PROPOSAL FOR THE INCLUSION OF THE BALTIC PROPER HARBOUR PORPOISE (*Phocoena phocoena*) ON APPENDIX I OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

A. PROPOSAL: This proposal is for the inclusion of the Baltic Proper subpopulation of the harbour porpoise *Phocoena phocoena* on CMS Appendix I, while maintaining its existing status on Appendix II. The Baltic Proper porpoise subpopulation meets the criteria on account of its Critically Endangered conservation status due to a severely depleted population size (<500 animals), contracted historic range, genetic-distinctiveness, concentration in a limited spatial area during the summer reproductive season, and evidence for unsustainably high anthropogenic mortality, particularly from bycatch in fishing gear. An Appendix I listing would require strict protection of the population by all Range States, and encourage directed and collaborative effort to address the main threats such as bycatch and environmental contaminants.

B. PROPONENT: [to follow]

C. SUPPORTING STATEMENT

1. Taxonomy

1.1 Class:	Mammalia
1.2 Order:	Cetacea
1.3 Family:	Phocoenidae
1.4 Species or subspecies:	*Phocoena phocoena* (Linnaeus, 1758); Baltic Sea subpopulation
1.5 Scientific synonyms:	No current synonyms
1.6 Common name(s):	Denmark: marsvin Estonia: harilik pringel Finland: pyöriäinen France: marsouin commun Germany: Schweinswal, Kleiner Tümmler Latvia: cûkdelfîni Lithuania: paprastoji jûrø kiaulë Poland: morświn Russia: морская свинья (Morskaja svin'ja) Spain: marsopa común Sweden: tumlare UK: harbour porpoise

2. Overview

In the Baltic Sea, several strands of evidence including genetics, distributional data, skull morphometrics and contaminant work, are supportive of the existence of two distinct subpopulations of the harbour porpoise, *Phocoena phocoena*. A "Belt Sea" subpopulation occupies the southern Kattegat, the Belt Sea and the south-western Baltic Sea, with an eastern summer management border at approximately 13.5°E (Sveegaard et al., 2015). The "Baltic Proper" subpopulation inhabits the eastern portion of the Baltic Sea, with a south-western summer management border extending in a diagonal line between Hanö in Sweden and Słupsk in Poland (SAMBAH, 2016; Carlén et al., 2018). The latter subpopulation appears to be concentrated over a relatively small spatial area in summer, incorporating the Hoburgs and Midsjöbankarna offshore banks in Swedish and Polish waters. The genetic differentiation between the Belt Sea and Baltic Proper subpopulations is maintained by limited gene flow resulting from the spatial separation of the two subpopulations during the summer reproductive season (Carlén et al., 2018). However, in winter the Baltic Proper subpopulation appears to be more widespread and very likely overlaps spatially with the Belt Sea subpopulation in the south-west Baltic (east of the Drogden and Darss Sills), resulting in a complicated scenario for management. The Baltic Proper subpopulation has long been of conservation concern, with marked declines noted anecdotally over the last century by many observers, and a Critically Endangered status on both the IUCN Red List (Hammond et al., 2008) and the Baltic Marine Environment Protection Commission Red List (HELCOM, 2013). The first, and only, abundance estimate available for the subpopulation was of only 497 individuals in 2011–2013, and had wide confidence limits (95% CI 80–1,091; SAMBAH, 2016). Regular transboundary movements by individuals

from the Baltic Proper subpopulation are evidenced by spatio-temporal variation in distribution, the spanning of the core summer high density areas across Swedish-Polish borders, and the high mobility of the species in general. Life-history information indicates that female porpoises in Baltic Sea waters have a shorter lifespan than elsewhere (3.7 years), with only ~27% of females living long enough to produce a calf (Kesselring et al., 2017, 2018). High anthropogenic-related mortality due to bycatch in fisheries (especially static gear such as gillnets) appears to be the major threat to the Baltic Proper subpopulation, and is considered to be unsustainably high. Environmental contaminants may also have contributed to the decline in, and lack of recovery of, Baltic porpoise abundance. Underwater noise from sources including shipping and offshore wind farm construction, may potentially cause displacement and behavioural impacts. The inclusion of the Baltic Proper subpopulation on CMS Appendix I would require Range States to provide strict protection by prohibiting takes, conserving habitats, limiting obstacles to migration and controlling other factors that might endanger them, and would strengthen the collaborative effort by all EU Member States bordering the Baltic Proper.

3 Migrations

3.1 Kinds of movement, distance, the cyclical and predicable nature of the migration

The harbour porpoise is a highly-mobile, wide-ranging cetacean species that is not limited by national borders (Sveegaard et al., 2015). The small dorsal fin and elusive nature of this species, mean that it has not been the subject of either photo-identification or tagging work within the Baltic Proper, which would explicitly demonstrate the movement of individuals from the Baltic Proper population across national jurisdictional boundaries. Tagging studies conducted in the Belt Sea subpopulation were facilitated by the incidental capture of live porpoises in pound nets (Sveegaard et al., 2011), which are not used in the Baltic Proper. As noted by Koschinski (2001), little information is available on migrations or movements of the Baltic Proper subpopulation, because sightings are so rare. Nevertheless, such movements are strongly implied by:

- The documented summer distribution range of the Baltic Proper subpopulation includes all waters eastwards of a line from Hanö in Sweden to Słupsk in Poland (Carlén et al., 2018), while the winter distribution range may extend further westwards to Pomeranian Bay in Germany (Gallus et al., 2012; Benke et al., 2014). By definition therefore, the Baltic Proper subpopulation spans the waters of at least nine countries, Denmark (Bornholm), Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden, including eight EU Member States.
- The core area of concentration of the Baltic Proper subpopulation during the summer reproductive season incorporates a series of offshore banks that are split between Swedish and Polish waters, and consequently supports frequent movements of porpoises across those national boundaries (Carlén et al., 2018).
- In the winter months, the distribution of the Baltic Proper subpopulation seems to expand northwards,eastwards and westwards from the summer core area, with animals regularly occurring in Finnish waters south of the Åland islands, and thus crossing multiple national borders (Carlén et al., 2018).
- Satellite-tracking of tagged porpoises from the Belt Sea subpopulation indicated that porpoises regularly crossed national boundaries between Danish, German and Swedish waters (Sveegaard et al., 2011), and similar movements would be expected between countries in the Baltic Proper subpopulation. Additionally, the data from satellite-tracked harbour porpoises off eastern Canada indicated daily travel rates averaging up to 58.5 km/day, with one porpoise travelling over 300 km in just 21 days (Read and Westgate, 1997). This high mobility supports a high likelihood of transboundary movements within the semi-enclosed waters of the Baltic Proper.

3.2 Proportion of the population migrating, and why that is a significant proportion

There are currently no available data to indicate what proportion of the Baltic Proper subpopulation makes regular movements across one or more national jurisdictional boundaries. However, the latest information suggests that the subpopulation concentrates in defined core breeding areas on the offshore banks to the south of Gotland and south-east of Öland during summer (mainly Swedish waters), and disperses to wider parts of the Baltic Proper and south-west Baltic Sea during winter (including Finnish, Polish, German and Danish waters: Carlén et al., 2018). Consequently, seasonal transboundary movements by a significant

portion of the Baltic Proper subpopulation, and in particular the mature breeding component of the population, are strongly supported.

4. Biological data (other than migration)

4.1 Distribution (current and historical)

Historic
The historic distribution range of porpoises within the Baltic Sea Region apparently included all of the Kattegat, Skagerrak and the Baltic Sea proper, and continued northwards to the Gulf of Riga, Gulf of Finland and Kemi in the north-east part of the Gulf of Bothnia (Koschinski, 2001; HELCOM, 2013; Benke et al., 2014; Loisa, 2016). Sightings were known from Estonia and Latvia during summer and autumn, and some individuals even entered the river Neva at St Petersburg in the innermost Gulf of Finland (Koschinski, 2001). However, during the latter half of the 1900s porpoise numbers in the Baltic Sea appear to have declined and their range has contracted southwards and westwards; sightings in the eastern and northernmost Baltic are now rare (Koschinski, 2001).

Current
Most available information for the Baltic Proper subpopulation originates from opportunistic bycatch, stranding and sighting records along the Baltic Sea coasts (HELCOM, 2016). Observations are rare, and the species is considered to be virtually absent in the north-eastern part of the Baltic (Koschinski, 2001). Until recently, it was considered that the spatial boundaries between the Belt Sea and Baltic Proper subpopulations were the Drogden and Darss Sills (e.g. Berggren et al., 2002; Huggenberger et al., 2002; Gallus et al., 2012; Benke et al., 2014). However, a comprehensive assessment of the spatio-temporal distribution of the Baltic Proper subpopulation was carried out between May 2011 and May 2013 by the Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise project (SAMBAH, 2016; Carlén et al., 2018), which deployed 304 acoustic devices across Baltic Sea waters from the east end of the Belt Seas north to the Åland Islands (entrance to the Gulf of Bothnia). The Baltic Proper subpopulation was found to be spatially-distinct from the Belt Sea subpopulation during the reproductive period in the summer months (May to October), but with probable mixing of the two subpopulations in the south-west Baltic Sea during the winter (Carlén et al., 2018). This was consistent with earlier acoustic work in the German Baltic (Gallus et al., 2012; Benke et al., 2014), which indicated that the German waters north and east of the island of Rügen (Pomeranian Bay) were occupied by Belt Sea porpoises over the summer (June to August), but that during the winter both the Belt Sea and Baltic Proper subpopulations shifted westwards so that Pomeranian Bay was occupied by Baltic Proper porpoises in winter (January to March). The waters along the south coast of Sweden and around the Danish island of Bornholm, are also likely to be used seasonally by porpoises from both subpopulations. Consequently, the winter distributional limits of Baltic Proper porpoises remain unclear and are complicated by apparent mixing of two subpopulations in the same areas.

