Agenda Item 15.1 National Reporting

Reports from Parties

Document Inf.15.1.i

2014 Annual National Report: Sweden

Action Requested

- Take note

Submitted by Sweden

NOTE:
DELEGATES ARE KINDLY REMINDED
TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

2014 ASCOBANS Annual National Reports

This questionnaire has been pre-filled with answers given in 2013 National Report - please update!

This format for the ASCOBANS Annual National Reports was endorsed by the 6th Meeting of the Parties in 2009. Reports are due to be submitted to the Secretariat by 31 March of each year.

Parties are requested to use this report to provide NEW information on measures taken or actions towards meeting the objectives of the Conservation and Management Plan and the Resolutions of the Meeting of the Parties.

The 7th Meeting of the Parties in 2012 agreed to move to online reporting with immediate effect. In order to benefit fully from the opportunities for synergies among CMS Family treaties afforded by this tool, Parties decided that a revised national report format be developed by a small working group assisted by the Secretariat for consideration by the Advisory Committee in preparation for the 8th Meeting of the Parties. While retaining the questions related only to ASCOBANS, it should align more closely to the format used in CMS, AEWA and EUROBATS.

General Information

Name of Party
› Sweden

Report prepared by

This should indicate the name and affiliation of the lead person for filling in the report.

Name	Susanne Viker
Function	National expert
Organization	SwAM
Address	Box 11930, S 404 39 Göteborg
Telephone/Fax	+46730897967
Email	susanne.viker@havochvatten.se

You have attached the following Web links/URLs to this answer.

Swedish Agency for Marine and Water management

Coordinating Authority and National Coordinator

Please confirm the Coordinating Authority responsible for the national implementation of the Agreement, and give the name and contact details of the officially appointed National Coordinator (Focal Point).
› Susanne Viker at SwAM

List of National Institutions

List of national authorities, organizations, research centres and rescue centres active in the field of study and conservation of cetaceans, including contact details
› AquaBiota Water Research, Ida Carlén, ida.carlen@aquabiota.se

› Göteborg Natural History Museum (GNM), Anders Nilsson, anders.nilsson@gnm.se

› Kolmårdens Wildlife Park, Mats Amundin, mats.amundin@kolmarden.com

› Swedish Museum of Natural History (SMNH), Anna Roos, anna.roos@nrm.se

› Swedish University of Agricultural Sciences (SLU), Sara Königson, sara.konigson@slu.se

› Swedish Defence Research Agency (FOI), Peter Sigray, peter.sigray@foi.se

› AquaBiota Water Research, Julia Carlström, julia.carlstrom@aquabiota.se

Habitat Conservation and Management

Fisheries Interactions

Direct Interaction with Fisheries

1.1 Investigations of methods to reduce bycatch

› Studies investigating alternative fishing gear such as cod pots and traps for species like pike-perch and herring have been carried out by the Department of Aquatic Resources, the Swedish University of Agriculture Science. Since July 2011 this research is conducted by the Department of Aquatic Resources of the Swedish University of Agricultural Sciences (SLU).

› A Swedish fishing gear company Carapax has planned a project with funding for the next year to develop a full-scale cod pot fishing method. The project mainly focuses on how to improve the construction of the pot as well solutions for better handling of the pots on board. The outcome of this project may be of interest to evaluate in terms of bycatch reduction as well as consequences for the fisheries.

› The Department of Aquatic Resources, the Swedish University of Agriculture Science has carried out a project to try and find out why cod pots do work and catch cod in certain areas and do not work in other areas. Parameters as prey in the area, current, state of the fish might impact.

› Studies investigating alternative fishing gear such as cod pots and traps for species like cod, pike-perch and herring have been carried out by the Department of Aquatic Resources, the Swedish University of Agriculture Science during 2014. File attached for more information.

You have attached the following documents to this answer.

Ascobans_rapportering_20150827SK_Just_SV.docx - Alternative fishing gear short report Sweden 2014

K_nigson_2013_Development_of_alternative_gear.pdf - Report to the Proceedings of the conference: Progress of marine conservation in Europe. It describes why and how Sweden are developing alternative fishing gear.

K_nigson_2013_Development_of_alternative_gear.pdf - article on arlernative fishing gear published in 2013. Describes efforts done by SLU.

1.2 Implementation of methods to reduce bycatch

› At the Swedish south coast development and testing of new gear has been conducted. The South Coast Fishing Area (Sydkustens fiskeområde) operates experimental fishing project with seal-proof cod cages in collaboration with local fishermen and scientists at SLU. The goal of the South Coast Fishing Area is to develop future coastal fishing industries by initiating and supporting projects and greater integration between fish nutrition and other nutrition in the region. The business is collaboration between the municipalities of Sölvesborg, Kristianstad, Simrishamn and Ystad. In 2013 this project started collaborating with the Department of Aquatic Resources, the Swedish University of Agriculture Science to get a more scientific approach on the project. Several different models of pots have been tried out and the results are promising. The pots fish around 2 to 7,7 kg cod per emptying.

› Fishermen in the south of the Kattegat have been offered pingers for free and been successfully using them in the gillnet fisheries for flatfish. Six fishers have been using pingers since March 2011.

› During 2012, only one fisher, Kattegatt, was required to use pinger according to EC Regulation 812/2004.

1.3 Other relevant information

Other relevant information, including bycatch information from opportunistic sources

› In 2010 the SBF bought altogether nine camera systems to place on board fishing boats, to investigate discard as well as marine mammal and bird bycatch. Four of them were placed on trawlers and five on smaller fishing boats fishing with gillnets. A large effort was put into this project but only one fisherman was willing to participate in the project even if they were offered incentives for participating. These systems were later taken over by the SwAM whom is responsible for the task since July 2011.

1.4 Report under EC Regulation 812/2004

Please provide the link to your country's report under EC Regulation 812/2004.

› See Appendix 1.
http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2013/WKBYC/wkbyc_2013.pdf#search=wgbyc
Report from the Working Group on Bycatch.

Reduction of Disturbance

2.1 Anthropogenic Noise

Please reference and briefly summarise any studies undertaken
› TIn the field of the European Marine Strategy Framework Directive, SwAM has participated in the EU Working for Good Environmental Status (GES WG), to develop the indicators for descriptor 11 (energy and noise).

› FOI has published the report “Ambient Underwater Noise Levels at Norra Midsjöbanken during Construction of the Nord Stream Pipeline” which was funded by the Swedish Environment Protection Agency, SEPA, together with Nord Stream AG. It presents results from measurements of noise during the construction of the North Stream pipeline, which passes about 4 km off Norra Midsjöbanken which is a Nature 2000 area. Measures included trenching activities as well as the ambient noise including shipping noise.

› FOI has published the report "Skydd av marint liv vid användning av aktiv sonar" (Protection of marine life in conncetion with the use of active sonar; FOI-R--3716--SE, ISSN 1650-1942). It deals with generating knowhow on the effect of such noise and how to minimize these effects.

