

EMODnet – information on the occurrence of marine invasive species in European harbours within the frame of the Ballast Water Management Convention

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Outline

- ① Ballast Water Management Convention
- ① HELCOM/OSPAR Harmonised Procedure on the granting of exemptions (Same Risk Areas)
- ① Data analysis
 - ① OSPAR/HELCOM dataset
 - ① EMODnet biology database
 - ① Results & discussion
- ① Further developments



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Ballast Water Management Convention

- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC)
 - adopted by the International Maritime Organization (IMO) in 2004
 - aims to **prevent the spread of invasive aquatic organisms** from one region to another by establishing standards and procedures for the management and control of ships' ballast water and sediments
 - **Invasive (aquatic) species pose threats to biodiversity and ecosystem services (alteration of habitats, predation, diseases, etc.) and can also have a significant adverse impact on the economy and human health**
 - European Commission
 - published the Regulation (EU) No 1143/2014 on the Prevention and Management of the Introduction and Spread of Invasive Alien Species
 - The introduction of NIS also been considered as a biological disturbance in the MSFD (2008/56/EC) and introduced as a descriptor for a good environmental status



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Ballast Water Management Convention

- BWMC requires all ships in international traffic to manage their ballast water and sediments according to a ship-specific ballast water and sediments management plan (ships will also have to carry a ballast water record book and an international ballast water management certificate).
- However, BWMC Regulation A-4 provides the scope to **issue exemptions** from Regulation
 - granted based on a risk assessment
 - granted to a ship or ships on a voyage or voyages between specified ports or locations (Same Risk Areas)
 - Encouragement of regional agreements to develop harmonised procedures: e.g. HELCOM/OSPAR



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HELCOM/OSPAR Harmonised Procedure on the granting of exemptions

- Species-specific risk assessment
- The key risk criteria to distinguish between unacceptable (high) risk and acceptable (low) risk are:
 - Presence and abundance of target species in either port/location being visited by the vessel;
 - Difference in water salinity between ports/locations being visited;
 - Salinity tolerance of target species present.

- Low risk:** An exemption can be granted.
- Medium risk**
- High risk:** An exemption cannot be granted.



Figure 1. The HELCOM/OSPAR risk assessment algorithm.



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The Data: Target species within European harbours

- Target species: currently 67 marine species (living document)
- A decision support tool is based on extensive sampling of the fauna in different European harbours. This dataset contains, in total, appr. 10000 records from following ports Gdynia, Gothenburg, Hamina, Hull, Kokkola, Kotka, Las Palmas, Muuga, Naantali, Rotterdam, Skoldvik, Turku
- However, these decisions could be flawed by false negatives
 - If a species does occur in the harbour of departure, but was not detected in this dataset, then if it is absent in the harbour of destination: environmental risk!
 - In reverse, if a species is present in the harbour of departure and in the harbour of arrival, a false negative exists, unnecessary precaution would be applied: unnecessary costs!



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Exercise

- Use the EMODNET data base as a tool to check for false negatives in the harbours
- We downloaded the list of target species and candidate target species from the website of the tool. This list was manually checked in WORMS, and accepted scientific names and AphiaIDs were looked up.
- We subsequently produced maps of the distribution, both in the EMODNET database and in the harbour database.



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Maps -examples

- Group I: species that have been found in none of the harbours, and whose absence is confirmed by the complete absence of EUROBIS records in the mapped part of Europe