Based on the SAMBAH results, Carlén et al. (2018) proposed a summer south-west management border for the Baltic Proper subpopulation, in a diagonal line extending approximately between Hanö in Sweden to Słupsk in Poland (Figures 1 and 2). This proposed management border was located slightly further east than a previously-proposed easternmost summer management border for the Belt Sea subpopulation (13.5°E longitude: Sveegaard et al., 2015), highlighting an area of low porpoise occurrence between the two subpopulations during summer. Within their summer range, Baltic Proper porpoises were concentrated over the Hoburgs and Midsjöbankarna offshore banks in Swedish and Polish waters, in an area considered to be an essential core breeding area for the subpopulation (Figure 2; Evans and Similä, 2018). In winter, the Baltic Proper subpopulation was more widespread, with acoustic detections recorded from the south-west Baltic to the Åland Islands at the entrance to the Gulf of Bothnia, and low densities along Lithuania, Latvia, and along the east coast of Sweden (Carlén et al., 2018).

No detections were recorded in the Gulf of Riga of the Gulf of Finland by the SAMBAH project, indicating that porpoises in those regions are very scarce (Carlén et al., 2018). However, a sighting campaign launched by the Ministry of the Environment in Finland in 2001, resulted in 63 sightings of 113 individuals in Finnish waters between 2000 and 2015, and included a number of sightings from the Gulf of Finland and further north from the Gulf of Bothnia (Loisa, 2016). Records from Polish waters are rare and predominantly comprise fisheries bycatch, with an average of 4.5 animals captured annually between 1990 and 1999, predominantly in Puck Bay in the western part of Gdansk Bay (Koschinski, 2001; Skóra and Kuklik, 2003).

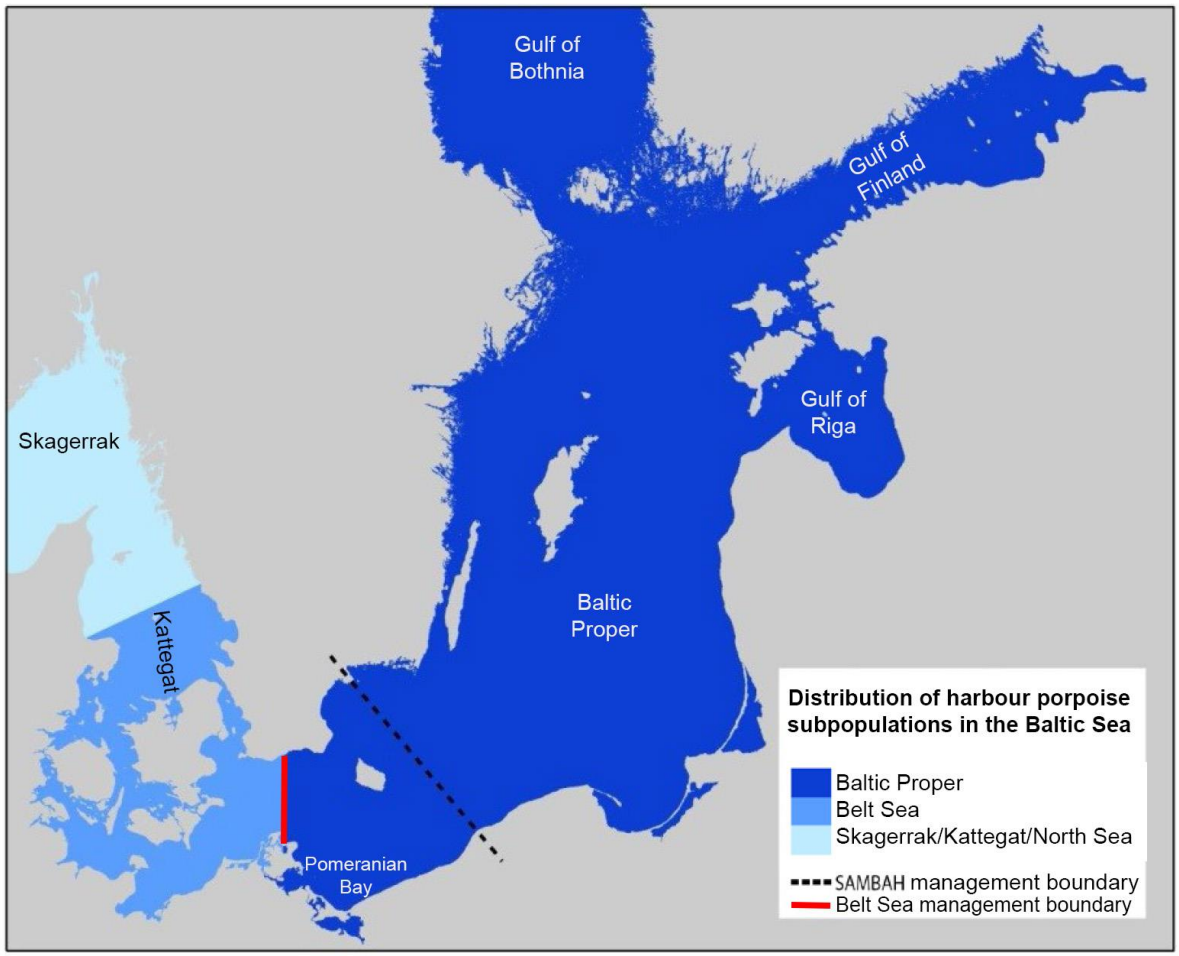

Figure 1. Distribution ranges of harbour porpoise subpopulations in the Baltic Sea (adapted from Loisa, 2016), and the proposed summer management boundaries for the Belt Sea (13.5°E: Sveegaard et al., 2015) and Baltic Proper (Carlén et al., 2018) subpopulations.

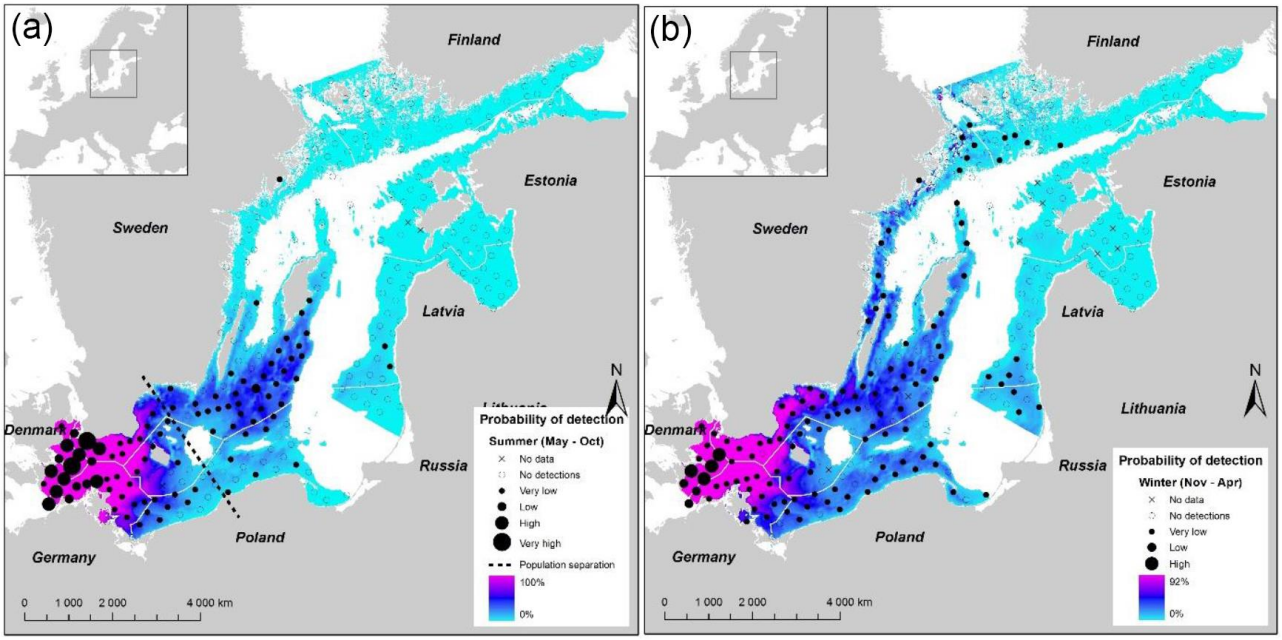

Figure 2. Predicted seasonal probability of detection of harbour porpoises in the SAMBAH project area during: (a) May–Oct; and (b) Nov–Apr (SAMBAH, 2016). The dashed line indicates the spatial separation between the Belt Sea and Baltic harbour porpoise populations during May–October.

4.2 Population (estimates and trends)

Abundance

The Baltic Proper subpopulation of harbour porpoises appears to have declined markedly in density and distribution over the last century, although quantitative data are lacking (Koschinski, 2001; Skòra et al., 1988; Hammond et al., 2008; ASCOBANS, 2009). Most harbour porpoise abundance surveys in the Baltic Sea have occurred during the summer months, when the Baltic Proper subpopulation was shown by Carlén et al. (2018) to be concentrated north-east of Bornholm island and particularly around the offshore banks in Swedish and Polish waters. Consequently, summer abundance estimates originating from the Kattegatt, Skagerrak, Belt Seas and German Baltic (e.g. Berggren et al., 2002, 2004; Gilles, 2008; Siebert et al., 2006; Scheidat et al., 2008; Benke et al., 2014), most likely apply only to the Belt Sea subpopulation rather than the Baltic Proper subpopulation. Additionally, Europe-wide cetacean surveys carried out during Project SCANS (small cetacean abundance in the North Sea and adjacent waters) in the summers of 1994 (Hammond et al., 2002), 2005 (Hammond et al., 2013) and 2016 (Hammond et al., 2017) specifically omitted the Baltic Proper region from Pomeranian Bay eastwards, because porpoise densities were anticipated to be too low to generate robust abundance estimates (Hammond et al., 2002).

