



www.sambah.org
www.kolmarden.com



HEARD BUT NOT SEEN

Sea-scale Passive Acoustic Survey Reveals a Remnant Baltic Sea Harbour Porpoise Population that Needs Urgent Protection



SAMBAH

Static Acoustic Monitoring of the Baltic Harbour porpoise
LIFE08 NAT/S/000261



THE HARBOUR PORPOISE

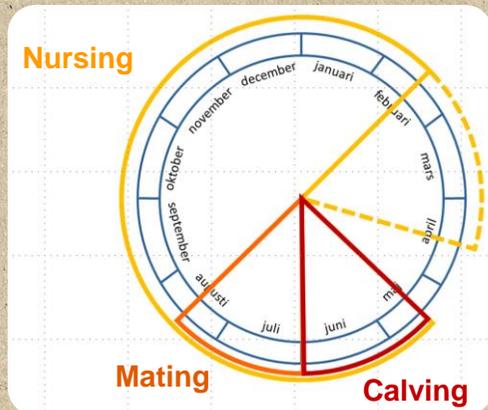
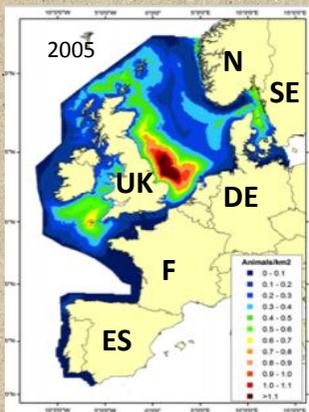
Phocoena phocoena

- Toothed whale (Odontocetes), family Porpoises (Phocoenidae)
- Small size:
 - Adult body length 1.4-1.8m
 - Adult body weight 40-75 kg
 - New-born body size 75cm, 7kg
- Generally shy and hard to spot
- Lives alone or in small group size (mother + calf ± yearling)
- Living in the fast lane:
 - Sexually mature at 3-4 years of age
 - Maximum life span ~23 years
 - Less than 7% live beyond 12 years of age



Copyright Uko Gorter

Porpoise distribution in Europe Annual life cycle in Baltic Region



Results from an aerial survey in 2005. Red is high porpoise density, blue is low.

Mating takes place soon after delivery, so a female is often pregnant while also nursing a calf.

Prey selection

Small, fat pelagic schooling fish, but also bottom-dwelling species. Fish are swallowed whole, head first. Due to narrow throat, only rather small fish can be swallowed, up to about 30cm. length



Herring
Clupea harengus



Sprat
Sprattus sprattus



Cod
Gadus morhua



Whiting
Merlangius merlangus



Gobies
Gobiidae



Sand eel
Ammodytidae



SAMBAH beneficiaries, subcontractors, partners and co-financiers



WE WHO DID IT



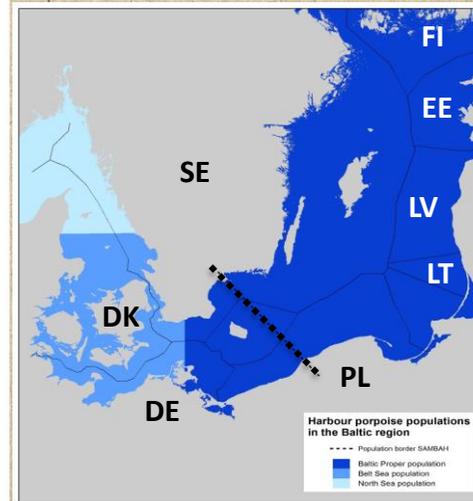
Part of the SAMBAH team at the University of Turku field station on Seili island, Finland, October 2013



SAMBAH SHORT FACTS

- All EU countries around the Baltic participated.
- Nature conservation authorities in four countries were partners.
- Kolmården Wildlife Park, Sweden, was coordinator.
- AquaBiota Water Research, Sweden, was project manager
- SAMBAH was executed from January 2010 until September 2015.
- Total budget 4.2 million Euro.
- 50% funding came from EU LIFE+ and 50% from national sources and co-financiers.
- Germany participated with separate funding from the Federal Agency for Nature Conservation (BfN).

THREE POPULATIONS IN THE BALTIC SEA REGION



The blue colours indicate management borders for the Belt Sea porpoises, in relation to the North Sea population in the north and the Baltic Proper population in the east. The dashed line marks the new delimitation found by SAMBAH between the porpoise in the southwest and those in the central Baltic Sea during the summer (see "WHAT MORE DID WE FIND?").