› FOI has published the report "Akustiska miljöeffekter av svenska marinens aktiva sonarsystem" (Acoustic environmental effects of the Swedish Navy's active sonar systems; FOI-R--3504--SE, ISSN 1650-1942). it presents a summary of existing systems, the frequencies used and their relation to the audiogram of marine mammals residing Swedisch waters. It also gives risk distances for behavioural effects as well as temporary and permanent hearing threshold shifts.

› FOI has published the report "Säker användning av militära sonarsystem - nationella handlingsregler och svensk lag" (Safe use of military sonar systems - national handling rules and Swedish law; FOI-R--3656--SE, ISSN 1650-1942). It presents guidelines on how to plan and implement military exercises where active sonar is included.

› The 4th Naval warfare flotilla, part of the Swedish Armed Forces, has produced the "Maringeografisk biologikalender" (the Marine geographic biology calender), a planning tool for the Swedish Navy, with the aim at minimizing the negative effects of military activities on the marine ecosystems. It is presented as an ArcGIS-based map, on which layers with the distribution in time and space of different factors, e.g. protected areas, biological databases for fish, birds, seals, etc., can be shown. It is still under development, and e.g. the SAMBAH harbour porpoise distribution maps will be included when available.

2.4 Pollution and Hazardous Substances

Please report on main types of pollution and hazardous substances (including source, location and observed effects on cetaceans). Please provide information on any new measures taken to reduce pollution likely to have an impact.
› The Swedish Museum of Natural History (SMNH) is carrying out a 3-year study on several contaminants in harbour porpoises from Swedish waters. The study was finished in 2012 and a report of the results should have been delivered to SwAM, but the report has been delayed.

› The report was not delivered during 2014.

2.5 Other Forms of Disturbance

Please provide any other relevant information, e.g. relating to recreational activities affecting cetaceans.
› None

Marine Protected Areas

Marine Protected Areas for Small Cetaceans

3.1 Relevant Information

Please provide any relevant information on measures taken to identify, implement and manage protected areas for cetaceans, including MPAs designated under the Habitats Directive and MPAs planned or established within the framework of OSPAR or HELCOM.
› In a report to the Swedish government, the Swedish Agency for Marine and Water Management, SwAM, has suggested the need for fishing regulations as a first-step measure in reaching conservations goals in the country’s marine protected areas.

› The protection of marine areas is an important measure in ensuring that Sweden reaches its national environmental objectives. This action is also key in fulfilling the requirements put forth by a number of EU directives and international conventions.
Today, 6.3 percent of Sweden’s marine waters are designated as protected areas. Included are marine nature reserves, marine habitat areas within the Natura 2000 network, and Sweden’s marine national park Kosterhavet.
To ensure biodiversity in these areas, conservation goals are needed. According to goals established by the Swedish government to address biodiversity, 10 percent of the country’s marine waters are to be protected by 2020, an increase of 570,000 hectares from today.

3.2 GIS Data

Please indicate where GIS data of the boundaries (and zoning, if applicable) can be obtained (contact email / website).
› None

Surveys and Research

4.1 Abundance, Distribution, Population Structure

Overview of Research on Abundance, Distribution and Population Structure
› A LIFE+ Nature application for the SAMBAH project was approved and the Grant Agreement was signed in November 2009 by the Kolmården Wildlife Park as the Coordinating Beneficiary. This project is running over five years (January 2010 – September 2015), and aims at producing an estimate of the total abundance and distribution of harbour porpoises in the Baltic Sea. The project is based upon data from passive acoustic porpoise echolocation loggers (CPODs) deployed from 1 May 2011 to 30 April 2013 at approximately 300 positions at 5-80m in the Baltic Sea. All EU countries around the Baltic Sea participate in the project; Germany with separate funding.
Three types of experiments have been carried out for calculation of the CPOD detection function; (1), all partners have carried out playback trials emitting artificial harbour porpoise clicks at 0-300m from the CPODs in conjunction with their servicings, (2) the German Oceanographic Museum has lead an experiment in which a three-dimensional array has been deployed from a boat, drifting in an area where CPODs have been deployed and porpoises have been present, and (3) the Danish team has deployed CPODs on a line outside pound nets with porpoises trapped inside. In addition to these experiments, the Danish team has deployed acoustic tags on harbour porpoises to obtain data on their click rate. These data sets will be used as input to state of the art population density statistics, and subsequently allow for habitat modelling carried out by AquaBiota Water Research, Stockholm.
In 2013 the CPOD data collection and all experiments on supplementary data have been finished. The CPOD data has been quality controlled and a database for future storage of the data has been designed. Due to the delay in the CPOD data collection (originally planned from January 2010 to December 2012) the project end date has been extended from December 2014 to September 2015. All analyses will be finalized in 2014 and the public end-of-project conference will be held at Kolmården Wildlife Park on 8-9 December 2014.

› The SAMBAH end-of-project conference was held on 8-9 December 2014 at Kolmarden Wildlife Park. Here, the final results of SAMBAH were presented, including abundance estimates and distribution maps of harbour porpoises in the Baltic Sea, and the use of the results in management were discussed.
On 9-10 December there was a national workshop dedicated to Swedish marine environment managing bodies.
Please visit www.sambah.org for more information.

You have attached the following documents to this answer.

SAMBAH-news-2014-08.pdf - SAMBAH news August 2014

4.2 Technological Developments

New Technological Developments
› SLU have conducted behavioural studies on cods at the entrance of cod pots. The goal is to produce useful results to develop more catch efficient cod pots. This work has continued in cooperation with a project on cod pots by the South Baltic Flag.

Use of Bycatches and Strandings

Post-Mortem Research Schemes

5.1 Contact Details

Contact details of research institutions and focal point
› Anna Roos, Department of Contaminant research, Swedish Museum of Natural History, PO Box 50007, SE-104 05 Stockholm. anna.roos@nrm.se

5.2 Methodology

Methodology used (reference, e.g. publication, protocol)
› Using a common protocol made for cetaceans.

5.3 Samples

Collection of samples (type, preservation method)
› The Baltic Sea, up to Skanör/Måkläppen: Basically samples from all carcasses were collected, and if the carcass was not too rotten SMNH made a full autopsy. Skin, blubber, muscular tissue, kidney, liver, brain, lung, spleen, stomach, intestines teeth etc. are taken and stored deep frozen in SMNH's Environmental Specimen Bank (ESB).
Porpoises found in 2011 have autopsied by pathologists at The National Veterinary Institute (SVA) together with personnel from SMNH. All of the carcasses were from the Baltic Sea (including the Kattegat). In addition, eleven stranded porpoises were sampled by GNM. Samples (dorsal fin, blubber, lower jaw) were sent to ESB. Seven of the specimen originated from the Baltic Sea.
No report have been deliverd by SMNH in 2012.

› In 2013 there were 6 harbour porpoises reported, all from the Swedish west coast. They were all non-sexually mature. Three of them could be considered as by-catch (found on the beach with injuries from fishing nets + drowned)

› We have got reports on 7 harbor porpoises found dead from the Swedish westcoast and 1 from the Baltic sea during 2014. This time we can´t tell if they died from drowning/bycatch or from any other cause.