The only existing abundance estimate specific to the Baltic Proper subpopulation (i.e. covering the core summer occurrence around the offshore banks in the central Baltic Proper) results from the SAMBAH acoustic monitoring in 2011–2013, which generated an overall summer density of 0.00375 animals/km^2 and an abundance estimate of 497 individuals (95% CI 80–1,091; SAMBAH, 2016). However, the confidence limits for this abundance estimate were wide.

Population structure

Two subspecies of harbour porpoise are currently recognised in Europe, the North-east Atlantic subspecies (*P. p. phocoena*) and the Black Sea subspecies (*P. p. relicta*). A third subspecies in this region was recently proposed in Iberian and North-west African waters (*P. p. meridionalis;* Fontaine et al., 2014). The population structure of the North-east Atlantic subspecies is typically weak across the European continental shelf from the northern Bay of Biscay to Norway and Iceland, supporting the existence of a single subspecies (Fontaine et al., 2014). However, there is evidence for the occurrence of three separate porpoise subpopulations within the eastern part of the North Atlantic:

(1) The Skagerrak, northern Kattegat and extending into the North Sea;

(2) The southern Kattegat, the Belt Sea and south-western Baltic Sea; and

(3) The Baltic Proper, extending from the south-west Baltic Sea eastwards.

Although debated (e.g. Palmé et al., 2008), this population structure has been supported by genetic work (Tiedemann et al., 1996; Wiemann et al., 2010; Lah et al., 2016), skull morphometrics (Huggenberger et al., 2002; Galatius et al., 2012), contaminant loads (Berggren et al., 1999), and recent distributional studies using visual surveys, satellite-tracking and static acoustic devices (Sveegaard et al., 2015; SAMBAH, 2016; Carlén et al., 2018). The subtle genetic differentiation between the Belt Sea and Baltic Proper subpopulations and low genetic diversity, are likely the result of the short history of porpoise occurrence in the Baltic (< 9,000 years, following the last Ice Age) and limited gene flow with adjacent areas (Tiedemann et al., 1996; Koschinski, 2001; Sommer et al., 2008). The genetic differentiation between the Belt Sea and Baltic Proper subpopulations is likely maintained by limited gene flow resulting from the spatial separation of the subpopulations during the summer reproductive season (Carlén et al., 2018).

4.3 Habitat (short description and trends)

Harbour porpoises occupy cold to temperate shelf habitat throughout the northern hemisphere. The Baltic Sea is a semi-enclosed and marginal sea of the Atlantic Ocean, connected to the North Sea via several channels in the Kattegat/Skagerrak region. Since the average depth of the Baltic Sea is 55 m, it provides large amounts of potentially-suitable shelf habitat for porpoises. Within the Baltic Proper, Carlén et al. (2018) reported a higher number of porpoise acoustic detections at low and intermediate bottom topographic complexities, and at water depths of 20–50 m, with only limited use of the deeper areas from 50 to 80 m depth. Berggren (1994) noted that most porpoise bycatches in the Swedish Baltic occurred in shallow waters of ≤10 m depth. It is presumed that this shallow-depth habitat use reflects food availability and the distribution of preferred prey species (Koschinski, 2001). Within the Baltic Proper the presence of winter sea ice and cooling temperatures probably also limits the availability of habitat for porpoises (Koschinski, 2001; Galatius et al., 2012), although porpoises do occur in the northern Baltic Proper (i.e. Finnish waters) during the winter as long as they remain ice-free.

4.4 Biological characteristics

The availability of life history information for the Baltic Proper subpopulation of harbour porpoises has been limited by the lack of systematic stranding schemes and necropsies by the Range States (see Section 6.5), as well as by the very limited number of specimens due to the small size of the subpopulation. Of the countries bordering the Baltic Proper, only Germany has a targeted programme to collect and necropsy stranded porpoises, and since the German coast is inhabited by both the Belt Sea and Baltic Proper subpopulations then the resulting information relates to Baltic Sea porpoises but not specifically to the Baltic Proper subpopulation.

Group size
In the German Baltic Sea, average group size was 2.2 animals, with the majority of sightings comprising single (30.5%) or pairs (35.8%) of animals (Siebert et al., 2006).

Body size
Harbour porpoises in the Baltic Sea region reach maximum body lengths of 1.9 m (Lockyer, 2003). Some female porpoises reach body weights of up to 89 kg (Lockyer and Kinze, 2003). Size at sexual maturity in North Atlantic populations is approximately 138–152 cm for females and 127–135 for males (Lockyer, 2003), and the weight at sexual maturity is 47 and 40 kg for females and males respectively in Danish waters (Lockyer and Kinze, 2003).

Life history and reproduction
Although porpoises stranded along the German North and Baltic Sea coasts had a maximum longevity of 22 years of age, the majority had much shorter lives with a mean age at death of 4.9 years (Kesselring et al., 2017). A subset of 215 female porpoises examined from the German Baltic shore between 1990 and 2016, had an average age at death of 3.7 years, which was significantly lower than that for the German North Sea coast (Kesselring et al., 2017). Stranding and bycatch datasets of harbour porpoises on the German Baltic coasts between 1990 and 2001, revealed an even sex ratio of 1:1 (Siebert et al., 2006). The sexual maturity of female porpoises was reached at 3.63 years in Danish waters (including both North and Baltic Seas: Lockyer, 2003), and 4.95 years (50% threshold) in German waters (including both North and Baltic Seas: Kesselring et al., 2017).

There is a strongly seasonal reproductive period, and females are hypothesised to show site fidelity to calving and mating areas (Huggenberger et al., 2002; Tiedemann et al., 1996). Pregnancy rates in porpoises from various geographic regions are in the range of 0.61–0.986 per year (Sørensen and Kinze, 1994; Lockyer, 2003). The birth period of harbour porpoises in North Sea and Baltic waters is between June and August, after a gestation period of approximately 10 to 11 months (Sørensen and Kinze, 1994; Hasselmeier et al., 2004). Calves are weaned after approximately 8 to 10 months (Lockyer, 2003). Mature females produce a single calf every 1–2 years (Lockyer, 2003), and are thus considered to be a slowly-reproducing species (Kesselring et al., 2017). A female with longevity of 20 years might produce a maximum of 11–12 calves in a lifetime (Lockyer and Kinze, 2003). However, a more reasonable longevity of about 10–12 years, would result in only 4–6 calves in a lifetime, and the short 3.7 year lifespans documented for German Baltic animals suggest that only 27.4% of female porpoises in the Baltic Sea had lived sufficiently long to produce any calves (Kesselring et al., 2017, 2018). A theoretical maximum population growth rate has been estimated for harbour porpoises at up to 10%; however, such growth is very vulnerable to any form of removals and can quickly turn into a decline (Lockyer, 2003).

Diet
The stomach contents of 339 stranded harbour porpoises in the western Baltic (probably the Belt Sea subpopulation) included at least 32 fish species and a small number of invertebrates (Andreasen et al., 2017). Seven main prey species accounted for 91% of the total prey mass: Atlantic cod (*Gadus morhua*), whiting (*Merlangius merlangus*), Atlantic herring (*Clupea harengus*), sprat (*Sprattus sprattus*), sandeels (*Ammodytidae*), eelpout (*Zoarces viviparus*), and gobies (*Gobiidae*). Differences in prey were detectable between adults and juveniles, with adult stomachs mostly containing cod (36%) and herring (34%), while cod (26%), gobies (25%) and herring (18%) were the dominant prey in juvenile stomachs (Andreasen et al., 2017). Seasonal variation was also evident especially in adults, with cod and herring comprising the majority of the diet (>80%) during winter, while eelpout was important (25%) in the autumn.

4.5 Role of the taxon in its ecosystem

Relatively little is known about the ecological influences of small cetaceans, although their high metabolic rates and locally high population densities have the potential to exert considerable top-down control on populations of some prey species (Estes et al., 2016). The harbour porpoise is the only cetacean species that occurs regularly and year-round in the Baltic Sea (Benke et al., 2014), and consequently is one of the top predators in the Baltic marine environment. As such, it contributes to the maintenance and the structure of the ecosystem, and is also an important indicator species (Andreasen et al., 2017). 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 those prey species (Evans and Similä, 2018).

Porpoises forage nearly continuously day and night, attempting to capture up to 550 small (3–10 cm) fish prey per hour and with a high prey capture success rate of >90% (Wisniewska et al., 2016). Andreasen et al. (2017) estimated that harbour porpoises in the western Baltic (probably the Belt Sea subpopulation) had daily prey consumption rates of between 1.8 and 5.6 kg/day, with average values of 3.6 kg/day for adults and 3.8 kg/day for juveniles. Porpoises in the western Baltic Sea consumed large quantities of cod, which are commercially important in the Baltic fisheries. They suggested that increasing the accuracy of prey-specific consumption rates by harbour porpoises would be beneficial for informing the western Baltic Sea multispecies and ecosystem-based models (Andreasen et al., 2017).

