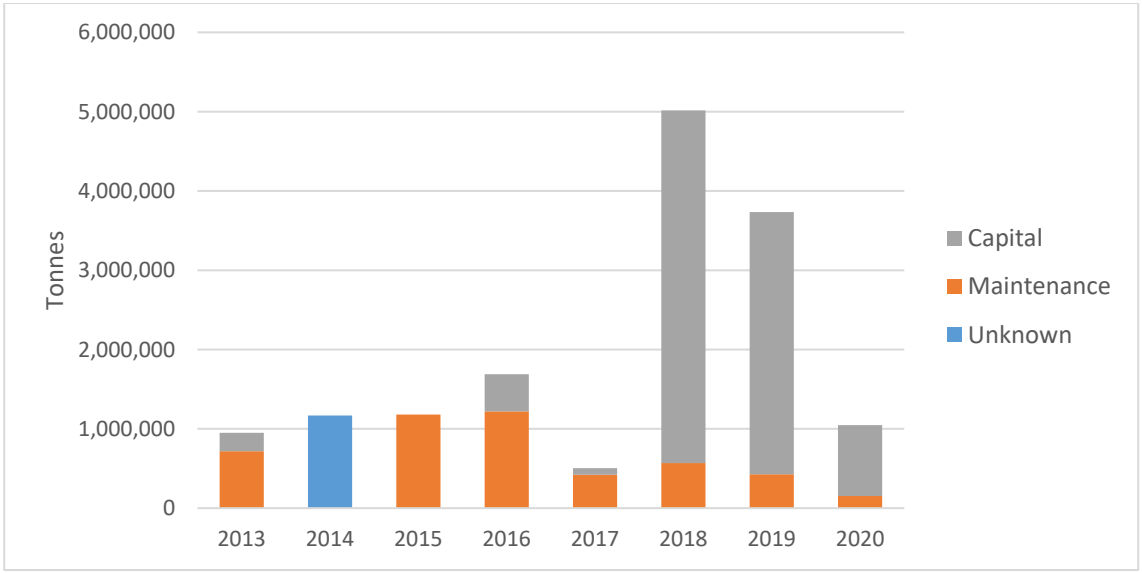

Figure 14. Amount of material originating from different dredging operations.

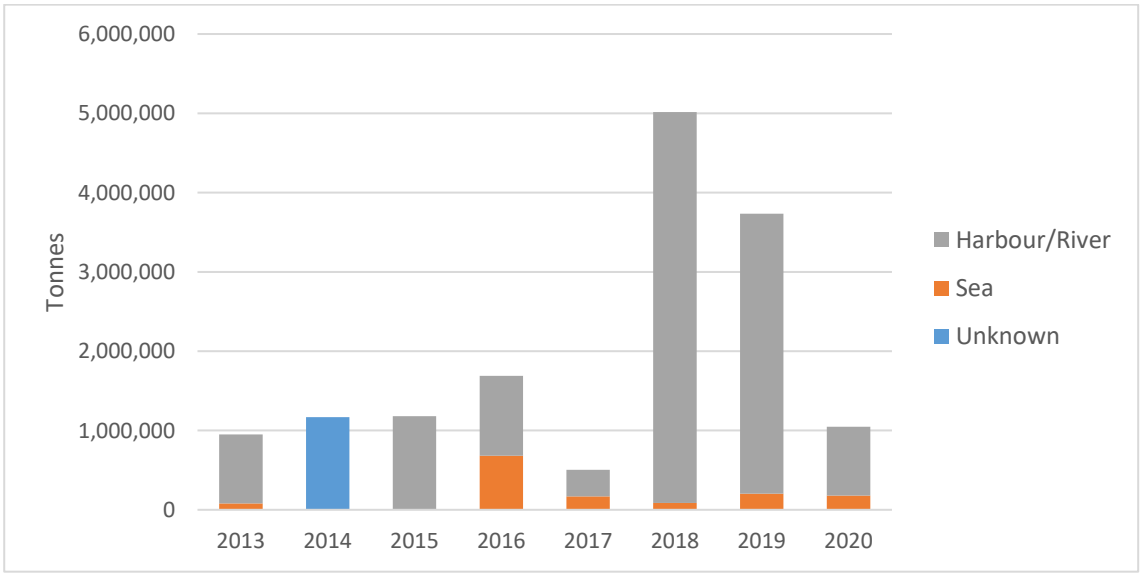

Figure 15. Sources of deposited material.

Estonia

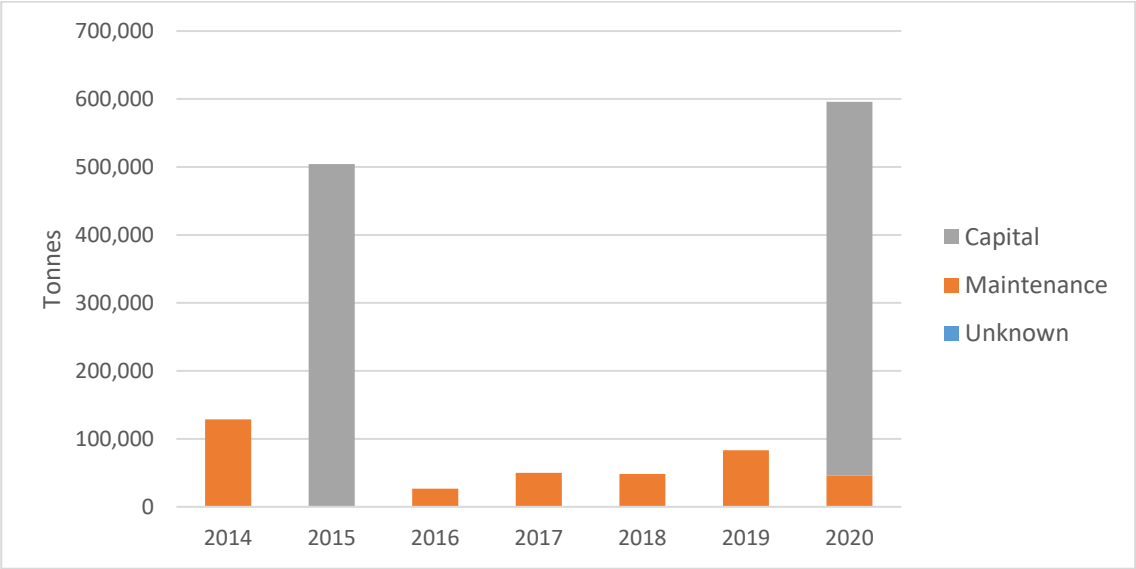

Figure 16. Amount of material originating from different dredging operations.

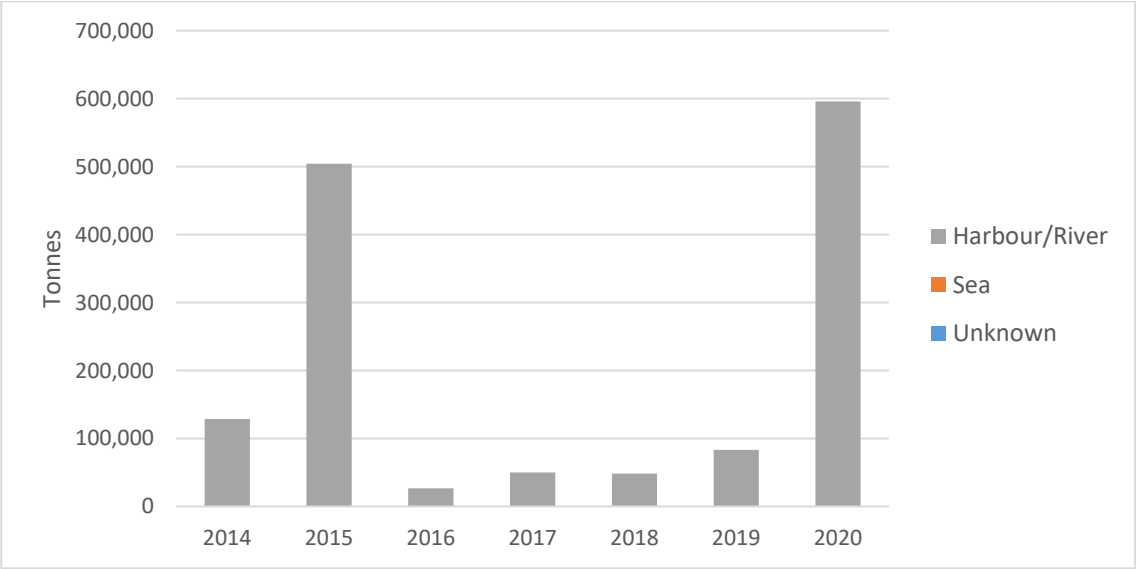

Figure 17. Sources of deposited material.

Finland

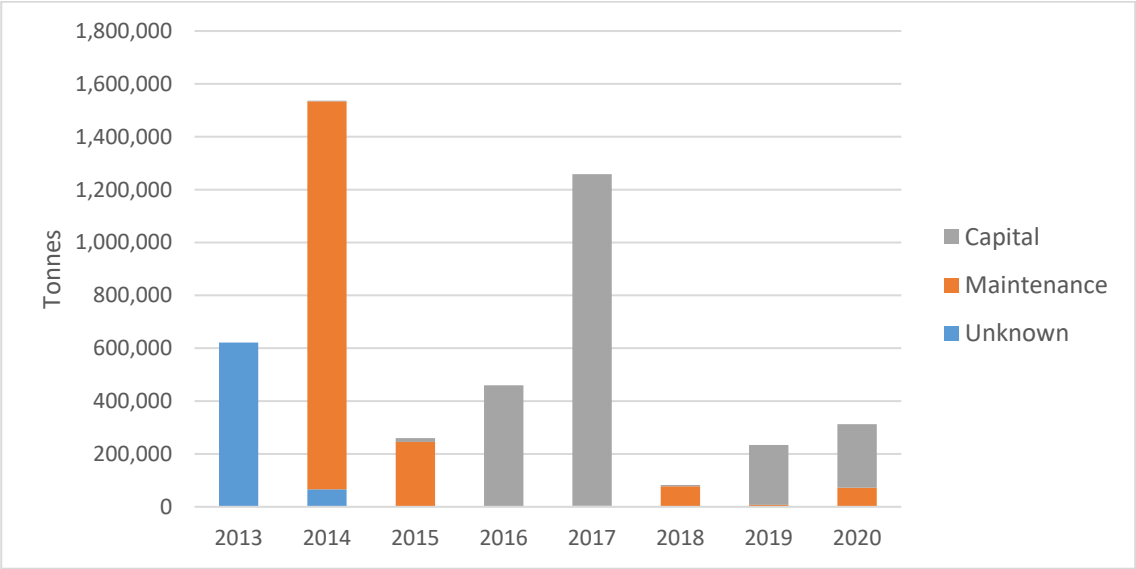

Figure 18. Amount of material originating from different dredging operations.

