Agenda Item 3 Species Action Plan

Recovery Plan for Baltic Harbour Porpoise (Jastarnia Plan)

Document 3.1.b

Progress Report on the Recovery Plan for Baltic Harbour Porpoise (Jastarnia Plan)

Action Requested

- Take note

Submitted by

Sea Watch Foundation
(Harbour Porpoise Coordinator)

NOTE:
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Secretariat's Note

The Rules of Procedure adopted at the ASCOBANS 8th Meeting of Parties remain in force until and unless an amendment is called for and adopted.

PROGRESS REPORT

on

THE JASTARNIA PLAN:

THE RECOVERY PLAN FOR THE HARBOUR PORPOISE

IN THE BALTIC PROPER

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CONTENTS

The views and recommendations expressed in this report are the authors' own

JASTARNIA PLAN PROGRESS REPORT

Background & History

The ASCOBANS Jastarnia Plan is a recovery plan for harbour porpoises inhabiting the Baltic Proper. The harbour porpoise is the only cetacean species occurring throughout the year in the Baltic Sea. Genetic (Wiemann *et al*., 2010), morphometric (Galatius *et al*., 2012), and distributional studies (Sveegaard *et al*., 2015; SAMBAH, 2016a; Carlén *et al*., 2018) all indicate a separate harbour porpoise population in the Baltic Proper (Lockyer, 2003; Evans & Teilmann, 2009; Sveegaard *et al*., 2015).

Figure 1. Map of geographical terms used in the Jastarnia Plan

Since the mid-twentieth century, harbour porpoise numbers have declined drastically. This decline has probably been caused by a combination of factors: commercial hunting up to the end of the nineteenth century which was resumed during the two world wars (Lockyer & Kinze, 2003; Skóra & Kuklik, 2003), severe ice conditions during the first half of the twentieth century (Svärdson, 1955), environmental contaminants (Beineke *et al*., 2005; Berggren *et al*., 1999) probably causing immunosuppression, increased disease risk and reproductive failure (Jepson *et al*., 2005, 2016; Murphy *et al*., 2015), and, perhaps most importantly during the last decades, the use of synthetic gillnets (Hammond *et al*., 2008; HELCOM, 2013). The population is currently listed as Critically Endangered (CR) by IUCN (Hammond *et al*., 2008), and in Annexes II and IV of the Habitats Directive.

During the Second Meeting of the Parties to ASCOBANS, held in Bonn, Germany in November 1997, a Resolution was adopted inviting Parties and Range States to develop, by 2000, a recovery plan for harbour porpoises in the Baltic Sea. The following year, an ASCOBANS Baltic Discussion Group was formed, comprising a number of porpoise specialists from the region, chaired by Finn Larsen. However, by the time of the Third Meeting of the Parties in Bristol, UK, in July 2000, a recovery plan had still not been established. The Baltic Discussion Group then held a meeting in January 2001, hosted by the Danish Institute for Fisheries Research in Charlottenlund, Denmark. And in October of that year, a preparatory meeting of environment and fishery agencies and fishermen's organisations from the various Nordic Parties to ASCOBANS, was organised in Sweden, with funding from Sweden and the Nordic Council.

In January 2002, a workshop was held in the Polish coastal town of Jastarnia, in order to draft a recovery plan. Hosted by the Foundation for the Development of the University of Gdańsk and the University of Gdańsk's Hel Marine Station, and funded by the Danish government, the workshop was attended by representatives of ministries, NGOs, fishermen's organisations, and public and private institutions from six Baltic Sea countries, as well as regional international organizations. Based on the outcome of this workshop and in cooperation with the Secretariat, Dr Randall Reeves, the facilitator of the workshop, produced the draft Baltic Harbour Porpoise Recovery Plan (ASCOBANS, 2002) that was presented to the Fourth Meeting of the Parties in Esbjerg, Denmark in August 2003. This became known as the Jastarnia Plan.

Although not formally adopted in 2003 due to concerns about competency issues raised by the European Commission, a revised version of the Plan, produced by the ASCOBANS Baltic Sea Steering Group (Jastarnia Group), was finally adopted in Bonn, Germany, in October 2009, at the Sixth Meeting of the Parties (ASCOBANS, 2009). A further revision, compiled by Julia Carlström, was adopted at the Eighth Meeting of the Parties (Helsinki, Finland, August/September 2016) (ASCOBANS, 2016).

Since 2005, the ASCOBANS steering group for the Baltic Sea region, known as the Jastarnia Group, has met annually, the latest (14^{th}) meeting being at the Danish Environmental Protection Agency in Copenhagen, Denmark, in March 2018. Six main action points were identified, based upon the 2016 revision of the Jastarnia Plan. Each will be considered below, with a summary of progress by country.

Actions

1. Increase involvement, awareness and cooperation

The rarity of harbour porpoises in the Baltic Proper has meant that over large parts of the region, the public remains unaware of its existence. This applies particularly to the eastern Baltic States of Russia, Lithuania, Latvia, and Estonia. Therefore, there is a strong need for an awareness raising programme. This could usefully be championed by both international and national non-governmental organisations that have direct connections to the public. Potential examples include CCB, WWF, and WDC. In Poland, Hel Marine Station has had a long history of raising awareness about harbour porpoises, led by initiatives from Krzysztof Skóra and Iwona Pawliczka, in collaboration with WWF Poland. Those efforts should continue. Museums and aquaria also have an educational role to play. In this context, the German Oceanographic Museum in Stralsund, Germany has done much to raise awareness in the German sector of the Baltic, whilst the Tampere Dolphinarium in Finland had an education programme championed by Kai Mattson over a number of years until its closure in 2015. WWF Sweden has recently been active by including the plight of the harbour porpoise in their Baltic Sea campaign. CCB based in

Sweden has a Facebook page aimed at the general public informing them about the Baltic harbour porpoise, and models of porpoises have been placed in Sweden's largest zoo, Kolmården, where Mats Amundin has done much to raise awareness of the species. The SAMBAH Project between 2010 and 2015 also had a major public campaign to raise awareness of the Baltic harbour porpoise, holding a stakeholder workshop in Gothenburg, Sweden in April 2013, and a conference at Kolmården Wildlife Park, Sweden in December 2014.

Several of the above initiatives were most active a few years ago. There is a need now to sustain those efforts in all the countries bordering the Baltic Sea, and to develop new awareness campaigns especially in those countries in the eastern Baltic where promoting conditions favourable for the recovery of porpoises would constitute an important first step.

One of the major pressures upon the Baltic harbour porpoise is fisheries bycatch. In order to address this, efforts should be made to engage with stakeholders, in this case, particularly fishers. In **Poland**, ghost netting has been identified as a major conservation issue. Since 2011, WWF Poland has been running a project to remove lost nets and, in 2016, joined the international project called MARELITT BALTIC. Its aim is to develop simple, cost-effective and environmentally safe methods of fishing "ghost nets" from the Baltic Sea floor and to find a practical solution to the environmental problem associated with derelict fishing gear (DFG) through marking and identification of the nets. In 2017, Polish fishermen, working with the MARE Foundation, actively joined an action to remove ghost nets from the Baltic Sea. In total, 147 tons of derelict fishing nets were removed. It has been estimated that up to 800 tons of ghost nets may occur in the Polish zone of the Baltic Sea. So far, in their activities, WWF and its partners have fished 300 tons of derelict fishing nets. This is a very positive effort and could be expanded to other countries in the Baltic. It would not only improve the situation for the harbour porpoise but also for other marine wildlife such as seabirds and waterfowl.

In **Sweden**, authorities are having dialogue meetings with fishermen concerning the regulation of fisheries in protected areas, both for specific areas and more generally, the latter in conjunction with the Swedish Agency for Marine & Water Management (SwAM). A sightings programme where the public can report harbour porpoise observations is run by the Swedish Museum of Natural History.

There is little information on public awareness campaigns in **Denmark.** There is no porpoise sightings programme in operation at the moment, although there are plans for 2019 to launch one. Strandings and incidental catches were un-reported in 2015-17.

In **Germany**, sightings and strandings programmes involving the public are ongoing. For Schleswig-Holstein, they are coordinated by the Terrestrial and Aquatic Wildlife Research (ITAW) in Büsum; for Mecklenburg-West Pomerania, they are administered by the German Oceanographic Museum in Stralsund, who have also produced an app "OstSeeTiere" (Baltic Sea Animals) (https://www.deutsches-meeresmuseum.de/wissenschaft/ infothek/sichtungskarte/). Project "STELLA" (November 2016 – December 2019) is another project involving close cooperation with fishers to develop of alternative management approaches and fishing gear. Public engagement activities include an exhibition "Die letzten 300" in collaboration with NGOs NABU and OceanCare as well as with ASCOBANS. The exhibition displayed the many works received as part of the creative competition, and was on display in the German Oceanographic Museum from January – April 2015, and visited by an estimated 30,000 people. Every year, the museum also participates in the International Day of the Baltic Harbour Porpoise coordinated by ASCOBANS, with specific activities and information for the public. The museum has a marine mammal science education project (http://dev.marine-mammals.com/), and focuses mainly on school activities and educating teachers. In 2017, it produced an app ("Be the Whale") depicting a humpback whale, and in 2018 is doing the same using the beluga. Although not focused upon the harbour porpoise, these are designed to make children aware of dangers to cetaceans in general. Noise, pollution and bycatch are all included as

threats as well as shipping in general (ship strikes) and prey depletion.
In the eastern Baltic, the Ministry of the Environment in **Finland** has had a public reporting scheme for porpoise sightings since 2001. Press releases have been made in early summer along with information on the current situation of harbour porpoise. However, none of the countries Russia, Latvia, and Estonia appear to have campaigns to raise public awareness about porpoises in the Baltic, their conservation status, and need for conservation action. Porpoises are simply not recognised as part of the native fauna. This is going to be challenging but there is an important need to make people aware that the porpoise does occur in their waters albeit at low numbers, and that efforts to create the conditions favourable for the species will go a long way to enhancing the possibility of porpoises returning in greater numbers to their waters. In **Lithuania**, on the other hand, a harbour porpoise protection plan has been initiated, with flyers and a short documentary made to raise public awareness (https://www.youtube.com/watch?v=WQYP5T0SCbs). There are also future plans by the Lithuanian Sea Museum (LSM) for a Baltic Sea Animals and Therapy Centre (BARTC).

Key Conclusions and Recommendations *Public awareness initiatives and collaborations with stakeholders have shown very variable progress between countries. They have been particularly weak for countries in the eastern Baltic where porpoises are not recognised as part of the native fauna. Efforts to improve awareness of the presence of the species, its conservation status and threats should be made as a priority across the region.*

2. Monitor and estimate abundance and distribution

The international collaborative LIFE+ Project SAMBAH (Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise) (www.sambah.org) was undertaken in order to estimate harbour porpoise abundance and map its distribution in the Baltic Sea. Based on an acoustic survey using harbour porpoise click loggers deployed at 304 locations from May 2011 to April 2013 (Figure 2), the abundance of the Baltic harbour porpoise population was estimated at 497 individuals (95% CI 80–1091) (SAMBAH, 2016a; Carlén *et al.*, 2018).

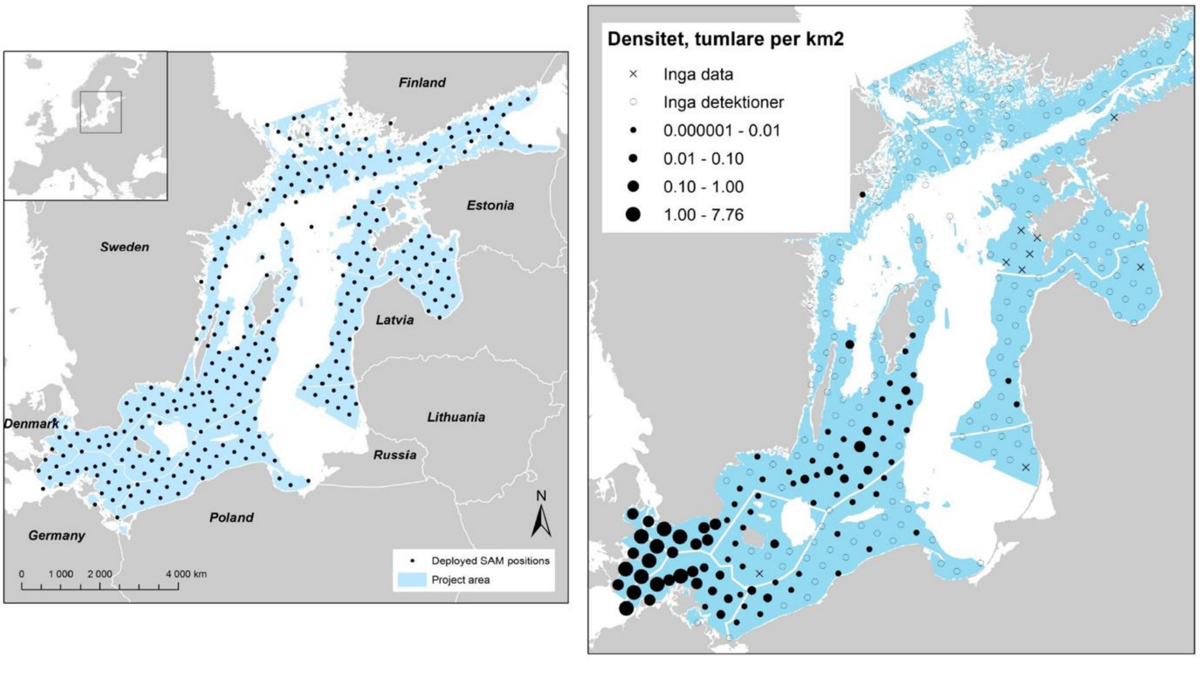


Figure 2. Distribution of C-PODs deployed in the SAMBAH Project, between 2011 and 2013 (left), and resultant estimated densities of harbour porpoises (right). The legend in the right-hand map shows estimated porpoise

density per km^2. Crosses indicate no data and open circles no detections (Source: SAMBAH, 2016a)

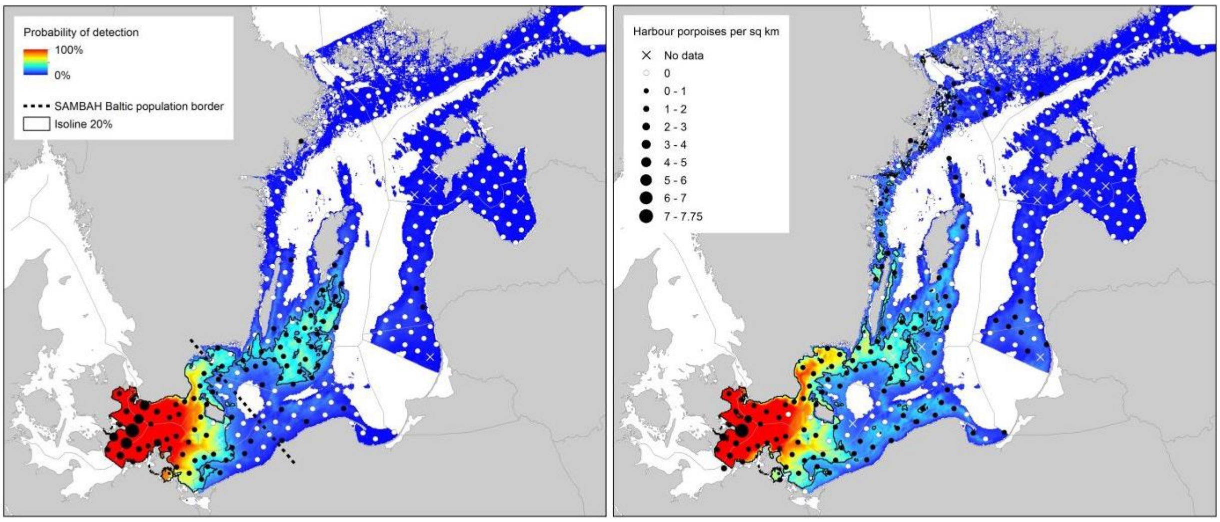


Figure 3. Predicted probability of detection of harbour porpoises per month in the SAMBAH project area during May – October (left) and November – April (right). The black line indicates 20% probability of detection, approximately equivalent to the area encompassing 30% of the population, often used to define high-density areas. The dots or crosses show the probability of detection at the SAMBAH survey stations. The border indicates the spatial separation between the Belt Sea and Baltic harbour porpoise populations during May – October, according to Carlén *et al*., 2018).

Modelled maps of the probability of detecting harbour porpoises show a spatial separation between the Belt Sea and Baltic populations during the summer season (SAMBAH, 2016a; Carlén *et al*, 2018). Particularly between May and August, i.e. when calving and mating take place (Börjesson & Read, 2003; Lockyer, 2003), Baltic harbour porpoises aggregate at and around the Hoburg's and Northern and Southern Mid-sea banks in the Baltic Proper (Figure 3). During the winter season, especially between January and March, the animals are more spread out across the study area, and they overlap spatially with the Belt Sea population (Figure 3). The area around the Hoburg's and Northern and Southern Mid-sea banks in the Baltic Proper should be considered essential and probably the main breeding area for the Baltic harbour porpoise population (Figures 2b, 3).

In 2014, the Finnish Ministry of Environment established a working group to update information on the status of harbour porpoises in Finnish waters, and to make recommendations for actions to be taken for better protection of the species (Loisa (editor) & Pyöriäistyöryhmä, 2016).

The visual observations show that harbour porpoises occur also further north in the Bothnian Bay, an area which was not covered by SAMBAH (Figure 4). It is clear that the numbers of harbour porpoises have decreased drastically in Finnish waters, as elsewhere in the Baltic Proper, since around the mid 20^{th} century. However, visual observations, strandings and bycatch of harbour porpoises were still common in the 1960`s. Since mother-calf pairs are no longer observed in Finnish waters, the species has been considered as regionally extinct (Liukko *et al*., 2016).

The presence of porpoises in Finnish waters, together with SAMBAH results, suggests that they also occur in the other eastern Baltic states, even if only intermittently or in small numbers.

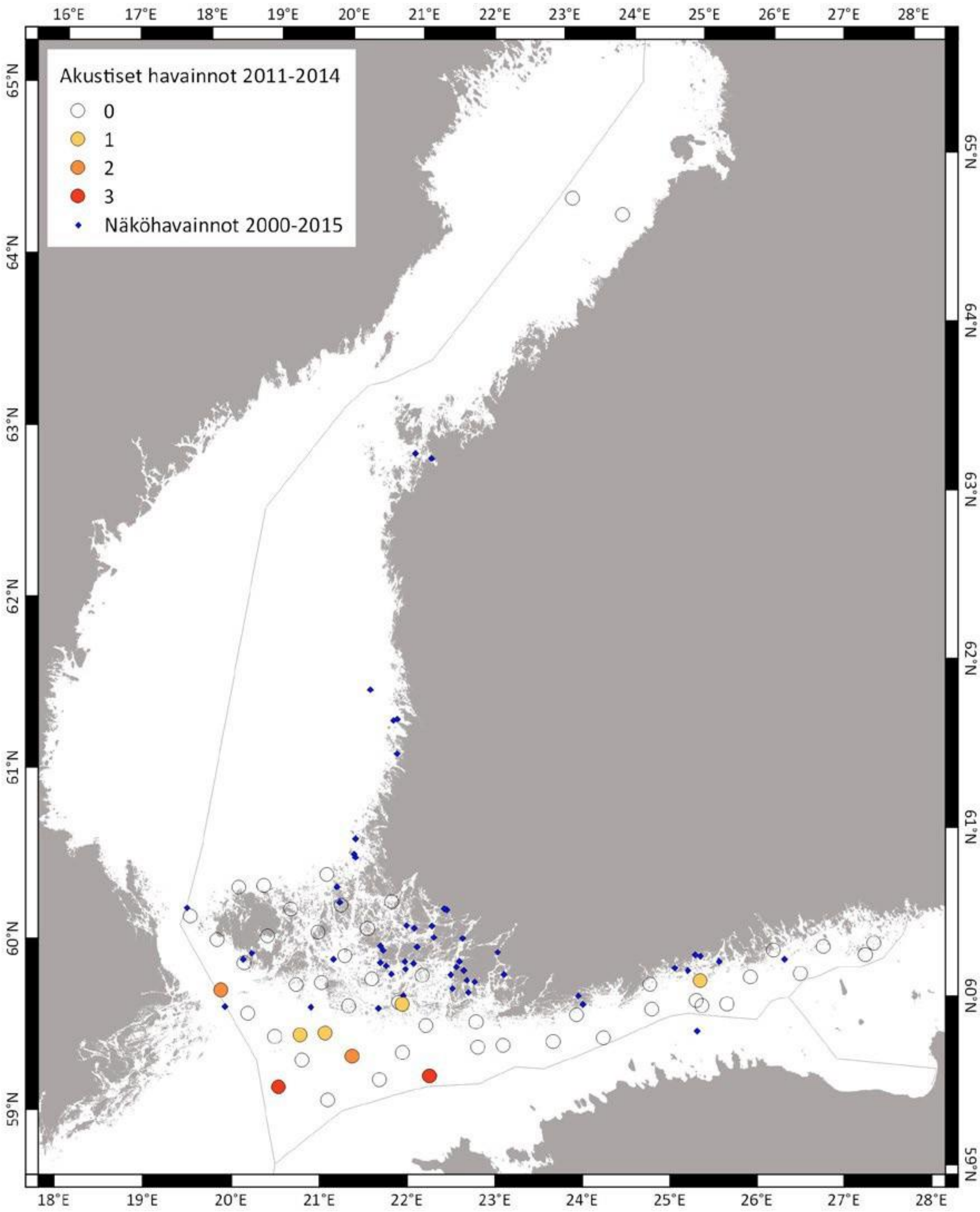


Figure 4. Acoustic and visual observations of harbour porpoises in Finnish waters since 2000. The blue dots represent visual observations (in total 53) in 2000-2015. The circles represent passive acoustic monitoring stations and the number of observations received from then in 2011-2014. Legend shows acoustic observations for 2011-2014 and visual observations 2000-2015 (Source: Loisa, 2016).