5.4 Database

Database (number of data sets by species, years covered, software used, online access)
› The SMNH has a database of porpoise samples from 1972 until today, and consist of more than 700 specimens.
Software: MySQL. No online access yet.
Data include: species, location, cause of death, blubber thickness (several places), length, weight, weight of several organs etc.
The SMNH also has a database on reported live (and dead) animals, all published on line at www.nrm.se/tumlare.

5.5 Additional Information

Additional information (e.g. website addresses, intellectual property rights, possibility of a central database)
› The SMNH host a web page where the public can report sightings of live porpoises: www.nrm.se/tumlare.

Activities and Results

5.6 Necropsies

Number of necropsies carried out in the reporting period

	Recorded cause of death	Numbe r
Phocoena phocoena		

Tursiops truncatus		
Delphinus delphis		
Stenella coeruleoalba		
Grampus griseus		
Globicephala melas		
Globicephala macrorhynchus		
Lagenorhynchus albirostris		
Lagenorhynchus acutus		
Orcinus orca		
Hyperoodon ampullatus		
Mesoplodon bidens		
Kogia breviceps		
Other (please specify under number)		
Other (please specify under number)		
Other (please specify under number)		
Other (please specify under number)		
Other (please specify under number)		
Other (please specify under number)		

5.7 Other Relevant Information

Please provide any other relevant information on post-mortem / stranding schemes
› We have got reports on 7 harbor porpoises found dead from the Swedish westcoast and 1 from the Baltic sea during 2014. This time we can´t tell if they died from drowning/bycatch or from any other cause.

Relevant New Legislation, Regulations and Guidelines

6.1 New Legislation, Regulations and Guidelines

Please provide any relevant information
› During 2010 SEPA started developing national guidelines for underwater noise and marine mammals. This responsibility for the guidelines has now shifted to the SwAM. A background report that SEPA commissioned by AquaBiota Water Research which has been received by the SwAM. The guidelines do not cover noise from vessels, but will be useful during constructions of windparks, pipelines, blastings, etc. SwAM has not approved the report in 2012.

Public Awareness and Education

7.1 Public Awareness and Education

Please report on any public awareness and education activities to implement or promote the Agreement to the general public and to fishermen.

› The Kolmården Wildlife Park, in the dolphinarium, has a one-day program “Närkontakt Delfin” (Dolphin Close Encounters), available on demand to pre-booked groups. It offers an in-depth lecture on dolphin biology in general and also gives updated information on the dire situation of the Baltic harbour porpoise. A special SAMBAH exhibition is presented to all visitors to the Lagoona, one of the public display areas of the Dolphinarium. In addition the staff of Kolmarden has given lectures on SAMBAH for special tour groups at the dolphinarium and during conferences. The main dolphin show, called LIFE. presents a strong message about the grave effects of pollution on the marine eco systems.

› There are two different websites and database systems for reporting of harbour porpoises and cetacean in general: one is the web site of SMNH accessible for the public to report live harbour porpoises, the other is the Species Gateway (Artportalen).
The report form of SMNH's web site is relatively simple which make it relatively easy for almost anyone to complete a report (www.nrm.se/tumlare). Statistics from 2012 have not been compiled but in 2011 at least 177 reports were submitted. Most of the reports came from the Swedish west coast. All reports are quality controlled before being published on the web. The web page also includes photos, and a couple of very interesting films of porpoises playing around a small boat. Data from the SMNH’s database have not been submitted to the HELCOM/ASCOBANS Harbour porpoise database and map service. However, SwAM have asked SMNH to complete that.
Species Gateway (Artportalen) is an independent site by the Swedish Species Information Centre at the SLU for collecting sightings of species (www.artportalen.se/default.asp). The site is open to anyone who wishes to contribute their data and is more detailed in data, relative to that one of the SMNH. It also demands relatively more of the observer to be complete the report, than in the SMNH’s database. Beside the option to report cetaceans in the reporting system for mammals, Amphibians and Reptiles, there are reporting systems for all organism groups. The data can be used by anyone – the general public, scientists, organisations and authorities. All observations are published first and are verified later by authorized persons within the organisations.
Data of the two databases are not directly exchangeable but information to some extent has been transferred to the SMNH. Booth reporting databases has been developed by support from SEPA. However, the authorities should consider which of the organizations that will have national responsibility for receiving reports. Therefore SwAM initiated a meeting regarding this in 2012, which was held in 2013. Both parties agreed to make a joint interface and the data should be stored in a way to make it easier to execute statistical reports from.

› SAMBAH’s web site (www.sambah.org) gives general information about the project’s objectives, activities, methodologies etc.

› Harbor porpoise day 18 of may 2014 at "Naturum Kullaberg"

› 19 of may there was activities around

› The SAMBAH end-of-project conference was held on 8-9 December 2014 at Kolmarden Wildlife Park. Here, the final results of SAMBAH were presented, including abundance estimates and distribution maps of harbour porpoises in the Baltic Sea, and the use of the results in management were discussed.
On 9-10 December there was a national workshop dedicated to Swedish marine
environment managing bodies.
Please visit www.sambah.org for more information.

Possible difficulties encountered in implementing the Agreement

Difficulties in Implementing the Agreement

Please provide any relevant information
› None

Fisheries Interactions

Direct Interaction with Fisheries

1.1 Investigations of methods to reduce bycatch

Studies investigating alternative fishing gear such as cod pots and traps for species like cod, pike-perch and herring have been carried out by the Department of Aquatic Resources, the Swedish University of Agriculture Science.

SLU in cooperation with DTU Aqua in Denmark started a project developing cod pots in Southern Baltic. The purpose of the project is to develop the cod pots, make them more effective, and to investigate if the fishery can be economic reliable.

South Baltic Flag an organization funded by EU, in collaboration with Swedish Agriculture University (SLU) finished their project involving cod pots and their effectivity as well as practicality. The goal of the South Coast Fishing Area is to develop future coastal fishing industries by initiating and supporting projects and greater integration between fish nutrition and other nutrition in the region. The project was carried out in close collaboration with fishermen. Many different pots were tried and the project showed that cod pots in the future can be effective and viable fishery. One of the fishermen designed a large bottom standing cod pot with four entrances. The pot gave on average 7,7 kg per pot.

Figure 1. Bottom standing cod pot with four entrances.

The Department of Aquatic Resources, the Swedish University of Agriculture Science investigated what parameters do affect the cod pots catchability. Parameters taken into regards were current velocity and direction, topography, season and soaktime. Different stimuli to attract cods to the pots was also investigated. Light is a stimuli that can increase the pots catchability significantly.

A project developing a new concept trying to catch cod in the southern Baltic started out in 2014. The project was carried out by the SLU. Two pontoon traps adjusted to catch cod were developed and one of them in use in 2014. The traps can be effective and the project continued in 2015.