PORPOISES IN THE BALTIC SEA



- The only resident whale species in the Baltic Sea.
- Baltic Sea population listed as critically endangered.
- Traditional transect surveys resulted in very few observations in the Baltic Proper.
- The very little existing information on distribution is based only on strandings and opportunistic observations from leisure boats.
- Previous abundance estimates are imprecise.
- This called for new, innovative survey methodology.

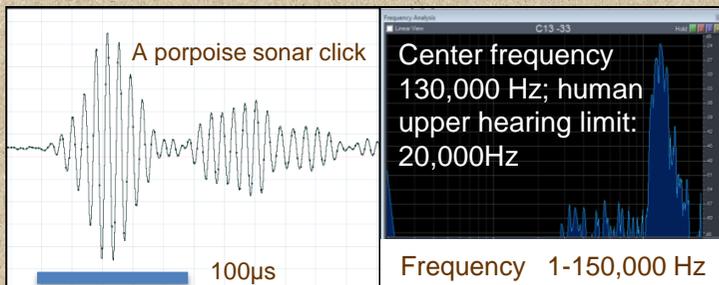
WHAT DID WE WANT TO ACHIEVE?

- Better estimates of the number of porpoises in the Baltic Sea calculated for:
 - the entire surveyed area
 - each country
- Distribution maps showing:
 - hotspots
 - areas of conflicts with human activities,
- Increased awareness in society of the harbour porpoise
- Demonstrate “best practice” for surveying low density populations of toothed whales



ECHO-LOCATION (SONAR)

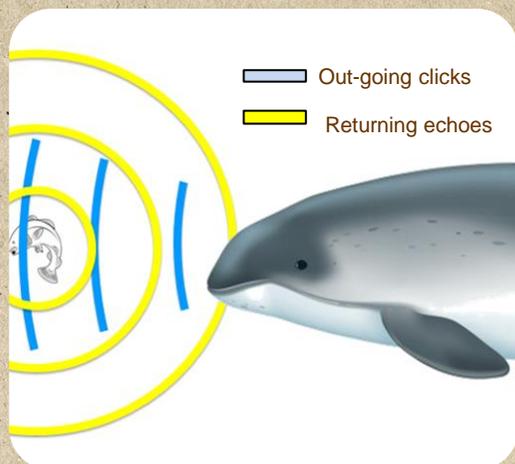
In murky waters, at night and at great depths the porpoise relies entirely on its sonar. The porpoise generates click trains and listens for the returning echoes from obstacles and fish.



Detecting these click trains formed the basis for SAMBAH.

DIRECTIONAL SONAR BEAM

The sonar click sounds are contained in a narrow beam, similar to that of the light beam from a torch. How this sound beam is pointed, in combination with scanning movements with the head, determine the probability that a passing porpoise will be recorded by the click detectors (C-PODs) used in SAMBAH.



WHO SHOULD USE THE SAMBAH RESULTS?



Policy makers at the:

- International level
- National level

Managers of the marine environment.

- National environmental protection agencies
- International organisations

Stakeholders

- Fisheries
- Shipping
- Oil and gas prospectors
- Offshore wind mill constructors

General public

- Leisure boat owners
- Recreational fisheries
- NGOs

HOW CAN THE RESULTS BE USED?

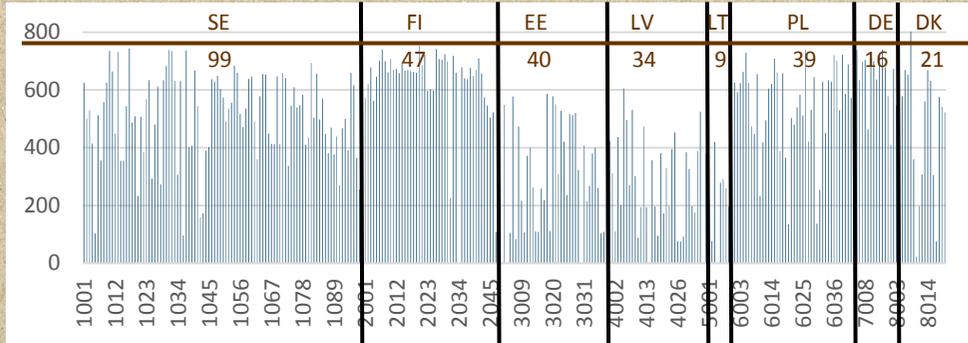
The SAMBAH results can contribute to making all users of the marine environment aware of the biological and habitat needs of porpoises and of the potentially harmful impacts of anthropogenic activities.