Population Structure & Management Units

The Jastarnia Plan took the management area for porpoises in the Baltic proper as all waters east of the Darss and Limhann Ridges, with the new Conservation Plan for the Western Baltic, the Belt Sea and the Kattegat filling the gap between the Baltic Proper and the North Sea (see Figure 5).

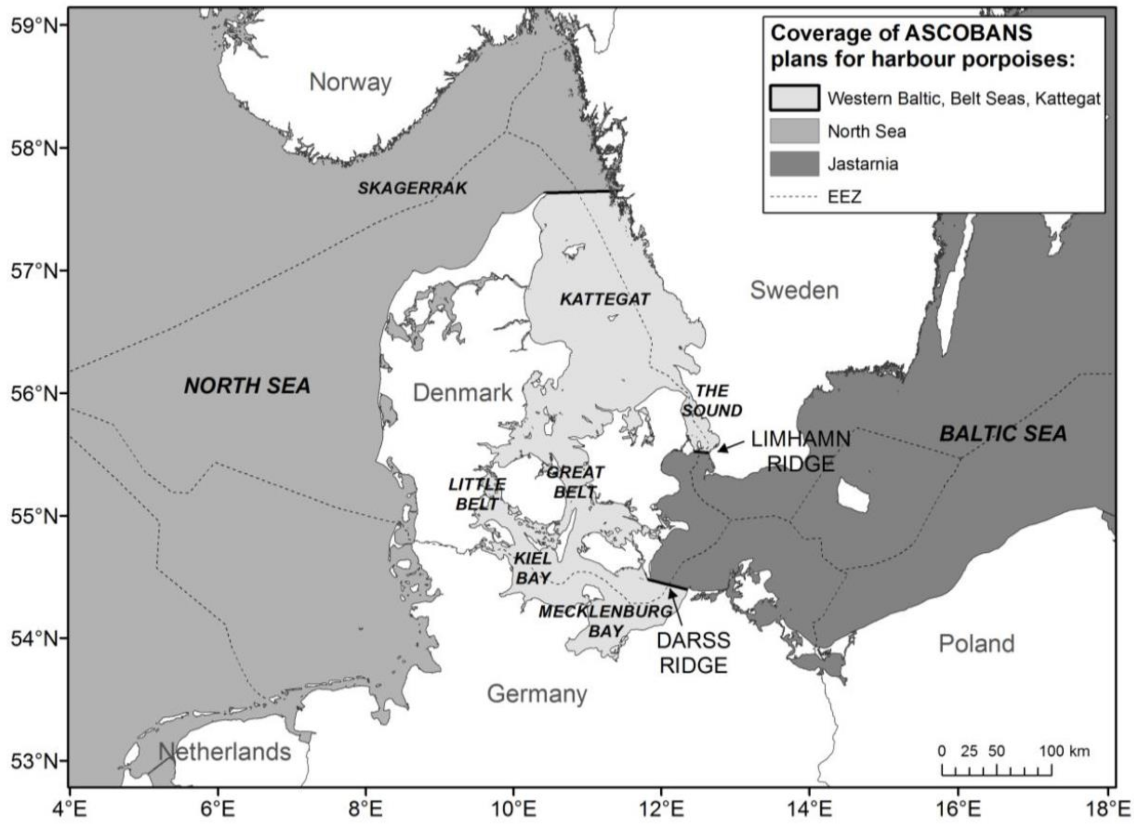


Figure 5. Map of the North Sea and the Baltic indicating where the geographical area covered by the Plan for the population in the Western Baltic, the Belt Sea and the Kattegat adjoins that of the ASCOBANS North Sea Plan and the ASCOBANS Jastarnia Plan. The dashed line indicates the national borders of the Exclusive Economic Zone (EEZ) (Source: ASCOBANS, 2012).

For the purpose of estimating the size of the Baltic Proper population, the SAMBAH Project treated this as everywhere east of the hatched line indicated in Figure 3, in the summer months May-October (SAMBAH, 2016a; Carlén *et al*., 2018). Sveegaard *et al*. (2015), on the basis of genetics, morphology, acoustics and satellite tracking, proposed a slightly different set of boundaries, the North Sea population management area having its southern boundary extending into the Kattegat (the east-west line drawn at 56.95°N), and the Belt Sea population management area having its eastern boundary around 13.5°E (Figure 6). They recommend that ASCOBANS reconsider the boundaries for each of the plans taking account of these findings. The fact that summer and winter distributions appear to vary with movement across boundaries complicates issues. However, a decision should be taken on the boundaries for implementing all three porpoise conservation plans, and adopted by those countries with EEZs spanning more than one conservation plan, so that in their reports countries apportion information to the appropriate management areas. At present, this is not occurring. This applies in particular to the countries of Germany, Denmark, and Sweden.

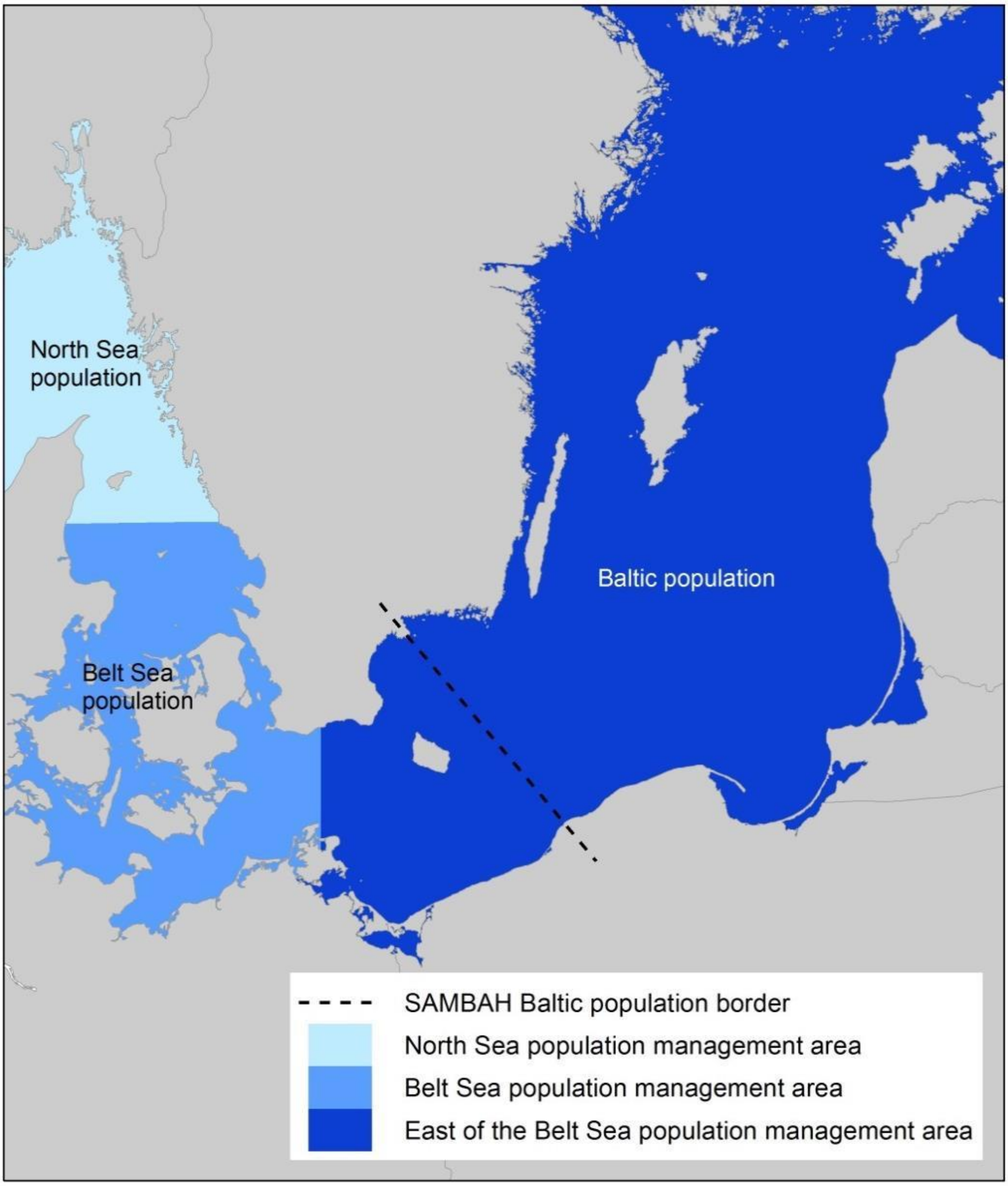


Figure 6. Harbour porpoise populations in the Baltic region. Blue shading indicates the borders proposed for the management unit of the Belt Sea population by Sveegaard *et al.* (2015), the dotted black line the spatial separation during May-Oct of the Belt & Baltic populations by SAMBAH (2016a). All borders are for the summer half-year only.

Conservation action clearly should be the priority for the harbour porpoise in the Baltic Proper. Notwithstanding that, some more work on population structure in the region would be beneficial. The conclusions reached by Sveegaard *et al*. (2015) apply to summer month distributions. It would be useful to explore potential differences at other seasons, bearing in mind that animals from the German Belt Sea appear to move eastwards seasonally into the Baltic Proper. There remains debate as to whether there is indeed a distinct population inhabiting only the Baltic Proper, as highlighted by the Powerpoint presentations of Ralph Tiedemann and Per Palsbøll at the last Jastarnia Group meeting. Palsbøll reanalysed the samples used by Lah *et al*. (2016), again using single nucleotide polymorphisms (SNPs) on the same 37 porpoise samples from the North Sea (n=6), Skagerrak (n=5), Kattegat (n=6), Belt Seas (n=10) and Baltic Proper (n=10) used by Lah *et al*., obtaining the same plots but by using a likelihood-based analytical approach to identify the most likely number of genetic clusters present in the data, and a larger sample (n=73), found no evidence for a distinct population in the Baltic Proper. Tiedemann, on the other hand, also using SNPs but with a sample of 109 from the different regions (North Sea, n=20; Skagerrak, n=10, Kattegat, n=19; Belt Seas, n=39; Baltic Proper, n=21), and a variety of analytical approaches, considered they discriminated between a Baltic Proper population and one in the Belt Seas. In all these studies, the sample sizes from the Baltic Proper remain very small, and very largely from the western end. There needs to be more sampling of animals in the eastern sector of the Baltic Proper for comparison with animals in the west, and a comparison between extant populations and museum specimens from historical times to establish whether the original population of the Baltic remains intact after the declines of the middle of the last century.

Monitoring abundance and distribution

The SAMBAH Project provided important new information on the abundance and distribution of porpoises in Baltic Proper. However, there were constraints. The project aimed for large-scale data collection, thus some more detailed information in coastal areas may be missing. Also, there was no sampling in areas of >80m depth; notably Russia were not included; and because of the difficulty of applying a robust detection function, the resultant estimates had very large confidence intervals. There are tentative plans for a SAMBAH-II project, and interested parties need to identify their priorities, bearing in mind what can be undertaken practically, and the needs of the Jastarnia Plan, as well as for EU HD and MSFD reporting. A first meeting discussing the potential aims of the project was held at the ECS Conference in La Spezia, Italy, in April 2018.

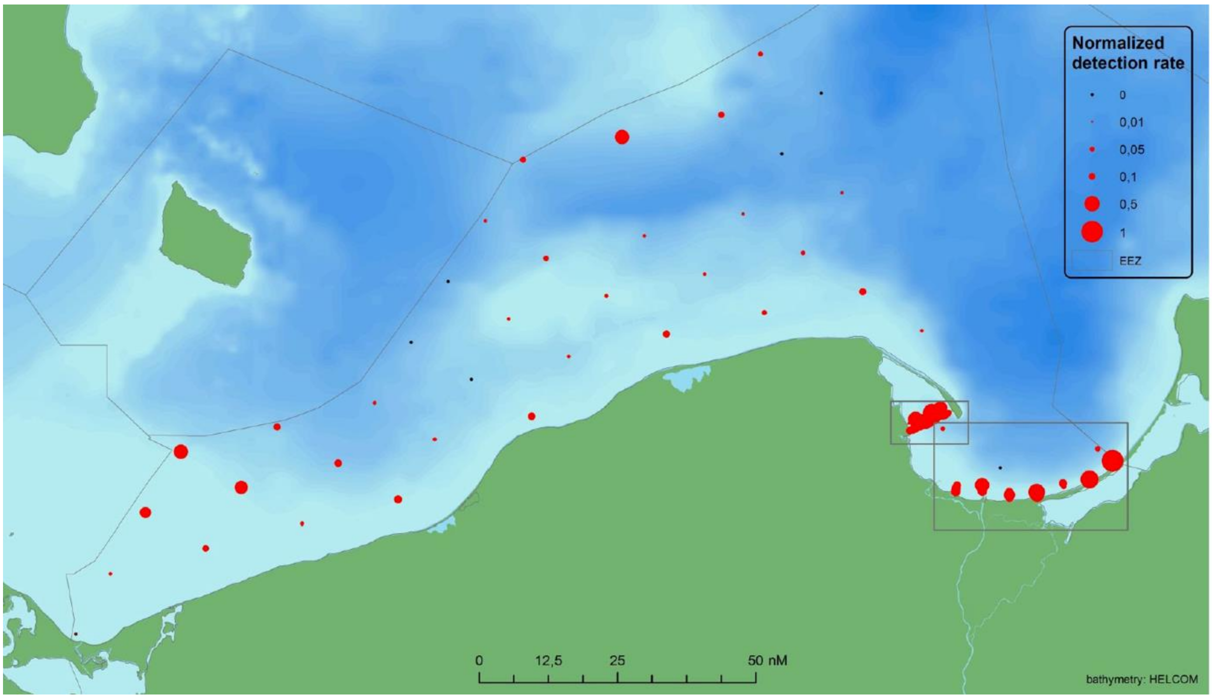
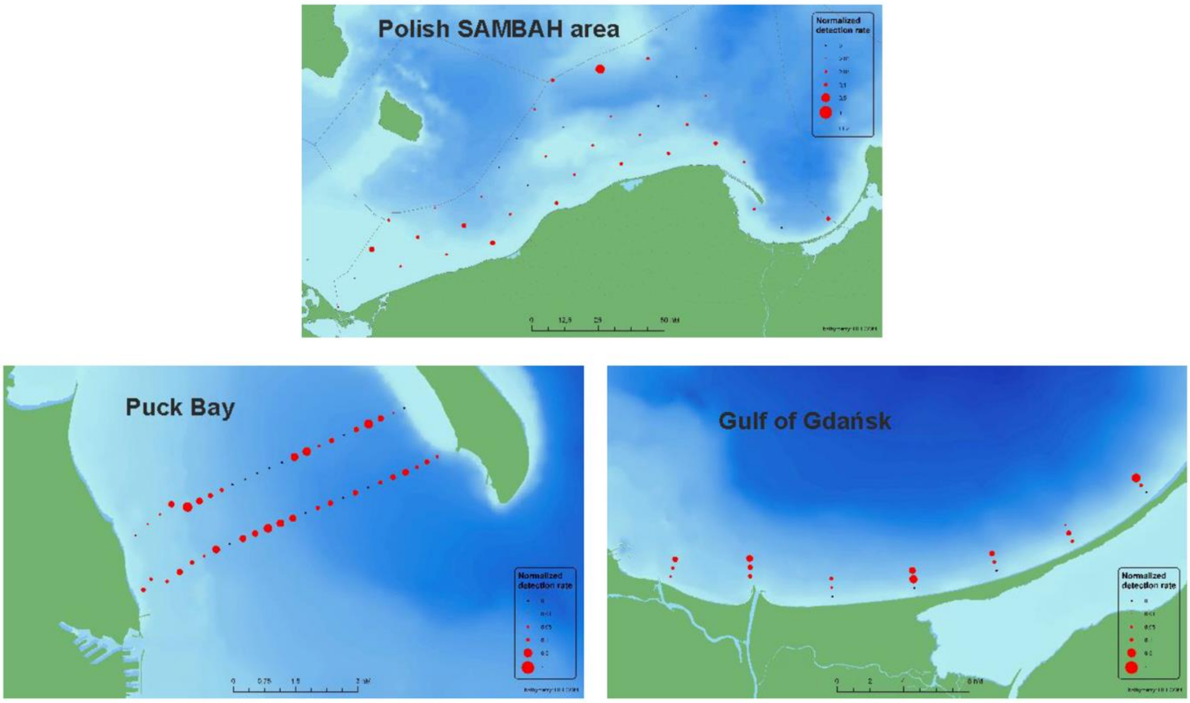


Figure 7. Results of Static Acoustic Monitoring Projects carried out in Polish Baltic waters, 2017-18. PPM were calculated for a period of deployment in each location (Source: Hel Marine Station).

Since SAMBAH, some countries have continued acoustic monitoring. **Poland**, for example, has undertaken static acoustic monitoring using C-PODs in the southern part of the Gulf of Gdánsk between 2013 and 2014, and at 25 stations in Puck Bay between 2017 and 2018, building upon earlier acoustic monitoring there, from 2009-2013 (Figure 7). For Puck Bay in particular, they show a seasonal influx of animals during the winter period (November-April) (Figure 8).

a) Winter period (November to April)



b) Summer period (May to October)

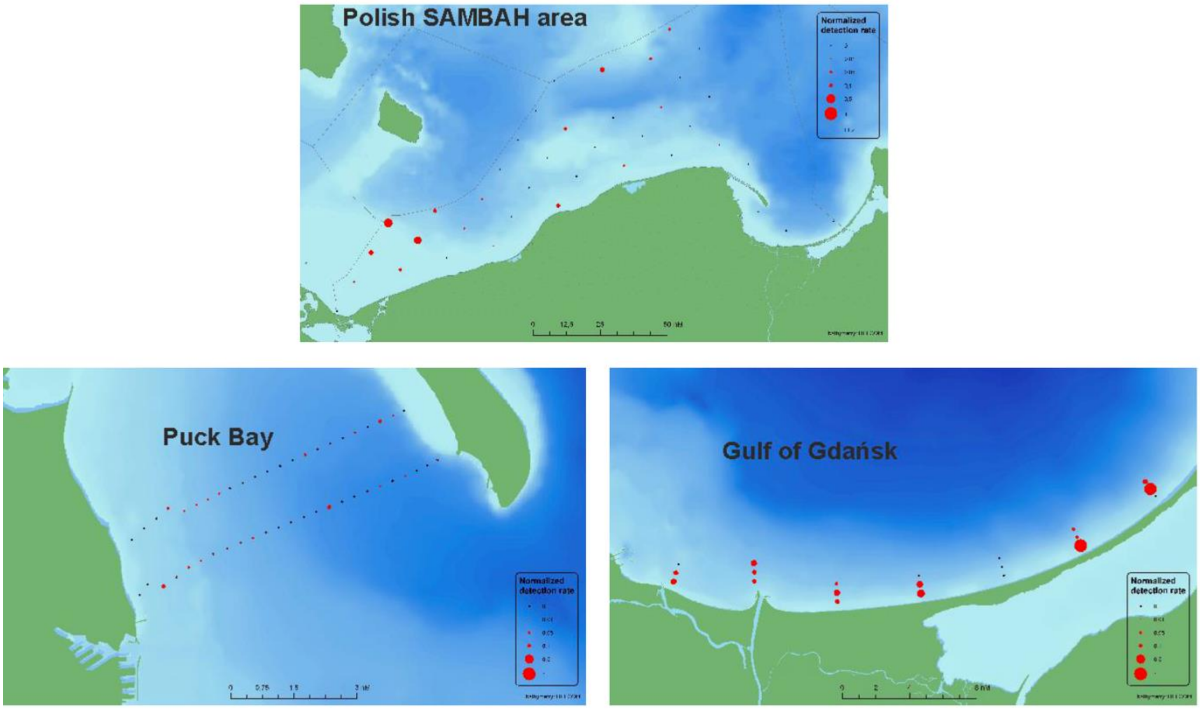


Figure 8. Seasonal Variation in Harbour Porpoise Acoustic Detection Rates (PPM) in coastal waters of the Polish Baltic, 2017-18 (Source: Hel Marine Station).

Sweden has also continued acoustic monitoring after the end of the SAMBAH Project, with ten stations operated by the Swedish Museum of Natural History off SE Sweden from summer 2017 (Figure 9). Four of these stations are within the Hoburgs bank and Midsjøbankarna Natura 2000 site. There is also a station for porpoise & underwater noise monitoring within this pSCI. Regional monitoring has taken place at ten coastal stations in Blekinge, run by the County Administrative Board.