Bryhn, A. C., Königson, S. J., Lunneryd, S. G., and Bergenius, M. A. J. 2014. Green lamps as visual stimuli affect the catch efficiency of floating cod (*Gadus morhua*) pots in the Baltic Sea. Fisheries Research, 157: 187-192. DOI 10.1016/j.fishres.2014.04.012

Königson, S. J., Fredriksson, R. E., Lunneryd, S-G., Strömberg, P., and Bergström, U. M. 2015 Cod pots in a Baltic fishery: are they efficient and what affects their efficiency? – ICES Journal of Marine Science, doi: 10.1093/icesjms/fsu230.

Lundin, M., Calamnius, L., Lunneryd, S. G., and Magnhagen, C. 2014. The efficiency of selection grids in perch pontoon traps. Fish. Res., 162: 58-63. doi:10.1016/j.fishres. 2014.09.017

Burfiske I Östersjön-Nytt I Östersjön. Sydkustens fiskeområde i samarbete med SLU. Report written in swedish.

Development of Alternative Fishing Gear in the Swedish Small-scale Coastal Fisheries

SARA KÖNIGSON AND SVEN-GUNNAR LUNNERYD

Institute of Coastal Research, Swedish University of Agricultural Sciences, Sweden

1 Why do we need alternative fishing gear?

In the Swedish small-scale and coastal fisheries, alternative fishing gear has been, and is still being, developed. The main reason for the development is the seal inflicted damages to fishing gear and catch. Seals can cause damage by tearing holes in the fishing gear which shortens the livelihood of the fishing gear and in trap fisheries cause the catch to escape. Seals also consume or damage the catch caught in the fishing gear. There are three species of seals along the Swedish coast; the grey seal (*Halichoerus grypus*), the ringed seal *(Phoca hispida)* and the harbour seal (*Phoca vitulina*). All populations have increased in numbers. Grey seals are increasing by 7 to 8%, ringed seals by 4,5% and Harbour seals on the west coast by 12% (HAVET, 2011). The seals-fisheries conflict in the Baltic has escalated concurrently with the population increase (BALTSCHEFFSKY, 1997; KAUPPINEN et al., 2005; WESTERBERG et al., 2000; LUNNERYD, 2001; FJÄLLING, 2004). The fisheries which are subjected to the seal-fisheries conflict to the greatest extent is the small-scale and coastal fisheries. Coastal fisheries are widely scattered along the Swedish coastline and they are of great importance to the local population in many villages. In addition to facing damage caused by seals, these fisheries tend to suffer from diminishing fish stocks and structural problems such as difficulties distributing the catch. There is a need to develop alternative fishing gear in order to decrease the seal fisheries conflict. Traps and pots are fishing gear where it is possible to protect the catch from seals. In traps and pots, the catch can be gathered in closed departments which in turn can be designed using a solid construction and a strong material which ensures a seal-safe fishing gear.

Nevertheless, there are many other reasons why we need alternative fishing methods. The environmental impact of alternative fishing gear such as traps and pots is considered less severe compared to traditional fishing methods. In comparison to trawls and other active fishing gear, alternative gears such as pots cause limited harm to the marine environment (JENNINGS et al., 2001; THOMSEN et al., 2010). SUURONEN et al., (2012) included pots in the compilation of LIFE (Low Impact and Fuel Efficient) fishing gear due to their low energy use, effective species selectivity and low gear construction costs. Another advantage with pots is that these can be designed to capture cod above a certain length limit (KÖNIGSON, 2011; OVEGÅRD et al., 2011) as well as decreasing the bycatch of marine mammals and birds. There is a need to broaden the perspectives regarding fisheries management for every kind of fisheries, e. g., with life cycle assessment methods which evaluate the environmental impacts of products using a broad and systematic approach (HORNBORG et al., 2012).

Another equally important reason for considering alternative fishing gear is that the small-scale coastal fisheries suffer from low profitability and scant addition of young fishers, needs a positive development. Coastal or small scale fishery is often carried out by single fishers who make daily fishing trips and return every night to harbour. These fisheries could supply a local market with high quality fish and low transportation costs. However, in Sweden, Baltic fishers get a low price for the fish (on average less than 1.5 euro per kg cod) and the fish is often exported to central Europe as there are no other distribution channels. A positive development such as using alternative fishing gear could include ecolabelling fish or marketing the fish as locally caught which in turn could hopefully give the fishers a higher catch value and a higher income.

2 How do we develop alternative fishing gear?

The seal-fisheries conflict, the environmental impact, practical handling of alternative fishing gear and, last but not at least, the catch efficiency of the alternative fishing gear must be taken into regard when developing alternative fishing. Our first priority has been to study the fishing efficiency of alternative fishing gear and whether catch from alternative fishing gear is comparable to traditional fishing gear. This work not only includes comparing the fishing efficiency but also studying which variables can affect the catch and how we can increase the fishing efficiency of alternative gear by for example modifying the gear or by using stimuli to attract fish.

The next priority is the environmental impact, such as increasing size selectivity of the fishing gear as well as decreasing the bycatch of marine mammals and birds. Pots and traps can effectively limit the catch of undersized fish by using selection panels (OVEGÅRD et al., 2011; LUNDIN et al., 2011). Decreasing the fuel costs and the extent of ghost fishing by lost gear are also factors which need to be taken into regard. By having an opening in the pot which is secured with degradable thread material as for example cotton, the opening will open after a couple of months and thereby create an escape for fish trapped inside the pot. Pots and traps also demand less fuel compared to gill nets which are normally set during one day and retrieved the following day. Pots and traps can be left in the water and emptied when the weather allows it or when there is an accentuated demand of fresh fish.

The last part of the work has been to actually develop a seal-safe fishing gear. This can be done by gathering the fish in a closed and solid compartment where seals cannot access the catch. Making it hard for seals to access the catch will consequently minimize the reward for the seal and thereby decrease its motivation to raid fishing gear for food (KÖNIGSON et al., 2007). Handling and practicality of the fishing gear also needed to be taken into account.

Most important in the development of alternative fishing gear was the cooperation between fishers, manufactures and scientists. The following two chapters will describe two alternative fishing gears developed to decrease the seal-fisheries conflict in the Baltic.

3 Trap net fisheries in northern Baltic

Salmon (*Salmo salar,*) trout (*Salmo trutta*) and whitefish (*Coregonus laveratus*) traps are included in the gear category subject to the largest economic damage due to seals in the Swedish fishery and in this category, developing alternative fishing gear as a mitigation method has been highly prioritized (WESTERBERG et al., 2006). The trap net fishery in the Baltic is, in many respects, a model fishery - being selective, energy saving and harmless to the benthic environment. The trap nets used in the fisheries are huge constructions that comprise a leader arm, a trap (gathering compartments) and a fish chamber where the fish finally gather (Figure 1). The trap nets are often placed close to river mouths with the traps leader arm set perpendicular to the shore line. The fisheries are carried out with small boats normally operated by one single person. Salmon, trout, and whitefish follow the leader arm into the trap and finally get caught in the fish chamber.