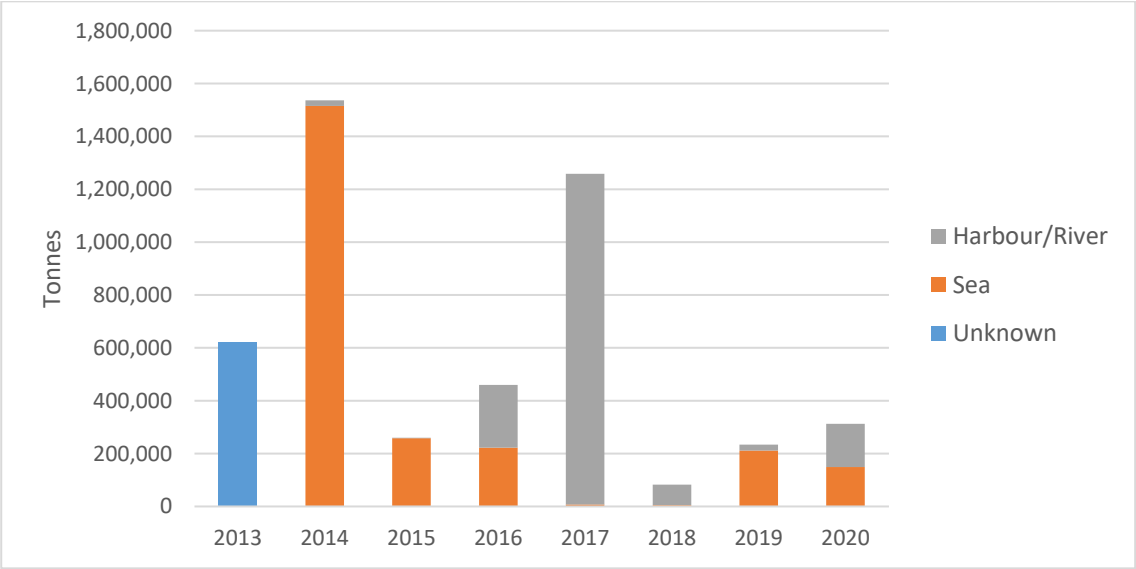

Figure 19. Sources of deposited material.

Germany

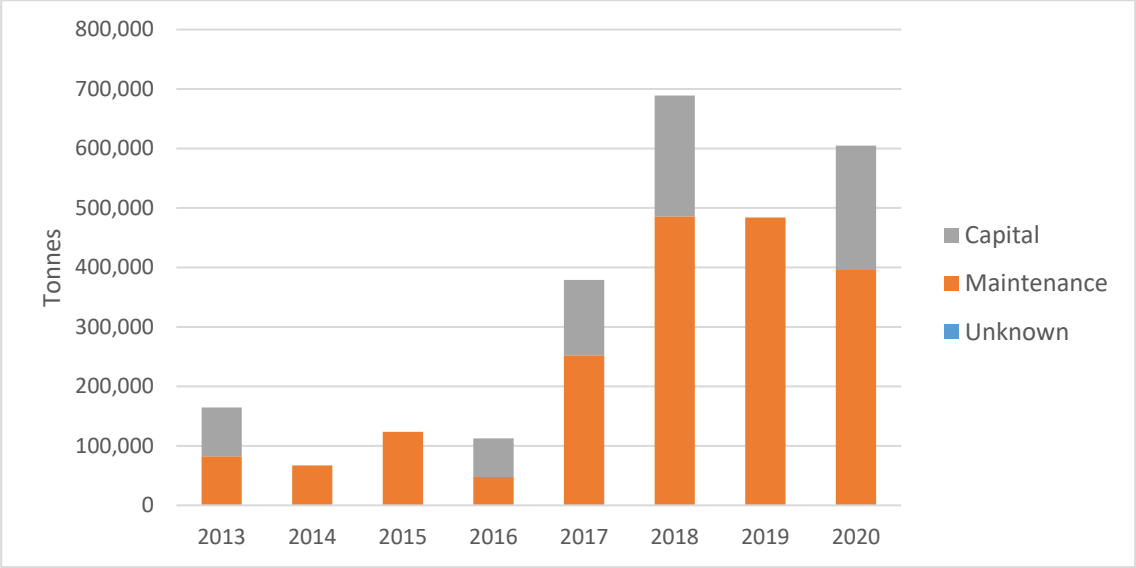

Figure 20. Amount of material originating from different dredging operations.

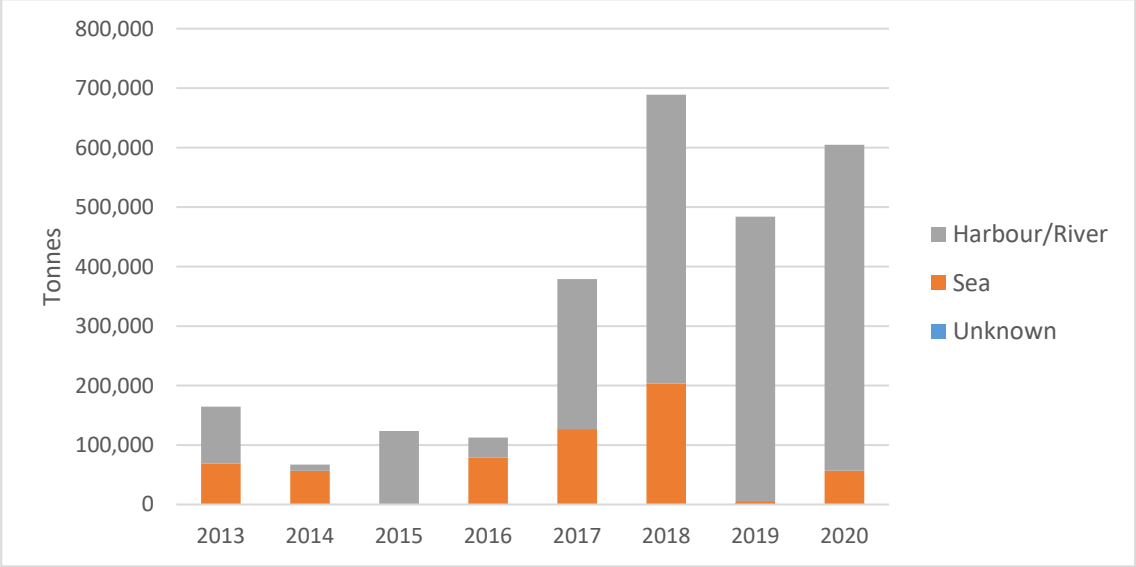

Figure 21. Sources of deposited material.

Latvia

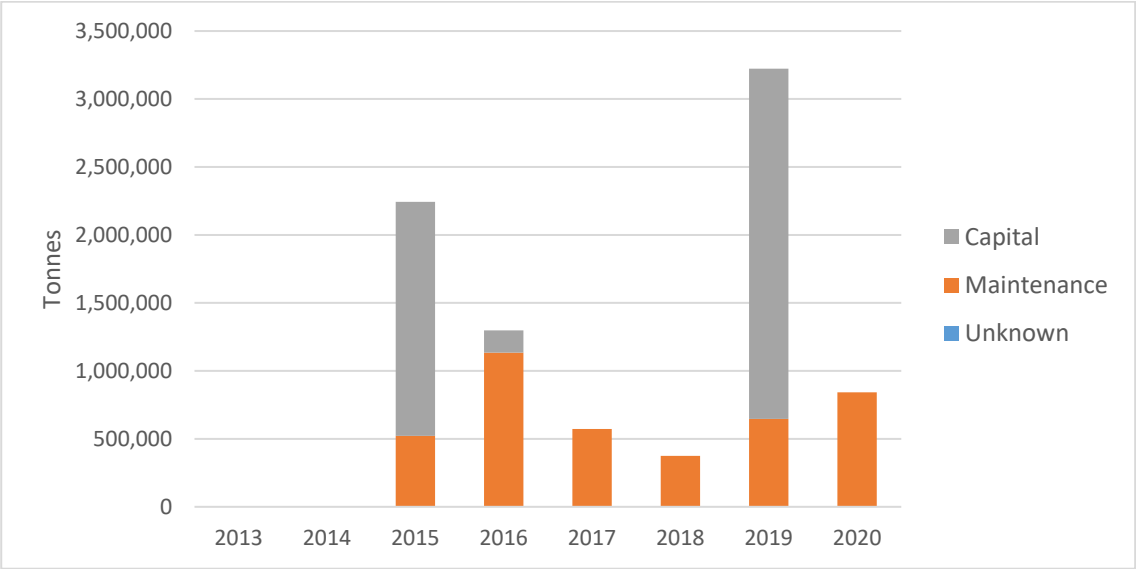

Figure 22. Amount of material originating from different dredging operations.

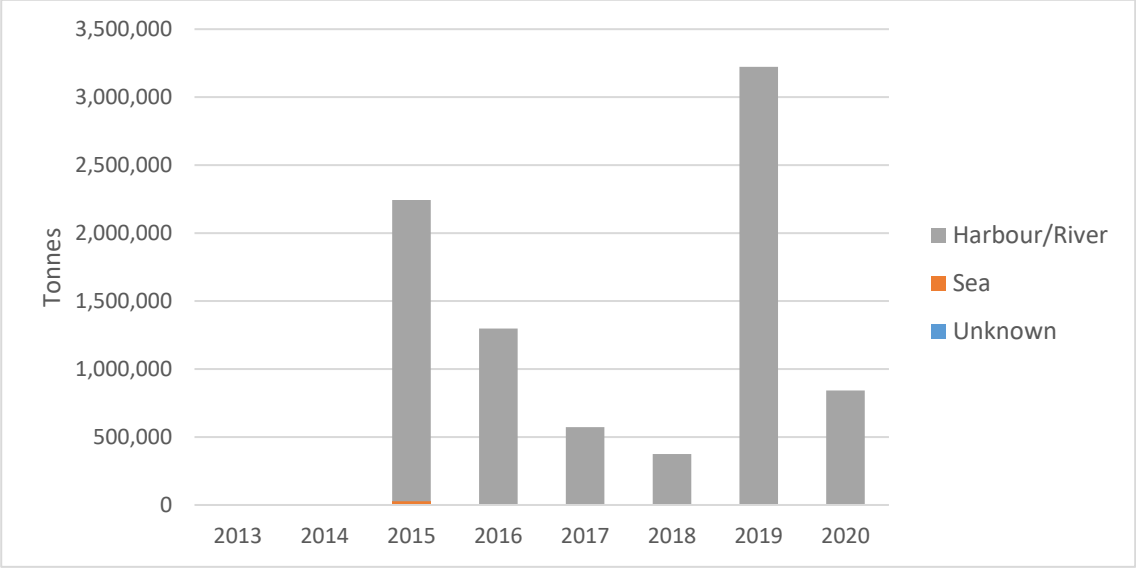

Figure 23. Sources of deposited material.

Lithuania

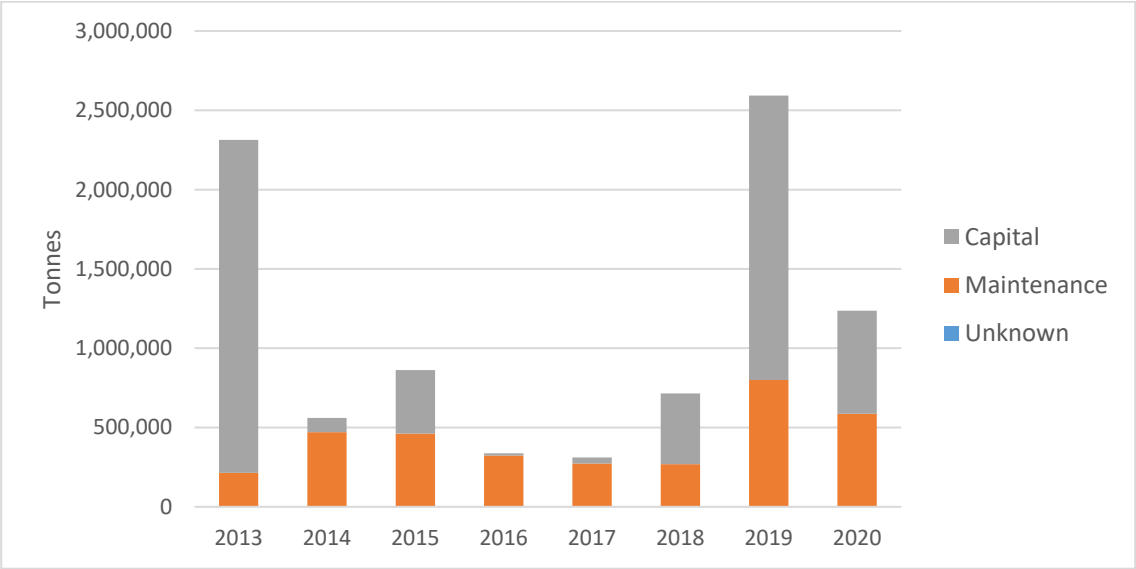

Figure 24. Amount of material originating from different dredging operations.