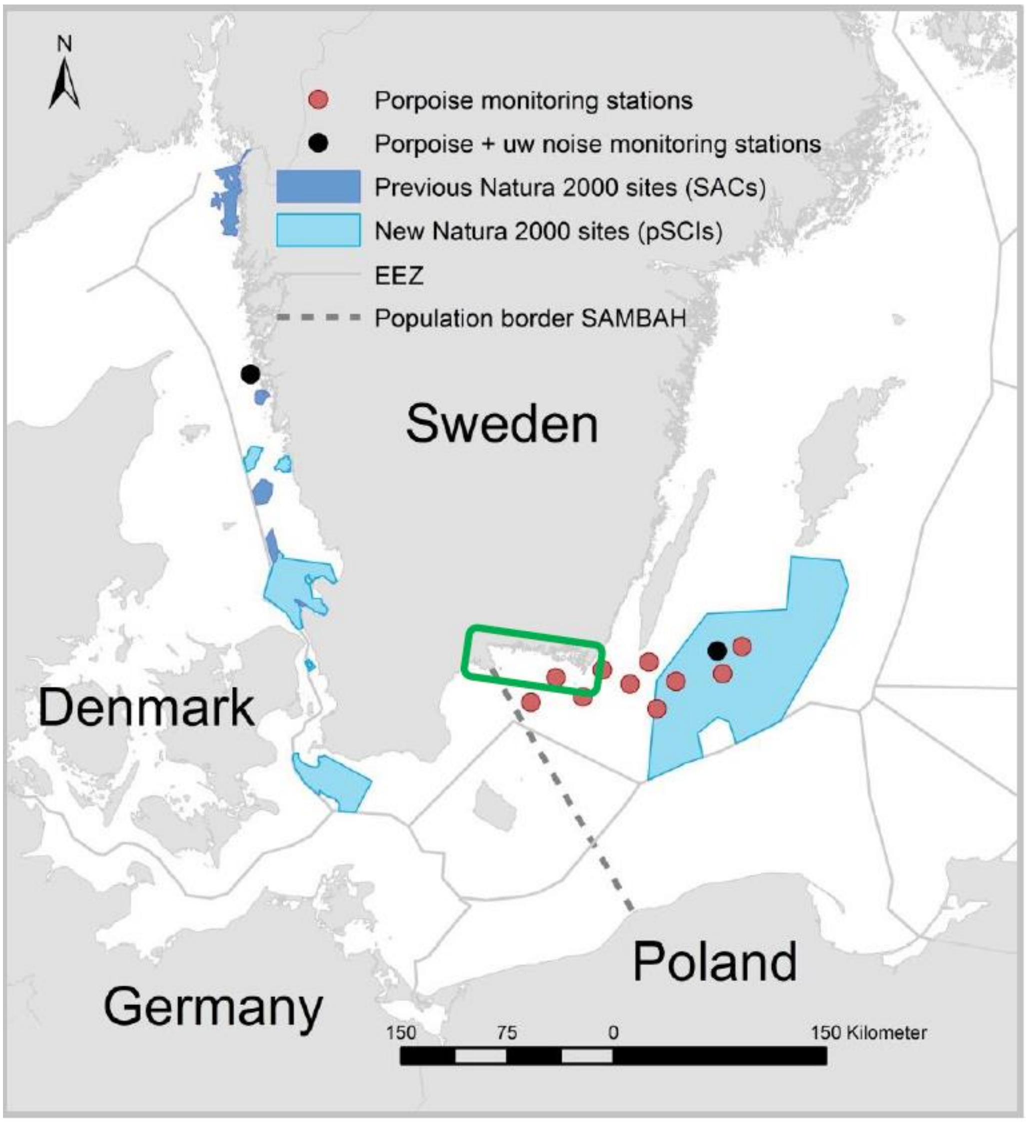


Figure 9. Monitoring stations for harbour porpoises in the Swedish waters of Baltic proper (right of the dashed line) including the location of Marine Protected Area (Natura 2000) (Source: Swedish Museum of Natural History)

In **Denmark,** the Nature Agency has initiated monitoring of the Baltic population under MSFD, with C-PODs deployed at ten stations around Bornholm between June 2018 and June 2019 (Figure 10).

In **Germany**, between 2018 and 2020, aerial surveys (both visual and digital) will be undertaken annually and C-PODs deployed at 15 stations in five areas (Figure 11). Attempts will be made to calibrate the two monitoring approaches with one another.

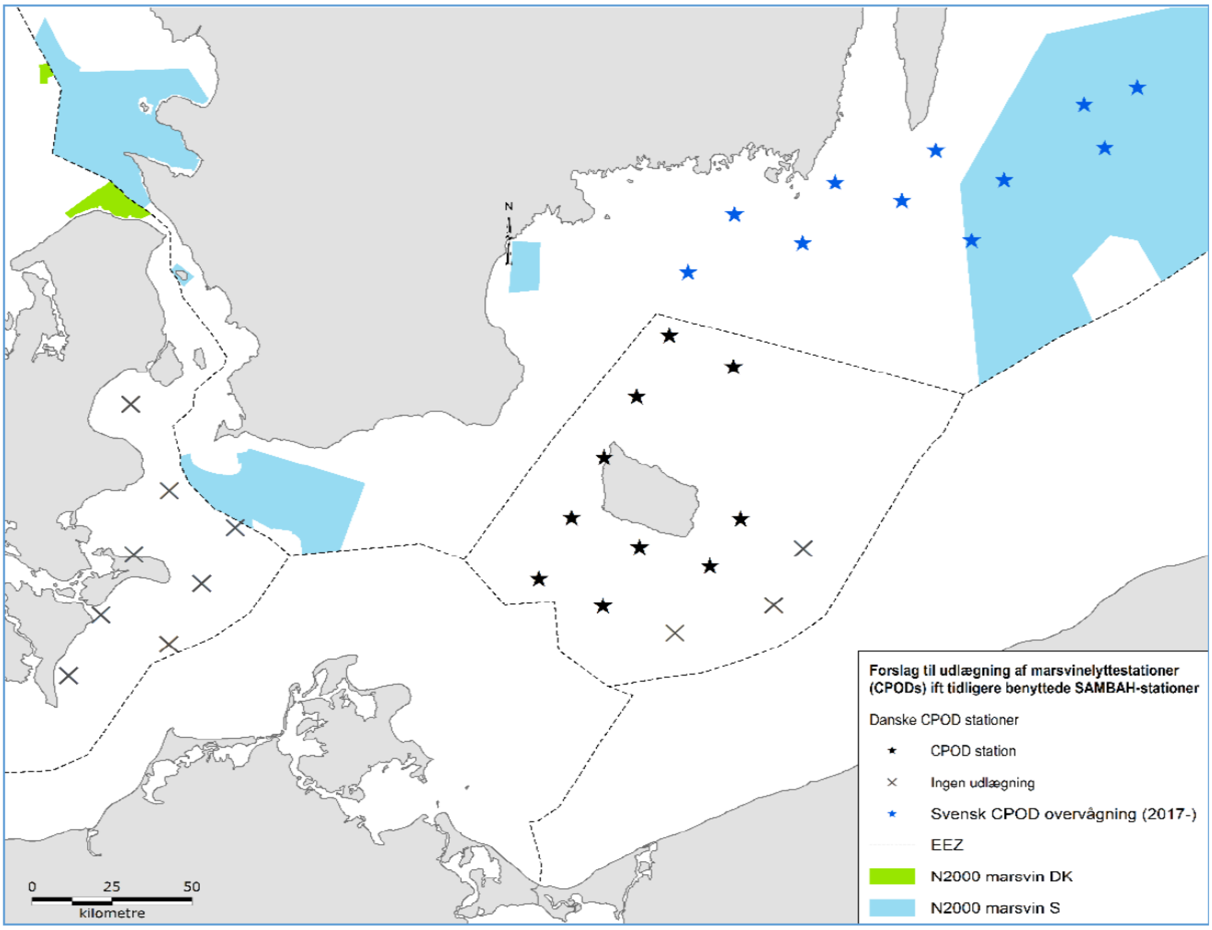


Figure 10. Locations of ten C-POD acoustic monitoring stations in Danish waters of the Baltic. Legend shows proposals for the deployment of porpoise acoustic stations (CPODs) in the previously used SAMBAH stations. Black stars signify Danish stations, blue stars Swedish monitoring proposed in 2017, and crosses are stations recovered. Green shows Danish Natura 2000 site, and pale blue Swedish Natura 2000 sites (Source: Danish Nature Agency).

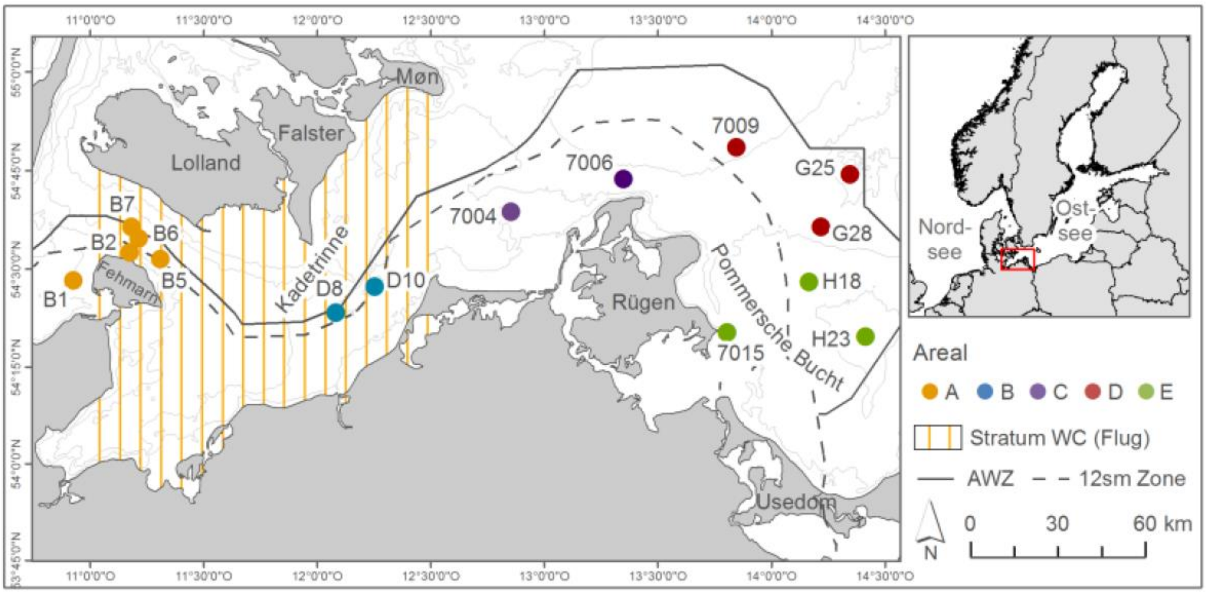


Figure 11. Monitoring Programme to determine abundance and distribution of harbour porpoises in German waters of the Baltic, with aerial survey tracks & C-POD deployments (Source: German Oceanographic Museum).

In the northern Baltic Proper, in **Finnish** waters, acoustic monitoring has been ongoing from October 2016 at 17 stations (11 SAMBAH sites and six between those) in the offshore area south of Åland and the Archipelago Sea (Figure 3), applying the same methodology as used in the SAMBAH Project. Funding is currently secured until Spring 2019. The preliminary results indicate a similar pattern and rates of detection as was obtained in the SAMBAH Project. This monitoring programme is undertaken by Turku University of Applied Sciences, funded by the Finnish Ministry of the Environment and Åland Government.

No formal monitoring programmes exist in other **eastern Baltic states**. Although **Lithuania** participated in the SAMBAH Project, there is no ongoing monitoring programme. The deployment of C-PODs in this part of the Baltic would provide a useful assessment of the occurrence of porpoises in the region.

The collection of opportunistic records can also be informative of the distribution of harbour porpoises in the Baltic Proper, particularly in those areas where it is rare.

In **Poland**, voluntary reports of sightings, strandings, and bycaught animals between 1986 and 2015 are summarised in Figure 12.

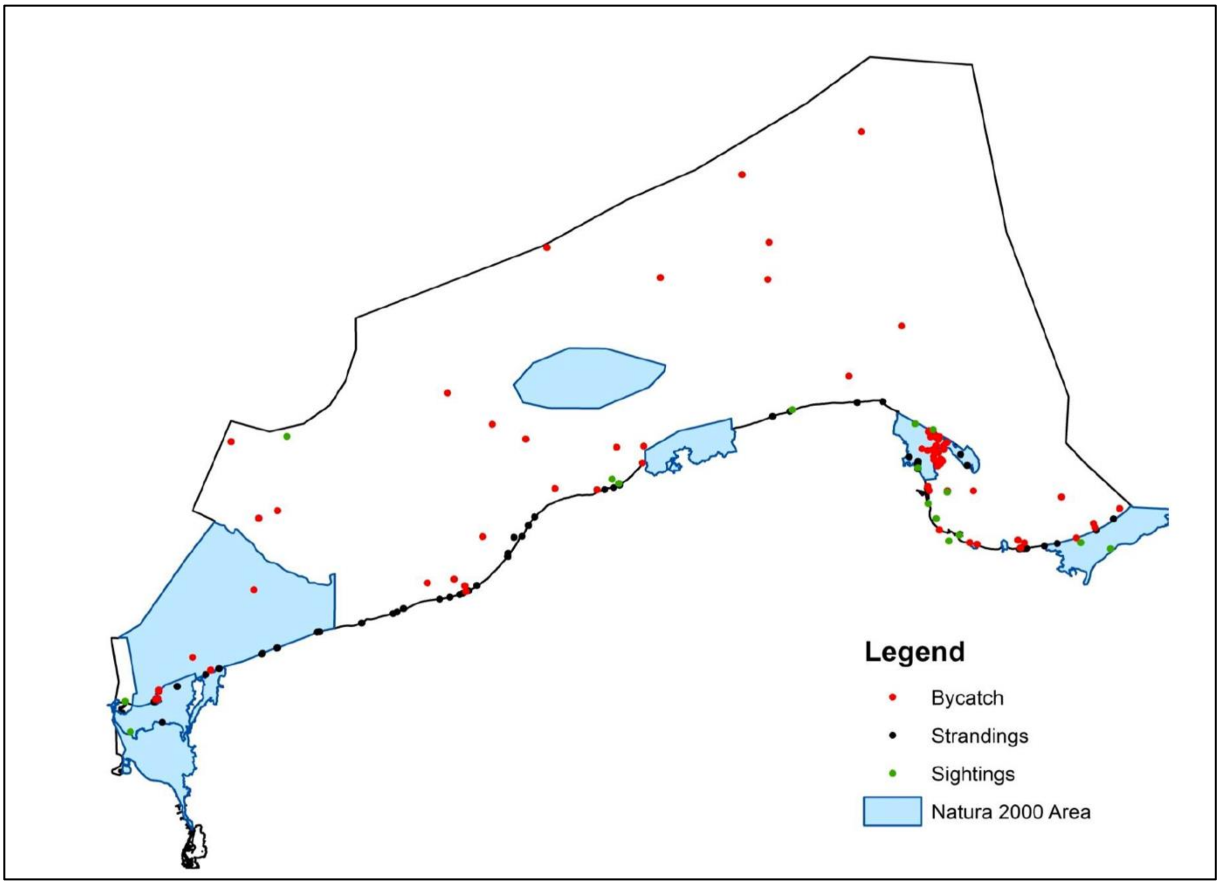


Figure 12. Occasional voluntary reports of harbour porpoises in the Polish EEZ between 1986 and 2015 (Source: Hel Marine Station).

The Swedish Museum of Natural History and SE Species Information Centre collates records from live sightings, and dead animals (strandings) in **Swedish** waters (Figure 13). There is no sighting scheme currently in operation in **Danish** waters although there are plans to resume one in 2019.

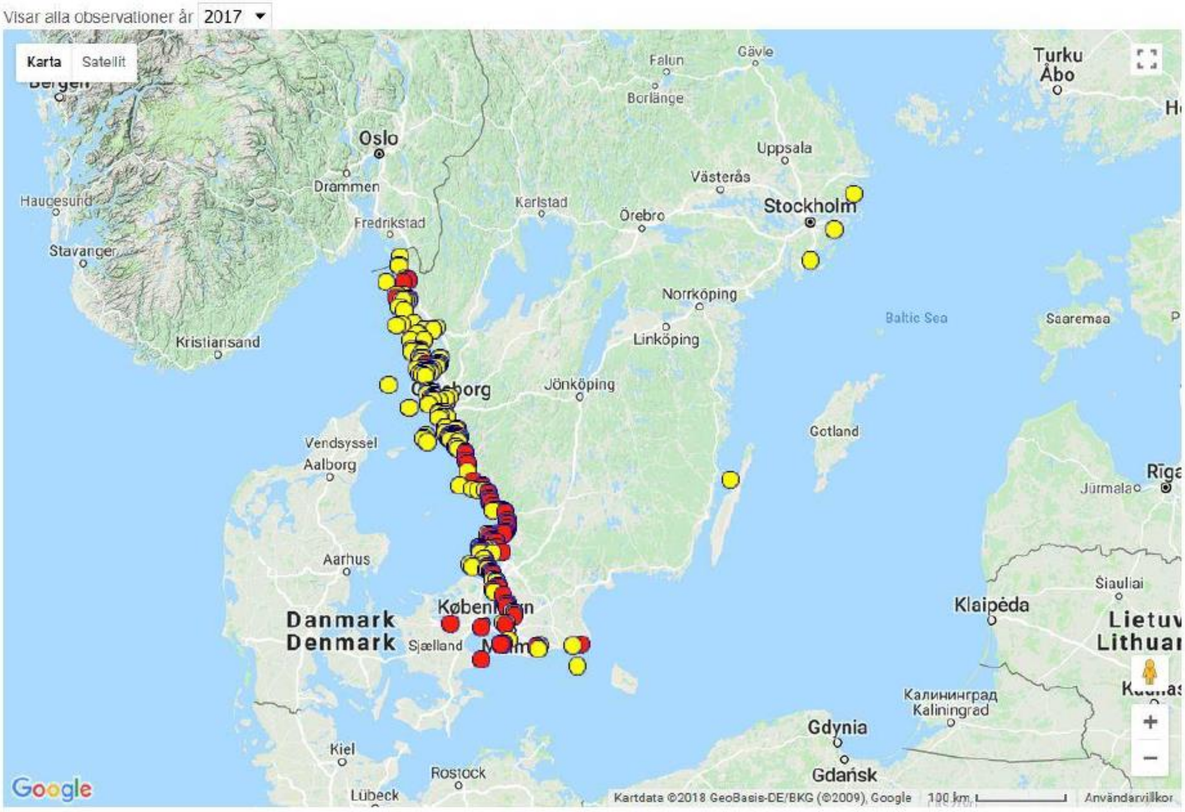


Figure 13. Opportunistic records of live (red circles) and dead (yellow circles) harbour porpoises from Swedish waters in 2017 (Source: Swedish Museum of Natural History).

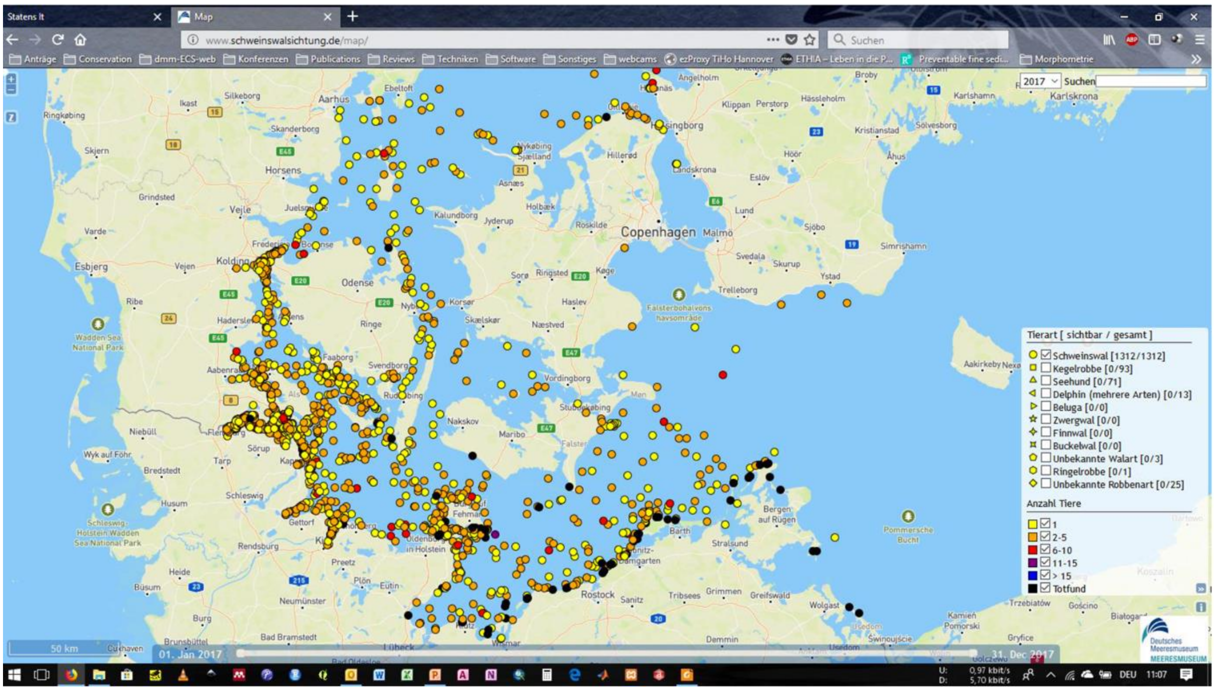


Figure 14. Opportunistic records of sightings of harbour porpoises from German waters in 2017 (Source: German Oceanographic Museum).

Germany has a well organised sighting scheme, and sightings are being logged annually. In 2017, there were more than one thousand sightings of harbour porpoise (see Figure 14).

In the northern Baltic, opportunistic sightings are collected annually in **Finnish** waters through "porpoise detection days", announced in the media. From 2000–16, there were 65 sightings of 115 animals, with an average group size of 1.8 (range 1-6) (see Figure 4 for a plot of sightings). In 2016, there were three accepted sightings involving five individuals.