A solution was found by redesigning the whole trap in such a way that it became a hindrance to the seals' fishing efforts, instead of assisting seals. The fish chamber was constructed with an outer protecting net. The outer net needed to be under tension to prevent seals from reaching the fish, and to accomplish this, the fish-bag had to be stiff. This led to a special arrangement for emptying the bag. Inflatable pontoons were mounted under the bag, lifting the fish chamber up to the surface with the help of an air compressor. Handling this new construction proved to be very labor saving and took less time than handling the original fish chamber. The opening into the fish chamber has a frame made of stainless steel with a width of 40 cm and a wire in the middle of the frame in order to prevent seals from entering the fish chamber. The trap connected to the pontoon fish chamber was designed without any narrow corners. The stretched mesh size of 400 mm allows the fish but not the seal to swim through the meshes during a chase inside the trap. Traditional traps have sharp corners and are made in a polyethylene material with a mesh size of 200 mm. These traps guide or lead the fish into the fish chamber where the fish gather. Lunneryd et al. (2002) showed that the mesh size can be large without losing the guiding properties. However, data showed that there was a loss of salmon through the large meshes in the experimental trap which was independent from seal disturbance. In a following study, detailed damage records of 5,400 emptyings of conventional and large mesh traps with pontoon fish chambers were kept. The result showed that the catch of salmon and trout was 50% higher and that the number of incidents with damaged fish and gear decreased by 80% compared with conventional salmon traps (LUNNERYD & FJÄLLING, 2004).

This alternative fishing gear, a combination of the large mesh trap and the pontoon fish chamber, has been a successful development of seal-safe alternative fishing gear (LUNNERYD et al. 2003). The traps are now used by 86 % of the Swedish salmon trap fishermen along the northern Baltic coast (HEMMINGSSON & LUNNERYD, 2007).

Pontoon traps are being developed for other fish species such as perch *(Perca fluviatilis)*, pike perch (*Sander lucioperca*) and herring *(Clupea harengus).* The development of a seal-safe herring pontoon trap began in 2009. The traps can be used when the herring aggregate in coastal areas. A problem with traps used for herring is the possibility of large catches of small herring. However, the traps can be made selective by releasing the undersized herring with the use of selection grids (LUNDIN et al., 2011).

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4 Cod pot fisheries in central Baltic

Another example of an alternative fishing gear which is under development is the cod pot. At this point, at least three models of the seal-safe cod pots have been produced by three fishing gear manufacturers (Figure 2). Two different two-chambered pots as well as one chambered pots are produced and the different models are currently being tried out by commercial fishers in the south Baltic. To meet the requirements of being a seal-safe gear, the construction needs to be rigid and made in a strong material. Therefore, the models are either collapsible or possible to stack on each other.

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Figure 2: Three of the seal-safe models being developed in collaboration with fishing gear manufacturers, fisheries scientists and fishers. Model a and b are collapsible made in a material with a meshsize of around 30 mm mesh to mesh. Model c can be stacked on each other and has a mesh size of 45 mm. Model a has only one chamber, model b and c are two-chambered with an entrance chamber and a fish holding chamber. The two-chambered models are the most efficient pots compared to pots with only one chamber and an open entrance.

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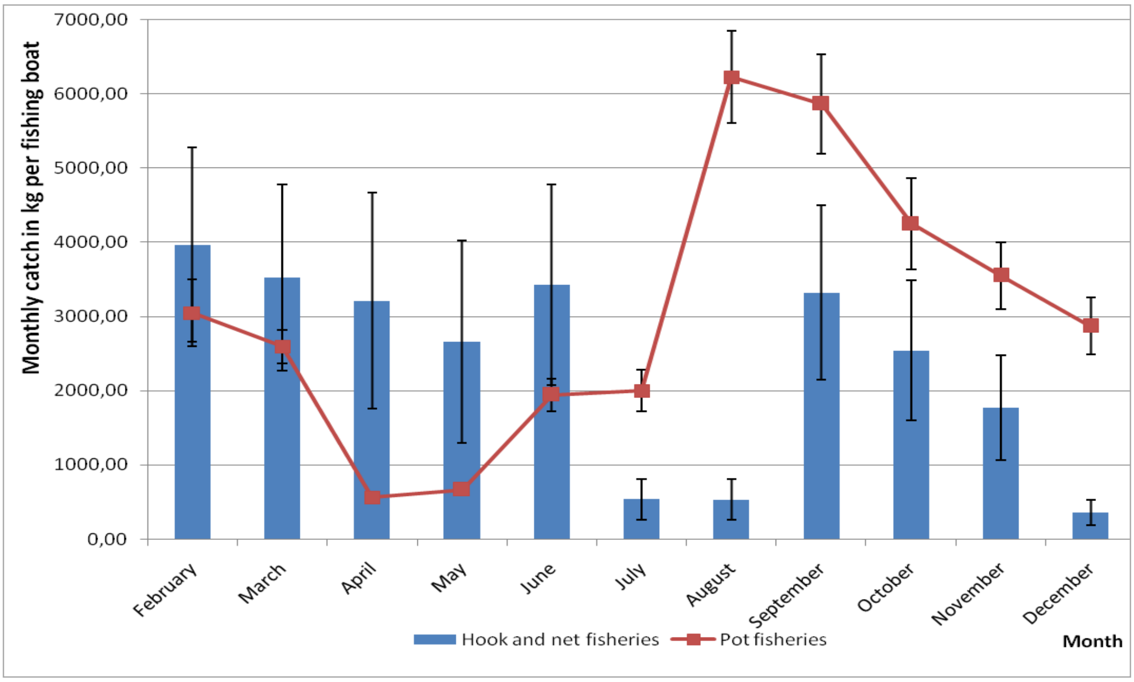

Figure 3: Extrapolating the catch per kg and month to a possible full-time cod pot fishery using 100 pots and comparing it to a full-time gillnet and hook fishery in the same area reported to the EU-logbook (from KÖNIGSON et al., 2010). In July and August, fishing with gillnets and hooks is not permitted. Therefore catches were small during this period.

Compared to other fishing gear, such as for example gillnets which can cover long distances, the general catch efficiency of pots is low (SUURONEN et al., 2012) and therefore there is a need to increase the fishing efficiency of the pots. High fishing efficiency of pots is usually maintained by attracting fish to the fishing grounds using bait (FUREVIK & LØKKEBORG, 1994; LØKKEBORG, 1998), but fishing efficiency could be improved further with other methods such as visual stimuli. Artificial light is a stimulus which can be used to attract or affect fish in order to increase catch efficiency (BEN-YAMI, 1988). A study was carried out to investigate Atlantic cod behaviour when confronted by visual stimuli in floating cod pots and to determine whether it is possible to increase the pots catch efficiency when using a steady green light inside pots. Preliminary results showed that the catch increased significantly in pots with a green lamp inside (BRYHN et al., manuscript).

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5 Challenges and future work

There is a need for alternative fishing gear in many fisheries along the Baltic coast due to many of the reasons mentioned in this report. When developing alternative fishing gears an overarching recommendation is the need for researchers to fully understand and work together with the subjected fishery. This usually requires collaborations between scientists, industry, and fishery managers.