5. Conservation status and threats

5.1 IUCN Red List Assessment (if available)

The Baltic Sea subpopulation of the harbour porpoise (*Phocoena phocoena*) has been listed as Critically Endangered on the IUCN Red List since 2008 (Hammond et al., 2008), meaning that it is considered to be facing an extremely high risk of extinction in the wild. The listing criteria is C2a(ii), based on a population size of fewer than 250 mature individuals, a continuing decline in numbers of mature individuals inferred from bycatch mortality, and population structure of at least 90% of mature individuals in one subpopulation. However, the Red List assessment did not specifically recognise the occurrence of more than one porpoise population within the Baltic Sea.

5.2 Equivalent information relevant to conservation status assessment

The more recent HELCOM Red List assessment recognised separate porpoise subpopulations in the Baltic Sea and considered that the Baltic Proper subpopulation qualified as Critically Endangered under criterion C1 (HELCOM, 2013), as a population for which the number of mature individuals is estimated to be less than 250 and a continuing decline of at least 25% within one generation is assumed. Information produced since the IUCN Red List assessment has distinguished between summer spatial management area of the Belt Sea and Baltic Proper subpopulations (Sveegaard et al., 2015; Carlén et al., 2018), and provided for the first time a robust dataset supporting the limited distribution and low abundance (<500 animals; SAMBAH, 2016) specific to the Baltic Proper management unit. The limited available information indicates that fisheries bycatch of the Baltic Proper subpopulation is unsustainable (Section 5.3), and the anecdotal nature of that information is likely to be a minimum representation of contemporary bycatch levels.

5.3 Threats to the population (factors, intensity)

A number of threats, both past and present, are considered to have contributed to the current low abundance of the Baltic Proper subpopulation. Prior to the 1940s, targeted hunting of harbour porpoises occurred throughout the Baltic Sea (Skòra and Kuklik, 2003), with several hundreds to thousands taken annually in Denmark alone (Lockyer and Kinze, 2003). However, it is not certain whether the animals hunted in the Danish Straits belonged to the Belt Sea subpopulation or the Baltic Proper subpopulation. Historically, severe winters in the Baltic Proper caused the sea to periodically freeze over, with reports of mass mortality of harbour porpoises during 1928/29, 1939/40 and 1946/47 (Koschinski, 2001; Lockyer and Kinze, 2003) and anecdotal accounts of bottom trawl fisheries retrieving large numbers of porpoises that had apparently suffocated under the ice (Berggren, 1994). Habitat deterioration due to coastal development and eutrophication, and prey depletion due to over-fishing, have also been presented as factors (Koschinski, 2001; Gallus et al., 2012; Benke et al., 2014). However, the main threats currently affecting the Baltic Proper subpopulation appear to be bycatch in fishing gear, environmental contaminants, and disturbance from anthropogenic noise (ASCOBANS, 2009; Benke et al., 2014). The International Council for the Exploration of the Sea (ICES) Working Group on Marine Mammal Ecology (WGMME) applied a threat matrix to the harbour porpoise in the Baltic Sea, listing bycatch and

contaminants in the highest threat category (ICES, 2015). In the medium category, underwater noise from pile driving and shipping, and prey depletion by removal of non-target species were listed.

Fisheries bycatch

Bycatch in gillnet fisheries is recognised as the single most serious threat to the Baltic Proper porpoise subpopulation (Berggren 1994; Skóra and Kuklik, 2003; Koschinski and Pfander, 2009; ASCOBANS, 2009, 2016; HELCOM, 2013; Loisa, 2016). It has been suggested that the shortened lifespan of Baltic Sea harbour porpoises is linked to rising bycatch mortalities due to gillnet fisheries (Kesselring et al., 2017). Bycatch has long-impacted porpoises in the Baltic Proper; for example, hundreds of animals died annually in nets in the Gulf of Gdansk (Poland) until the end of the 1930s (Skóra and Kuklik, 2003). The introduction of synthetic gillnets into Baltic fisheries and a concurrent increase in fishing effort during 1950–1970, led to a marked increase in porpoise bycatch (Koschinski, 2001) with drastic declines in numbers noted between the 1960s and 1980s (Berggren et al., 2002). In the region east of Bornholm, recent porpoise bycatch has been reported from Swedish (Berggren et al., 2002), Finnish (Loisa, 2016), Latvian (Loisa, 2016; HELCOM-ASCOBANS database), Lithuanian (Loisa, 2016; HELCOM-ASCOBANS database) and Polish (Skóra and Kuklik, 2003) waters. Until new EU legislation phased-out the fishery in 2008 (EC Regulation 812/2004), vessels from Russia, Finland, Sweden, Denmark, Poland and Germany participated in a large-scale pelagic driftnet fishery for salmon in the Baltic Proper which was a significant source of bycatch in Swedish and Polish waters (Berggren, 1994; Berggren et al., 2002; Skóra and Kuklik, 2003). Little or no information is available regarding porpoise bycatch in the eastern Baltic waters of Russia, Lithuania, Latvia and Estonia, but Koschinski (2001) notes that porpoises were caught in salmon nets between Gdansk Bay and Estonia each spring during the early 1900s.

The Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas (ASCOBANS) has stated that the general aim should be to minimise (i.e. to ultimately reduce to zero) anthropogenic removals within some yet-to-be-specified time frame. ASCOBANS has provided criteria to assess the sustainability of fisheries bycatch on cetacean populations, stating that ‘‘populations should be kept at or restored to 80% of their carrying capacity’’ with the equivalent of a 1.7% maximum total anthropogenic removal rate from the population annually whereby the immediate precautionary objective is to reduce bycatch levels to less than 1% of the best available population estimate (ASCOBANS resolutions 3, 2000; resolution 5, 2006 and resolution 8.5; 2016). Unfortunately, crucial information on mortality rates are lacking for the Baltic Proper subpopulation and limit any assessment of the level of takes. However, the recent population size estimate for the Baltic Proper subpopulation of 497 individuals (SAMBAH, 2016), indicates that the 1% and 1.7% limits proposed by ASCOBANS would amount to only 4.97 or 8.45 animals annually. There is no systematic bycatch monitoring in the gillnet fisheries of most Range States, and consequently any reported incidents must be viewed as a minimal indication of current bycatch levels. However, the reported amounts already exceed the ASCOBANS sustainable bycatch limits (Loisa, 2016). For example, between 1990 and 1999, a total of 45 porpoise bycatches were reported in Polish waters alone, averaging 4.5 animals per annum (Skóra and Kuklik, 2003). Bycatch rates are also considered to be unsustainable in parts of the south-west Baltic Sea that are likely inhabited by the Baltic Proper subpopulation on a seasonal basis (Berggren et al., 2002; Koschinski and Pfander, 2009).

Contaminants

Environmental contaminants are also considered to be a factor in the decline of the Baltic Proper subpopulation (Kannan et al., 1993; Koschinski, 2001; HELCOM, 2013). High concentrations of organochlorines such as polychlorinated biphenyls (PCB) and dichlorodiphenyltrichloroethane (DDT) have led to reduced fertility and population decline in Baltic seals (Bergman, 1999), and may be expected to accumulate and cause similar effects in other top marine predators including porpoises. In the Swedish Baltic, porpoises were found to have three times the level of PCBs and more than 10 times the level of DDT than porpoises from the Kattegat/Skagerrak Seas or Norway (Berggren et al., 1999). This coincides with enhanced contaminant concentrations in Baltic fish stocks such as herring. Strandberg et al. (1998) found the highest herring-related biomagnification factors in harbour porpoises for chlordane pesticides (accumulated with a factor of up to 25), dieldrin, PCBs and DDTs. Porpoises from the Polish coast had relatively high concentrations of the pesticides aldrin, dieldrin and chlordane, and their blubber also contained mirex, heptachlor and heptachlor epoxide (Kannan et al. 1993; Strandberg et al. 1998). Harbour porpoises from the Baltic Proper subpopulation also carry a significant mercury burden (Szefer et al., 1995). The livers of two Polish porpoises had markedly elevated levels of silver, indicating that they had been exposed to point sources of pollution (e.g. harbours or industrial plants).

Disturbance

In addition to shipping noise, a variety of impulsive anthropogenic sound sources are used in the waters of the Baltic Proper, including acoustic deterrent devices (ADDs or pingers), pile-driving, sonar, airgun arrays and explosives (Evans and Similä, 2018). In the 2013 HELCOM Declaration it was agreed that Baltic Sea marine life should not be negatively impacted by noise, and that the use of any potentially-harmful sound sources should only be permitted if relevant mitigation measures were in place. To address these aims, the LIFE+ project "Baltic Sea Information on the Acoustic Soundscape (BIAS)" was established from 2012 to 2016 and measured ambient noise during 2014 to produce a series of soundscape maps for the Baltic region (Folegot et al., 2016).

Harbour porpoises emit narrow-band high-frequency (NBHF) echolocation clicks, with a hearing range of maximum sensitivity at around 125 kHz (Kastelein et al., 2002, 2015). Sounds occurring at frequencies greater than 15 kHz are within the hearing range of porpoises and may potentially impact on them both directly (disturbance or hearing loss) and indirectly via changes in their prey species. Currently, low frequency (<1 kHz) shipping noise and pile-driving are considered to comprise the two major sources of underwater noise in the Baltic Sea. Offshore wind farm developments are located in some parts of the Baltic Sea (particularly Denmark and Germany), and can potentially impact on porpoises via construction noise, increased vessel traffic, pollutant emissions and stirred-up bottom sediments. For example, porpoises showed marked changes in habitat use following pile-driving operations in Danish and German wind farms respectively, with a marked increase between consecutive porpoise acoustic detections recorded during the baseline and construction surveys (Carstensen et al., 2006; Brandt et al., 2018). Overlap between the Baltic Proper subpopulation and certain noise-generating anthropogenic activities could therefore be expected to cause changes in their spatio-temporal distribution, which would be especially critical during the summer reproductive period when porpoises occur in more concentrated areas (Carlén et al., 2018). Exposure to noise may also cause disturbance to behaviours, such as mating, nursing and foraging, with the potential for long-term fitness consequences (e.g. Wisniewska et al., 2018).