In **Lithuania**, opportunistic records are logged, and this has yielded official reports of just 13 strandings between 1903 and 2017, and three sightings at sea.

HELCOM has been collaborating with ASCOBANS to produce an online database of records of harbour porpoise from the Baltic Proper. A plot of live sightings from 1800-1980 is presented in Figure 15.

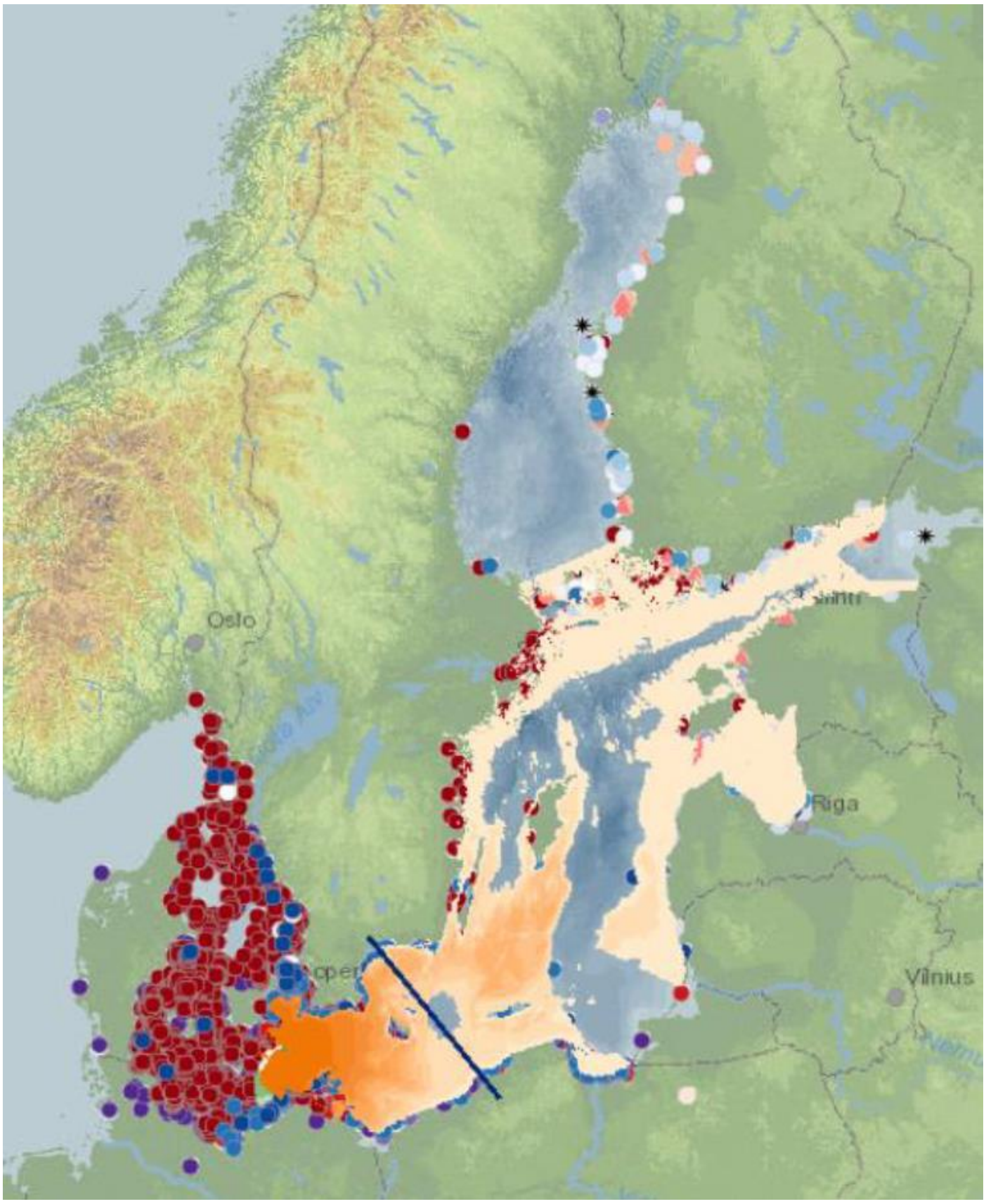


Figure 15. HELCOM Map of Harbour Porpoise Records from the Kattegat, Belt Seas and Baltic Proper, 1800-1980. Different colour circles refer to different time periods, the red circles representing 1961-80 (Source: HELCOM Database).

A summary plot of the status of harbour porpoises in the Baltic Proper is presented in Figure 16.

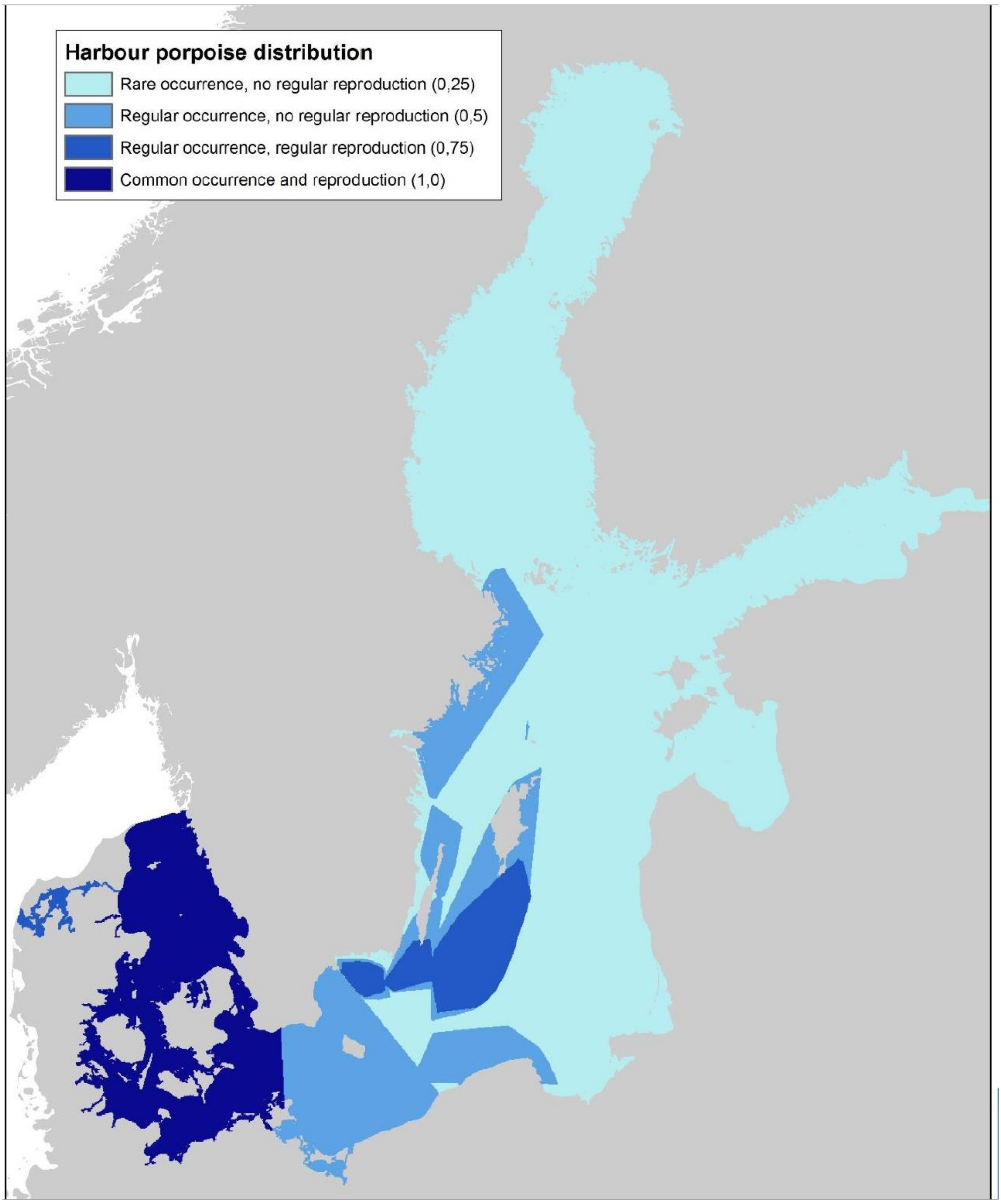


Figure 16. Summary of the status and distribution of harbour porpoise in the Baltic Proper (Source: HELCOM).

Key Conclusions and Recommendations *The first abundance estimate (2011-13) for the entire Baltic Proper indicates a population of around 500 porpoises, although with wide confidence limits. The greatest concentration appears to be off SE Sweden around Hoburgs and Northern and Southern Mid-sea banks although it is clear that the species also occurs in the Bothnian Bay in the northern Baltic. In summer the population in the Baltic Proper is separated from the one in the Belt Sea, but in winter there is some mixing in the Western Baltic. Inevitably, there has been little genetic sampling of animals* *in the eastern Baltic nor comparison with historical samples for further elucidation of this population. Acoustic monitoring continues mainly in the western parts of the Baltic. These should continue and be extended eastwards. A new SAMBAH II project should be supported.*

3. Monitor, estimate and reduce bycatch

Reporting of fishing effort and any associated bycatch is done by ICES Area, with subdivisions as indicated in Figure 17.

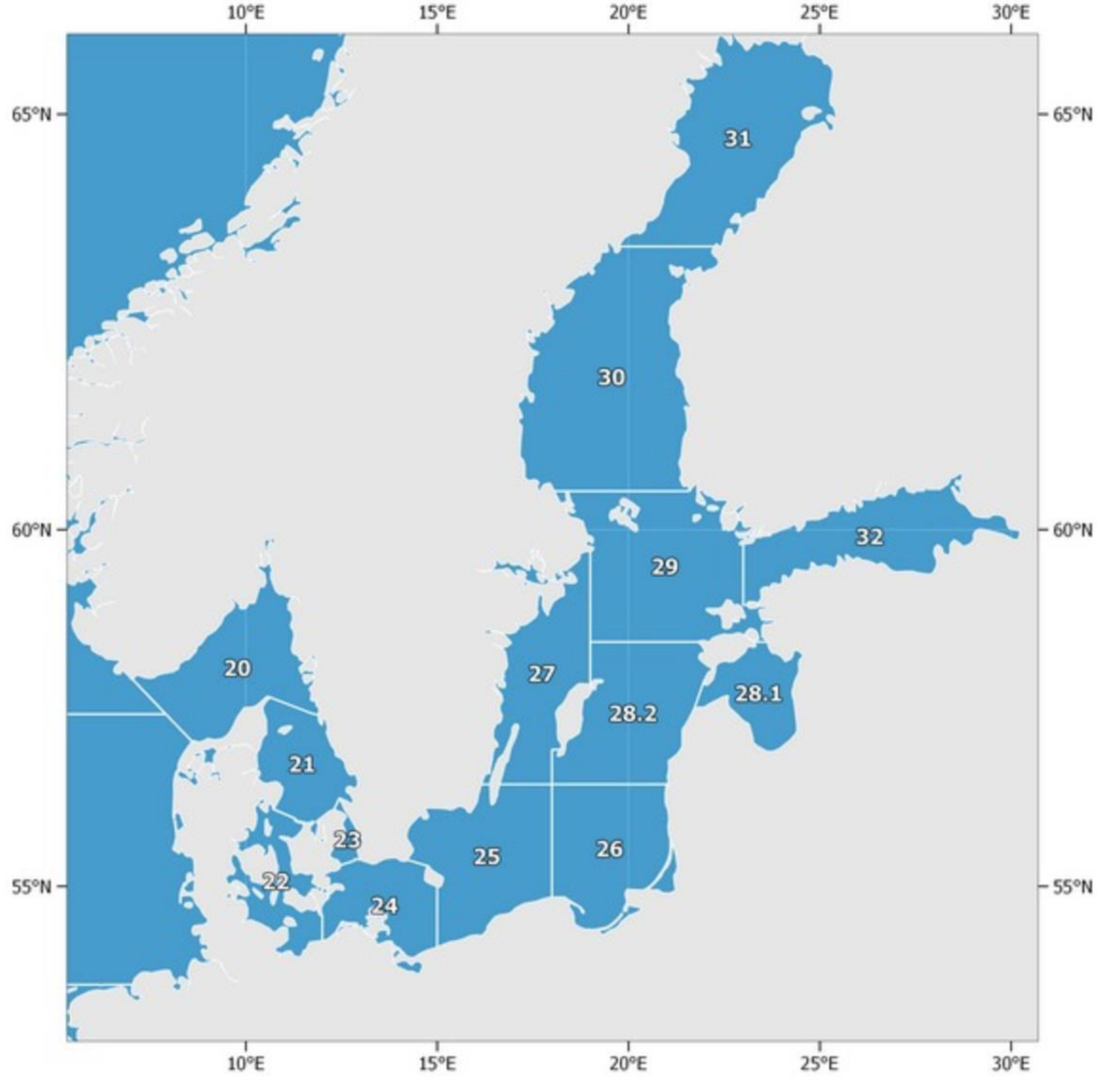


Figure 17. Map of the ICES Area subdivisions of the Skagerrak, Kattegat, Belt Seas and Baltic Proper, for the reporting of catch statistics (Source: ICES).

Gillnet fishing effort across ICES SubDivisions 22-28 has generally declined in recent years, but particularly with respect to the Finnish fleet which dominates fishing effort (see Figure 18). Excluding the Finnish fleet, other countries' fleets show variation in effort between years, but also for the most part with a general declining trend (Figure 19). To properly assess the impact of bycatch, focus should be placed on gillnetting effort and any mitigation measures (pingers, alternative fishing methods) applied to the appropriate area and gear type.

In Polish waters, the breakdown of different gear types in Puck Bay between the years of 2004 and 2017 is shown in Table 1, with a spatial comparison of fishing effort for the years 2009 and 2017 in Figure 20. Information on bycatch in Polish waters comes entirely from strandings.

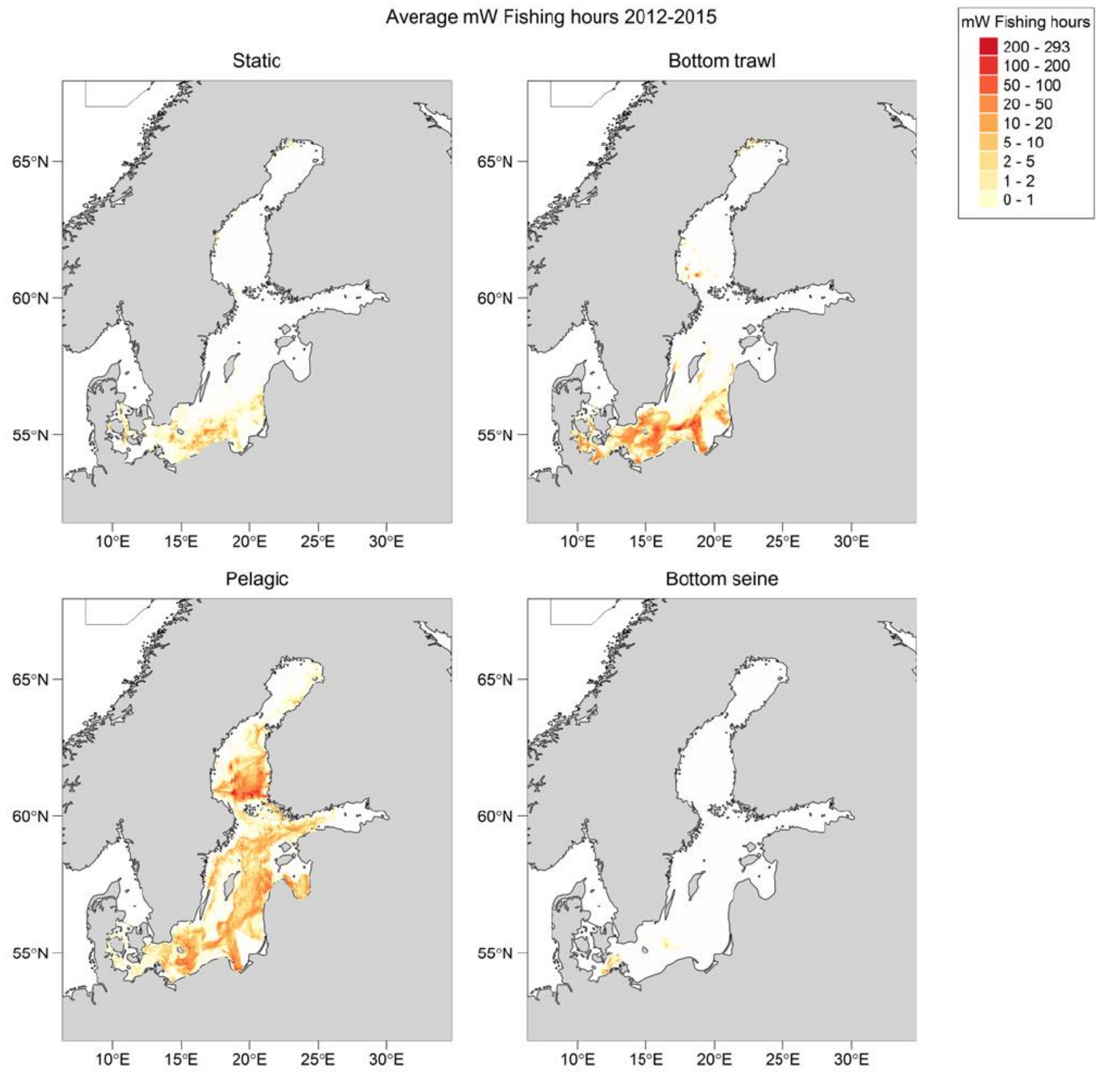


Figure 18. Spatial distribution of average fishing effort (mW fishing hours) in the Baltic Sea during 2012–2015 by gear type. Fishing effort data are only shown for vessels >12 m carrying VMS. Estonian fishing effort is not included due to incompatible data, and Russian data are absent as they were not received. Bottom trawl effort in the northern part of the Baltic Sea is shown in error, due to gear coding issues (Source: ICES, 2017).

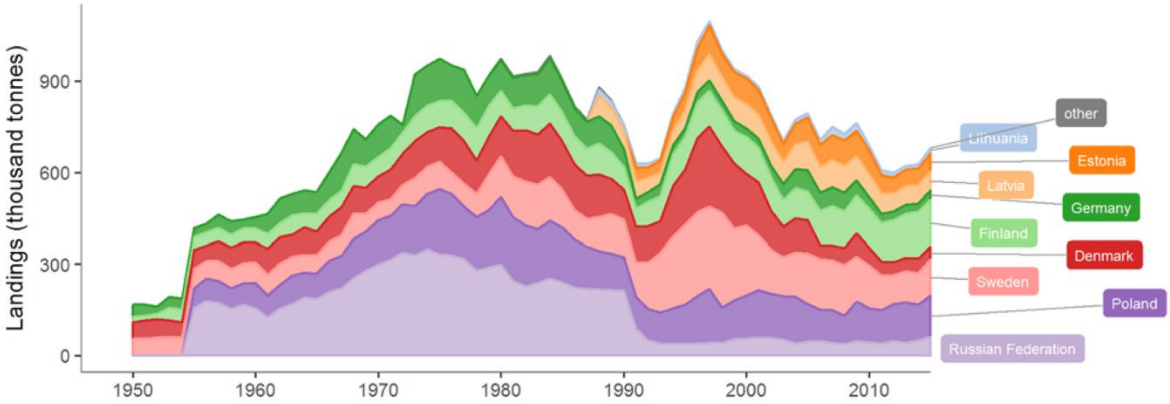


Figure 19. Landings (thousand tonnes) from the Baltic Sea in 1950–2015, by (current) country. The nine countries having the highest landings are displayed separately and the remaining countries are aggregated and displayed as "other" (Source: ICES, 2017).

Table 1. Number of fishing gears used in Puck Bay, 2004-2017 (GNS = Set gillnet, GND = Driftnet, GTR = Trammel nets, LLS = Set longlines, LLD = Drifting longlines, FPO = Pots & Traps) (Source: Centre of Fishery Monitoring, Poland).