Bighead Goby

Ponticola kessleri

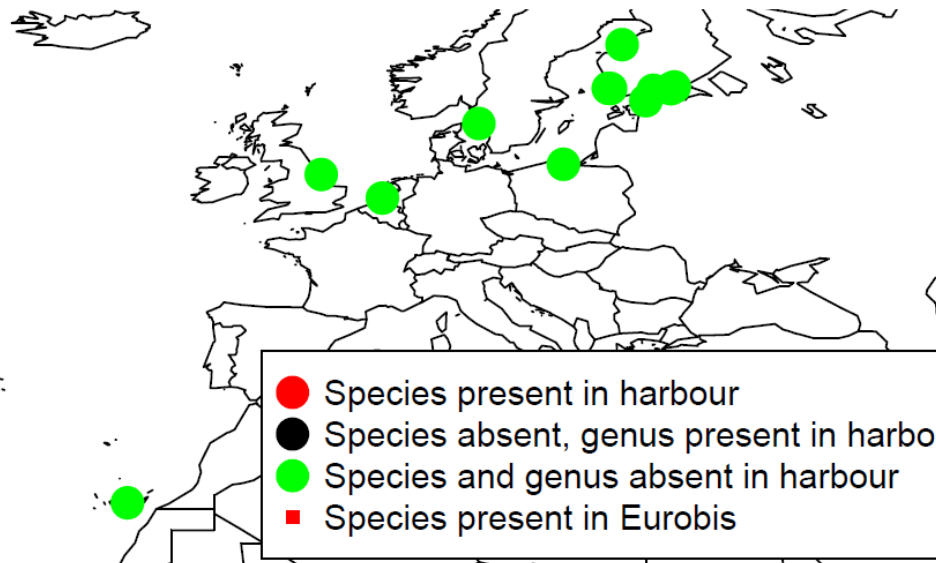


Figure 1: Example of a species of Group I



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Maps -examples

- Group II: were also not found in any of the harbours, were found in the NW Mediterranean, but not in the Atlantic and Baltic parts of Europe. Absence of these species from the considered harbours is also very likely, although invasion may have a higher probability than for the first list of species



FAO

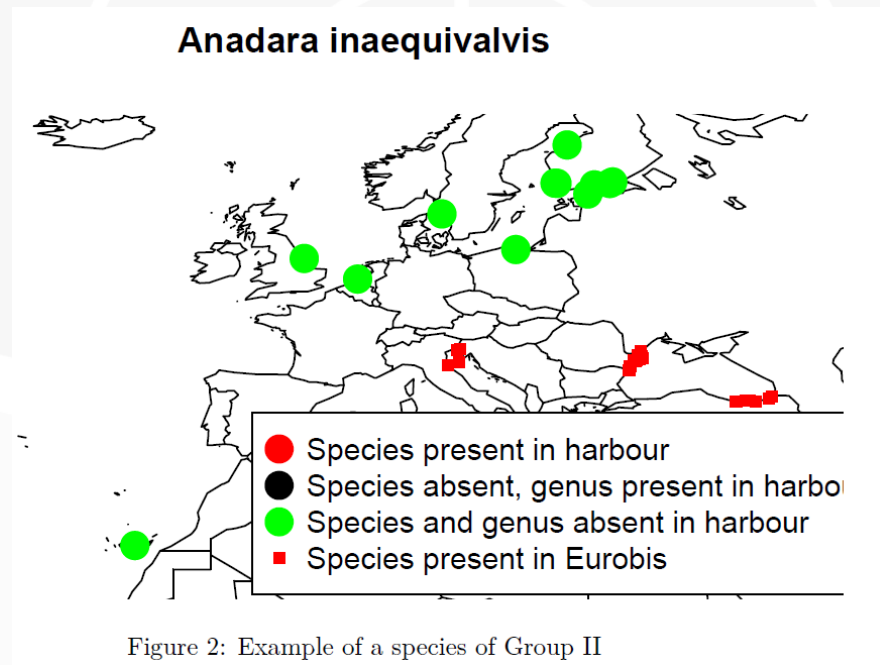


Figure 2: Example of a species of Group II



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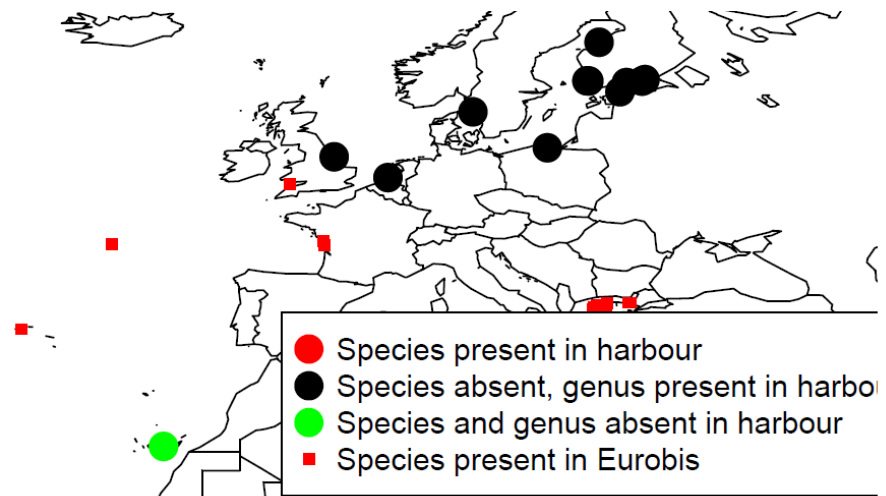


Maps -examples

- Group III: not been recorded in the harbours, but are known from Western Europe at relatively long distances from the harbours considered. In all of these cases it is up to judgement what is 'far' from the harbours, but this list seems to contain mostly species that can reasonably be thought to be (still) absent in the harbours considered