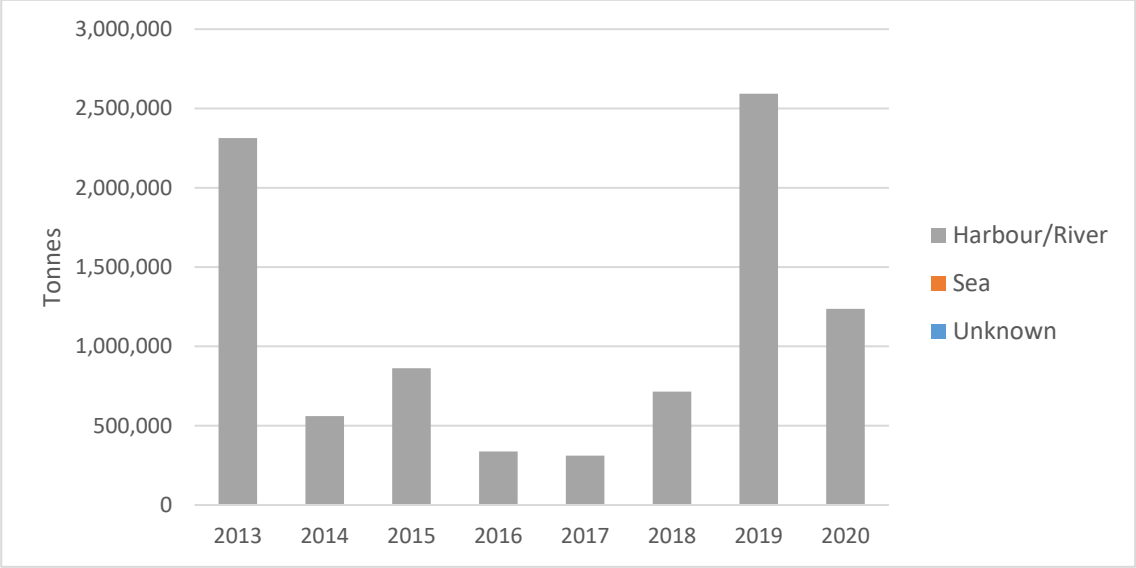

Figure 25. Sources of deposited material.

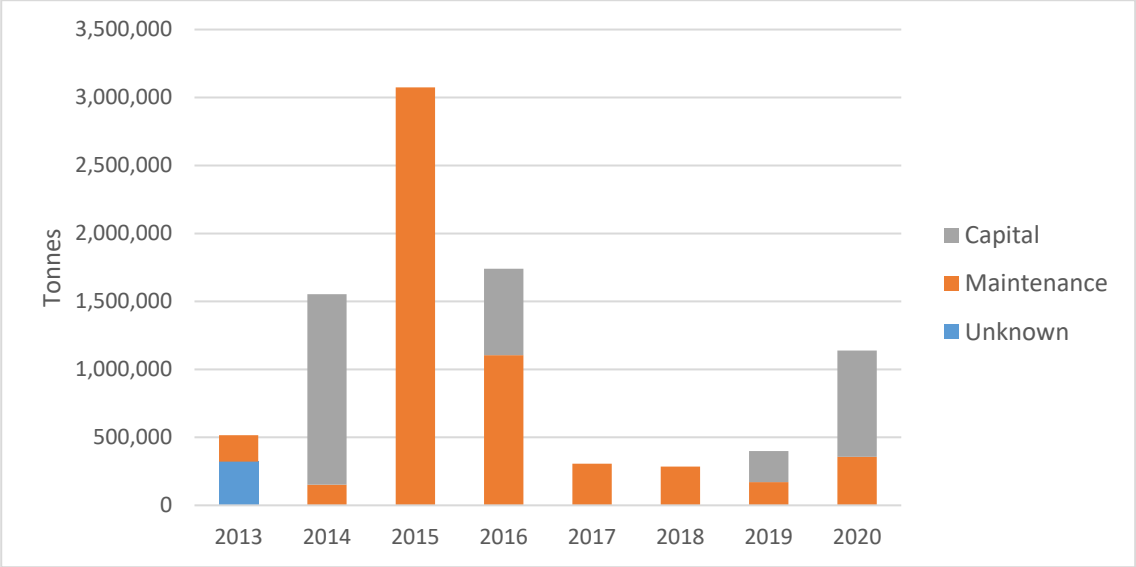

Figure 26. Amount of material originating from different dredging operations.

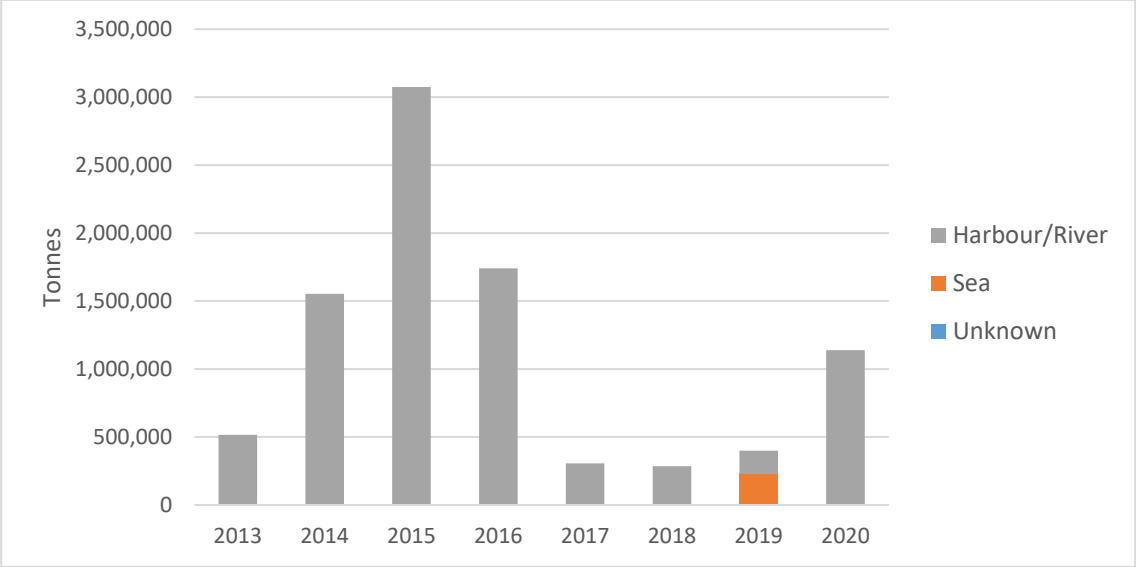

Figure 27. Sources of deposited material.

Russia

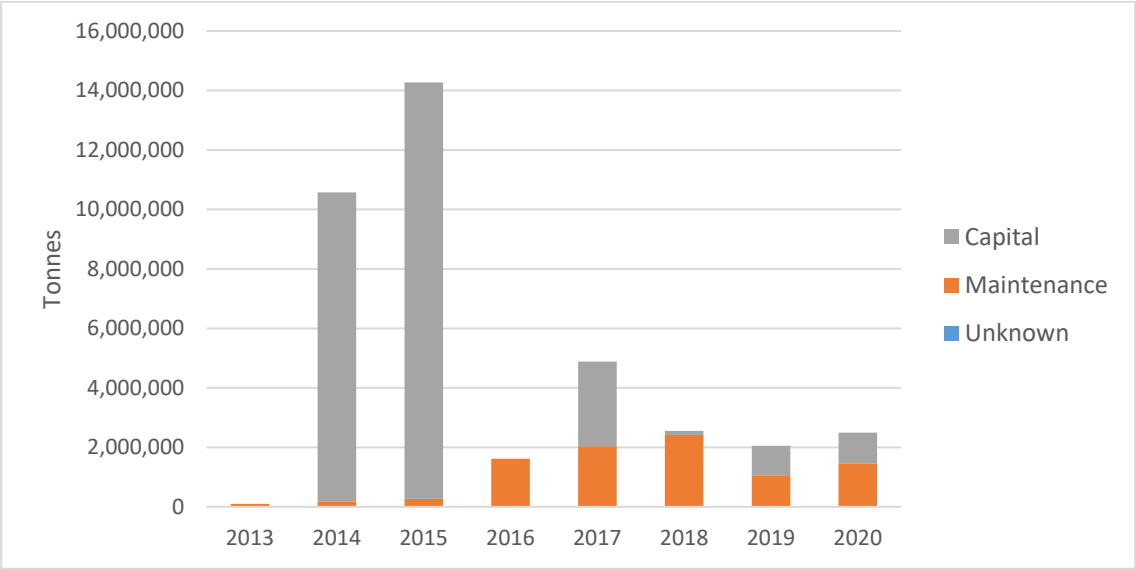

Figure 28. Amount of material originating from different dredging operations.

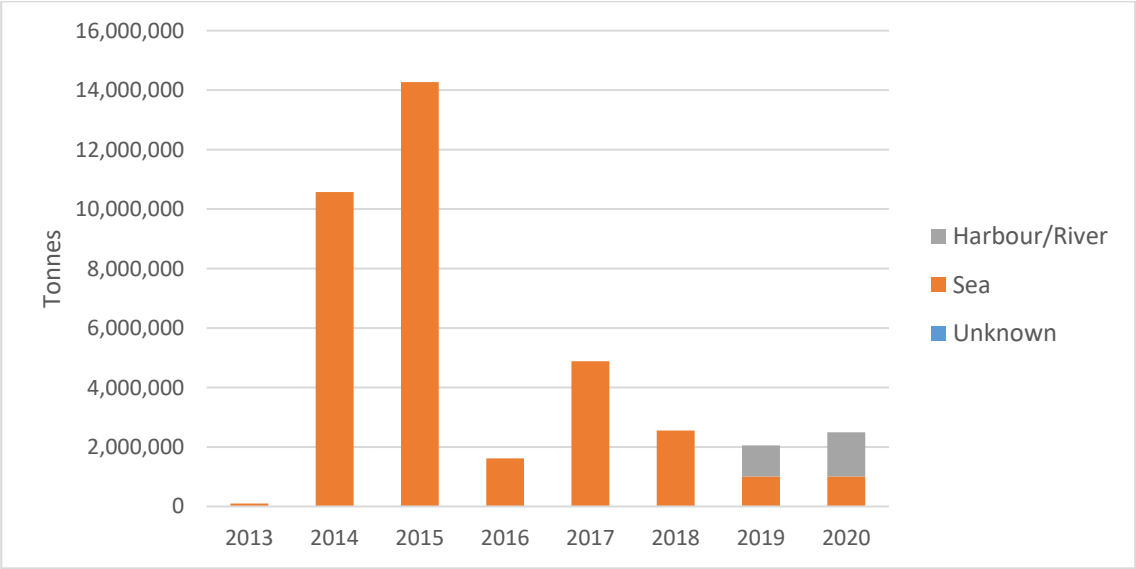

Figure 29. Sources of deposited material.