	Number of fishing gears used in Puck Bay		
	GNS, GND, GTR	LLS, LLD	Trap nets FPO
2004	493218	1324530	37746
2005	429082	1168108	40028
2006	338206	630325	54052
2007	270961	1155300	34197
2008	232897	650300	36741
2009	278 884	661 300	36438
2010	320907	677650	23110
2011	267925	363766	12284
2012	319215	563300	6362
2013	376091	531046	16477
2014	449408	527812	23797
2015	348546	765850	33984
2016	199031	708400	39281
2017	161 202	417 550	56044

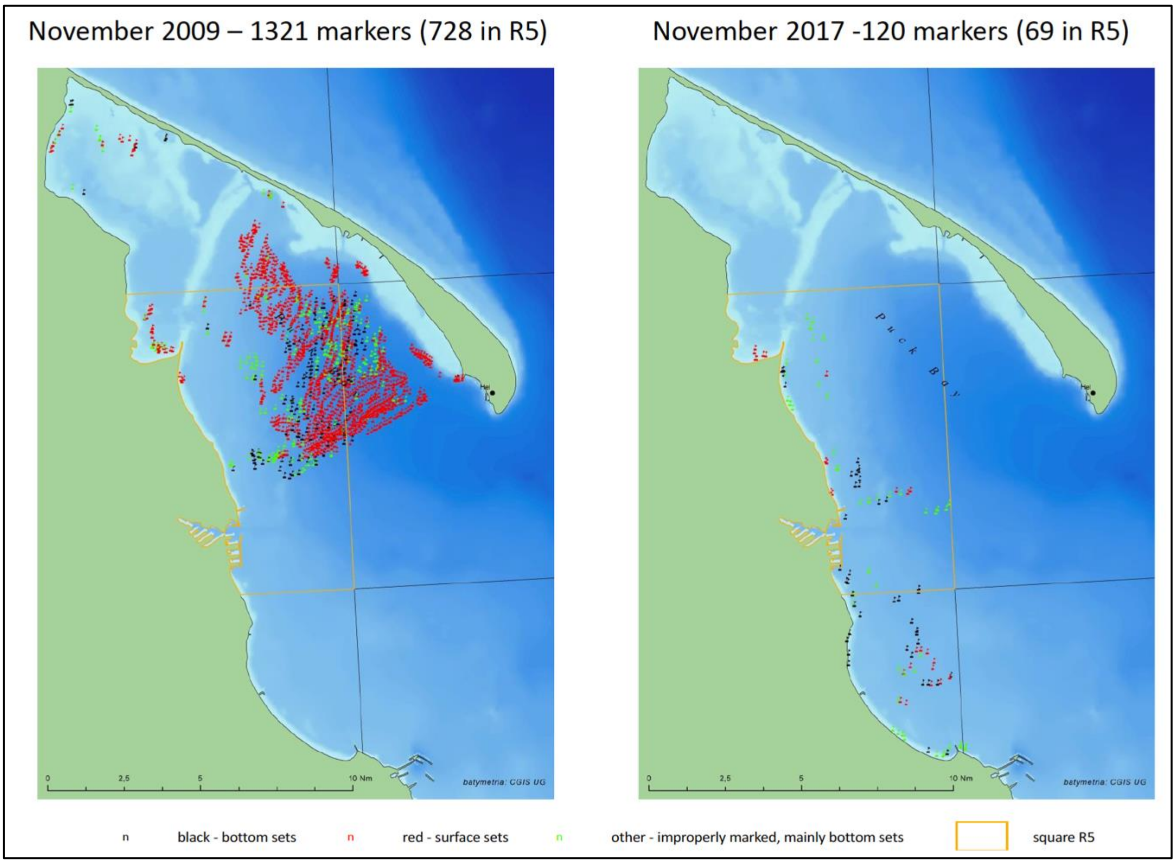


Figure 20. Changes in fishing effort (number and distribution of nets) in Puck Bay, Nov 2009 & Nov 2017 (Source: Hel Marine Station).

Poland

Poland currently has 423 vessels using gillnets. No vessels are using alternative gear like cod pots (that are used on Swedish coast). They are not suitable due to the open coastline with strong currents. The testing of alternative gear is conducted on a minor scale, with a focus on selectivity of the gear.

In 2016, the programme for monitoring incidental catches continued as part of the National Fisheries Data Collection Programme. The observation scheme included possible catches or entanglements of cetaceans and other marine mammals, as well as seabirds and protected species such as twaite shad (*Alosa fallax*) and sturgeon (*Acipenser oxyrhynchus*).

Observations of bycatch according to EU Council Regulation 812/2004 were conducted on ten fishing vessels over 15m in length, operating from six different ports. Observers were at sea for 102 days, including 47 days on pelagic trawl fishing vessels, 32 days on gillnet fishing trips, 10 days on a vessel using bottom trawls, 11 days on a drifting longline vessel (LLD) and 2 days on a pelagic pair trawler (PTM). It should be noted that for larger vessels the number of days at sea was significantly different from the number of days when fishing took place due to transit time to fishing grounds. No cetacean bycatch was reported in 2016 or 2017. On April 26, 2018, a fisherman from Rowy (Poland) reported porpoise bycatch. This voluntary report was recorded outside and independently of the monitoring of bycatch of cetaceans carried out according to the EU Council Regulation 812/2004.

No cetacean bycatch has been documented during the pilot programme in 2006-2009 and during the follow-up of the monitoring programme in the years 2010-2016. It is therefore not possible to obtain a coefficient of variation not exceeding 0.3 as provided for in Annex III of Regulation EC 812/2004 as it would require monitoring about 80% of the fishing effort.

No consensus has been reached within Poland for determining the size of dedicated observer schemes required, use of remote electronic monitoring, or of strandings information. The number of observers onboard fishing vessels varies between years. In 2017, the number was four. As noted above, the observers onboard gillnet fishing vessels are present for only a few fishing days in a year.

There is no current estimate on the number of boats using pingers. In 2015, the number of vessels was sixteen. WWF Poland has provided an additional 300 pingers, but so far just one fishing vessel has decided to use them. There are difficulties in encouraging fishermen to use pingers, because for boats under 12m (which dominate the fishing fleet) there is no obligation to use them. More fishermen could be interested in using pingers after the adoption of the new EU regulation on technical measures in fisheries.

Since 2008, 500 pingers (Aquatec Aquamarks 100) have been used by Polish fishermen in ICES SubDivision 24. Due to the current wear of the devices, new equipment should be provided, and the purchase of these could be financed from the European Maritime and Fisheries Fund.

Sweden

Like Poland, Sweden has no dedicated at-sea observer scheme focusing on the bycatch of marine mammals. The monitoring effort conducted and provided by Sweden is part of the EU Data Collection Framework where on-board observer data are mainly from trawl fisheries but also pot fisheries for crayfish. The reason for this is due to Reg. 812/2004 articles 4 and 5 not effectively serving its purpose to estimate bycatch in waters around Sweden. In these waters, harbour porpoises are bycaught in gillnets and not in pelagic trawls, and therefore observing 5% of Swedish pelagic trawl effort in the Baltic is insufficient to provide an estimate of total cetacean bycatch with acceptable confidence limits.

In the bottom trawl fisheries in 2016, 40 trips were observed out of a total fleet effort of 6,161 trips including all areas around Sweden. In the Multi-rig otter trawl métier, another 40 trips were observed out of a total effort of 5,267 trips. In the pot and trap fisheries in the Kattegat, 13 trips were observed of a total of 10,777 trips. No bycatch of cetaceans was observed. In 2017, where observers were onboard on 33 trips with gillnetters, 75 trips with bottom trawl and 12 trips with pot fishing boats in ICES SubDivision 23. Two porpoises were recorded bycaught, in combined gillnets/trammel nets (GTR).

Remote electronic monitoring (REM) was started with one fisher, but at present the project lacks funding for any expansion.

The implementation of pingers as laid down in Reg. 812/2004, is most likely not being implemented in regulated fisheries in Sweden. However, in 2015, a project started with the purpose of implementing pingers on a voluntary basis. After discussions with fishermen, Banana pingers were chosen for the project. The fishers consider the Banana pinger to be practical to use and that it decreases bycatch of harbour porpoises. They report their catch, effort and bycatch. The voluntary pinger use continued through 2016 and, during that year, seven fishers used pingers voluntarily in the cod and gillnet fisheries within Öresund Sound, in ICES SubDivisions 21 and 23.

In the area where pingers have been used in the commercial lumpfish fisheries in southern Sweden, a study looking at the distribution of harbour porpoises in relation to commercial fisheries with pingers is currently taking place. Preliminary results show that harbour porpoise detections in the area are low when fisheries with pingers are carried out. However, when the “pingers” were switched off, the harbour porpoise detections increase and are at the same levels as areas where no fishing with pingers has been carried out. The study continues in 2018, with twenty fishers volunteering.

In the Swedish small-scale coastal fisheries, alternative fishing gear has been, and is still being, developed. Pontoon traps for fishing salmon, white fish, trout and vendace are now used in commercial fisheries in the northern Baltic. During recent years, there has been a development of a pontoon trap to be used for cod in the southern Baltic. The results show that during certain times catches of cod can be high. However, gear needs further development with regards to resistance to rough seas and open archipelagos as well as practical handling (Nilsson, 2018). The main reason behind the development of the fishing gear is the seal inflicted damages to fishing gear and catch, which threatens an economically viable gillnet fishery.

Since 2014, there have been funding opportunities for fishers to put forward their ideas for selective fishing gear to the "Secretariat for selective fishing gear" funded by the Swedish Agency for Water Management. The purpose of the Secretariat was to enable the fishing industry to develop selective fishing gear to help the transition to the new landing obligation. Projects were carried out by the Swedish University of Agriculture Science in cooperation with the involved fishers. In 2016, the Secretariat funded projects regarding size and species selectivity in benthic trawl fisheries for cod, shrimp and crayfish, a project developing multifunctional pots for fishing for cod and lobster, a project developing pots for shrimp fisheries and a project regarding trap net fisheries for mackerel, cod and herring (Nilsson, 2018). Use of pots and trap-nets as an alternative to gillnets in area 24-25. Developing selectivity grids in trawls prevent bycatch of certain fish species as well as birds and marine mammals. Pot and trap-net fisheries are fisheries with high selectivity with regard to marine mammals, birds and undersized fish. Developing these fisheries prevents an increase in, for example, gillnet fisheries which can have high bycatch rates for both birds and marine mammals.

DTU Aqua and the Thünen Institute have been engaged in a programme to improve the design of cod pots to reduce bycatch. Three fishers are now using these in the Baltic on loan, with a commitment to their use for a defined period (one month).

Several studies have been undertaken to evaluate the catch efficiency of different cod and lobster pots and what factors affect it (Ljungberg *et al*., 2017; Hedgärde *et al*., 2017; Nilsson, 2018). This is done partly by studying the behaviour of cod in relation to cod pot models and other fisheries related factors such as soak-time. The entry rate of cod entering pots gives an indication on the catch efficiency of the pots and by studying the entry rate in relation to factors such as cod pot model, number of fish inside the pot, and current strength, one gains information on what factors are affecting catchability. The results are show that the number of entrances on the pot and the number of cod already inside the pot affect the entry rate of the cod entering the pot (Hedgärde *et al*., 2017). Another study has shown that using a funnel on the entrance opening to the fish holding chamber also affects the behaviour of cod while entering the pots. However, it increases the catch efficiency (cpue) due to the decreasing number of cod exiting the pots (Ljungberg *et al*., 2017).

An alternative to both trawl and gillnet fisheries is bottom seine netting, such as Danish Bottom Seine. Bottom seines are generally considered less damaging than bottom trawls (ICES, 2006) and well-managed seine fisheries generally have minor ecosystem impacts (Morgan and Chuenpagdee, 2003). In 2016, the Swedish University of Agriculture Science has continued to develop a seine net modified for small open boats and tried it for pelagic and demersal species as a possible alternative to gillnet fisheries. The development is still under progress and the upcoming years there will be a focus on evaluating the seines environmental impact on the benthic habitat.

Denmark

Denmark (through DTU Aqua Research) has been using REM successfully for a number of years, but has recently been engaged in making further improvements, switching from Canadian to Danish equipment as it was easier to influence developments. Bycatch data are being collected from 12 vessels, and used to extrapolate to the amount of bycatch in the fleet. However, these are all operating in the Western Baltic, Belt Seas, Kattegat and Skagerrak; none are operating in the Jastarnia area. Studies are progressing to better understand the factors affecting bycatch rates. With regard to mitigation, “pingers” were being developed and tested, and trials conducted using lights and setting nets lower. The development of acoustically reflective gillnets with the Thünen Institute of Baltic Sea Fisheries had so far failed to identify a suitable material. In developing and testing alternative gear, studies are taking place to improve the catch efficiency of cod traps, using push-up traps for cod as well as developing and testing small-scale Danish seine for cod. These actions are being undertaken in collaboration with SLU, Sweden. These programmes of research are scheduled to be completed by 2020.

Germany

In Germany, there has been a voluntary agreement with fishers since 2013 in Schleswig-Holstein, for the conservation of harbour porpoises and sea ducks in the Baltic Sea. This has involved the Fishery Association and Fishery Protection Union of Schleswig-Holstein, the Baltic Sea Information Centre (OIC), and Ministry of Energy transition, Agriculture, Environment and Rural Areas Schleswig-Holstein (MELUR). This has resulted in a reduction in the total length of gillnets in the months of July and August to 4km for boats > 8m, to 3km for boats between 6 and 8m, and to 1.5km for boats < 6m. In addition, almost 1,700 alternative “pingers” (Porpoise Alerting Devices or PALs) are being handed out to fishers through the OIC in Eckernförde. PALs operate by replicating the sounds of porpoises (synthesising aggressive click trains at 133 kHz) and were designed to serve as an alerting device rather than as a deterrent, by increasing their rate of echolocation (Culik *et al.*, 2015). Trials in a Danish fishery using REM to monitor bycatch rates had indicated a 70% reduction when PALs were deployed (Culik *et al*., 2017), although the size of the effect was much less than with pingers. The device has also been tested in a Danish North Sea fishery but was found to have no effect there. Reasons for the different results are unclear but it is possible the two different porpoise populations are responding differently to the signals. To date, there is no clear evidence that PAL operates as an alerting device, Karin Tübbert (who identified the signal) actually describing it as causing the animals to move away,

Germany has also been investigating alternative management approaches and the use of alternative fishing gear. The “Stella” Project (November 2016 – December 2019) has a number of strands: building data, modifying gillnets, investigating the feasibility of alternative gear, creating incentives for data collection, synthesizing the results, and promoting social responsibility within the German Baltic EEZ. This inter-disciplinary project is funded by the Federal Agency for Nature Conservation (BfN), and conducted by the Thünen Institute of Baltic Sea Fisheries. It will engage fishermen of the Baltic Sea, and amongst other tasks, will synthesise the results of the various disciplines - fisheries biology, fishing technology and social sciences, and derive policy advice for decision makers, considering also the interest of nature conservation.

In 2017, no bycatch of harbour porpoises was recorded in The Baltic Proper east of ICES Area 24; three porpoises were reported bycaught in the waters of Schleswig-Holstein. However, as representatives for several countries have pointed out, the Cetacean Bycatch Monitoring under EU Regulation 812/2004 covers only boats 15m or longer, which means that potential bycatch from a large part of the fishing fleet in the Baltic is not being registered. The regulation states that regarding vessels < 15m, data on incidental catches should be collected through scientific studies or pilot projects. However, little is done regarding this matter in the Baltic Proper.

Finland

In Finland, since 2016, the reporting of bycatch of marine mammals has become mandatory, but it is not clear how the compliance to this is followed up in practice. No estimate has been available for the number of gillnet fishing vessels in operation. It is dominated by the recreational fishery which appears to go unrecorded. There is no effort towards alternative gear or other mitigation measures in Finland. No bycaught harbour porpoise has been reported since 1999, and there have been no strandings reported. The view of the Finnish fishing authorities is that these issues could be discussed if the number of harbour porpoises increased in Finnish waters. The irony is that unless a more porpoise-safe fishery develops in the eastern Baltic, it is unlikely that porpoises will be able to return and thrive in these waters. At least one positive change is that fishing with the most harmful type of gillnets for harbour porpoises, large mesh sized nets made of thick material, have become less common.

Lithuania

In Lithuania, 56 fishing companies use gillnets but the actual number of vessels involved has not been reported. Due to the increasing number of grey seals, Lithuanian fishers are trying to change their gear into more sustainable alternative gear like open traps and longlines. At least ten companies are using alternative gear as a result. New projects evaluating the use of pontoon traps on the Lithuanian coast, and information exchange concerning alternative gear with local fishers should start in 2018.

Latvia

In Latvia, there is a national monitoring programme of incidental catches of cetaceans. In 2016, observations were made on 496 trips in the pelagic trawl fisheries, and 33 trips in gillnet fisheries. The observations were carried out by seven observers on 13 different vessels. No incidental catch of cetaceans was observed in 2016, the same result as reported from 2006–15. Reported observer coverage was 6.9% of the pelagic trawl fishery with vessels 12-18m, and 11.4% with vessels 24-40m (towing time). Reported coverage in the gillnet fishery was 11.8% (soak time). The conclusion of the Latvian fisheries authorities was that the results showed that cetacean monitoring had no practical significance in Latvian waters and is therefore an unnecessary expenditure of financial and human resources. Latvia therefore suggests stopping future observations.

Key Conclusions and Recommendations *There are huge differences between countries in the Baltic in terms of funding for monitoring, estimating and mitigating bycatch, as well as in how fisheries are regulated and by whom. In addition, the areas differ quite a lot in terms of bottom topography, currents etc. It would be really useful if each country would present an assessment of how they see their gillnet fishery from a conservation standpoint, the potential for alternative gear and other mitigation measures. Special attention should be given to the ICES SubDivisions 25 & 26 which include the main mating and calving grounds for the Baltic harbour porpoise population, extending perhaps to SubDivisions 27 and 28.2. Fishing activity in this area should be investigated in detail.*

Attention needs to be paid to improvement in the extent and methods of recording fishing effort and cetacean bycatch, and most importantly, for this small porpoise population, mitigation actions should be taken starting immediately.

The Jastarnia Group should consider whether countries should be encouraged to involve fishers and their organisations at a much larger scale to explore alternatives to gillnets, and to resolve whether pingers and other alerting devices are effective mitigation measures and do not have unintended *population-level consequences. Both Sweden and Denmark are using an individual-based model to explore this issue, to be completed within 1-2 years.*

Increased cooperation with fishers might help reduce potential bycatch, with particular attention to recreational fishermen using gillnets. There is currently poor documentation of the magnitude of gillnet fishing by recreational fishermen, although in Finland, for example, it is estimated that the number of nets used in recreational fishery outnumbers that of the professional fishery.

4. Monitor and mitigate impact of underwater noise

In the context of impacts upon marine mammals, underwater noise can be divided into continuous low frequency sounds largely derived from shipping, and low and mid frequency impulsive sounds derived from sources such as seismic survey airguns, pile driving, detonations and active sonar. For this reason, under the EU Marine Strategy Framework Directive, two indicators were developed for Descriptor 11 on the introduction of energy/noise:

- 11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds
- 11.2. Continuous low frequency sound

For Indicator 11.1, ICES have set up a registry in support of HELCOM and OSPAR. This registry provides an overview of the spatial and temporal distribution of impulsive noise events over the frequency band of 10 Hz to 10 kHz causing a "considerable" displacement (http://www.ices.dk/marine-data/data-portals/Pages/underwater-noise.aspx). "Considerable" displacement is defined as displacement of a significant proportion of individuals for a relevant time period and at a relevant spatial scale. Data are slowly being entered. Maps downloaded on 23 July 2018 showing the blocks with activity for each of the main source types for the years 2008-16, are depicted in Figures 21-25.

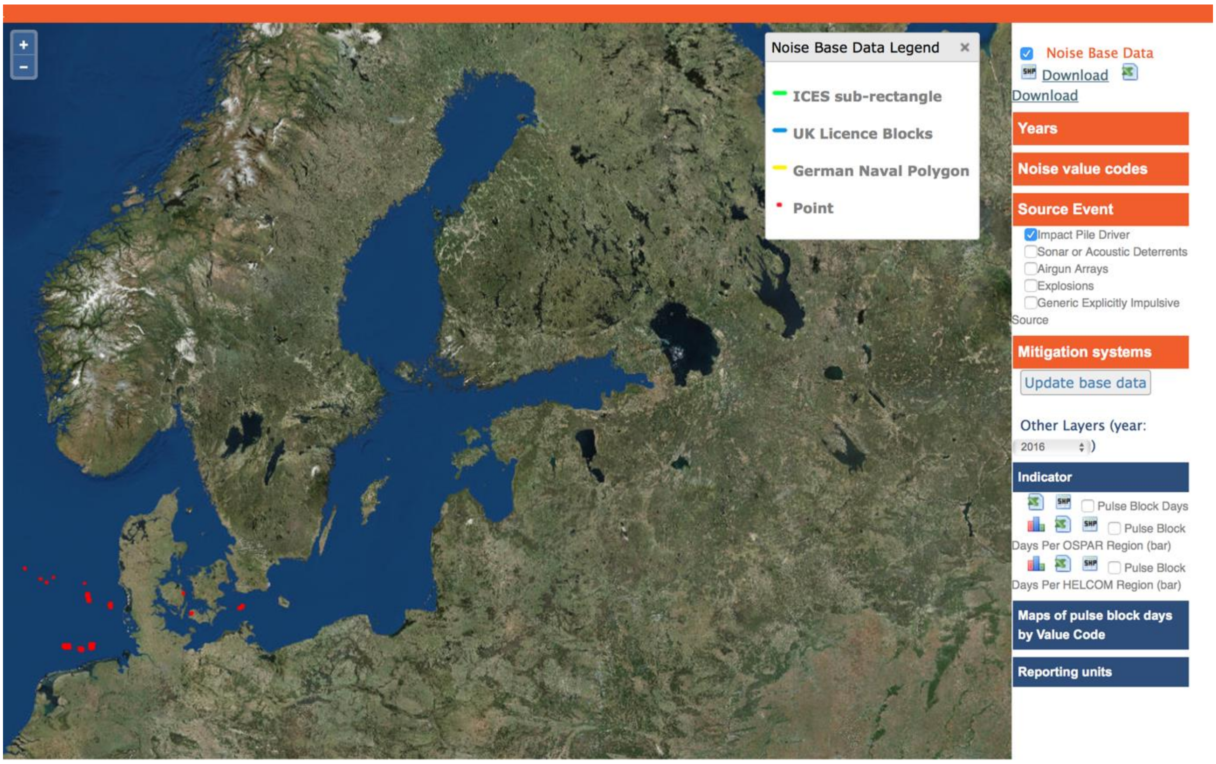


Figure 21. Noise Map of Impulsive sound produced from pile driving between 2008 and 2016 (Source: ICES database).