The SAMBAH spatial and temporal distribution maps can be used:

- to identify areas with higher risk of conflicts with human activities and to define ways to mitigate or hinder their negative impacts
- to designate areas of protection, e.g. within the Natura 2000 network
- by the armed forces to time their military exercises and mine clearance operations so negative impacts are minimized
- by the commercial fisheries to avoid net fishing in high density areas and periods
- by offshore wind power constructors to avoid pile-driving or else choose time periods with low porpoise density within the noise-exposed area.
- by the shipping industry to re-route ship lanes in order to minimize negative effects of underwater noise.

WHAT DID WE ACHIEVE?

- An average of 478 days of logging per C-POD position, corresponding to a total of 398 logging years!
- Data losses were mainly due to foul weather interfering with servicing, C-PODs being removed by trawling and malfunctioning acoustic releasers, leaving the C-POD tied to the anchor instead of allowing it to float to the surface.



Number of logging days per C-POD position in the participating countries. X-axis are C-POD station numbers



WHAT DID WE FIND?

Abundance

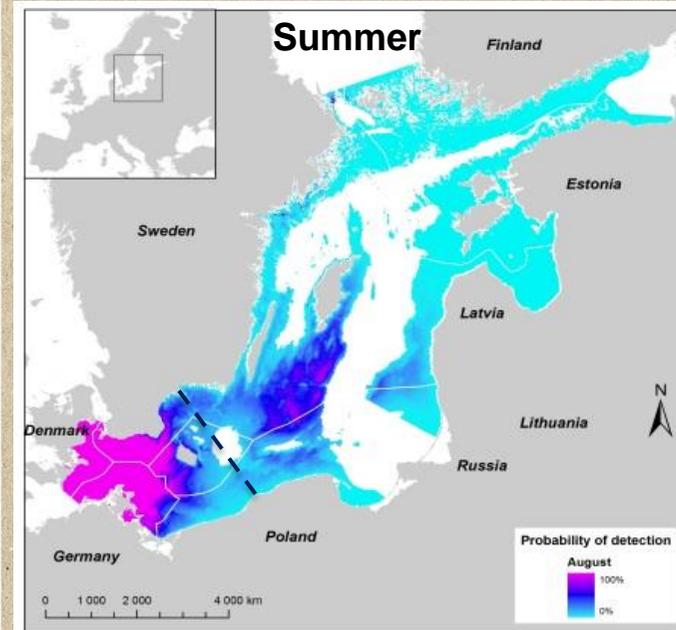
During summer the porpoises aggregated on and around the shallow banks in the central Baltic. They were estimated at ca. 500 animals (95% range 80-1,100) and they are believed to be the main part of what is left of the Baltic Proper population.

In summer there was a very high porpoise abundance west of the dashed delimitation line (see the summer distribution map), with an estimated total abundance of more than 20,000 porpoises (95% range 13,500-38,000). These porpoises are likely to belong to the Belt Sea population.

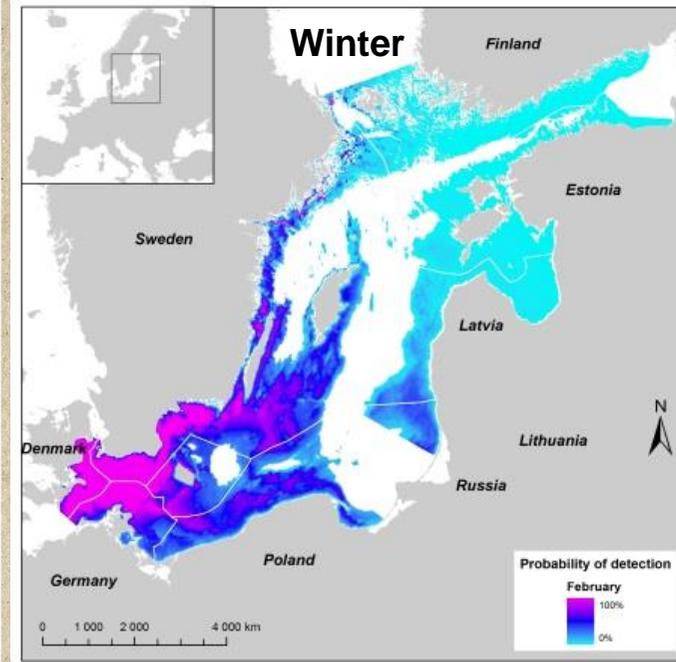
During winter there was still very high abundance in the southwest, albeit much lower than during summer. Since there was no clear clustering, the winter abundance was calculated for the whole surveyed area and was estimated at ca. 11,000 animals (95% range 5,500-24,000). These were dominated by Belt Sea porpoises remaining in the southeast corner of their distribution range.