Fishing gear, which catchability is dependent on the behavior of the target species such as for example pots, do most likely have different requisites in different areas. A fishing gear used in a certain area might not work for the same target species in another area due to abiotic factors which affects the species behavior. This is important to take into consideration when evaluating alternative fishing gears that potentially can be used in an area. Therefore, when developing alternative fishing gear, studies on the behavior of target fish species in relation to fishing gear characteristics as well as the surrounding abiotic factors are crucial. This knowledge can help determine what fishing gear characteristics are needed to develop alternative fishing gear for different target species.

We will most likely not be able to continue fishing the way we are used to in the future. For example we need to reduce the fuel consumption as well as the bycatch of non-target species and we need to increase the size selectivity of the fishing gear. However if we want to work towards a sustainable fishery then alternative fishing gear might be the solution in many fisheries. I believe there is a need to start thinking outside the book when developing fishing gear. We need to look at new fishing possibilities and taking the behavior of the target species into consideration might be a way forward. Developing fishing gear is challenging as well as time consuming, however hopefully the results will take us towards a sustainable fishery. The large-meshed push-up trap is an excellent example of a newly developed fishing gear taking the behavior of fish into consideration and thereafter having a successful implementation in the subjected fishery.

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Development of Alternative Fishing Gear in the Swedish Small-scale Coastal Fisheries

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1 Why do we need alternative fishing gear?

In the Swedish small-scale and coastal fisheries, alternative fishing gear has been, and is still being, developed. The main reason for the development is the seal inflicted damages to fishing gear and catch. Seals can cause damage by tearing holes in the fishing gear which shortens the livelihood of the fishing gear and in trap fisheries cause the catch to escape. Seals also consume or damage the catch caught in the fishing gear. There are three species of seals along the Swedish coast; the grey seal (*Halichoerus grypus*), the ringed seal *(Phoca hispida)* and the harbour seal (*Phoca vitulina*). All populations have increased in numbers. Grey seals are increasing by 7 to 8%, ringed seals by 4,5% and Harbour seals on the west coast by 12% (HAVET, 2011). The seals-fisheries conflict in the Baltic has escalated concurrently with the population increase (BALTSCHEFFSKY, 1997; KAUPPINEN et al., 2005; WESTERBERG et al., 2000; LUNNERYD, 2001; FJÄLLING, 2004). The fisheries which are subjected to the seal-fisheries conflict to the greatest extent is the small-scale and coastal fisheries. Coastal fisheries are widely scattered along the Swedish coastline and they are of great importance to the local population in many villages. In addition to facing damage caused by seals, these fisheries tend to suffer from diminishing fish stocks and structural problems such as difficulties distributing the catch. There is a need to develop alternative fishing gear in order to decrease the seal fisheries conflict. Traps and pots are fishing gear where it is possible to protect the catch from seals. In traps and pots, the catch can be gathered in closed departments which in turn can be designed using a solid construction and a strong material which ensures a seal-safe fishing gear.

Nevertheless, there are many other reasons why we need alternative fishing methods. The environmental impact of alternative fishing gear such as traps and pots is considered less severe compared to traditional fishing methods. In comparison to trawls and other active fishing gear, alternative gears such as pots cause limited harm to the marine environment (JENNINGS et al., 2001; THOMSEN et al., 2010). SUURONEN et al., (2012) included pots in the compilation of LIFE (Low Impact and Fuel Efficient) fishing gear due to their low energy use, effective species selectivity and low gear construction costs. Another advantage with pots is that these can be designed to capture cod above a certain length limit (KÖNIGSON, 2011; OVEGÅRD et al., 2011) as well as decreasing the bycatch of marine mammals and birds. There is a need to broaden the perspectives regarding fisheries management for every kind of fisheries, e. g., with life cycle assessment methods which evaluate the environmental impacts of products using a broad and systematic approach (HORNBORG et al., 2012).

Another equally important reason for considering alternative fishing gear is that the small-scale coastal fisheries suffer from low profitability and scant addition of young fishers, needs a positive development. Coastal or small scale fishery is often carried out by single fishers who make daily fishing trips and return every night to harbour. These fisheries could supply a local market with high quality fish and low transportation costs. However, in Sweden, Baltic fishers get a low price for the fish (on average less than 1.5 euro per kg cod) and the fish is often exported to central Europe as there are no other distribution channels. A positive development such as using alternative fishing gear could include ecolabelling fish or marketing the fish as locally caught which in turn could hopefully give the fishers a higher catch value and a higher income.

2 How do we develop alternative fishing gear?

The seal-fisheries conflict, the environmental impact, practical handling of alternative fishing gear and, last but not at least, the catch efficiency of the alternative fishing gear must be taken into regard when developing alternative fishing. Our first priority has been to study the fishing efficiency of alternative fishing gear and whether catch from alternative fishing gear is comparable to traditional fishing gear. This work not only includes comparing the fishing efficiency but also studying which variables can affect the catch and how we can increase the fishing efficiency of alternative gear by for example modifying the gear or by using stimuli to attract fish.

The next priority is the environmental impact, such as increasing size selectivity of the fishing gear as well as decreasing the bycatch of marine mammals and birds. Pots and traps can effectively limit the catch of undersized fish by using selection panels (OVEGÅRD et al., 2011; LUNDIN et al., 2011). Decreasing the fuel costs and the extent of ghost fishing by lost gear are also factors which need to be taken into regard. By having an opening in the pot which is secured with degradable thread material as for example cotton, the opening will open after a couple of months and thereby create an escape for fish trapped inside the pot. Pots and traps also demand less fuel compared to gill nets which are normally set during one day and retrieved the following day. Pots and traps can be left in the water and emptied when the weather allows it or when there is an accentuated demand of fresh fish.

The last part of the work has been to actually develop a seal-safe fishing gear. This can be done by gathering the fish in a closed and solid compartment where seals cannot access the catch. Making it hard for seals to access the catch will consequently minimize the reward for the seal and thereby decrease its motivation to raid fishing gear for food (KÖNIGSON et al., 2007). Handling and practicality of the fishing gear also needed to be taken into account.

Most important in the development of alternative fishing gear was the cooperation between fishers, manufactures and scientists. The following two chapters will describe two alternative fishing gears developed to decrease the seal-fisheries conflict in the Baltic.

3 Trap net fisheries in northern Baltic

Salmon (*Salmo salar,*) trout (*Salmo trutta*) and whitefish (*Coregonus laveratus*) traps are included in the gear category subject to the largest economic damage due to seals in the Swedish fishery and in this category, developing alternative fishing gear as a mitigation method has been highly prioritized (WESTERBERG et al., 2006). The trap net fishery in the Baltic is, in many respects, a model fishery - being selective, energy saving and harmless to the benthic environment. The trap nets used in the fisheries are huge constructions that comprise a leader arm, a trap (gathering compartments) and a fish chamber where the fish finally gather (Figure 1). The trap nets are often placed close to river mouths with the traps leader arm set perpendicular to the shore line. The fisheries are carried out with small boats normally operated by one single person. Salmon, trout, and whitefish follow the leader arm into the trap and finally get caught in the fish chamber.