Sweden

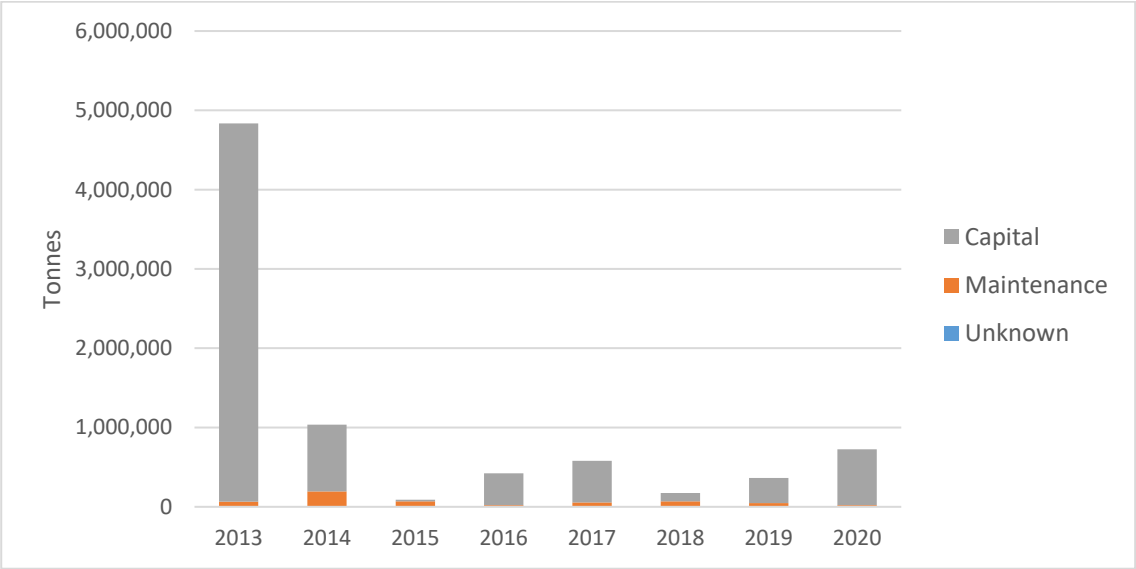

Figure 30. Amount of material originating from different dredging operations.

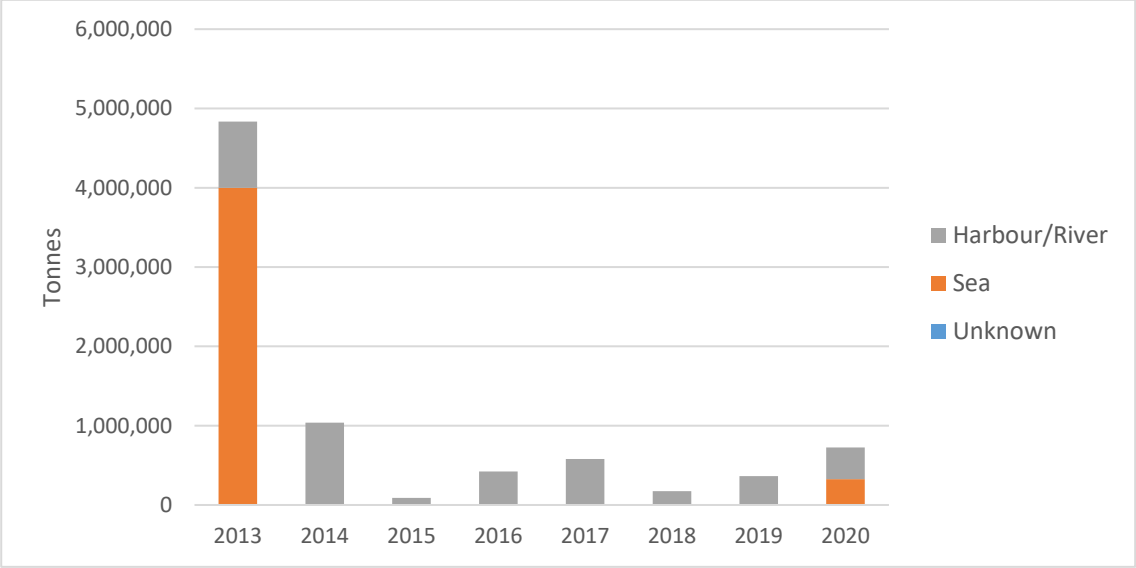

Figure 31. Sources of deposited material.

Contaminant loads

For the purposes of this assessment, transportation of contaminants with dredged material originating from harbors and river estuaries is considered as their input to the marine environment. In cases, where dredged material is produced by dredging operations at sea, pollutants contained by this material are only relocated elsewhere within the marine environment.

Table 1 and Figure 32 illustrate total amount and percentage of priority pollutants transported to the marine environment with sediments dredged in harbor/river and relocated during dredging/depositing operations at sea. Figure 33 illustrates proportions of pollutants in dredged material of different origin averaged for the period 2013-2020. Cadmium (Cd) and mercury (Hg) are two heavy metals identified as priority pollutants by HELCOM Recommendation 31E/1. Most of heavy metals entered the Baltic Sea marine environment in 2020 with dredged material transported from harbors and rivers. However, the percentage of mercury and copper (Cu) originating from sea sediments is a bit higher than of lead and cadmium. Proportion of heavy metals in dredged material originating from sea and harbors/rivers in 2020 differs from previous years. In previously observed years, most of the copper and mercury is relocated with sea sediments, while lead (Pb) and cadmium tended to be introduced into the marine environment with sediments dredged in harbors and rivers. Nonetheless, on average for the last 6 years sea sediments remain the main source for copper and mercury while lead and cadmium originates mainly from harbor/river sediments.

Harbors/rivers remain dominating source of TBT and PAH in 2020 which is typical for the whole reported period.

All contaminants are not reported by all Contracting Parties, thus the graphs, figures and maps on the following pages does not necessarily give a complete picture of the contaminants deposited. The share of contaminants originating from different environments and from different Contracting Parties are based on the reported data, and thus providing the best available information of their characteristics, but gaps in the data are however possible.

Table 1. Total input of contaminants in the Baltic Sea in 2020, originating from harbour/river, sea and unknown environments.

Contaminant	Harbour/river	Sea	Unknown	Harbour/river (%)	Sea (%)	Unknown (%)
PAH (t)	1,396	0,046	0	96.8	3.2	0.0
TBT (kg)	21,003	1,022	0	95.4	4.6	0.0
Pb (t)	74,250	3,546	0	95.4	4.6	0.0
Cu (t)	92,097	29,046	0	76.0	24.0	0.0
Hg (t)	0,382	0,144	0	72.6	27.4	0.0
Cd (t)	5,969	0,128	0	97.9	2.1	0.0

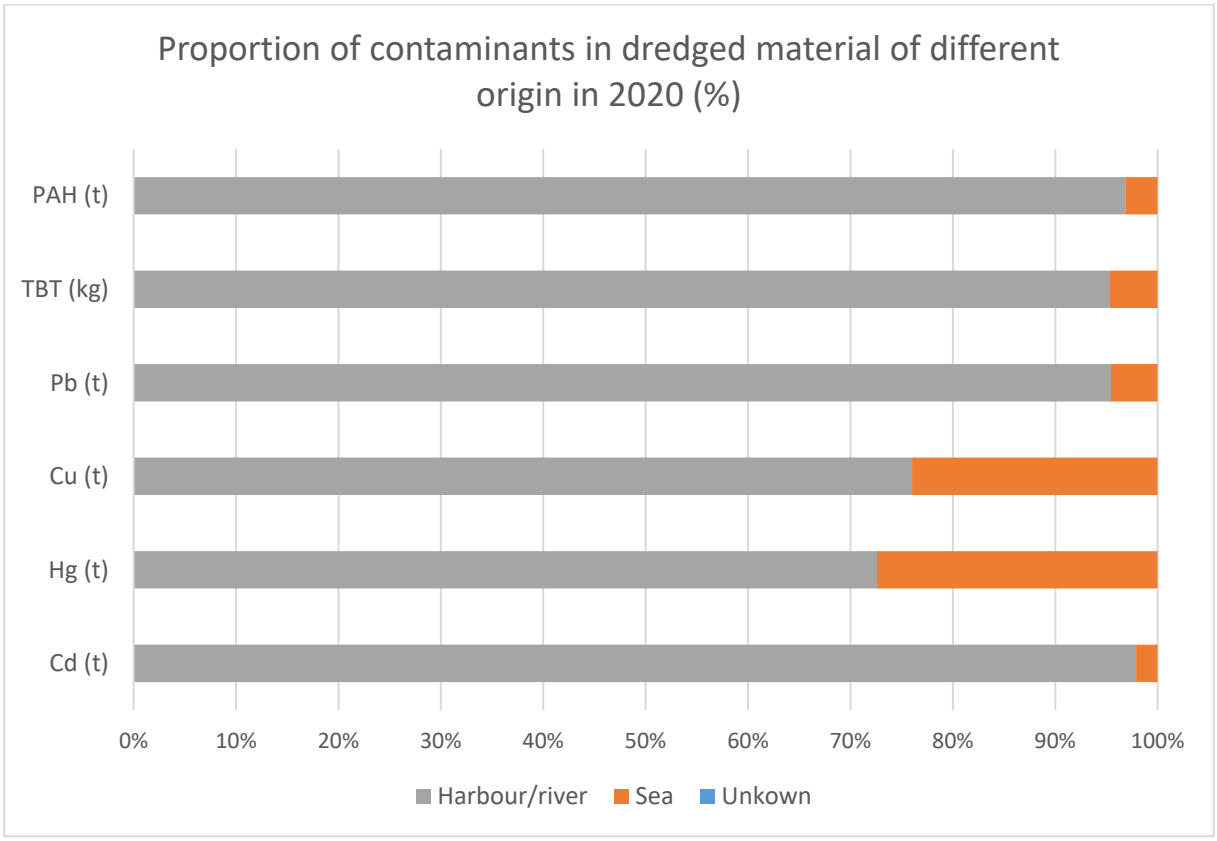

Figure 32. Proportion of contaminants originating from harbor/river, sea and unknown areas in 2020.

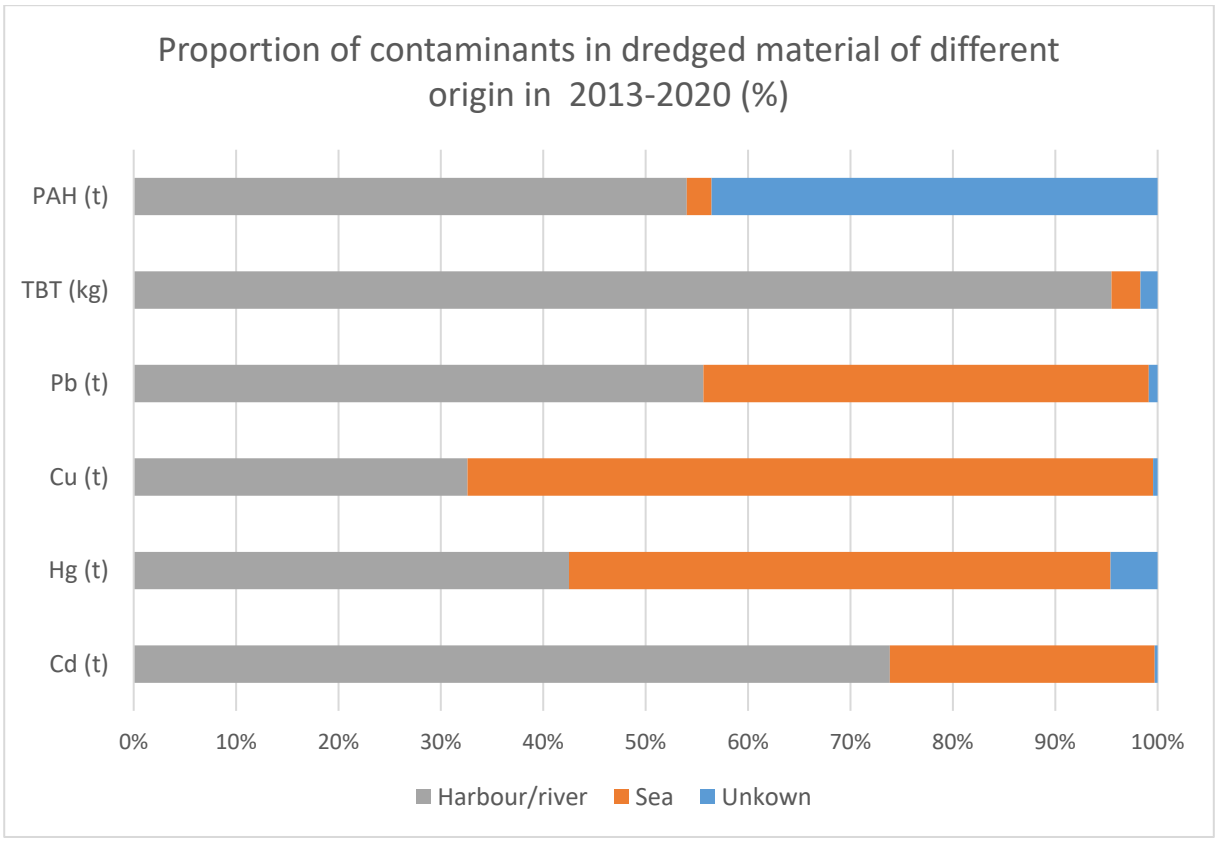

Figure 33. Proportion of contaminants originating from harbour/river, sea and unknown locations for the period 2013-2020.