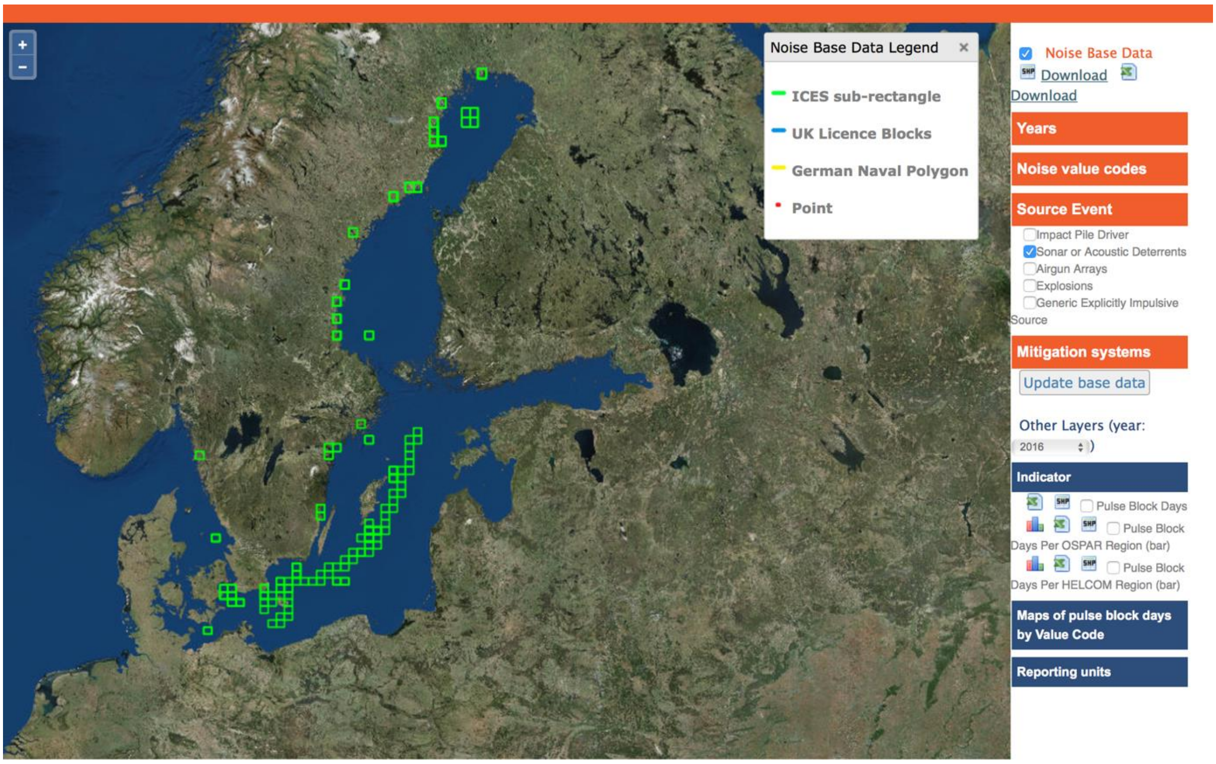


Figure 22. Noise Map of Impulsive sound produced from sonar or ADDs between 2008 and 2016 (Source: ICES database).

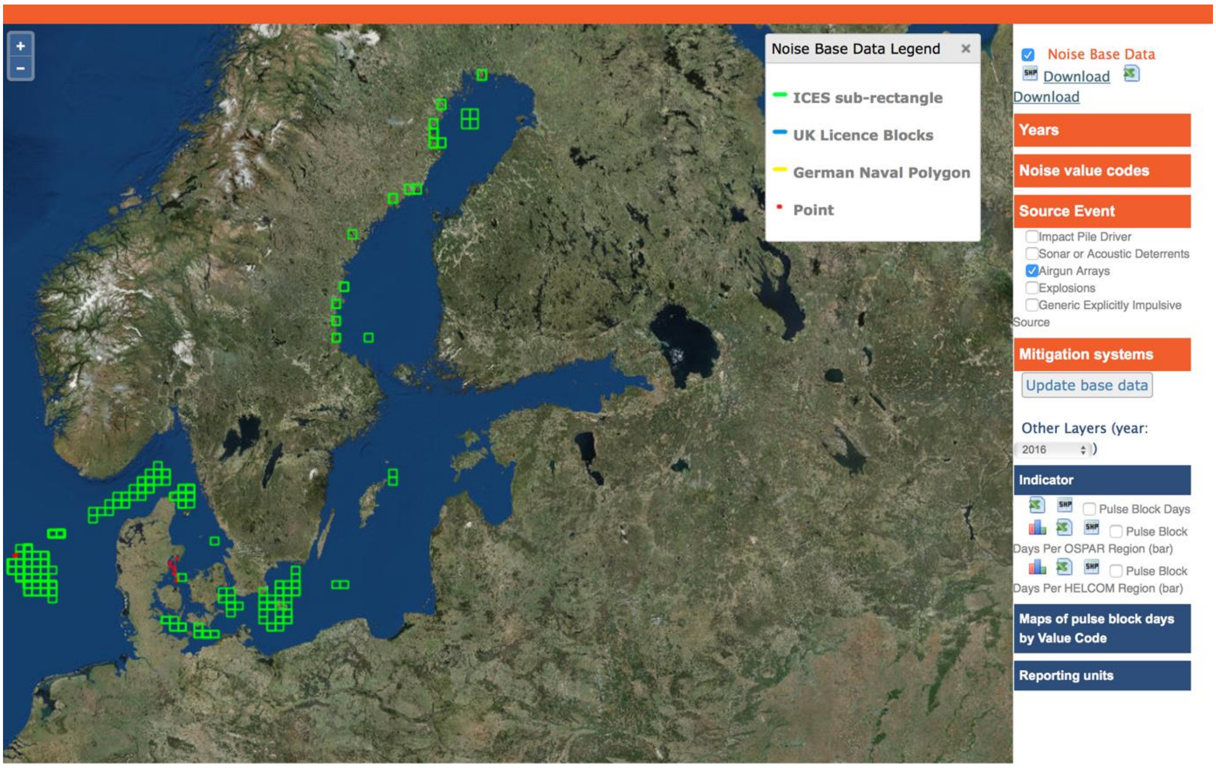


Figure 23. Noise Map of Impulsive sound produced from airgun arrays between 2008 and 2016 (Source: ICES database).

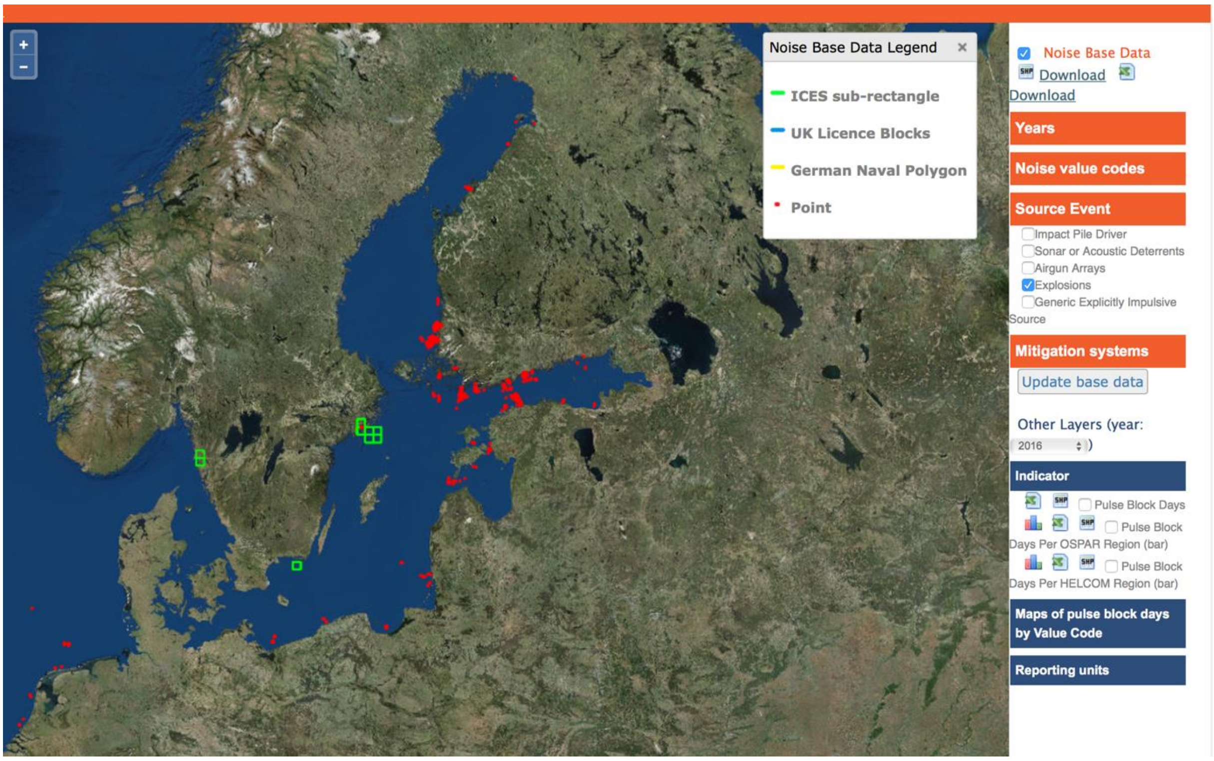


Figure 24. Noise Map of Impulsive sound produced from explosions between 2008 and 2016 (Source: ICES database).

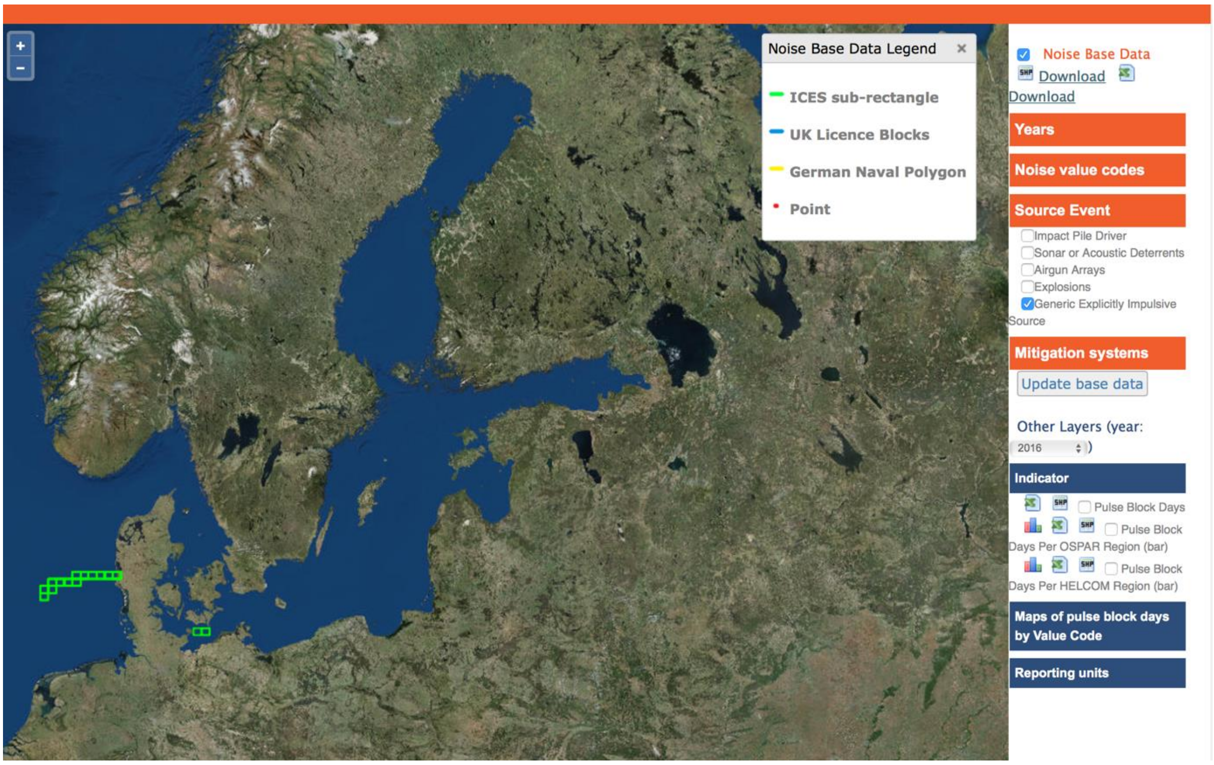


Figure 25. Noise Map of Impulsive sound produced from generic impulsive sources between 2008 and 2016 (Source: ICES database).

It is clear from the maps that there are data still to be provided by countries so it would be premature to draw many conclusions from these maps other than to note that a variety of sources of impulsive sound are active within the Baltic Proper. Countries known to have contributed data include Germany, Denmark and Sweden.

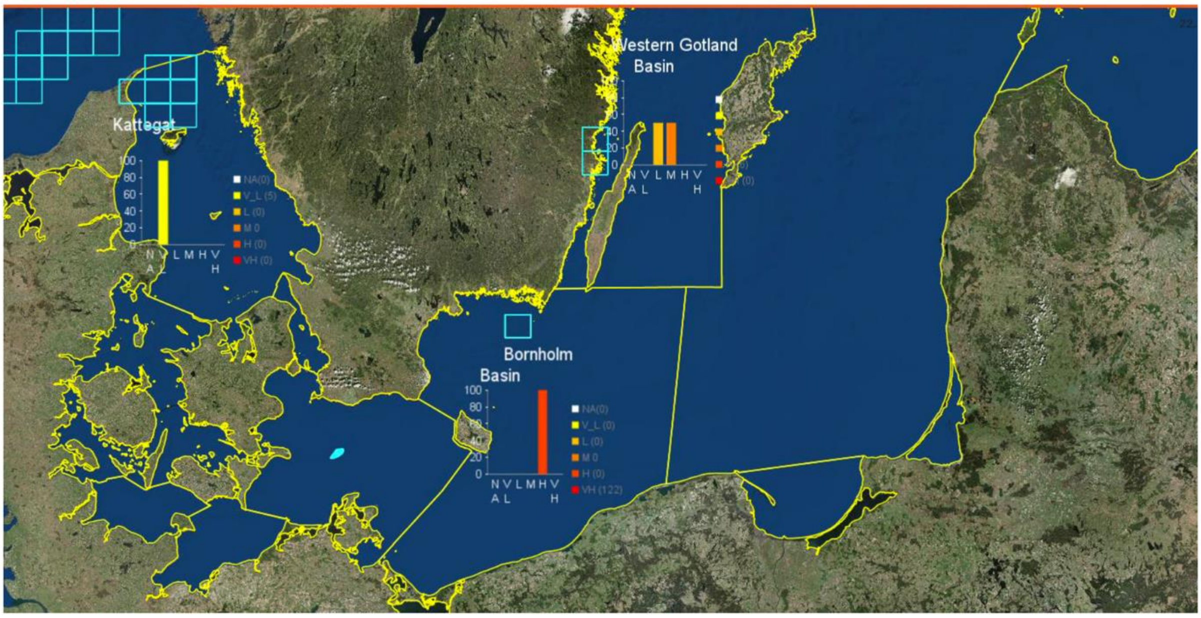


Figure 26. First draft of the graphs of pulse block days per HELCOM sub-basin based on data from the regional registry (Source: HELCOM, 2017a).

The ICES noise register also allows for the calculation of pulse block days by time period (e.g. year) for each of the five categories of sources. A start on this has been made in the Baltic (Figure 26).

For indicator 11.2, the trends of ambient noise measured in 1/3 octave bands centred at 63 and 125 Hz are to be monitored. In the Baltic marine region, the LIFE+ project called BIAS (Baltic Sea Information on the Acoustic Soundscape), running from September 2012 – August 2016, measured the ambient noise during 2014 and modelled monthly soundscape maps based on the measurements, data on AIS traffic and environmental covariates (www.bias-project.eu). In addition to the MSFD centre frequencies, BIAS also measured the ambient noise at 2 kHz, as a compromise between the hearing ranges of herring, seals and the harbour porpoise. Figure 27 shows the 38 recording stations used to monitor continuous noise.

The BIAS project produced soundscape maps in 2016, showing the underwater noise generated by commercial vessels, the major source of human-induced underwater noise in the Baltic Sea. Seasonal soundscape maps were produced for each of the demersal, pelagic and surface zones. These soundscape maps will serve as a baseline for the development of monitoring and assessment of ambient noise in the Baltic Sea. Figure 28 shows noise maps across the whole water column for the three centre frequencies, 63 Hz, 125 Hz, and 2 kHz.

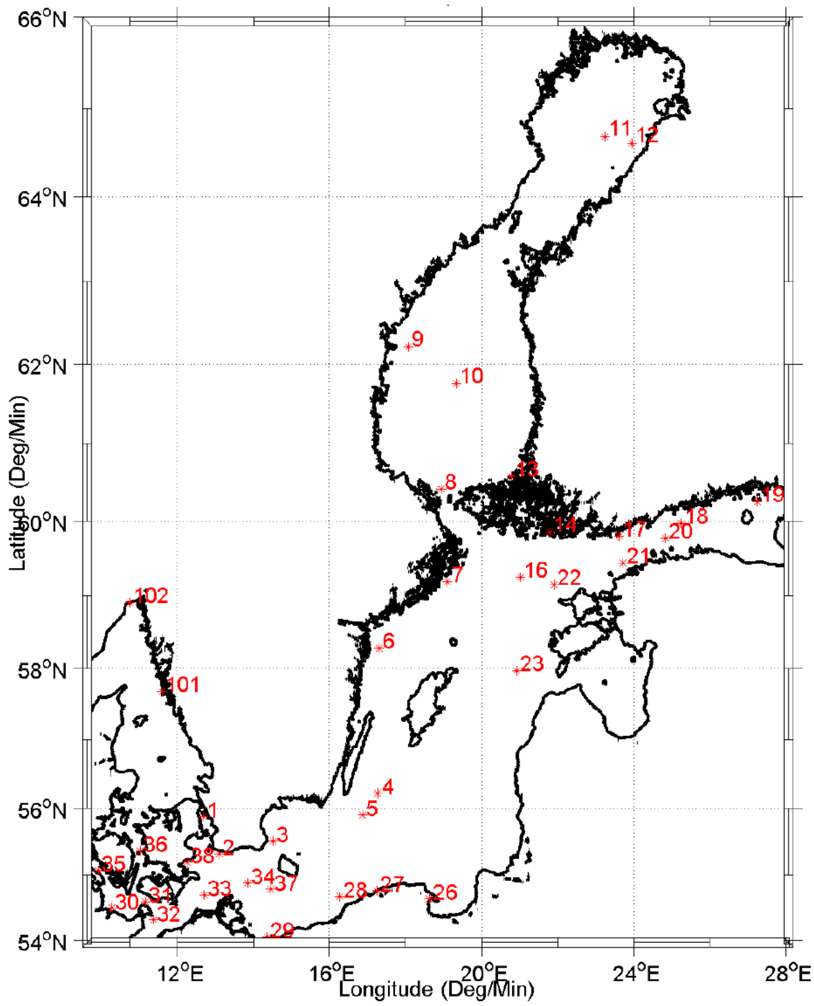


Figure 27. Baltic Sea Regional Map showing the positions of the acoustic measurements carried out by the BIAS Project (Source: Folegot *et al*., 2016).

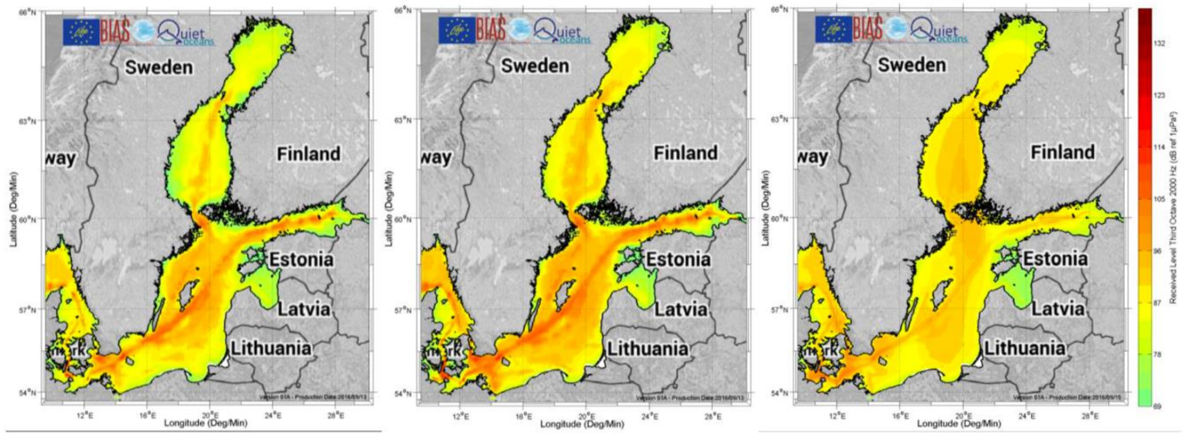


Figure 28. Annual median noise maps for the full water column for the 63 Hz third-octave (left), the 125 Hz third-octave (middle), and the 2kHz third-octave (right) (Source: Folegot *et al*., 2016).

Since the end of the BIAS Project, there are proposals for countries to maintain at least some of their recording stations (Figure 29). Finland, for example, has continued monitoring at two BIAS stations, and Sweden at one BIAS station.