Amphibalanus eburneus





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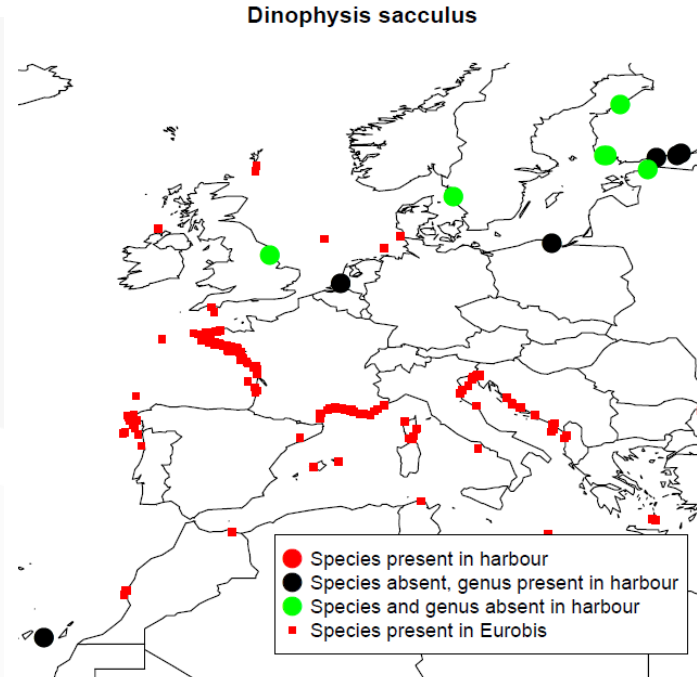


Maps -examples

- Group IV: species that have not been recorded from any of the harbours, but have been found in EUROBIS at locations in the proximity of the harbours. These findings suggest that the negatives in some harbours run the risk of being false negatives, even though there might be some ecological differences between the places of occurrence and the harbours.



Dinophysis sacculus is a marine, planktonic dinoflagellate species. It is a toxic species associated with DSP outbreaks in Europe





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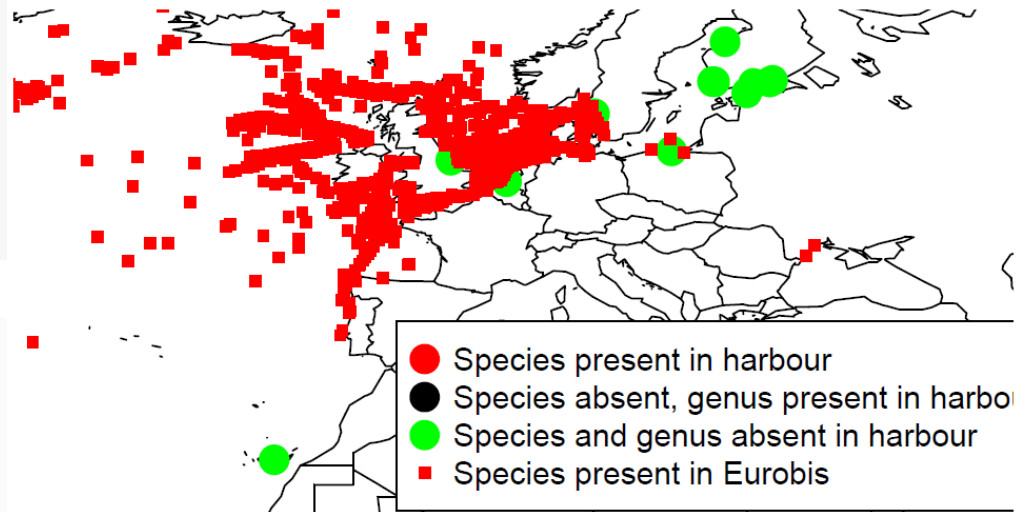


Maps -examples

- Group V: many occurrences in EUROBIS, often over a large area, but have, remarkably, never been recorded in any of the harbours. An example of these species is *Phaeocystis pouchetii*. It is likely that seasonality of the sampling has played an important role in this absence. For other species, such as *Ensis leyi*, taxonomic confusion may have played a role.



Phaeocystis pouchetii





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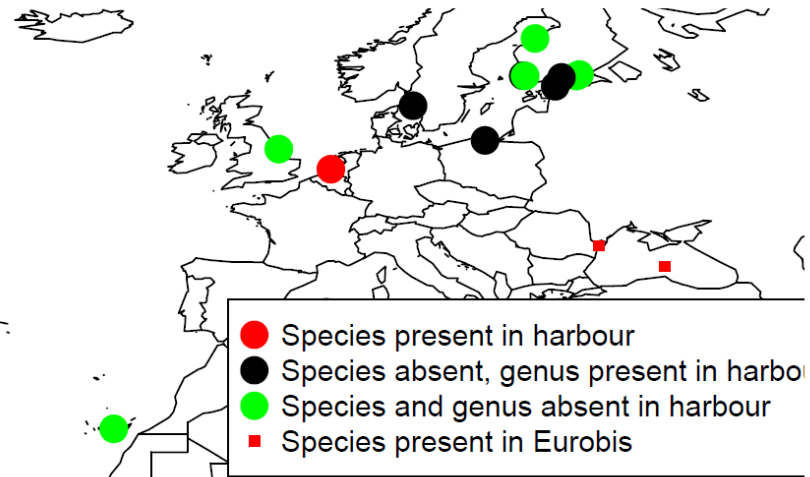