Figures 34-39 illustrate total amount of priority pollutants in dredged material deposited at sea in 2013-2020 per country in tonnes (TBT in kilograms). The amount of cadmium was considerably higher than in the recent years.

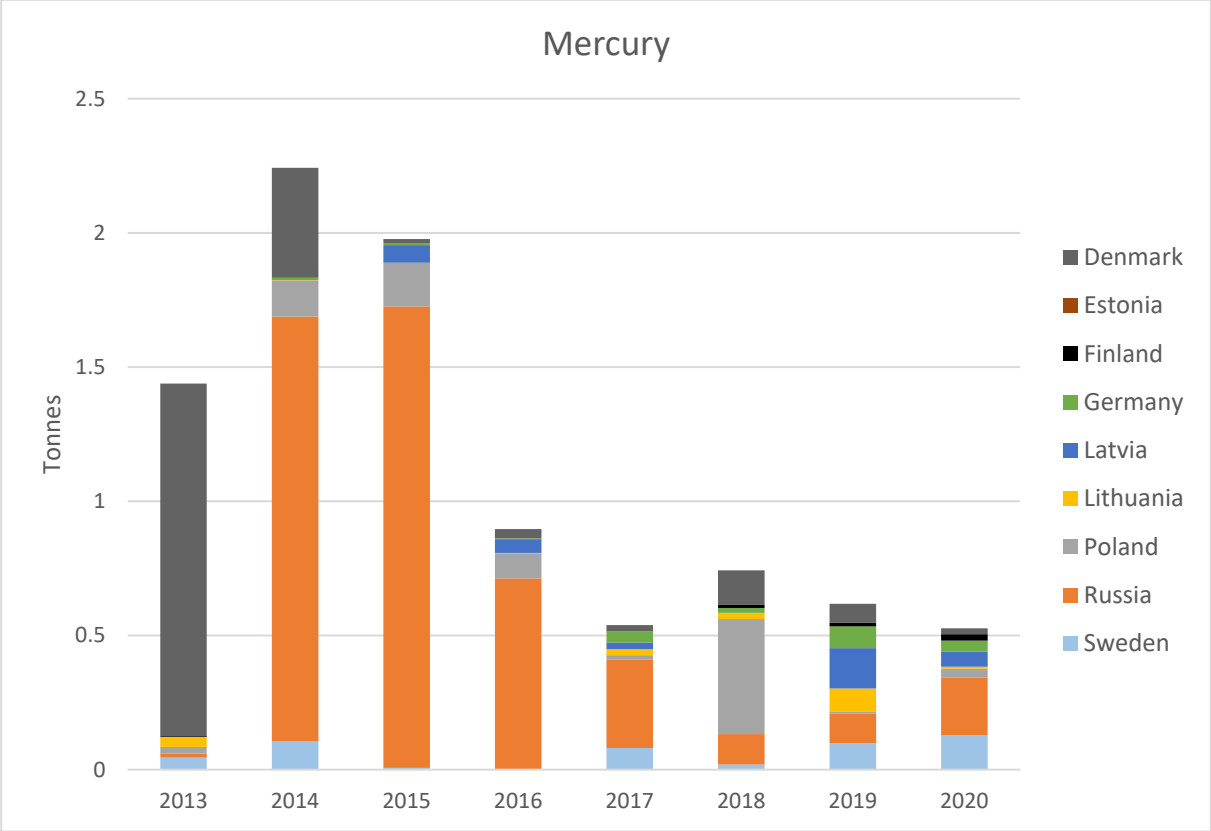

Figure 34. Total amount of mercury in dredged material deposited at sea in 2013-2020.

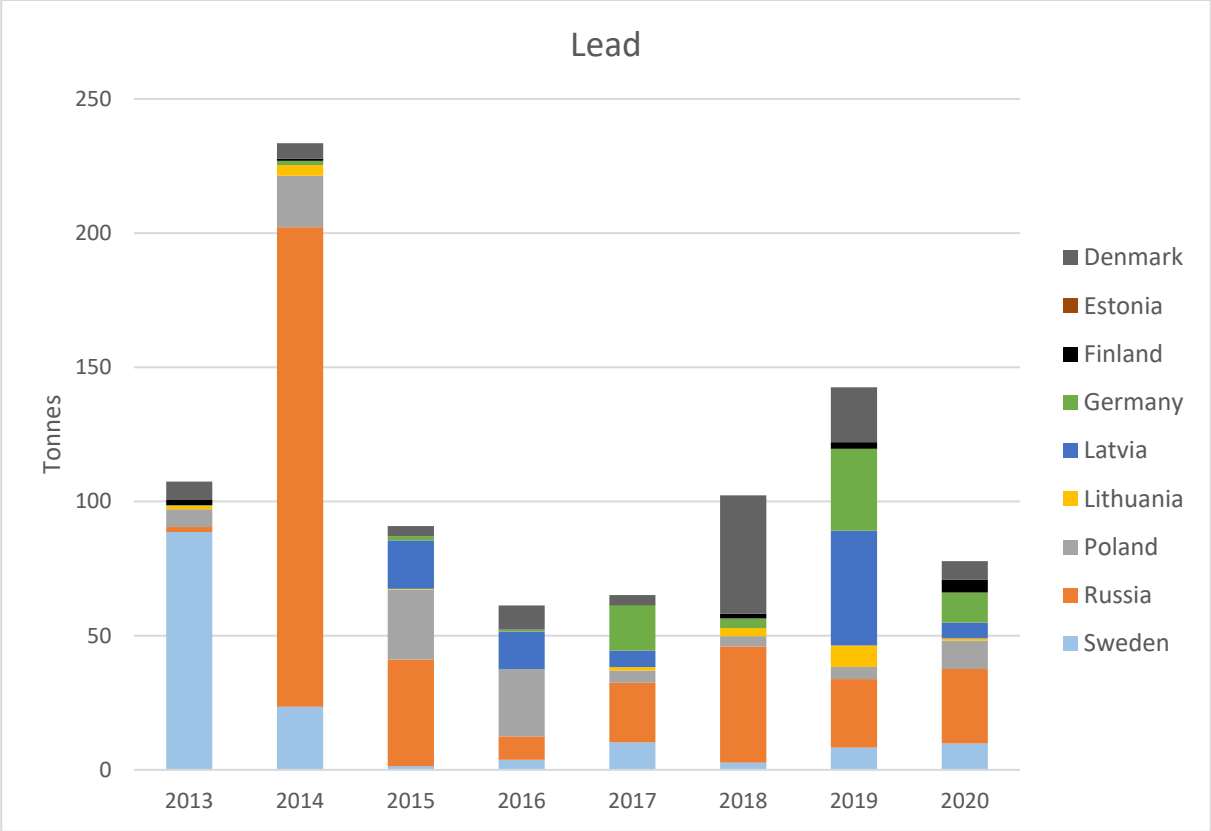

Figure 35. Total amount of lead in dredged material deposited at sea in 2013-2020.

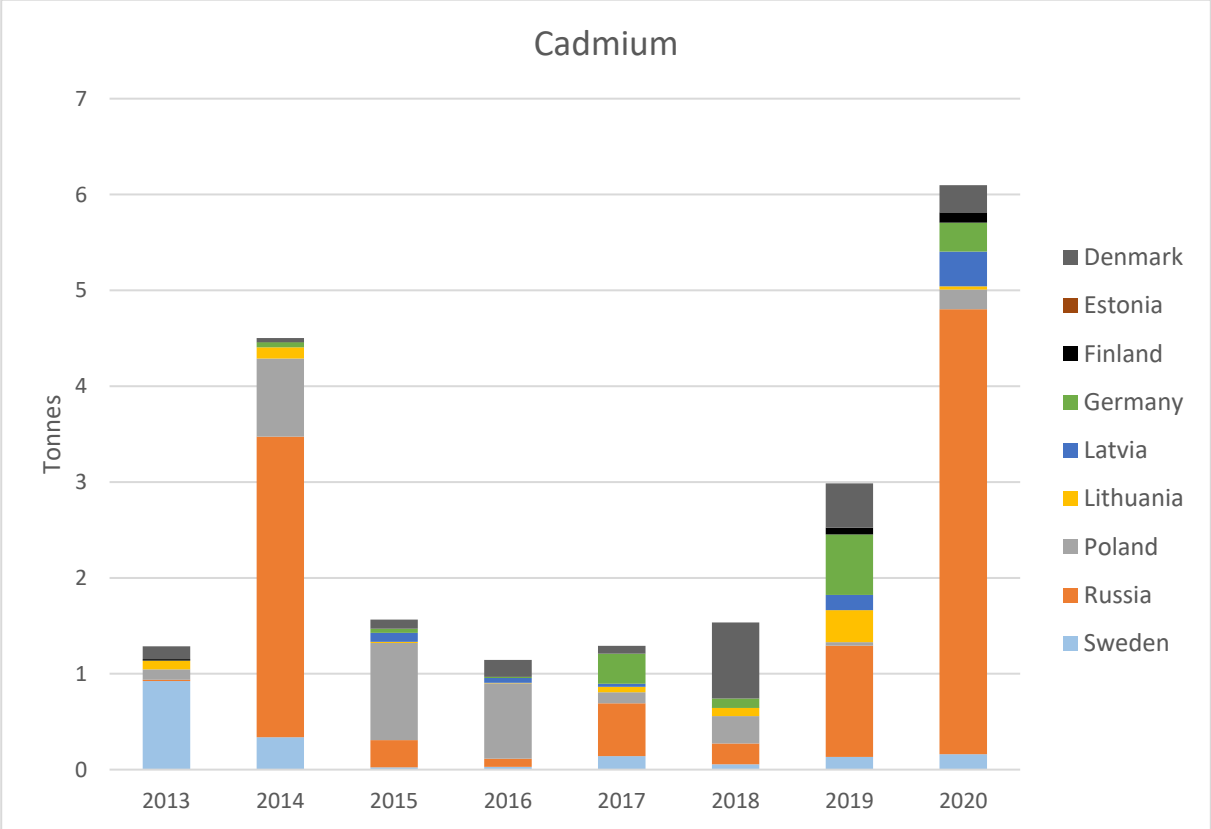

Figure 36. Total amount of cadmium in dredged material deposited at sea in 2013-2020.