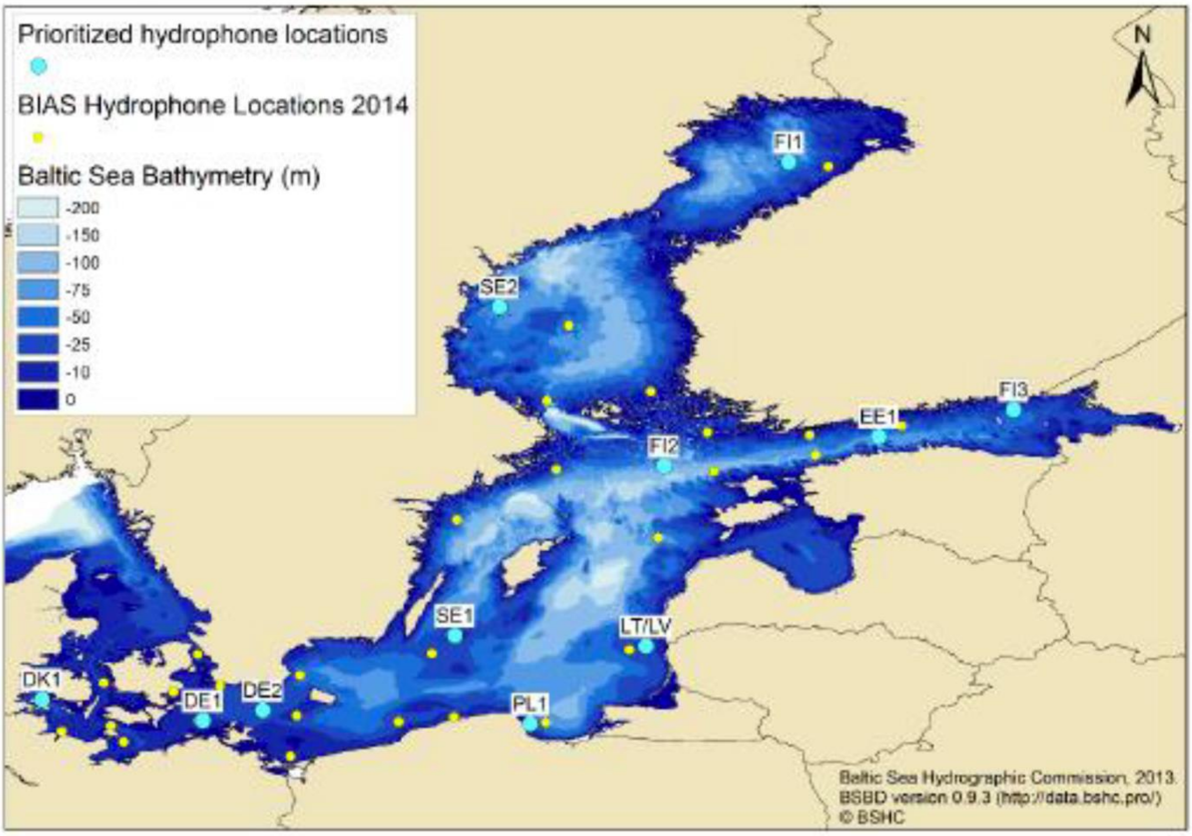


Figure 29. Selected prioritised locations for minor assessment are shown in blue, while the measurement locations used in the BIAS project and proposed for major assessment are shown with yellow circles (HELCOM 2017a).

It is important to note, however, that since porpoises are high frequency echolocators with a hearing range most sensitive above 15 kHz (maximum sensitivity c. 125 kHz) (Kastelein *et al*., 2002, 2015), the MSFD frequencies are unsuitable for assessing impact of continuous noise on this species (Hermannsen *et al.*, 2014; Dyndo *et al*., 2015; Wisniewska *et al*., 2018).

The BIAS project focused upon modelling shipping noise. which generates most sound at low frequencies, below 1 kHz. However, Hermannsen *et al.* (2014) using a broadband recording system in four heavily ship-trafficked marine habitats in Denmark, found that vessel noise from a range of different ship types substantially elevated ambient noise levels across the entire recording band from 0.025 to 160 kHz at ranges between 60 and 1000 m. These ship noise levels are estimated to cause hearing range reduction of >20 dB (at 1 and 10 kHz) from ships passing at distances of 1190 m and >30 dB reduction (at 125 kHz) from ships at distances of 490 m or less. They conclude that a diverse range of vessels produce substantial noise at high frequencies, where toothed whale hearing is most sensitive, and that vessel noise should therefore be considered over a broad frequency range, when assessing noise effects on porpoises and other small toothed whales. Ship noise extending to higher frequencies and thus potentially affecting toothed whales and dolphins has been reported also by other authors (see, for example, McKenna *et al*., 2012; Williams *et al*., 2014; Veirs *et al*., 2016; Southall *et al*., 2017). Of relevance to the porpoise in particular is that recreational craft are generally not equipped with AIS and so are un-monitored, yet those craft usually produce sounds at frequencies of 1-15 kHz. Veirs & Veirs (2006) found that recreational vessels on average increased background noise 5 – 10 dB higher than the average of large commercial ships. It would therefore be prudent to establish better ways to monitor these craft.

Presently, shipping (continuous noise) and piling (impulsive noise) are considered to constitute the two major sources of underwater noise in the Baltic Sea. In the 2013 HELCOM Copenhagen Ministerial Declaration, it was agreed that the level of ambient and distribution of impulsive sounds in the Baltic Sea should not have a negative impact on marine life, and that human activities that are assessed to result in negative impacts on marine life should be carried out only if relevant mitigation measures are in place. Also, as soon as possible and by the end of 2016, using mainly already on-going activities, countries should:

- establish a set of indicators including technical standards which may be used for monitoring ambient and impulsive underwater noise in the Baltic Sea;
- encourage research on the cause and effects of underwater noise on biota;
- map the levels of ambient underwater noise across the Baltic Sea;
- set up a register of the occurrence of impulsive sounds;
- consider regular monitoring on ambient and impulsive underwater noise as well as possible options for mitigation measures related to noise taking into account the ongoing work in IMO on non- mandatory draft guidelines for reducing underwater noise from commercial ships and in CBD context;

The goal of the Baltic underwater noise roadmap is to make every effort to prepare a knowledge base towards a regional action plan on underwater noise in 2017/2018 to meet the objectives of the 2013 Ministerial Meeting, and of the EU MSFD for HELCOM countries, being EU members.

By 2018, a review of sound sources and their impacts upon marine life had been made, along with a summary of potential underwater noise mitigation measures that could be employed for the different sound sources (HELCOM, 2018a). Harbour porpoise was identified as one of the priority species (along with harbour seal, ringed seal, grey seal, cod, herring and sprat). A map compiling noise sensitive areas derived from biological data on noise sensitive species so far identified has also been produced (see, Figure 30), and incorporated in the latest version of the State of the Baltic Sea report (HELCOM, 2018b). An inventory of noise mitigating measures already used in the Baltic Sea region has been compiled (HELCOM 2017bl). The inventory shows that at least three countries (Germany, Denmark, Sweden) are implementing measures to reduce the impact of noise on the marine environment, i.e. by exclusion of noise generating activities for a certain time period or from certain areas, restriction of anthropogenic underwater noise to a certain level, and use of noise reducing techniques (Table 2).

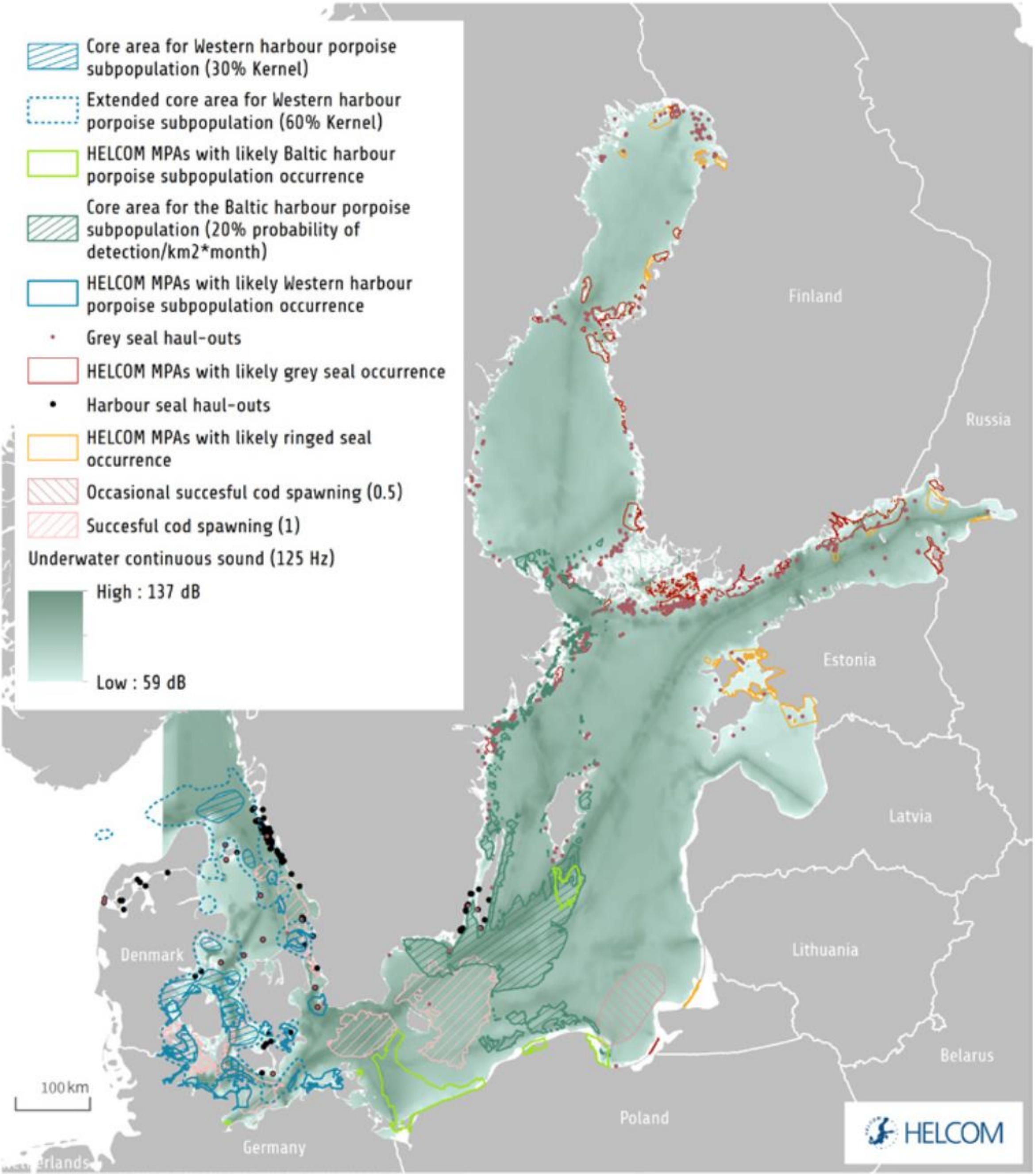


Figure 30. Example of how information on the distribution of sound can be compared with important areas for species that are sensitive to sound. The example shows areas identified so far (based on HELCOM, 2016b). The soundscape shown is the sound pressure level (dB re 1uPa) for the 125 Hz frequency band occurring 5 % of the time, for the whole water column (surface to bottom) in June 2014 (Source: HELCOM, 2018b).

Table 2. Summary of Progress made by countries within the Baltic Sea on noise mitigation actions (Source: Ruiz & Lalander, 2017)

Exclusion of noise generating activities for a certain time period	DK*, FI*, SE
Exclusion of wind farms in Nature Conservation Areas (Maritime Spatial Planning)	DE
Restriction of anthropogenic underwater noise to a certain level	DE, DK, SE
Exclusion of noise generating activities from certain areas (e.g. wind farms)	DE, SE
Spatio-temporal exclusion or limitation of noise causing activities	DK*, SE
Usage of alternative techniques	SE
Modification of operational state of noise source, e.g., reducing ship speed	SE
Refraining from applying activities (e.g. by refrain from using explosives when decommissioning offshore constructions)	SE
The environmental courts may impose any of these restrictions as conditions for granting a project license. For shipping over 500 tonnes, the Swedish Transport Agency may propose "Areas to be avoided" through the IMO. Two such areas were implemented in the Baltic in 2005. No speed restrictions for larger vessels have been proposed, though regional authorities have implemented coastal "Consideration Areas" which include speed restrictions for motorboats. The Swedish Armed Forces use a marine biological calendar when planning exercises to minimize environmental disturbance.	SE

**Potential measure*

Table 3. Principles for defining guidance levels of a) Impulsive underwater noise and b) continuous underwater noise consistent with good status for a sound sensitive species, the harbour porpoise (Source: HELCOM, 2017b).

Sound type	**Guidance Principles**
a) Impulsive noise	Levels of anthropogenic noise should not: - Cause injury on individual animals - Cause loss of habitat, through displacement, for a significant period of time or significant less of habitat that leads to a decrease on the population level that affects the conservation status - Affect the energy budget of individual animals nor reproduction to a degree that leads to a decrease on the population level that affects the conservation status; particular emphasis should be on calving and nursing grounds and biologically sensitive times
b) Continuous noise	Levels of anthropogenic noise should not: - Cause injury on individual animals - Cause loss of habitat, through displacement, for a significant period of time or significant less of habitat that leads to a decrease on the population level that affects the conservation status - Affect the energy budget of individual animals nor reproduction to a degree that leads to a decrease on the population level that affects the conservation status; particular emphasis should be on calving and nursing grounds and biologically sensitive times - Cause masking leading to a decrease in the population level

HELCOM indicators to assess status in relation to underwater noise are still being developed. Table 3 outlines a qualitative description of conditions to be met to consider good status to be achieved and are meant to facilitate a coherent approach among the countries. They are meant to be used to develop guidance levels i.e. thresholds of noise consistent with good status for each noise sensitive species and furthermore the establishment of environmental targets, i.e. the reduction in pressure needed to reach good status, if the national evaluation show that is needed. It is proposed that environmental targets are defined based on a risk based approach even if the status and impacts are not fully known, since there is a risk of degradation in environmental status, in particular in relation to activities known to cause significant pressures on the environment. Decision support trees for establishing environmental targets for impulsive noise and continuous noise have been developed within HELCOM.

These indicators will be used to seek synergies with the work of OSPAR and be provided as input to the work of EU TG Noise and the decision to establish GES principles and threshold values which is to be made at European Union level. The international framework provided by IMO (in relation to continuous noise) will also be applicable when considering further work.

Key Conclusions and Recommendations *Through the BIAS Project and the work of HELCOM, the region has received a lot of attention with respect to assessment and monitoring of noise, particularly the MSFD continuous low frequency sound indicator. Some of the listening stations in Denmark, Estonia, Finland, Germany, Poland, and Sweden have been maintained (withdifferent effort in different countries) but it would be good for there to be full coverage of the Baltic Proper with listening stations. A few countries have contributed information on impulsive noise events to the MSFD noise register maintained by ICES. This needs to be extended across all Range States.*

5. Monitor and assess population status

Assessment of population status and examination for linkages to specific human threats are necessary before appropriate conservation action can be taken. Bycatch in gillnet fisheries has been recognised as the primary threat for the survival of the Baltic harbour porpoise population. Other concerns are high contaminant levels, anthropogenic noise and overfishing. The continuing eutrophication of the Baltic Sea increases the area of seabed devoid of oxygen, which has a negative impact on harbour porpoise prey species. A lack of top predators such as cod and porpoises is thought to be allowing numbers of sprat and herring to increase to the extent that it is affecting the nutritional status of these prey species. A similar link has been proposed as affecting grey seals in the Baltic (Kauhala *et al*., 2017). Although warming climate decreases ice coverage in the Baltic Sea during winter and can thus be considered to have a positive impact on harbour porpoises, the overall effects of changing climate has in the Baltic Sea ecosystem remains poorly understood.

IUCN (Hammond *et al*., 2008) has classified the Baltic subpopulation of the harbour porpoise as critically endangered. Table 4 gives an overview of the conservation status of the harbour porpoise according to national red data books or red lists. Note that Denmark, Germany and Sweden do not give a separate classification for the Baltic harbour porpoise population, but one general classification for all populations in their national waters.

In Article 17 reporting for the Habitats Directive, all EU countries except Latvia give the conservation status as “Unfavourable-Bad”, with Latvia recording it as “Unknown”.

Table 4. National Red Data list status of the harbour porpoise in the Baltic Sea

Country	Red list status	Reference
Denmark*	Vulnerable (VU)*	Wind & Pihl (2004)
Estonia	Data Deficient (DD)	Anonymous (2008)
Finland	Regionally extinct (RE)	Liukko et al. (2016)
Germany*	Endangered (EN)	Haupt et al. (2009)
Latvia	Probably extinct (0)	Andrušaitis (2000)
Lithuania	Not listed	Rašomavičius (2007)
Poland	Least Concern (LC)	Glowacinski et al. (2002)
Russian Federation	Uncertain Status (4)	Iliashenko & Iliashenko (2000)
Sweden*	Vulnerable (VU)*	Artdatabanken (2015)

* No separate assessment has been made for the Baltic harbour porpoise population

The SAMBAH Project produced an abundance estimate of just under 500 animals for the Baltic Sea harbour porpoise population. The broad confidence limits and lack of a comparative estimate for an earlier period make it impossible to judge the population status beyond those country assessments detailed in Table 4. However, other approaches can be used to provide some kind of assessment. These can come from the collection of dead specimens and assessing health status, contaminant levels, life-history parameters and cause of death.

Germany

Only Germany has a dedicated stranding scheme, which operates in both Schleswig-Holstein and Mexklenburg – West Pomerania. The scheme is administered in the former region by the Terrestrial and Aquatic Research Institute (ITAW) in Büsum, and in the latter region by the German Oceanographic Museum in Stralsund. The trend in strandings for the two regions, and overall, is shown in Figure 31.

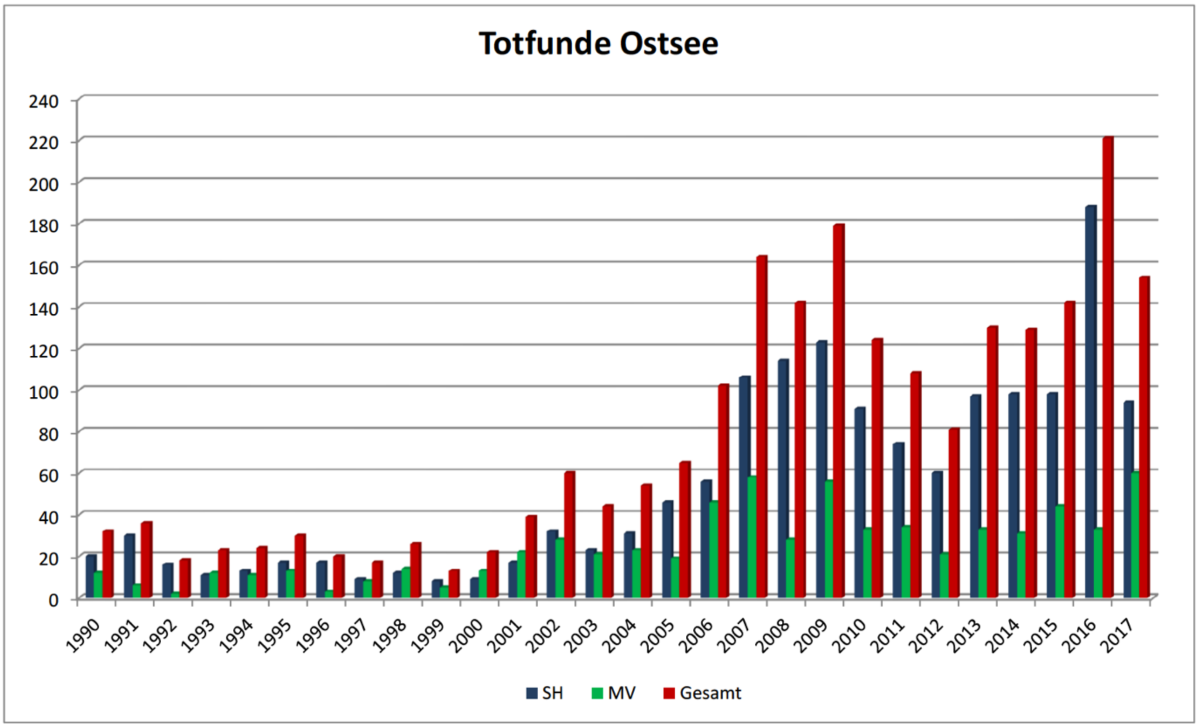


Figure 31. Strandings in German waters of the Baltic (Source: German National Report, 2018)

Since German waters span the transition zone, it is difficult to know how many animals came from the Baltic Proper. In 2017, 186 animals were reported stranding in Schleswig-Holstein and 60 in Mecklenburg-West Pomerania. Necropsies are undertaken on fresh specimens to determine cause of death and collect life history information. Kesselring *et al.* (2017) investigated the first signs of sexual maturity for a period of almost two decades (1990-2016). Ovaries from 111 female harbour porpoises stranded or bycaught from the German North Sea and Baltic Sea were examined for the presence and morphological structure of follicles, corpora lutea and corpora albicantia. They found that whereas there were no significant differences in the demographic structure of females between the two regions, the average age at death differed significantly with 5.70 (± 0.27) years for North Sea animals and 3.67 (± 0.30) years for those in the Baltic Sea. By comparing the age structure with the average age at sexual maturity, it has been estimated that around 28 % of the female harbour porpoises found dead along the German Baltic coast of Schleswig-Holstein had lived long enough to reach sexual maturity. In comparison, about 45 % of the dead females from the North Sea had reached sexual maturity. They concluded that growing evidence existed to suggest that the shortened lifespan of Baltic Sea harbour porpoises is linked to an anthropogenically influenced environment with rising bycatch mortalities probably due to local gillnet fisheries since about 30% of the animals sampled were thought to be by-caught.