5.4 Threats connected especially with migrations

No information. More studies are needed to assess both the migratory movements of the Baltic Proper subpopulation and the specific impacts of the identified threats (Section 5.3) on those movements.

5.5 National and international utilization

Anecdotal evidence suggests that all countries with a Baltic Sea coastline were engaged in harbour porpoise hunts during the 18th and 19th centuries (Berggren, 1994), with several hundreds to thousands taken annually in Denmark alone (Lockyer and Kinze, 2003). However, such hunts had ceased by the mid 20th century.

6. Protection status and species management

6.1 National protection status

The conservation status of the Baltic Proper subpopulation of porpoises according to national red data books or red lists for Range States is provided in Table 1. Harbour porpoises are fully protected year-round in all range states (HELCOM, 2013). All EU Member States that have assessed the conservation status of porpoise populations in the Baltic region have described them as having an unfavourable status (Table 1).

Table 1. National conservation status of Baltic Proper harbour porpoises (from ASCOBANS, 2016; Evans and Similä, 2018). Denmark, Germany and Sweden provide a single classification and do not currently distinguish between the Belt Sea and Baltic Proper subpopulations in their national waters.

Range State	Red List status	Overall conservation status
Denmark	Vulnerable (VU)	Unfavourable – bad (U2)
Estonia	Data Deficient (DD)	Unfavourable – Inadequate (U1)
Finland	Regionally Extinct (RE)	Not assessed
Germany	Endangered (EN)	Unfavourable – bad (U2)
Latvia	Probably Extinct (0)	Unknown (XX)
Lithuania	Not assessed	–
Poland	Least Concern (LC)	Unfavourable – bad (U2)
Russia	Uncertain status (4)	–

Sweden	Vulnerable (VU)	Unfavourable – bad (U2)

It has been noted that the status of the Baltic Proper porpoise on the national Red Lists of some countries needs to be updated, for example the Polish Red List status which does not reflect current knowledge of status (Evans and Similä, 2018).

6.2 International protection status

CITES
The 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival in the wild. Harbour porpoises are listed in Appendix II (species not threatened with extinction, but in danger if their commerce is not subject to restraints).

CMS
The 1979 Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. The North and Baltic Sea population of the harbour porpoise is listed on Appendix II (migratory species that need or would significantly benefit from international cooperation), but is not currently included on Appendix I.

Bern Convention
The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) aims to ensure the conservation and protection of wild plant and animal species (listed in four appendices) and their natural habitats, to increase co-operation between parties, and to regulate the exploitation of the listed species. Harbour porpoises are included in Appendix II, which lists strictly protected species.

EU Habitats Directive
To implement the Bern Convention in Europe, the European Union adopted Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) in 1992. The main aim of the Habitats Directive is to promote the preservation of biodiversity by requiring Member States to maintain or restore natural habitats and wild species listed in the Annexes at a favourable conservation status, and introduce robust protection for those habitats and species of European importance. All cetaceans are included in Annex IV, identifying them as species of European Union interest in need of strict protection, prohibiting all forms of deliberate capture and killing, damage to or destruction of breeding or resting sites, disturbance, particularly during the period of breeding, and the possession of, and international trade in, these animals. Harbour porpoises are also listed as priority species on Annex II, requiring Member States to designate Special Areas of Conservation (SACs), which are part of the Natura 2000 network, to protect their populations.

Marine Strategy Framework Directive
EU Council Directive 56/2008 (Marine Strategy Framework Directive, MSFD), which was adopted in 2006, seeks to achieve "good environmental status (GES)" for the marine areas within the EU by 2020. The MFSD provides the framework for implementing the EU Habitats Directive and the Common Fisheries Policy. It specifies requirements for Member States to monitor and report on the status of the marine environment and biodiversity, restore GES, and designate marine protected areas. With regard to the harbour porpoise, this mainly applies via GES descriptors 1, 4 and 11: (1) Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions; (4) All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity; and (11) Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment. Coordinated porpoise monitoring in the Baltic Proper (i.e. SAMBAH, 2016) is one method used to meet the GES requirements of the MSFD.

ASCOBANS
The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) entered into force in 1994, and was extended in 2008 (as the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas). ASCOBANS is a regional agreement concluded under the auspices of the CMS, and aims to achieve and maintain a favourable conservation status for cetacean species by obligating Member States to implement measures for habitat conservation

and management, promote scientific research, evaluate bycatch and strandings data, improve legislation and raise public awareness of cetacean conservation. The harbour porpoise is a focal species for ASCOBANS (see Section 6.3).

Helsinki Convention
The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention, 1992) is an international convention encompassing various measures for the prevention and elimination of pollution in the Baltic Sea. Parties to the Helsinki Convention agree to take all appropriate legislative, administrative or other relevant measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance. Under the Convention, the Baltic Marine Environment Protection Commission (HELCOM) was formed, whose responsibilities are to implement the Convention, make recommendations to the Parties, define pollution control criteria and objectives and promote additional measures in co-operation with respective governmental bodies of the Parties. The agreement includes Finland, Latvia, Lithuania, Poland, Sweden, Germany, Denmark, Russia and Estonia and the EU represented by the Commission. HELCOM's Baltic Sea Protection Action Plan (BSAP) was adopted in 2007. It aims to achieve a good ecological status in the Baltic Sea by 2021. The Baltic Sea subpopulation of harbour porpoise is listed as Critically Endangered on the HELCOM red list (HELCOM, 2013).

EC Council Regulation No. 812/2004
The EU regulates the fishing activities of its Member States through the Common Fisheries Policy (CFP; EC 1380/2013). Cetacean bycatch is specifically regulated via EC Council Regulation 812/2004, which aims to monitor and reduce the incidental bycatch of cetaceans in certain fisheries. In addition, EC Regulation 199/2008 requires the monitoring of discards and bycatch (including cetaceans), in certain fisheries in the ICES area. Regulation 812/2004 requires: (1) the use of dedicated on-board observers on large (≥15 m) commercial fishing vessels to monitor bycatch in specified fisheries; and (2) the use of acoustic deterrent devices to reduce cetacean bycatch in certain fixed gear fisheries by vessels ≥12 m length. However, the Baltic Proper is not included in Annex I as an area for which the Regulations apply (Gallus et al., 2012), and consequently only the Baltic Sea waters west of Bornholm are required to implement bycatch monitoring and pinger use. Regulation 812/2004 specifically recognised the risk of driftnet fishing to endangered porpoises in the Baltic Sea, and required the phasing out of driftnet gear by 1 January 2008 (to be incorporated into EC Council Regulation No. 88/98, subsequently repealed and replaced by EC Council Regulation No. 2187/2005, for the conservation of fishery resources in the waters of the Baltic Sea, the Belts and the Sound). Discussions are currently ongoing between the European Council and Parliament to negotiate the adoption of the "Conservation of fishery resources and protection of marine ecosystems through technical measures" (2016/0074(COD); https://oeil.secure.europarl.europa.eu/oeil/popups/printficheglobal.pdf?id=665585&l=en), which is aimed at achieving the key objectives of the CFP. This includes a proposal for a geographic extension of the mandatory use of acoustic deterrent devices (or "pingers") to include full coverage of the Baltic Sea.

Data Collection Framework
Under Council Regulation (EC) 199/2008, relating to the EU (fisheries) Data Collection Framework (DCF), there is a requirement for observers to monitor all discards and incidental catches of protected marine fauna in several fisheries in the ICES areas. In 2016, in accordance with Article 3 of the DCF, Implementing Decision EU 2016/1251 was adopted to establish a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019. This Decision included the collection of data (including absence in the catch) on the incidental bycatch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, and in all fisheries. Data can either be collected by scientific observers, or by the fishers themselves through logbooks.

6.3 Management measures

HELCOM
In 1996, HELCOM adopted the Recommendation on protection of harbour porpoises in the Baltic Sea (Recommendation 17/2, updated in 2013), to which all Baltic Sea countries are signatories. This Recommendation acknowledged that the number of Baltic Proper porpoises had declined drastically and that fisheries bycatch, and the degradation and disturbance of habitats, were having an unfavourable effect on the species. The recommendation specifically promotes bycatch reduction, relevant research and consideration of porpoise habitat requirements in the design and management of marine protected areas. The HELCOM Baltic Sea Action Plan adopted in 2007 aims to ensure viable populations of the species

e.g. by developing cooperation with ASCOBANS on a coordinated reporting system and database on Baltic harbour porpoise sightings, bycatches and strandings and developing and implementing effective monitoring and reporting systems for bycaught mammals.

ASCOBANS Jastarnia Plan

There has been ongoing focus by ASCOBANS on the conservation of the Baltic Proper harbour porpoise subpopulation, via the development of a targeted recovery plan aimed at restoring the subpopulation to 80% of its native carrying capacity. A draft plan was produced in the Polish town of Jastarnia in 2002, and consequently became known as the Jastarnia Plan. The plan was adopted in 2003 and subsequently revised in 2009 (ASCOBANS, 2009), and 2016 (ASCOBANS, 2016). Since 2005, an expert working group (Jastarnia Group) has met annually to discuss the implementation of the recovery plan and the status of the Baltic Sea porpoise, with the most recent progress report being presented to ASCOBANS in September 2018 (Evans and Similä, 2018). The Jastarnia Plan focuses on several priority recovery recommendations, including the reduction of fisheries bycatch, increased research and monitoring to produce the scientific data on population status and threats that are needed to inform management, the establishment of marine protected areas, increasing public awareness, and promoting cooperation between ASCOBANS and other relevant regional and international bodies. The latest version of the Jastarnia Plan (ASCOBANS, 2016) presents an extensive set of monitoring and threat mitigation recommendations. The management area for the Baltic Proper subpopulation defined in the current Jastarnia Plan includes all waters east of the Darss and Limhann Ridges (Figure 3). Several studies have noted that the biologically-based boundaries revealed during recent studies do not match the existing ASCOBANS boundaries for the two porpoise Baltic subpopulation management plans, and are therefore in need of revision (e.g. Sveegaard et al., 2015; Evans and Similä, 2018).