A solution was found by redesigning the whole trap in such a way that it became a hindrance to the seals' fishing efforts, instead of assisting seals. The fish chamber was constructed with an outer protecting net. The outer net needed to be under tension to prevent seals from reaching the fish, and to accomplish this, the fish-bag had to be stiff. This led to a special arrangement for emptying the bag. Inflatable pontoons were mounted under the bag, lifting the fish chamber up to the surface with the help of an air compressor. Handling this new construction proved to be very labor saving and took less time than handling the original fish chamber. The opening into the fish chamber has a frame made of stainless steel with a width of 40 cm and a wire in the middle of the frame in order to prevent seals from entering the fish chamber. The trap connected to the pontoon fish chamber was designed without any narrow corners. The stretched mesh size of 400 mm allows the fish but not the seal to swim through the meshes during a chase inside the trap. Traditional traps have sharp corners and are made in a polyethylene material with a mesh size of 200 mm. These traps guide or lead the fish into the fish chamber where the fish gather. Lunneryd et al. (2002) showed that the mesh size can be large without losing the guiding properties. However, data showed that there was a loss of salmon through the large meshes in the experimental trap which was independent from seal disturbance. In a following study, detailed damage records of 5,400 emptyings of conventional and large mesh traps with pontoon fish chambers were kept. The result showed that the catch of salmon and trout was 50% higher and that the number of incidents with damaged fish and gear decreased by 80% compared with conventional salmon traps (LUNNERYD & FJÄLLING, 2004).

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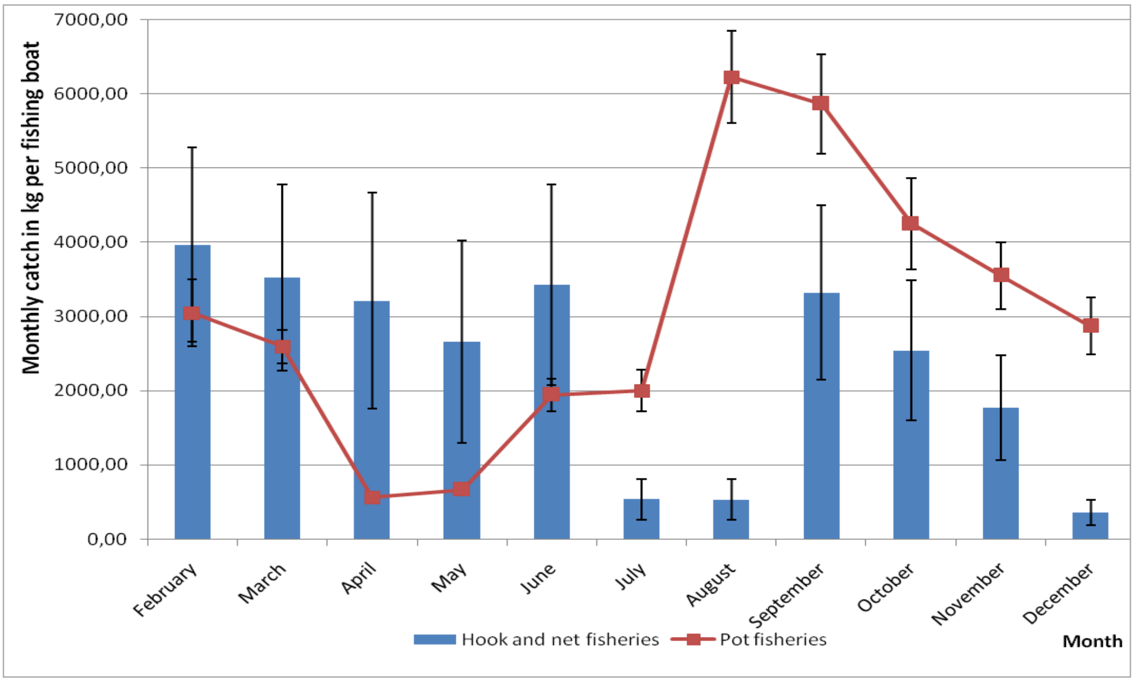

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5 Challenges and future work

There is a need for alternative fishing gear in many fisheries along the Baltic coast due to many of the reasons mentioned in this report. When developing alternative fishing gears an overarching recommendation is the need for researchers to fully understand and work together with the subjected fishery. This usually requires collaborations between scientists, industry, and fishery managers.

Fishing gear, which catchability is dependent on the behavior of the target species such as for example pots, do most likely have different requisites in different areas. A fishing gear used in a certain area might not work for the same target species in another area due to abiotic factors which affects the species behavior. This is important to take into consideration when evaluating alternative fishing gears that potentially can be used in an area. Therefore, when developing alternative fishing gear, studies on the behavior of target fish species in relation to fishing gear characteristics as well as the surrounding abiotic factors are crucial. This knowledge can help determine what fishing gear characteristics are needed to develop alternative fishing gear for different target species.

We will most likely not be able to continue fishing the way we are used to in the future. For example we need to reduce the fuel consumption as well as the bycatch of non-target species and we need to increase the size selectivity of the fishing gear. However if we want to work towards a sustainable fishery then alternative fishing gear might be the solution in many fisheries. I believe there is a need to start thinking outside the book when developing fishing gear. We need to look at new fishing possibilities and taking the behavior of the target species into consideration might be a way forward. Developing fishing gear is challenging as well as time consuming, however hopefully the results will take us towards a sustainable fishery. The large-meshed push-up trap is an excellent example of a newly developed fishing gear taking the behavior of fish into consideration and thereafter having a successful implementation in the subjected fishery.