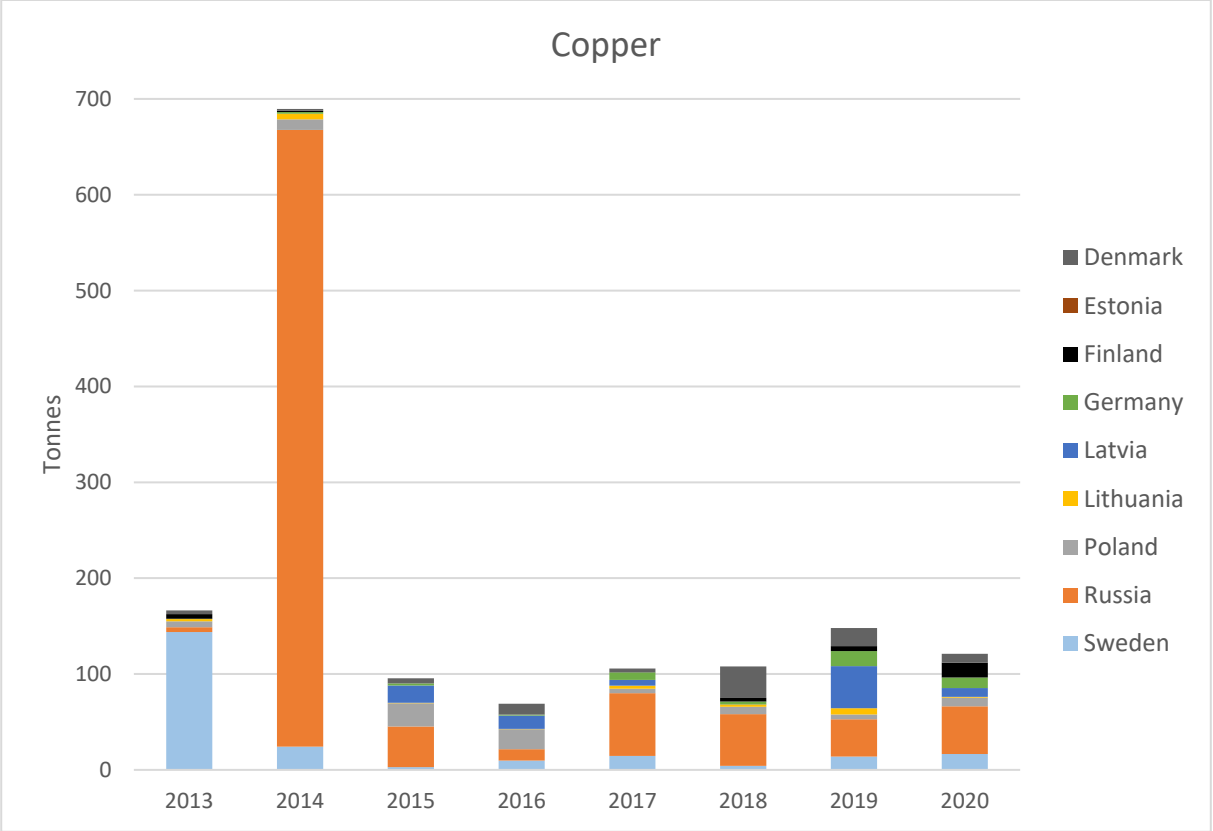

Figure 37. Total amount of copper in dredged material deposited at sea in 2013-2020.

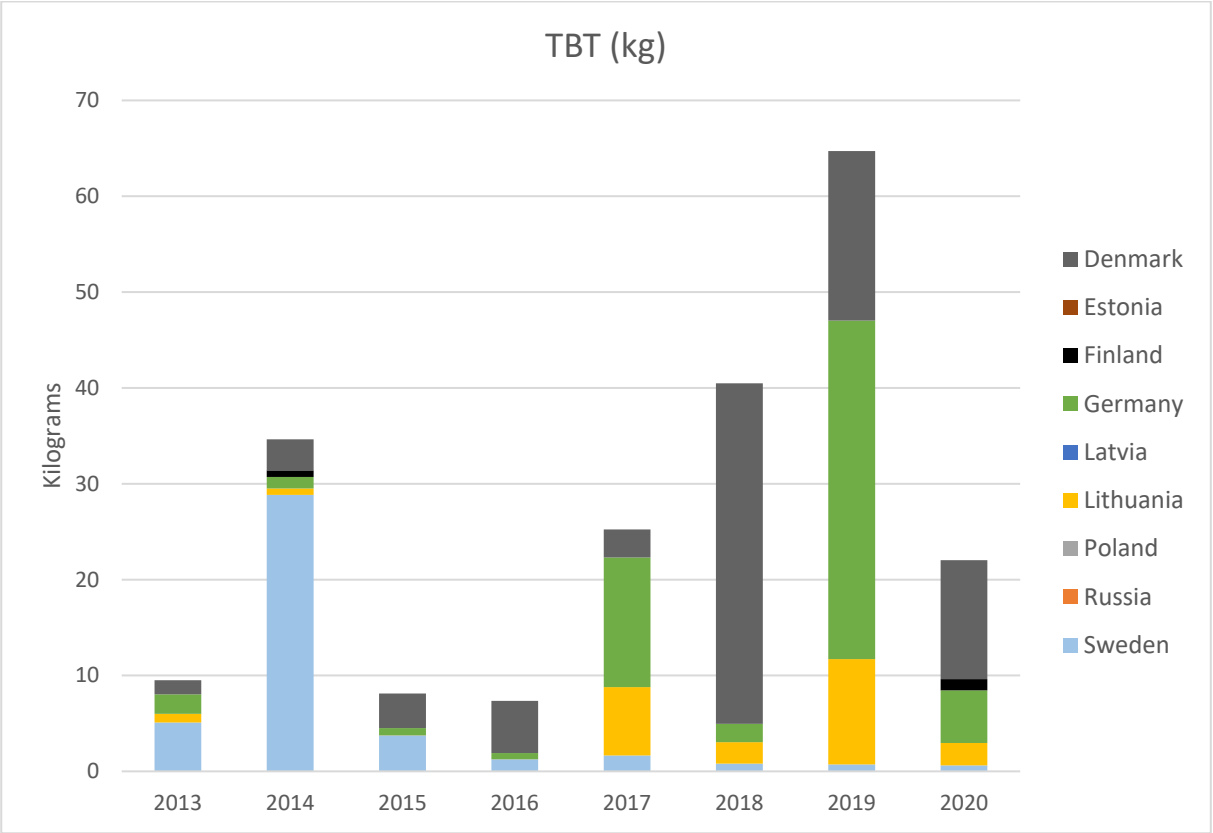

Figure 38. Total amount of TBT in dredged material deposited at sea in 2013-2020.

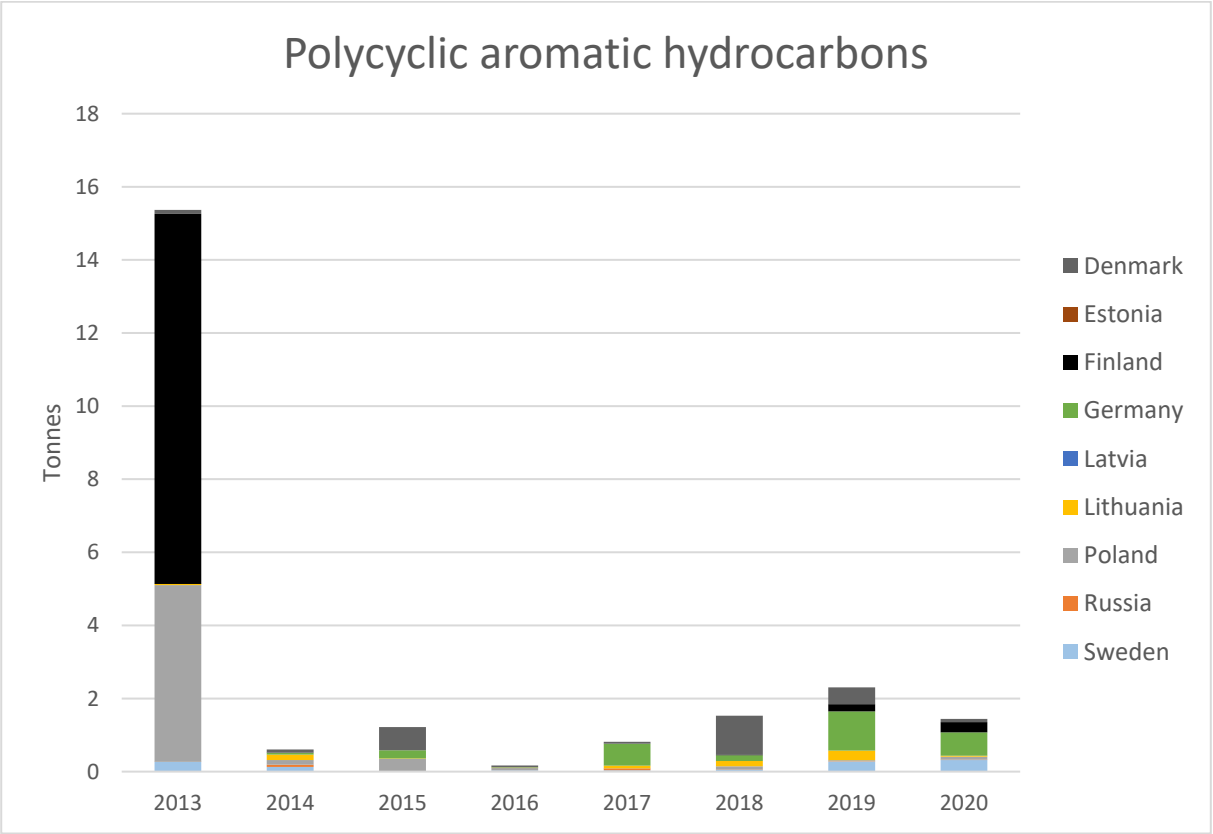

Figure 39. Total amount of polycyclic aromatic hydrocarbons in dredged material deposited at sea in 2013-2020.

Input of contaminants in 2020

Figures 40-45 illustrate spatial distribution of priority pollutants' input to the sea with dredged material originating from harbors/rivers in 2020. Contaminant load originating from sea is not included. "No data" in figures 40-45 can result from no data reported, concentrations below detection limit or that the material has been exempted from analyses according to the HELCOM Guidelines for the Management of Dredged Material at Sea.