Denmark

In Denmark, there is no stranding scheme currently in operation.

Sweden

In Sweden, records of strandings are collected opportunistically by the Swedish Natural History Museum (NRM) in collaboration with the Gothenburg Museum of Natural History. Twenty porpoises were necropsied out of 104 stranded animals reported in 2017: two from the Skagerrak, 14 from the Kattegat & Belt Seas, and two from the southern Baltic Proper. Nine of the necropsied animals had signs of bycatch. The aim for this programme is to continue to undertake necropsies at the level of 20 animals/year. In addition, around 660 porpoises, collected mainly during the 1990s, have been donated to the museum.

Poland

Although Poland does not have a dedicated national stranding scheme, it has started a voluntary pilot project called Blue Patrol in 2015-18, in two areas, and one of the actions is to recover stranded animals. In 2017, a total of 11 porpoises was collected. Necropsies are undertaken on fresh carcasses.

Finland, Estonia, Latvia and Lithuania

Baltic countries east of Poland have no formal stranding scheme. In Finland, there have been no strandings (or bycaught animals) since 1999, six of which were from the 1960s-1980s. In Lithuania, as noted earlier, there have been only thirteen documented cases of porpoise stranding or by-catch between 1903-2017; and none confirmed in recent years.

For those countries bordering the Baltic Proper (Denmark, Germany, Poland, and Sweden) reporting to the EU under the Habitats Directive, the status assessment is unfavourable-bad, the worst status class. To protect the Baltic Proper population of the harbour porpoise, the aim is to minimise incidental by-catches in fishing gear to close to zero, as agreed in the Baltic Sea Action Plan (HELCOM, 2018b), but there is a lack of data for proper assessments. The HELCOM Marine Protected Areas are considered an important step towards protecting harbour porpoise, particularly when relevant management measures are in place (HELCOM, 2018a, b).

Key Conclusions and Recommendations *Monitoring and assessing population status is challenging for a population that is so rare over large parts of the Baltic Proper. It is important that all lines of evidence are utilised, including acoustics, opportunistic sightings, and strandings along with life history information derived from dead animals. Only Germany has a dedicated stranding scheme with good samples of animals necropsied. All other countries need to do more to maximise opportunities for data* *on porpoises. This will need to be done in combination with a public awareness and education campaign. In this context, the perceived status of Baltic porpoises in national Red Data lists for most countries could usefully be updated. This applies particularly to Poland which lists a status for the porpoise that is clearly misleading, although it recognises its conservation status as "Unfavourable-Bad" in its Habitats Directive Article 17 reporting.*

6. Investigate habitat use and protect important areas

The SAMBAH Project has provided the best available map of the seasonal distribution of harbour porpoise in the Baltic Proper (see Figure 3). However, as noted earlier, there are some areas (e.g. waters deeper than 80 m and near-shore areas) that were not well sampled by the acoustic stations deployed. The proposed follow-up, SAMBAH II project, aims to fill in some of those gaps.

Sweden

The SAMBAH results highlight the area off southern Sweden around the shallow offshore banks south of Gotland as an important hotspot for the Baltic sea population in summer during the period of calving and mating. Following those findings, the Swedish Government proposed establishment of a Natura 2000 site (29 242 km^2) in this area, and this was designated in December 2016 (Figure 32). A management plan is currently being developed, which will include a monitoring strategy.

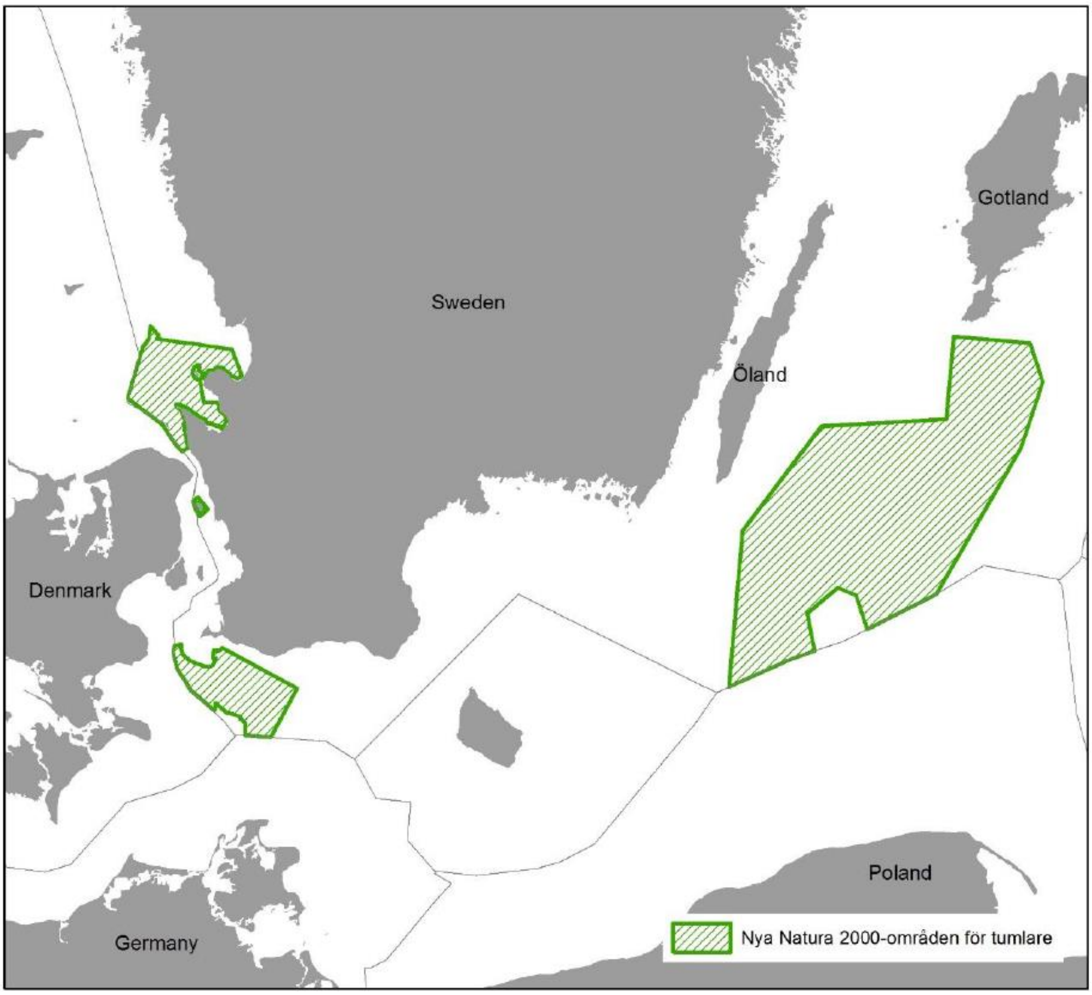


Figure 32. The location of Marine Protected Areas (Natura 2000 sites) for the protection of harbor porpoise in the Swedish waters of the Baltic Proper.

A dialogue is ongoing within Sweden on potentially reducing gillnet fisheries within protected areas, and the Swedish Agency for Marine and Water Management are due to deliver results on this to the Swedish government in the summer of 2018.

With further deployment of some acoustic stations since the SAMBAH project, it is important that the distribution of harbour porpoises continues to be assessed. So far, emphasis has been upon establishing Natura 2000 sites in Swedish waters, but areas in the EEZs of other countries should be examined further. These should include a possible extension of the offshore Swedish site into Polish waters where higher detections were made in the breeding season during the SAMBAH project; consideration for whether the Natura 2000 site in Puck Bay should be enlarged/extended; and further examination of the distribution of harbour porpoises between November and May, bearing in mind that it may be impossible to distinguish animals from the Baltic Proper sub-population from those from the Belt Sea.

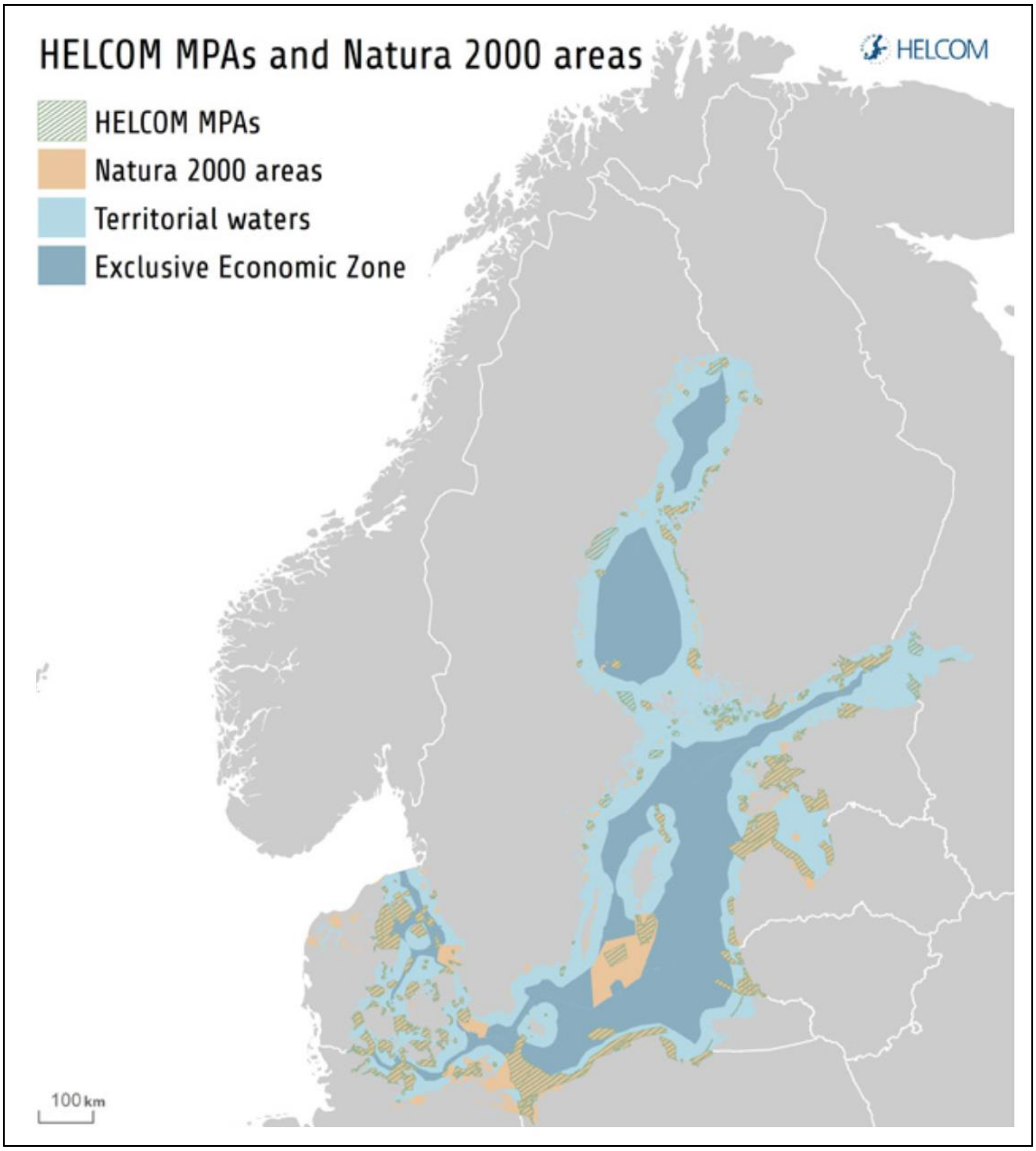


Figure 33. Marine Protected Areas in the Baltic Sea (Source: HELCOM, 2018a).

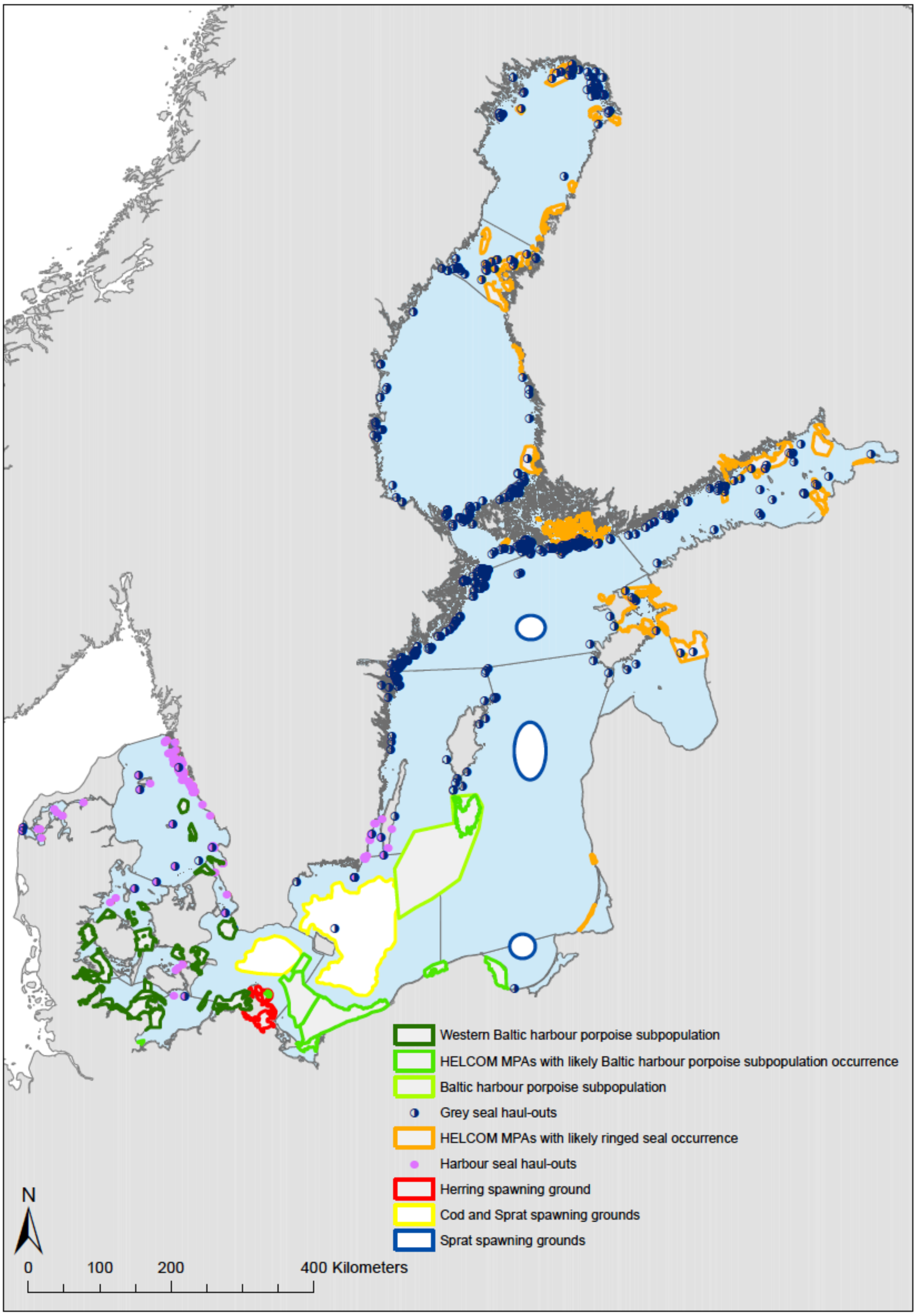


Figure 34. Preliminary biologically sensitive areas. For harbour porpoises, important areas are based on established MPAs where this species occurs as well as recent findings. For the Western Baltic subpopulation, important areas are based on tagging and acoustic survey data (dark green squares, Teilmann *et al.*, 2008; Sveegaard *et al.*, 2011a and b). For the Baltic sub-population, important areas are based on acoustic survey data (light green squares, Carlström & Carlén, 2016) and marine protected areas where this species occur (HELCOM MPA database; Carlström & Carlén, 2016) (Source: HELCOM, 2017a).

The Baltic Sea has reached the target of conserving at least 10% of coastal and marine areas, set by the United Nations Convention on Biological Diversity. By 2016, the area protected by these marine protected areas (MPAs) was estimated at 11.8% (54 367 km^2) (see Figure 33). A specific aim for the HELCOM network of marine and coastal Baltic Sea protected areas (HELCOM MPAs) is to be 'ecologically coherent', meaning that a network of protected sites should be designed so that it delivers more benefits than individual areas (HELCOM, 2016a). Management plans remain to be implemented in about 30% of the marine protected areas (including all those for harbour porpoise). HELCOM is working towards the development of a method to assess the management effectiveness of HELCOM marine protected areas and the network.

In February 2018, the UN Convention on Biological Diversity (CBD) held a Baltic Sea workshop in Helsinki, Finland, on the application of the EBSA (Ecologically and Biologically Sensitive Areas) criteria to draw attention to areas needing special attention. Seven criteria are used:

1. Uniqueness or Rarity
2. Special importance for life history stages of species
3. Importance for threatened, endangered or declining species and/or habitat
4. Vulnerability, Fragility, Sensitivity, or Slow recovery
5. Biological Productivity
6. Biological Diversity
7. Naturalness

These criteria can be ranked high, medium, low, or don't know. The workshop explored the potential for EBSAs in the Baltic Sea area covered by the Helsinki Convention. EBSAs are expected to contribute to fulfilling the regional goal of producing and applying maritime spatial plans that are coherent across borders and that apply the ecosystem approach. Nine areas were proposed as EBSAs: Northern Bothnian Bay; Kvarken Archipelago; Åland Sea, Åland Islands and the Archipelago Sea of Finland; Eastern Gulf of Finland; Inner Sea of West Estonian Archipelago; Southeastern Baltic Sea Shallows; Southern Gotland Harbour Porpoise Area; Fehmarn Belt; and Fladen and Stora and Lilla Middelgrund.

Clearly, harbour porpoise forms an important component of the Baltic sea ecosystem, and some of the above areas are inhabited by harbour porpoises, particularly in the Southern Gotland area. Those were based upon a preliminary list of candidate EBSAs mapped earlier by HELCOM (see Figure 34). These areas were submitted for consideration to the 22nd meeting for SBSTTA (the CBD Subsidiary Body on Scientific, Technical and Technological Advice) in July 2018 in Montreal, Canada and a decision will be reached at the upcoming meeting in Egypt. Once approved, they become included in the CBD EBSA repository (www.cbdint/ebsa) and a summary report conveyed to the United Nations General Assembly as well as other relevant UN/international organisations.

Key Conclusions and Recommendations *In recent years, particularly with benefit of the results of the SAMBAH Project, attention has been paid to the establishment of protected areas for harbour porpoise. Sweden in particular has key areas designated although these could usefully be extended, for example to include Polish waters adjacent to the protected area offshore of SE Sweden. All Baltic Sea countries need to consider whether there is scope for greater protection within their EEZs. The establishment of Ecologically and Biologically Sensitive Areas (EBSAs) in other parts of the Baltic, if accompanied by protective measures, could help provide the conditions for porpoise habitat to be restored, facilitating recovery of the population particularly in the eastern and northern portions of the Baltic.*

7. *Summary of Progress in the Implementation of the Recovery Plan*

Table 5 provides a qualitative assessment of progress on the various priority actions by each of the Member States.

At present, the majority of countries from the eastern Baltic have yet to embrace action in terms of attempts to monitor harbour porpoises within their EEZ either through visual observations or acoustically. This is understandable when the species is considered only a vagrant in their waters. However, it is likely to have been under-recorded, whilst until suitable conditions are provided in terms of reduced pressure from fishing activities, it will be difficult for populations to recover locally. Throughout the Baltic Proper in fact, there is a need for measures to reduce potential fisheries conflict.

8. *Priority Recommendations*

1) Immediately implement mitigation measures to minimise bycatch in the entire area, especially in protected areas but also in the rest of the Baltic Proper
2) Investigate options for more cost-effective bycatch monitoring to better estimate bycatch, particularly targeting high risk fisheries
3) Implement proper management of protected areas for porpoises
4) Undertake SAMBAH II to improve estimates of abundance and distribution
5) Increase public awareness, especially in countries where there is little or no engagement

Table 5. Summary of Progress in the Implementation of the Recovery Plan

Qualitative Assessment of Progress in the Implementatn of the ASCOBANS Jastarnia Recovery Plan for HP (update Aug 2018)												
na = non applicable; **-1**, situation is less good than at the adoption of the pl in 2009, **0** = no progress, **1** = small progress or at experimental level; **2**, steady progress; **3**, fully implemented.												
	Actions from the Jastarnia Recovery Plan for HP	**Priority**		**SE**	**DK**	**DE**	**PL**	**FI**	**LI**	**LA**	**ES**	**RU**
1	**Implementation of the CP: co-ordinator and Steering Committee**	**High**		Co-ordinator for 2018								
2	**Increase involvement, awareness and cooperation**	**High**		1	1	2	2	1	1	0	0	0
3	**Monitor and estimate abundance and distribution**	**High**	Large scale	SAMBAH II planned								
			Reg/survey	1	1	2	1	1	0	0	0	0
			Reg/modelling	0	1	2	0	0	0	0	0	0
4	**Monitor, estimate and reduce bycatch**	**High**		1	1	1	1	1	0	0	0	0
5	**Monitor and mitigate impact of underwater noise**	**High**		1	2	1	1	1	0	0	0	0
6	**Monitoring and assess population health status**	**Medium**		1	0	2	1	0	0	0	0	0
7	**Investigate habitat use and protect important areas**	**Medium**		2	2	2	1	0	0	0	0	0

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