WHAT MORE DID WE FIND?

Seasonal porpoise distribution



During summer the porpoises of the Baltic Proper population aggregated on and around shallow offshore banks south of the Island of Gotland – possibly an important breeding area, genetically isolated from the porpoises in the south-west part of the Baltic Sea. A proposed delimitation between the two clusters is indicated by the dashed line.



During winter the porpoises were more dispersed, spreading even to the far north, as well as along the Polish and Lithuanian coasts.

LAWS AND REGULATIONS

Habitats Directive – the harbour porpoise is listed in Annex II and hence requires designation of Special Areas of Conservation (SAC), within the Natura 2000 network. The porpoise is also listed in Annex IV, which implies that member states must ensure strict protection also outside the SACs.

Marine Strategy Framework Directive – eleven descriptors have been developed to determine “good environmental status (GES). The harbour porpoise is affected in particular by descriptor 11, concerning the introduction of energy, including underwater noise, but also by descriptor 1 (biodiversity), descriptor 4 (marine food webs) and descriptor 8 (environmental contaminants).

ASCOBANS (Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas) has developed the so called Jastarnia action plan specifically for the conservation of the Baltic harbour porpoise. It includes specific recommendations and mitigation actions against threats.

HELCOM’s Baltic Sea Action Plan (BSAP) includes recommendations to significantly reducing porpoise by-catch. HELCOM also has a red list, where the Baltic harbour porpoise is listed as critically endangered.



WHAT ARE THE MAIN THREATS TO PORPOISES?

- **By-catch in gillnet fisheries.** EU states that the annual by-catch rate must not exceed 1.7% of the total population. In the Baltic Sea by-catch cannot be monitored, but is still considered unsustainable and to be the most serious threat to porpoises.
- **Disturbances from anthropogenic activities,** in particular underwater noise
- **Pollution** - harbour porpoises have very high levels of several contaminants and negative health effects have been recognized.
- Historically the Baltic harbour porpoise was severely decimated probably by several factors like **commercial hunting** and occasional **mass-drowning** due to ice entrapments



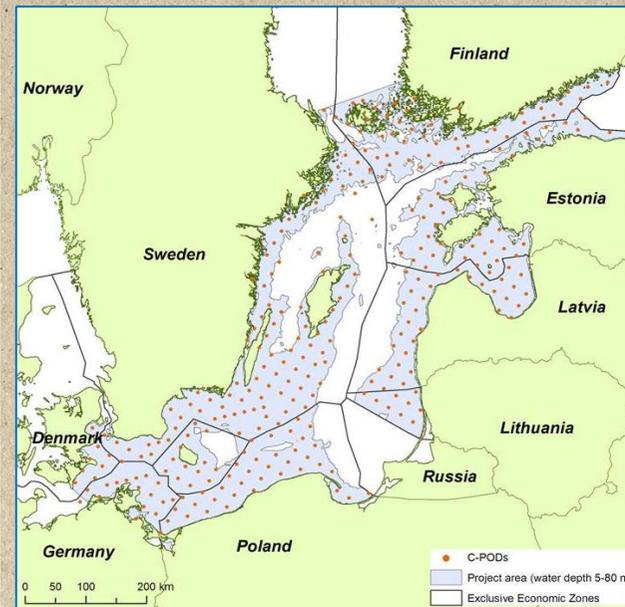
STATIC ACOUSTIC MONITORING

SAMBAH used a large number of click detectors, C-POD’s, to log the porpoises’ sonar click trains. Using click detections as a proxy for porpoise presence, population abundance were calculated. Feeding this data into GIS-based models, spatio-temporal distribution maps were produced.



A C-POD ready for deployment.

HOW DID WE DO IT?



Red dots marks the C-POD stations. Blue colour indicates the surveyed area; white areas inside this area are <5m and >80m deep and Russian waters, which were not surveyed.

We deployed C-POD’s:

- at 304 stations
- in water depths of 5-88m with the C-POD hydrophone suspended 2-3 m above the sea floor
- from May 2011 to April 2013, with the C-POD data uploaded and batteries changed every 3-6 months.