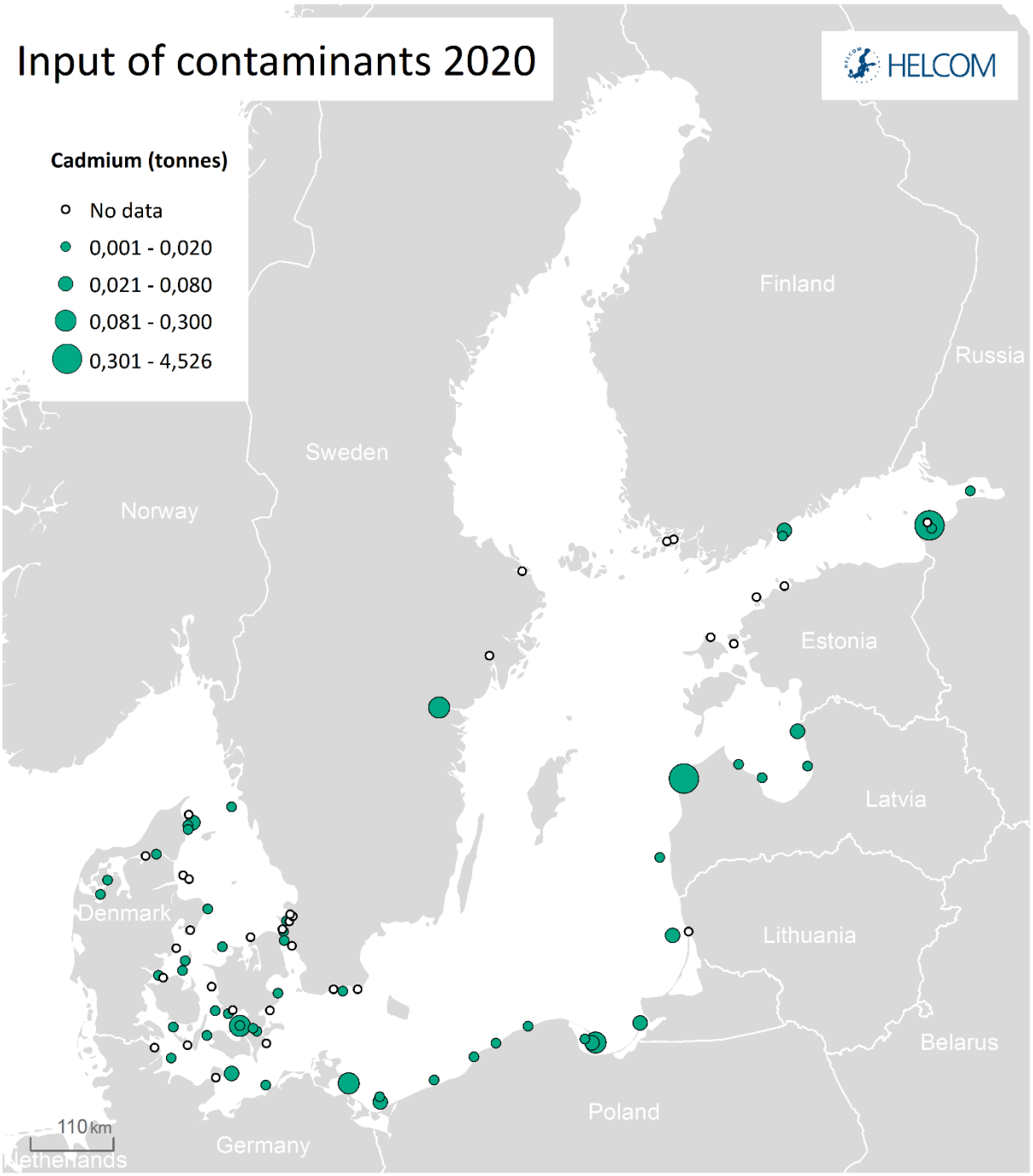

Figure 40. Input of cadmium from harbors/river in 2020. "No data" can result from no data reported, concentrations below detection limit or material exempted from characterisation.

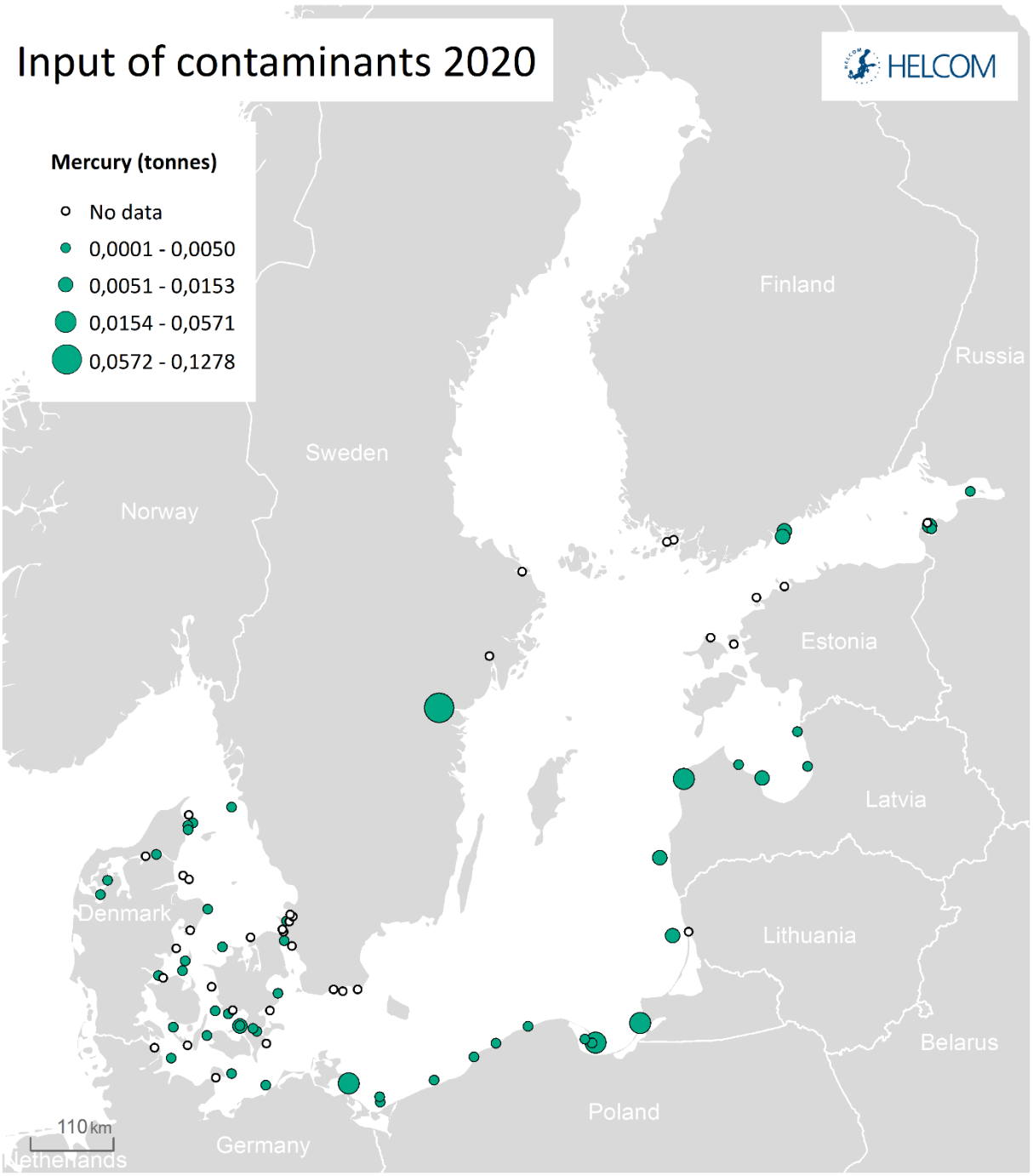

Figure 41. Input of mercury from harbors/river in 2020. “No data” can result from no data reported, concentrations below detection limit or material exempted from characterisation.

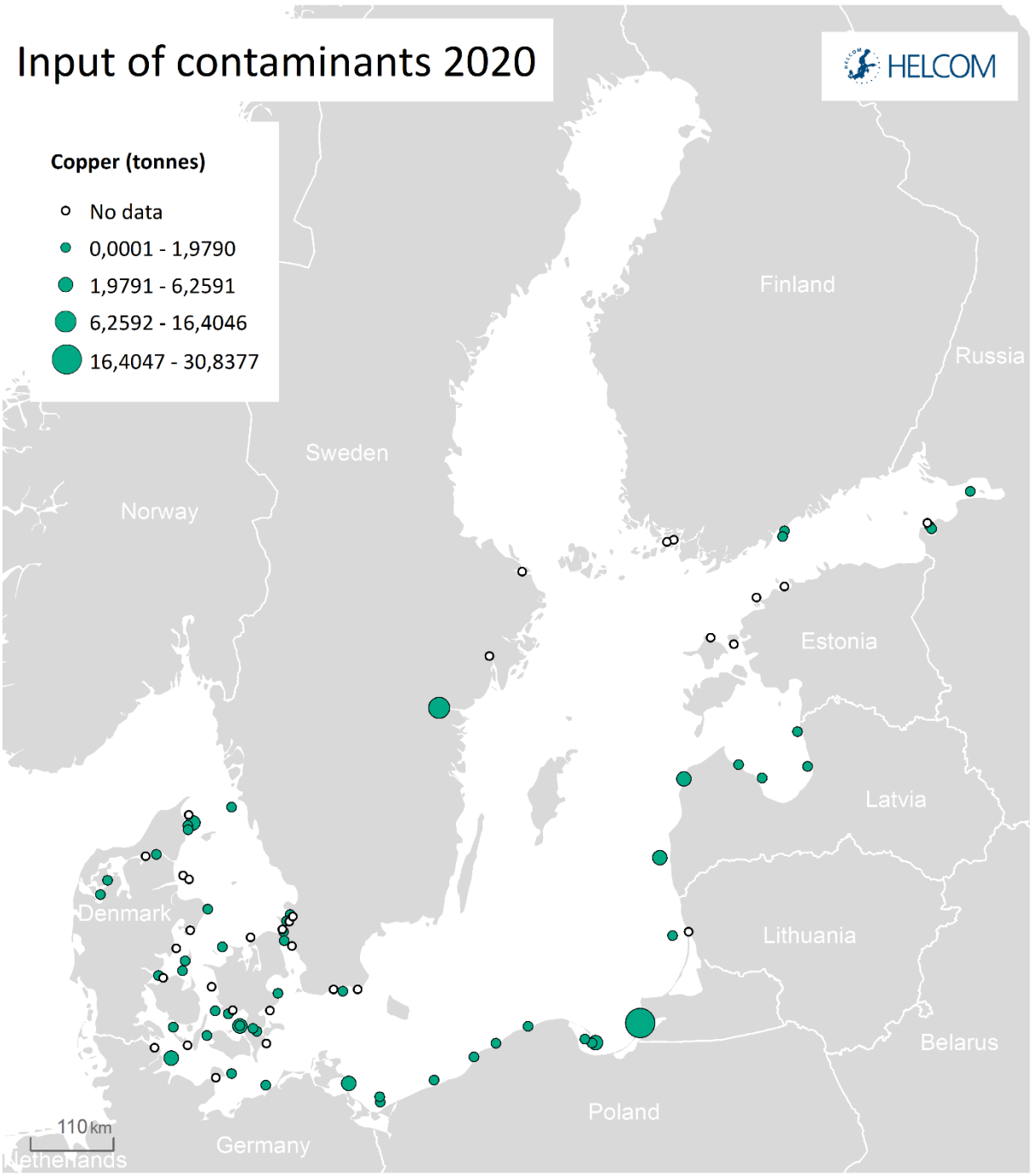

Figure 42. Input of copper from harbors/river in 2020. “No data” can result from no data reported, concentrations below detection limit or material exempted from characterisation.