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SAMBAH NEWS

August 2014

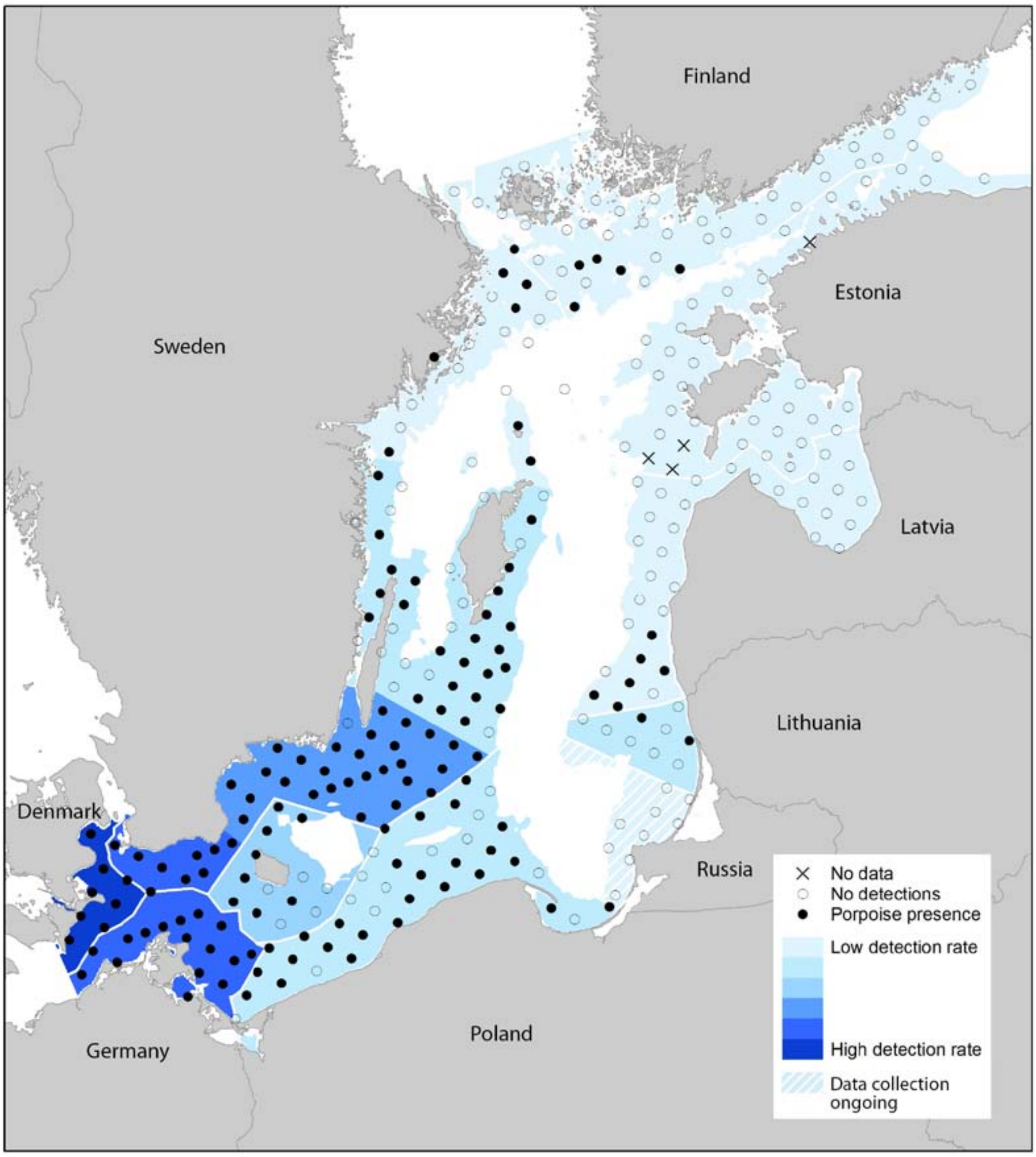
SAMBAH is an international LIFE+ funded project involving all EU countries around the Baltic Sea, with the ultimate goal to secure the conservation of the Baltic Sea Harbour porpoise.

SAMBAH current status

After completing the project field work in the summer of 2013, much time and effort have been devoted to securing the CPOD data quality. The CPOD system includes sophisticated algorithms to extract true porpoise click trains from the data. A special version of this algorithm, adapted to Baltic conditions, has been developed and validated. Also the metadata, including for example time of deployment, time of retrieval, geographical position etc has been meticulously checked.

Of the total possible 608 years of data, SAMBAH managed to recover 68%, corresponding to 413 years of data, a recovery rate that we are very pleased with. Needless to say, this is the largest passive acoustic monitoring data set in the world collected to date.

As expected the number of click detections was highest in the South/South-West of the Baltic and became more rare to the North and East. Relative densities were slightly higher than expected along the Swedish coast of eastern Skåne and Blekinge, and there was a relatively high number of detections in the waters that include the shallow banks South of Öland and Gotland.



SAMBAH positions with at least one detection during the two-year field period are shown as black dots in the map.

The COSAMM array experiment and SAMBAH density analyses

In 2012 and 2013, the German Oceanographic Museum led the COSAMM hydrophone array study with the aim to evaluate different Passive Acoustic Monitoring instruments by acoustically tracking porpoises underwater in the vicinity of a matrix of CPODs. The distance of clicking porpoises in relation to the CPOD registrations could be determined, which allowed for the calculation of the detection function describing the probability of porpoises being detected at a given distance from the CPOD; a vital input into the porpoise density calculations in SAMBAH.

COSAMM field team performing playbacks to the deployed grid of C-PODs.

After the initial post-processing all data was transferred for further analysis to the Centre for Research into Ecological & Environmental Modeling at the University of St Andrews, Scotland. Here the click detections are translated into population density and abundance. The outcome of this analysis is expected in the near future.

SAMBAH conference 8-9 December 2014

The SAMBAH end-of-project conference will be held on 8-9 December 2014 at Kolmarden Wildlife Park. Here, the final results of SAMBAH will be presented, including abundance estimates and distribution maps of harbour porpoises in the Baltic Sea, and the use of the results in management will be discussed. Please visit **www.conference.sambah.org** for more details and booking information.

On 9-10 December there will be a national workshop dedicated to Swedish marine environment managing bodies. Other national workshops may be organized by the respective SAMBAH teams.

Progress meetings and workshops

There is a tradition of arranging the SAMBAH spring progress meeting in connection with the annual European Cetacean Society conference. In 2013 this was held on April 7 in Setubal, Portugal, and in 2014 it was on April 5 in Liège, Belgium. In addition, the Finnish SAMBAH crew hosted a progress meeting on October 22-23, 2013, on the island of Seili at the Archipelago Research Station belonging to Turku University. At these meetings all participants got a chance to present and discuss the current status of the project and to make plans for the pending work. Different aspects of data analyses were also discussed.

On April 15, 2013, a SAMBAH stakeholder workshop was arranged in Gothenburg. The aim was to discuss the future use of SAMBAH data in the management of the Baltic Sea, and how SAMBAH's findings might affect users of the marine environment, e.g. professional fishermen, constructors of offshore windmill parks, etc. Important participants also came from NGO's engaged in the Baltic Sea. The workshop was successful and we hope to continue this effort in the future.

Participants at the SAMBAH progress meeting in Seili, Finland, Oct 2013.

The stakeholder workshop was arranged back-to-back with the ASCOBANS Jastarnia group meeting, taking place in Gothenburg on April 16-18, 2013. SAMBAH was represented on this meeting and reported on the positive outcome of the stakeholder workshop and the general project progress. In 2014 the Jastarnia Group meeting was held on April 1-3 in Bonn, and SAMBAH was again given the chance to present the current status of the project. SAMBAH will be a major input for the realization of the Jastarnia Plan for the conservation of the Baltic harbor porpoise, hence the great interest in the group to hear about the project progress.

SAMBAH project time extended

Due to the initial delay caused by the severe winter in 2010-2011, all subsequent actions were also delayed. In 2013 it became clear that the project end date had to be postponed, and the European Commission granted SAMBAH an extension until the 30th of September 2015. The extra time will allow us to focus on data analysis during 2014 and leave administrational matters for 2015.

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