Maps -examples

- Group VI: one species that was found in one of the harbours (Rotterdam) but had not yet been recorded in the EUROBIS database for NW Europe. Note however that a congeneric species (*Neogobius melanostomus*) has been recorded several times. *Neogobius fluviatilis* was known in the data base from the Black Sea and may have invaded recently.



Neogobius fluviatilis





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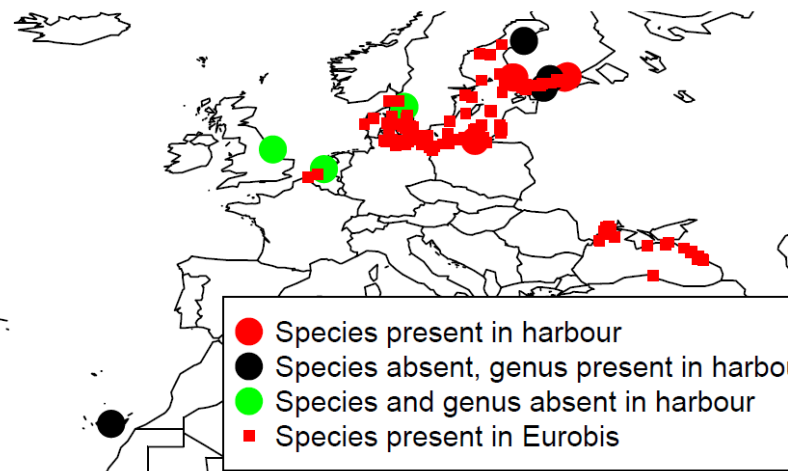


Maps -examples

- Group VII: have been found in at least one of the harbours, but very often there seems to be a high chance that some of the harbours report a false negative. An example is *Acartia* (*Acanthacartia*) *tonsa*, a species that is widely distributed in the Baltic and down to the Southern Bight of the North Sea, but has not been reported from several harbours in its region of distribution



Acartia* (*Acanthacartia*) *tonsa





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Discussion

- There is a high probability that many of the observations are false negatives. Of course, one cannot prove this beyond doubt, but if a species is widely distributed in the neighbourhood of a harbour, there is at least a reasonable chance that the species occurs in this harbour.
- False negatives can increase costs, but also environmental risk, depending on whether the false negative occurs in the harbour of depart or arrival.



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Discussion

- We do not think that EUROBIS can help in judging the positive records, i.e. the recorded presence in the harbours.
- There are a few cases where presence in a harbour is recorded while the species is not yet found in the EUROBIS database for W and N Europe.
 - Considering these species are invasive and that collection of data in EUROBIS lags behind the actual sampling dates
 - the species has only recently arrived in the region of interest.
 - In some cases, the species were riverine rather than marine, which can also explain their absence from EUROBIS.



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Discussion

- The maps are a basis for further reflection on the use of the harbour database, and can be used by experts to improve the decision support tool.
- The completion of the databases, using EUROBIS as an additional data source, can make these decisions less dependent on the vagaries of sampling at one or few occasions.

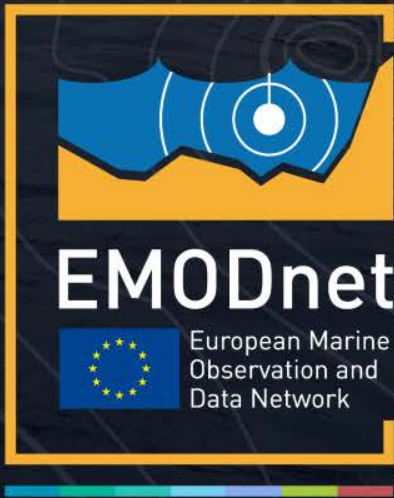


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Further development

- Improve graphical quality of the present product, an obvious further development is to produce the maps in an interactive web-based application
- include a time dimension to the EMODNET data. A time slicer can be added to an interactive application, allowing to view occurrences in the database for any time periods chosen
- For well-established species, it will be possible to investigate whether they have still been expanding in recent years or not.
- The EMODNET data is also available for download in tabular form. This will allow users to make their own calculations on the basis of the available data - In general, the actual use and incorporation into the decision support tool is not a task for EMODNET, and should be left to the developers and users of the tool



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