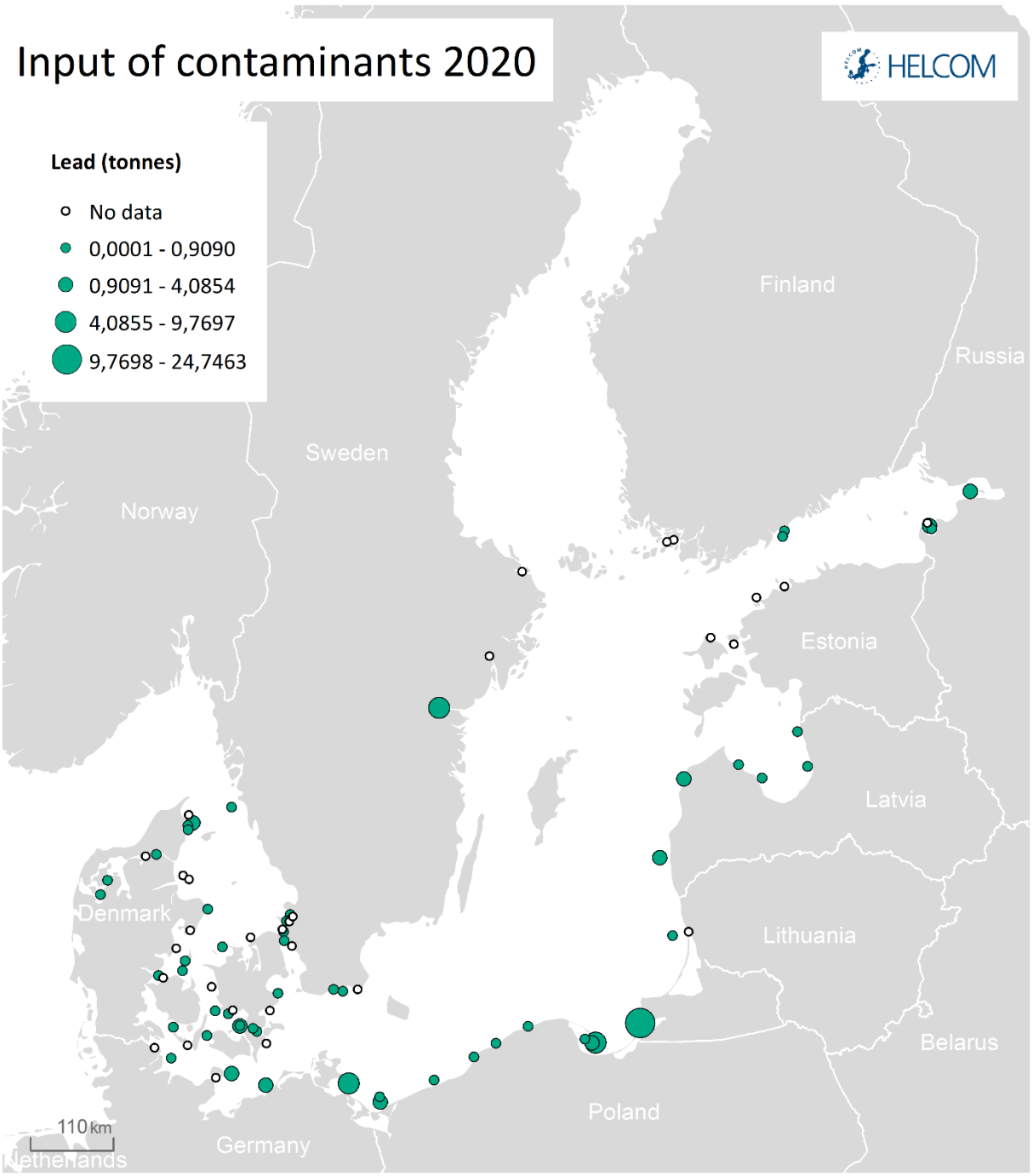

Figure 43. Input of lead from harbors/river in 2020. “No data” can result from no data reported, concentrations below detection limit or material exempted from characterisation.

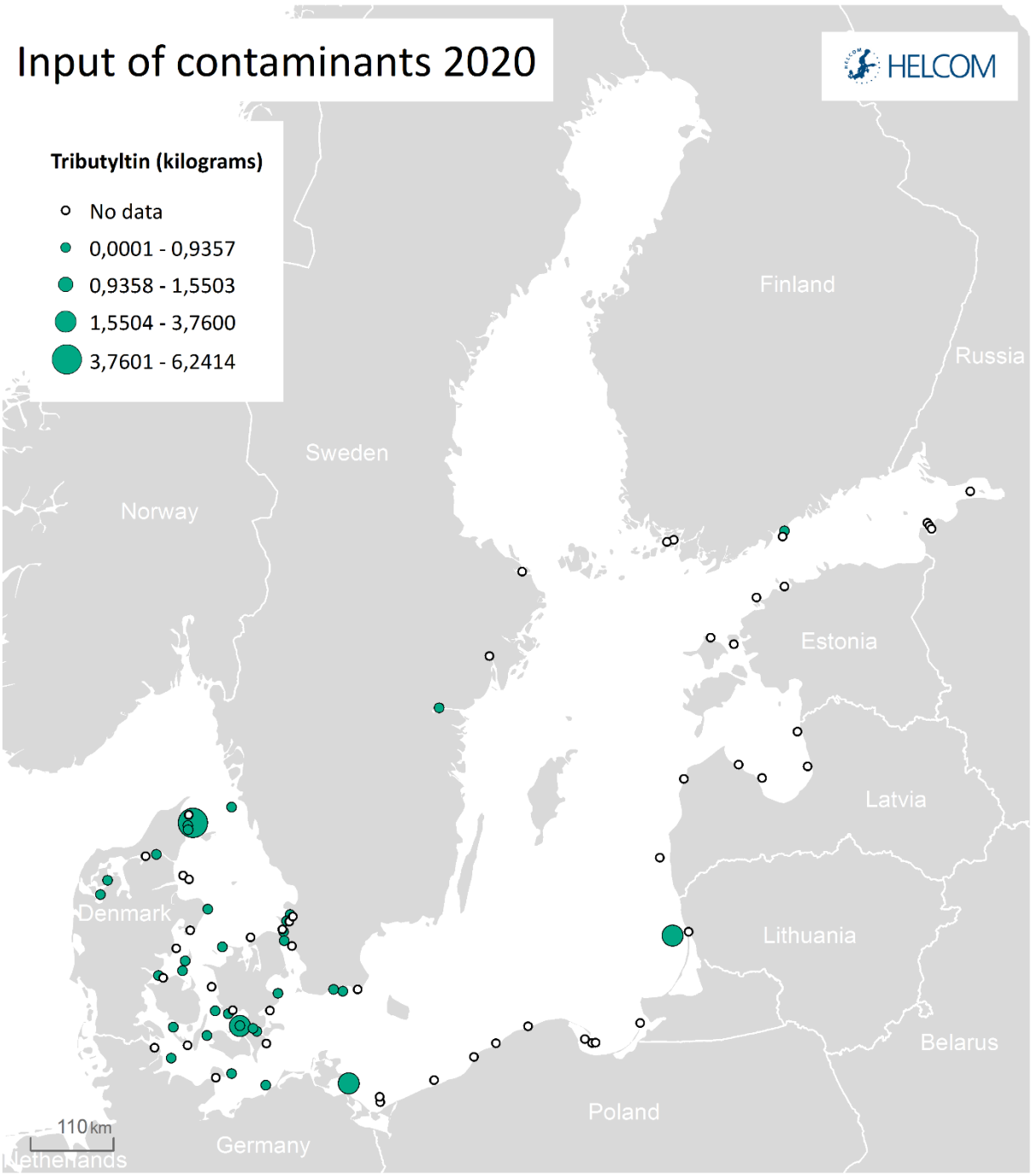

Figure 44. Input of tributyltin from harbors/river in 2020. “No data” can result from no data reported, concentrations below detection limit or material exempted from characterisation.

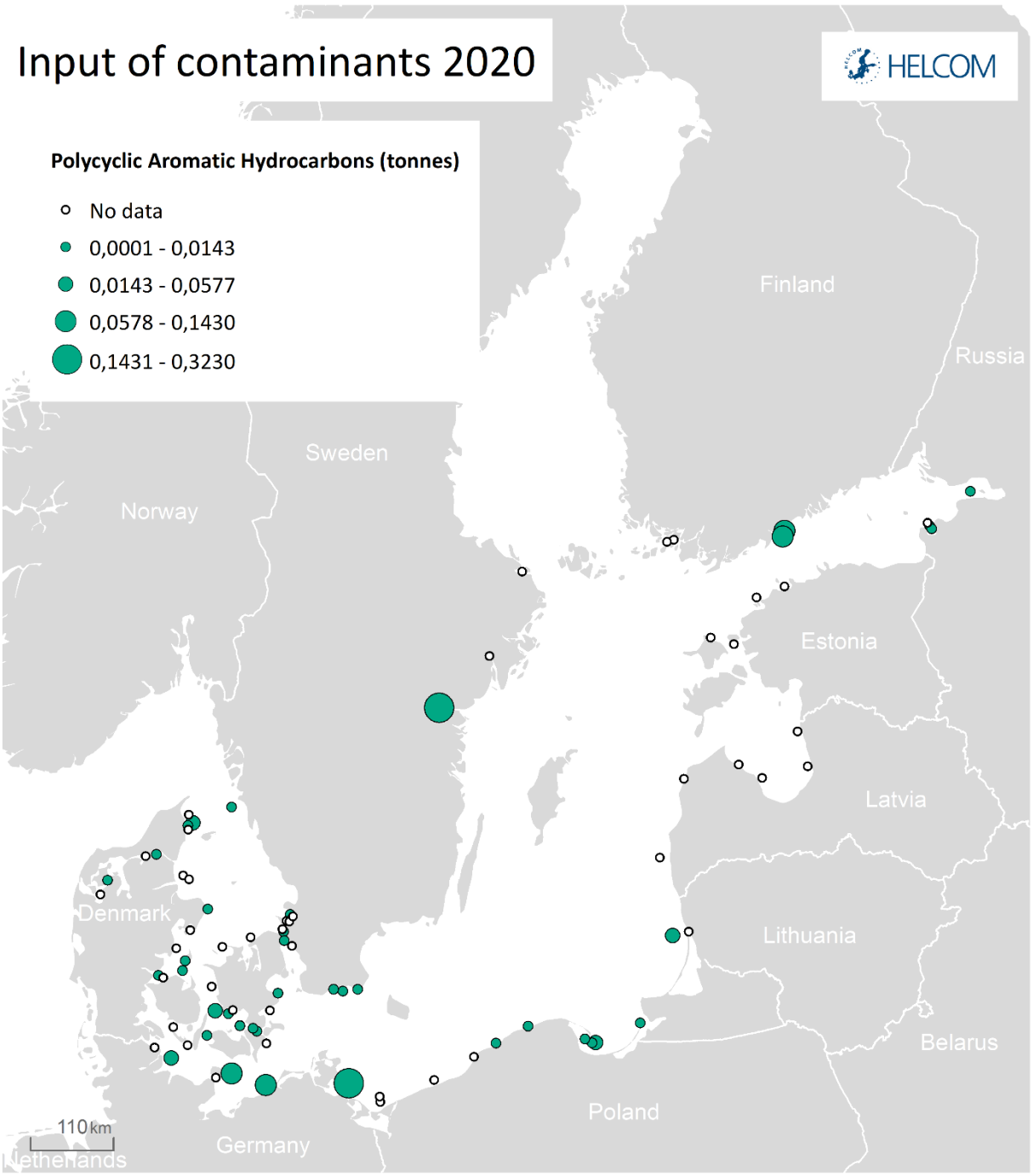

Figure 45. Input of polycyclic aromatic hydrocarbons from harbors/river in 2020. “No data” can result from no data reported, concentrations below detection limit or material exempted from characterisation.

Metadata

The data used in this assessment is originating from the reporting by Contracting Parties under HELCOM Recommendation 36/2 and the HELCOM Guidelines for Management of Dredged Material at Sea. The Contracting Parties report annually on the national data on management of dredged material according to the Reporting Format of the HELCOM Guidelines.

HELCOM compiles the nationally reported data, sends the harmonized datasets back to the Contracting Parties for verification, and publishes the data in HELCOM Map and Data Service (MADS). The underlying data for this assessment can be viewed and downloaded from HELCOM MADS.