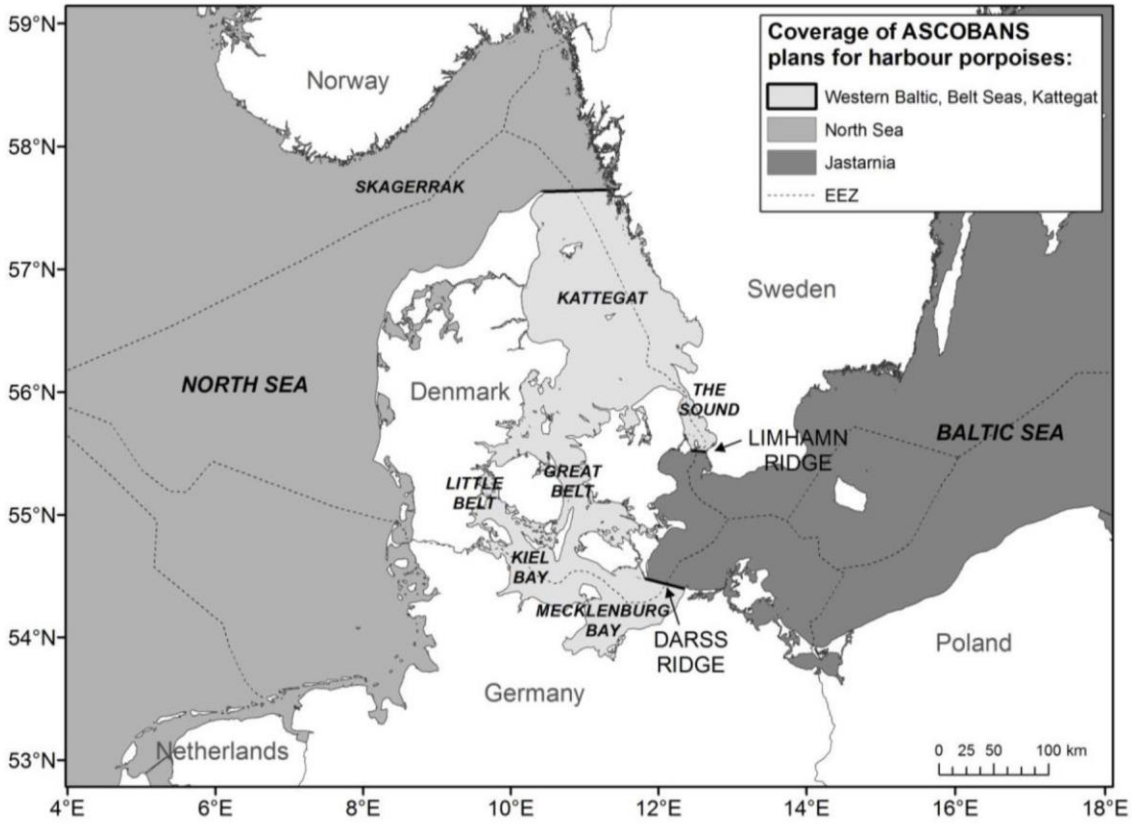

Figure 3. The geographical area covered by the three ASCOBANS management plans for porpoises in the wider Baltic region. From Evans and Similä (2018).

SAMBAH: An international collaboration aimed at monitoring porpoise abundance and distribution was carried out by LIFE+ Project SAMBAH (Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise) between 2011 and 2013. The project involved the cooperation of eight Baltic EU Member States (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden) in a joint effort to survey the distribution, density and abundance of harbour porpoises in the Baltic Sea subpopulations (SAMBAH, 2016). The overall aim was to conserve the Baltic Proper subpopulation through the collection of acoustic data on its seasonal and spatial distribution, identification of overlap with fishing activity, and via the

dissemination of management information to policymakers, managers, stakeholders and the general public. The focus area extended from the east end of the Belt Seas north to the Åland Islands at the entrance to the Gulf of Bothnia. Work by SAMBAH has been, inter alia, critical in producing a science-based population estimate for the Baltic Proper subpopulation and in identifying the summer (May-October) management border for the Baltic Proper subpopulation (SAMBAH, 2016; Carlén et al., 2018).

6.4 Habitat conservation

Natura 2000 is a network of sites designated under the EC Habitats Directive, and includes the SACs required for Annex II species to ensure their favourable conservation status. The robust spatio-temporal distribution data that form the basis for the identification of evidence-based marine protected areas have only recently become available for the Baltic Proper porpoise subpopulation (SAMBAH, 2016; Carlén et al., 2018), and should now further facilitate the designation and development of SACs by Baltic EU Range States. Based on those results, the Swedish government designated a large Natura 2000 site ("Hoburgs bank och Midsjöbankarna"; 10,511 km^2) in December 2016, which encompasses most of the core summer high density areas identified for the Baltic Proper porpoise subpopulation. A management plan is currently being developed for the site, which will include a monitoring strategy (Evans and Similä, 2018). In Poland, a small Natura 2000 site ("Zatoka Pucka i Półwysep Helski"; 266 km^2) was designated in 2008, encompassing Puck Bay and surrounding waters. The Baltic Proper harbour porpoise was a qualifying feature for this site, which represents the core area inhabited by porpoises in Polish waters and is of national importance for the species. No management plan currently exists. These appear to be the only Natura 2000 sites currently designated with the Baltic Proper porpoise subpopulation (i.e. within the summer management area identified by Carlén et al., 2018) as a primary qualifying feature. Several additional Natura 2000 sites in Swedish, Danish and German waters have porpoises as qualifying or additional features (for example the Pommersche Bucht, Adlergrund, and Westliche Rönnebank SACs in Germany), but primarily relate to the Belt Sea porpoise subpopulation with seasonal winter incursions by animals from the Baltic Proper subpopulation. Management plans are lacking for many of those sites.

Additionally, a number of marine protected areas (MPAs) have been designated as part of the HELCOM Baltic Sea Protected Area network, which include harbour porpoises from the Baltic Proper subpopulation as a qualifying feature (Table 2). The Pommersche Bucht-Rönnebank and Falsterbo Peninsula with Måkläppen MPAs are likely to only be used by the Baltic Proper subpopulation on a seasonal basis (winter) and primarily apply to the Belt Sea subpopulation during summer. None of these MPAs have specific management plans in place for harbour porpoises, and several are considered to be too small in size to provide significant benefits to mobile species such as harbour porpoises (ASCOBANS, 2009).

Table 2. HELCOM marine protected areas (MPAs) for which the Baltic Proper subpopulation of the harbour porpoise is a qualifying feature (HELCOM MPA database).

Site ID	MPA name	Country	Species status
172	Pommersche Bucht-Rönnebank	Germany	Occasional
84	Zatoka Pucka	Poland	Not reported
85	Ostoja Słowinska	Poland	Not reported
86	Wolin i Uznam	Poland	Not reported
170	Zatoka Pomorska	Poland	Not reported
111	Falsterbo Peninsula with Måkläppen	Sweden	Migratory
115	Hoburgs Bank	Sweden	Not reported

6.5 Population monitoring

Several Baltic Sea countries have opportunistic sighting and stranding reporting schemes in place to record porpoises observed at sea, bycaught or found dead along the shorelines, and HELCOM and ASCOBANS maintain a collaborative database of such records from the Baltic Proper. Of the Range States, only Germany has a targeted stranding and necropsy scheme, administered by the Terrestrial and Aquatic Research Institute (ITAW) in Büsum (for the North Sea and the Baltic Sea of the federal state of Schleswig Holstein) and the German Oceanographic Museum in Stralsund (for the Baltic Sea of the federal state of Mecklenburg Vorpommern). Strandings are also recorded and necropsied on an opportunistic basis by several other Range States including Sweden and Poland (Evans and Similä, 2018). There appear to be no formal national stranding schemes in the Baltic countries east of Poland.

Systematic visual monitoring schemes to produce robust abundance estimates for the Baltic Proper have been hindered by the low density of porpoises in the region, which does not yield sufficient sample sizes

to facilitate the application of the standard techniques (i.e. boat or aerial line transect surveys). This was the driver for the implementation of acoustic monitoring during the SAMBAH project. Since the completion of the SAMBAH project, some countries have continued acoustic monitoring of the Baltic Proper subpopulation within their own waters (Evans and Similä, 2018; ICES, 2018), for example Poland (Gulf of Gdánsk and Puck Bay), Sweden (south-east Sweden including the Hoburgs bank and Midsjøbankarna Natura 2000 site), Denmark (around Bornholm), Germany (Pomeranian Bay), and Finland (offshore area south of Åland and the Archipelago Sea). No formal monitoring programmes exist in other eastern Baltic states. There are plans to develop a follow-up to the SAMBAH project to meet the ongoing requirements of the EU Habitats Directive, EU MSFD, and ASCOBANS via the Jastarnia Plan, all of which require that the Baltic Proper subpopulation is restored to, and maintained at, favourable conservation status. A first meeting discussing the potential aims of the project was held at the European Cetacean Society Conference in La Spezia, Italy, in April 2018 (Evans and Similä, 2018).

The monitoring of porpoise bycatch in fishing gear and the implementation of mitigation measures in the Baltic Proper has varied greatly between countries. The core Baltic Proper porpoise subpopulation summer (breeding) distribution occurs within ICES Subdivisions 25 and 26 (extending to 27 and 28.2) in the waters of Sweden, Poland, Denmark (Bornholm) and Lithuania, which is where bycatch monitoring and mitigation focus is most urgently required. However, no dedicated at-sea observer schemes to monitor porpoise bycatch occur in Poland or Sweden (Evans and Similä, 2018), although limited pilot schemes have been carried out since 2006 in Poland. In Sweden, some observer effort has been conducted from trawl fisheries, but little in the gillnet fisheries that most affect porpoises. There has been some voluntary use of pingers by Swedish and Polish fishermen. Danish and German bycatch monitoring effort and pinger use are primarily being implemented in the areas inhabited by the Belt Sea subpopulation, rather than the Baltic Proper subpopulation. In Latvia there has been a national monitoring programme for cetacean bycatch since 2006, including both trawl and gillnet fisheries. However, no porpoise bycatch has been reported and monitoring is likely to cease to reduce expenditure (Evans and Similä, 2018). In Finland, the reporting of cetacean bycatch has been mandatory since 2016, but there are no active observer programmes or mitigation measures in place.

7. Effects of the proposed amendment

7.1 Anticipated benefits of the amendment

The CMS aims to conserve migratory species throughout their range via the promotion of concerted action among the Range States, which are encouraged to conclude global or regional conservation agreements. The CMS lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. The North and Baltic Sea populations of harbour porpoises are listed on CMS Appendix II. This proposal is for the inclusion of the Baltic Sea Proper subpopulation of the harbour porpoise on Appendix I as a migratory species in danger of extinction throughout all or a significant portion of its range.

Inclusion on Appendix I would require Baltic Sea Range States to provide strict protection by prohibiting takes, conserving habitats, limiting obstacles to their migrations and controlling other factors that might endanger them. The Baltic Proper subpopulation is recognised by the IUCN and HELCOM as Critically Endangered due to its small total population size and high mortality due to fisheries bycatch. Consequently, it is already considered to face the risk of extinction throughout its range, and to represent a high priority for conservation. Carlén et al. (2018) concluded that the status of the Baltic Proper subpopulation was critical and had been so for decades, and that effective management must include immediate measures to mitigate anthropogenic activities such as fisheries bycatch. Sveegaard et al. (2015) noted that it was not sufficient for each EU country to act individually in the conservation of porpoises, and that collaboration was needed to determine population status. Inclusion on Appendix I would provide the basis for more effective collaborative action by all EU Member States bordering the Baltic Proper.

7.2 Potential risks of the amendment

None identified.

7.3 Intention of the proponent concerning development of an Agreement or Concerted Action

To be completed by the proponent.

8. Range States

Denmark (Bornholm), Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden.

9. Consultations

To be completed by the proponent.

10. Additional remarks

No additional remarks.

11. References

Andreasen, H., Ross, S.D., Siebert, U., Andersen, N.G., Ronnenberg, K., and Gilles, A. (2017). Diet composition and food consumption rate of harbor porpoises (*Phocoena phocoena*) in the western Baltic Sea. Marine Mammal Science, 33: 1053-1079.

ASCOBANS (2009). Recovery Plan for Baltic Harbour Porpoises. Jastarnia Plan (2009 revision). 48pp.

ASCOBANS (2016). Recovery Plan for Baltic Harbour Porpoises. Jastarnia Plan (2016 revision). ASCOBANS Resolution 8.3. Annex I, 8th Meeting of the Parties to ASCOBANS, Helsinki, Finland, 30 August - 1 September 2016. 94pp.

Benke, H., Bräger, S., Dähne, M., Gallus, A., Hansen, S., Honnef, C.G., Jabbusch, M., Koblitz, J.C., Krügel, K., Liebschner, A., Narberhaus, I. and Verfuß, U.K. (2014). Baltic Sea harbour porpoise populations: status and conservation needs derived from recent survey results. Marine Ecology Progress Series, 495: 275-290.

Berggren, P. (1994). Bycatches of the Harbour Porpoise (*Phocoena phocoena*) in the Swedish Skagerrak, Kattegat and Baltic Seas 1973–1993. Reports of the International Whaling Commission, 15:211–215.

Berggren, P., Wade, P.R., Carlström J, and Read AJ. (2002). Potential limits to anthropogenic mortality for harbour porpoises in the Baltic region. Biological Conservation, 103: 313–322.

Berggren, P., Hiby, L., Lovell, P. and Scheidat, M. (2004). Abundance of harbour porpoises in the Baltic Sea from Aerial Surveys Conducted in Summer 2002. (No. Paper SC/56/SM7). IWC Scientific Committee.

Berggren, P., Ishaq, R., Zebühr, Y., Näf, C., Bandh, C. and Broman, D. (1999). Patterns and levels of organochlorines (DDTs, PCBs, non-ortho PCBs and PCDD/Fs) in male harbour porpoises (*Phocoena phocoena*) from the Baltic Sea, the Kattegatt-Skagerrak Seas and the West Coast of Norway. Marine Pollution Bulletin, 38: 1070-1084.

Bergman, A. (1999). Health condition of the Baltic grey seal (*Halichoerus grypus*) during two decades. Apmis, 107: 270-282.

Brandt, M.J., Dragon, A., Diederichs, A., Bellmann, M.A., Wahl, V., Piper, W., Nabe-Nielsen, J. and Nehls, G. (2018). Disturbance of harbour porpoises during construction of the first seven offshore wind farms in Germany. Marine Ecology Progress Series, 596: 213–232.

Carlén, I., Thomas, L., Carlström, J., Amundin, M., Teilmann, J., Tregenza, N., Tougaard, J., Jens C. Koblitz, J.C., Sveegaard, S., Wennerberg, D., Loisa, O., Dähne, M., Brundiers, K. Kosecka, M., Kyhn, L.A., Ljungqvist, C.T., Pawliczkai, I., Kozai, R., Arciszewskii, B., Galatius, A., Jabbusch, M., Laaksonlaita, J., Niemi, J., Lyytinen, S., Gallus, A., Benke, H., Blankett, P., Skórai, K.E. and Acevedo-Gutiérrezk, A. (2018). Basin-scale distribution of harbour porpoises in the Baltic Sea provides basis for effective conservation actions. Biological Conservation, 226: 42-53.

Carstensen, J., Henriksen, O.D. and Teilmann, J. (2006). Impacts of offshore wind farm construction on harbour porpoises: acoustic monitoring of echolocation activity using porpoise detectors (TPODs). Marine Ecology progress Series, 321: 295-308.

Estes, J.A., Heithaus, M., McCauley, D.J., Rasher, D.B. and Worm, B. (2016). Megafaunal impacts on structure and function of ocean ecosystems. Annual Review of Environment and Resources, 41: 83–116.

Evans, P.G.H. and Similä, T. (2018). Progress report on the Jastarnia Plan: The recovery plan for the harbour porpoise in the Baltic proper. 24th ASCOBANS Advisory Committee Meeting AC24/Doc.3.1.b. Vilnius, 25 -27 September 2018.

Folegot, T., Clorennec, D., Chavanne, R. and Gallou, R. (2016). Mapping of ambient noise for BIAS. Quiet-Oceans technical report QO.20130203.01.RAP.001.01B, Brest, France, December 2016.

Fontaine, M.C., Roland, K., Calves, I., Austerlitz, F., Palstra, F.P., Tolley, K.A., Ryan, S., Ferreira, M., Jauniaux, T., Llavona, A., Öztürk, B., Öztürk, A.A., Ridoux, V., Rogan, E., Sequeira, M., Siebert, U., Vikingsson, G.A., Borrell, A., Michaux, J.R. and Aguilar, A. (2014). Postglacial climate changes and rise of three ecotypes of harbour porpoises, *Phocoena phocoena*, in western Palearctic waters. Molecular Ecology, 23: 3306–3321.

Galatius, A., Kinze, C.C. and Teilmann, J. (2012). Population structure of harbour porpoises in the greater Baltic region: evidence of separation based on geometric morphometric comparisons. Journal of the Marine Biological Association of the United Kingdom, 92: 1669−1676.

Gallus, A., Dähne, M., Verfuß, U.K., Bräger, S., Adler, S., Siebert, U. and Benke, H. (2012). Use of passive acoustic monitoring to assess the status of the 'Critically Endangered' Baltic harbour porpoise in German Waters. Endangered Species Research, 18: 265−278.

Gilles, A. (2008) Characterisation of harbour porpoise (*Phocoena phocoena*) habitat in German waters. PhD Thesis, University of Kiel, Germany.

Hammond, P., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jørgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M. and Øien, N. (2002). Abundance of harbour porpoises and other cetaceans in the North Sea and adjacent waters. Journal of Applied Ecology, 39: 361−376.

Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K.A., Karczmarski, L., Kasuya, T., Perrin, W., Scott, M.D., Wang, J.Y. , Wells, R.S. and Wilson, B. (2008). *Phocoena phocoena* (Baltic Sea subpopulation). The IUCN Red List of Threatened Species 2008: e.T17031A98831650. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17031A6739565.en

Hammond, P.S., Macleod, K., Berggren, P., Borchers, D.L., Burt, L., Cañadas, A., Desportes, G., Donovan, G.P., Gilles, A., Gillespie, D., Gordon, J., Hiby, L., Kuklik, I., Leaper, R., Lehnert, K., Leopold, M., Lovell, P., Øien, N., Paxton, C.G.M., Ridoux, V., Rogan, E., Samarra, F., Scheidat, M., Sequeira, M., Siebert, U., Skov, H., Swift, R., Tasker, M.L., Teilmann, J., Van Canneyt, O. and Vázquez, J.A. (2013). Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. Biological Conservation, 164, 107–122.

Hammond P.S., Lacey C., Gilles A., Viquerat S., Börjesson P., Herr H., Macleod K., Ridoux V., Santos M.B., Scheidat M., Teilmann J., Vingada J. and Øien N. (2017). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://synergy.st-andrews.ac.uk/scans3/files/2017/04/SCANS-III-design-based-estimates-2017-04-28-final.pdf

Hasselmeier, I., Abt, K.F., Adelung, D. and Siebert, U. (2004). Stranding patterns of harbour porpoises (*Phocoena phocoena*) in the German North and Baltic Seas: when does the birth period occur? Journal of Cetacean Research and Management, 6: 259-263.

HELCOM (2013). Species Information Sheet: *Phocoena phocoena*. Available at: http://www.helcom.fi/Red%20List%20Species%20Information%20Sheet/HELCOM%20Red%20List%20Phocoena%20phocoena.pdf#search=porpoise

HELCOM (2018). State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings. 155pp. Baltic Marine Environment Protection Commission – HELCOM. Available at www.helcom.fi/baltic-sea-trends/holistic-assessments/state-of-the-baltic-sea-2018/reports-and-materials/.

Huggenberger, S., Benke, H. and Kinze, C.C. (2002). Geographical variation in harbour porpoise (*Phocoena phocoena*) skulls: support for a separate non-migratory population in the Baltic proper. Ophelia 56, 1–12. https://doi.org/10.1080/00785236.2002.10409484.

ICES (2015). Report of the Working Group on Marine Mammal Ecology (WGMME), 9–12 February 2015, London, UK. ICES CM 2015/ACOM:25. 114 pp.

ICES. (2018). Report of the Working Group on Marine Mammal Ecology (WGMME), 19–22 February 2018, La Rochelle, France. ICES CM 2018/ACOM:28. 120 pp

Kannan, K., Falandysz, J., Tanabe, S. and Tatsukawa, R. (1993). Persistent organochlorines in harbour porpoises from Puck Bay, Poland. Marine Pollution Bulletin, 23: 162-165.

Kastelein et al., 2002, 2015

Kesselring, T., Viquerat, S., Brehm, R. and Siebert, U. (2017). Coming of age: - Do female harbour porpoises (*Phocoena phocoena*) from the North Sea and Baltic Sea have sufficient time to reproduce in a human influenced environment? PLoS One, 12(10): e0186951. https://doi.org/10.1371/journal.pone.0186951

Kesselring, T., Viquerat, S., Brehm, R. and Siebert, U. (2018). Correction: Coming of age: - Do female harbour porpoises (*Phocoena phocoena*) from the North Sea and Baltic Sea have sufficient time to reproduce in a human influenced environment? PLoS ONE 13(6): e0199633. https://doi.org/10.1371/journal.pone.0199633

Koschinski, S. (2001). Current knowledge on harbour porpoises (Phocoena phocoena) in the Baltic Sea. Ophelia, 55: 167–197.

Koschinski, S. and Pfander, A. (2009). By-catch of harbour porpoises (*Phocoena phocoena*) in the Baltic coastal waters of Angeln and Schwansen (Schleswig-Holstein, Germany). 16th ASCOBANS Advisory Committee Meeting Document 2009: AC16/Doc.60. Dist. 8

Lah, L., Trense, D., Benke, H., Berggren, P., Gunnlaugsson, Þ., Lockyer, C., Öztürk, A., Öztürk, B., Pawliczka, I., Roos, A., Siebert, U., Skóra, K., Víkingsson, G. and Tiedemann, R. (2016). Spatially Explicit Analysis of Genome-Wide SNPs Detects Subtle Population Structure in a Mobile Marine Mammal, the Harbor Porpoise. PLOS ONE, 11: e0162792.

Lockyer, C. (2003). Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Biological parameters. NAMMCO Scientific Publications, 5: 71–89.

Lockyer, C. and Kinze, C. (2003). Status, ecology and life history of harbour porpoise (*Phocoena phocoena*), in Danish waters. NAMMCO Scientific Publications, 5: 143–176.

Loisa, O. (2016). Pyöriäinen Suomessa - Päivitetty ehdotus toimenpiteistä pyöriäisen suojelemiseksi Suomessa (Harbour porpoise – updated proposal on measures for the conservation of harbour porpoise in Finland). The Finnish Environment 5/2016. Ministry of the Environment. 56 pp. http://urn.fi/URN:ISBN:978-952-11-4619-0 [In Finnish, with English summary].

Murphy, S., Barber, J.L., Learmonth, J.A., Read, F.L., Deaville, R., Perkins, M.W., Brownlow, A., Davison, N., Penrose, R., Pierce, H.J., Law, R.J. and Jepson, P.D. (2015) Reproductive Failure in UK Harbour Porpoises Phocoena phocoena: Legacy of Pollutant Exposure? PLoS ONE, 10(7): e0131085. doi:10.1371/journal.pone.0131085

Palmé, A., Laikre, L., Utter, F. and Ryman, N. (2008). Conservation genetics without knowing what to conserve: the case of the Baltic harbour porpoise *Phocoena phocoena*. Oryx, 42: 305–308.

Read, A.J. and Westgate, A.J. (1997). Monitoring the movements of harbour porpoises (*Phocoena phocoena*) with satellite telemetry. Marine Biology, 130: 315–322.

SAMBAH (2016). Final report for LIFE Project Number LIFE08 NAT/S/000261 covering the project activities from 01/01/2010 to 30/09/2015. Reporting date 29/02/2016, 80pp.

Scheidat, M., Gilles, A., Kock, K-H. and Siebert, U. (2008). Harbour porpoise *Phocoena phocoena* abundance in the southwestern Baltic Sea. Endangered Species Research, 5: 215-223.

Siebert, U., Gilles, A., Lucke, K., Ludwig, M., Benke, H., Kock, K-H. and Scheidat, M. (2006). A decade of harbour porpoise occurrence in German waters - Analyses of aerial surveys, incidental sightings and strandings. Journal of Sea Research, 56: 65-80.

Skòra, K.E. and Kuklik, I. (2003). Bycatch as a potential threat to harbour porpoises (*Phocoena phocoena*) in Polish Baltic waters. NAMMCO Scientific Publications, 5: 303-315.

Skòra, K., Pawliczka, I. and Klinowska, M. (1988). Observations of the harbour porpoise (*Phocoena phocoena*) on the Polish Baltic coast. Aquatic Mammals 14, 113–119.

Sommer, R.S., Pasold, J. and Schmolcke, U. (2008). Post-glacial immigration of the harbour porpoise (*Phocoena phocoena*) into the Baltic Sea. Boreas, 37: 458–464.

Sørensen, T.B. and Kinze, C. (1994). Reproduction and reproductive seasonality in Danish harbour porpoises (*Phocoena phocoena*). Ophelia, 39: 159–176.

Strandberg, B., Strandberg, L., Bergquist, P.A., Falandysz, J. and Rappe, C. (1998). Concentrations and biomagnification of 17 chlordane compounds and other organochlorines in harbour porpoise (*Phocoena phocoena*) and herring from the southern Baltic Sea. Chemosphere, 37: 2513-2523.

Sveegaard, S., Teilmann, J., Tougaard, J., Dietz, R., Mouritsen, K.N., Desportes, G. and Siebert, U. (2011). High-density areas for harbor porpoises (*Phocoena phocoena*) identified by satellite tracking. Marine Mammal Science, 27: 230-246.

Sveegaard, S., Galatius, A., Dietz, R., Kyhn, L., Koblitz, J.C., Amundin, M., Nabe-Nielsen, J., Sinding, M.-H.S., Andersen, L.W. and Teilmann, J. (2015). Defining management units for cetaceans by combining genetics, morphology, acoustics and satellite tracking. Global Ecology and Conservation, 3: 839–850.

Szefer, P., Malinga, M., Czarnowski, W. and Skóra, K. (1995). Toxic, essential and non-essential metals in harbour porpoises of the Polish Baltic Sea. Developments in Marine Biology, 4: 617-622.

Tiedemann, R., Harder, J., Gmeiner, C. and Haase, E. (1996). Mitochondrial DNA sequence pattern of harbour porpoises (*Phocoena phocoena*) from the North and the Baltic Sea. Z. Saugetierkd, 61: 104–111.

Wiemann, A., Andersen, L.W., Berggren, P., Siebert, U., Benke, H., Teilmann, J., Lockyer, C., Pawliczka, I., Skora, K., Roos, A., Lyrholm, T., Paulus, K.B., Ketmaier, V. and Tiedemann, R. (2010). Mitochondrial Control Region and microsatellite analyses on harbour porpoise (*Phocoena phocoena*) unravel population differentiation in the Baltic Sea and adjacent waters. Conservation Genetics, 11: 195–211.

Wisniewska, D.M., Johnson, M., Teilmann, J., Rojano-Doñate, L., Shearer, J., Sveegaard, S., Miller, L.A., Siebert, U. and Madsen, P.T. (2016). Ultra-high foraging rates of harbor porpoises make them vulnerable to anthropogenic disturbance. Current Biology, 26: 1–6.

Wisniewska, D.M., Johnson, M., Teilmann, J., Siebert, U., Galatius, A., Dietz, R. and Madsen, P.T. (2018). High rates of vessel noise disrupt foraging in wild harbour porpoises (*Phocoena phocoena*). Proceedings of the Royal Society, B. 285: 20172314. http://dx.doi.org/10.1098/rspb.2017.2314