REPORT OF THE FIRST MEETING OF THE JASTARNIA GROUP

Bonn, Germany
3 & 4 March 2005

ASCOBANS
Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas

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1. Opening of the meeting

Opening the meeting, Dr Tilman Pommeranz welcomed the participants on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. It had been known for a considerable time that the Baltic harbour porpoise faced numerous threats; this knowledge resulted in the Jastarnia Plan, a document listing protection measures to be followed, for which the Parties to ASCOBANS had expressed strong support at the 4th Meeting of the Parties in August 2003. Nevertheless the situation in the Baltic continued to be precarious, and there was now urgent need for progress to be made by meetings such as this. Dr Pommeranz thanked the Secretariat for taking the initiative to call this first meeting, and the participants for coming to Bonn to contribute their expertise in dealing with the ambitious agenda. Dr Pommeranz wished the participants a successful meeting.

2. Adoption of Agenda

At the suggestion of Jonas Teilmann, three points from the Jastarnia Plan that had not been included were added to the agenda under agenda item 5 (Research and Monitoring). These were:

- Analysis of stock affinities of harbour porpoises in the southwestern Baltic
- Develop and apply new techniques for assessing trends in abundance
- Investigate the effects of various types of sound disturbance on harbour porpoises.

The agenda was adopted with these amendments.

3. Election of Chair

The election of a chair was initially postponed due to the delayed arrival of Mats Amundin (on account of a flight cancellation caused by a blizzard in Amsterdam). It was decided that Karl-Hermann Kock, as representative of the host government, would chair the meeting.

4. Bycatch reduction

- **Expected impact of amended EU Regulation No. 88/98 (banning of drift-nets in the Baltic Sea) on the recovery of Baltic harbour porpoises;**

Karl-Hermann Kock outlined the two major problems of harbour porpoise in the Baltic: drift netting for salmon, mostly used offshore, and set nets, which were used in many places inshore and offshore.

Regarding the banning of drift-nets in the Baltic, Iwona Kuklik pointed out that her report to ASCOBANS on bycatch in the Baltic since 1945, presented at MOP4 in Esbjerg, had included data showing three documented cases of harbour porpoise bycatch in drift-nets, but many more in set gillnets. She felt that it should be emphasized that this regulation would not solve the problem of high mortality in nets.

Types of fishery varied greatly, depending on the shoreline, local traditions etc. Driftnets that were harmful to cetaceans in the North Sea, seemed not to be so in the Baltic, and general regulations would not solve the problem. The main assumptions of the Jastarnia Plan were to consider and identify local bycatch problems and to cooperate with fishery. International discussions could lead to recommendations, but the problems needed to be tackled at the local level. For example, in Poland there was also a problem with the so-called semi-drift nets used in Puck Bay, which under the EU definition were set nets because they were anchored at one or both ends. She asked the opinion of the other participants

on this question, and enquired if there were any additional data available on bycatch in drift-nets in the Baltic Sea.

Iwona Kuklik felt that the ban of drift-nets was not a good starting point when dealing with the Jastarnia Plan, because this required activity and cooperation at a very local level. She did not agree that the ban would improve the situation of porpoises in the Baltic, and did not consider it was in line with the Jastarnia Plan.

Lidia Kacalska-Bienkowska, speaking on behalf of the Ministry of Agriculture and Rural Development, pointed out that Polish fishermen could not replace drift-nets by other gear because of the nature of the country's coastline. This was a social and an economic problem. The ban on drift-nets would lead to the death of the salmon fishery in Poland, and to strong opposition from Polish fishermen, who feared for their future.[1]

Karl-Hermann Kock agreed with Iwona Kuklik's view that set nets were probably a greater problem than drift nets. The question of set nets had not yet been addressed by the EU, except for the use of pingers on boats over 15 metres in length, but he felt that set nets were more of a problem because of the large numbers of them in use along coasts. Although the regulation was a compromise, the question of drift-nets was now largely covered by the EU. The Jastarnia Group should focus more on the various types of set nets. He felt it important to consider both the national level, responsible for a narrow strip of coastal waters, and the EU level, which covered the rest of the area, but agreed that a start should be made at the local level. The problems in Puck Bay could be dealt with at a national level by Poland, but the EU was responsible for the rest of the area, and here a ban on drift-nets was a good first step.

Jonas Teilmann reported that in Denmark the feeling was that a ban of drift nets as a potentially high-risk method was justified, especially where they were used extensively, as in Denmark.

Jarmo Vilhunen described the situation in Finland, where the ban will probably not have serious effects because the driftnet fishing sector has already been in economic difficulties. The EU regulation also contained other obligations such as national observer programmes to gather information, in which Finland was involved although harbour porpoises were rarely observed in Finnish waters. He felt that a general reduction of fishing effort was not appropriate. Effort reduction should be selective, so that economically viable and safe fishery types could continue. He considered that certain fishing methods should have been subject to closer analysis before the ban was imposed, and Finland would therefore probably seek some kind of derogation to solve this problem.

Petra Deimer reminded the Group that although more research was necessary, this should not prevent measures being taken immediately. The risks were known and did not need reiterating, while the precautionary principle made immediate action necessary.

Karl-Hermann Kock stated that he had hoped the EU would now consider gillnets and set nets. So far this had not happened.

[1] Cf. comment MA1 at Annex 3

- **Reduction of the fishing fleets in new EU member states**

Lidia Kacalska-Bienkowska reported that the Polish fishing fleet had already been reduced by 100 vessels, 20 of these being from the salmon fleet. Iwona Kuklik agreed to look into these figures further.

Concerning the scrapping of fishing vessels in the Baltic States (Estonia, Latvia and Lithuania) the Secretariat reported that according to information from the EU Commission data were not yet available or had not yet been disclosed.

Jarmo Vilhunen reported that some of the "old" EU member states were also reducing their Baltic fleets, but probably in the eastern Baltic republics the number was higher. There had been talk of large scrapping programmes in some of these countries. There was a need for more information, but this was a method of reducing fishing effort in the Baltic Sea.

- **Identification of areas of reported high bycatch and known use of harmful fishing gear**

Introducing, Karl-Hermann Kock mentioned that Poland had already identified a so-called hotspot in Puck Bay. The Group agreed that bycatch occurred all along the Baltic coast, and that specific hotspots were otherwise difficult to pinpoint.

Jessica Hjerpe Olausson reported that there had been no documented bycatch in Swedish Baltic waters in recent years, so no hot spots were identifiable. In Sweden there was driftnet fishery for herring in the Sound (Öresund), and it was hoped to obtain an exemption for this fishery because this was not considered relevant for bycatch reduction; it was a local fishery with only a few vessels, using a net size different to that used for salmon. These nets had a short setting time of 30 minutes and the fishermen followed the nets at all times.

Jarmo Vilhunen reported that in Finland there was strong opinion in favour of a derogation or change in the regulation for whitefish fishing with drift-nets, with approximately 30 vessels using this traditional method. There was no evidence of harbour porpoise bycatch with this fishing method. These nets were unlike salmon nets, and were unlikely to be harmful for harbour porpoises. This also applied to a small group of herring fishermen.

- **Reduction of fishing effort in the bottom-set gillnet fishery**

Introducing this subject, Karl-Hermann Kock pointed out that this important fishery occurred in all parts of the Baltic, offshore and over a very large area; and could be considered the major threat to the survival of the harbour porpoise in the central Baltic. As an example, he reported that along the German coast there were both professional fishermen and also approximately 600 fishermen with part-time licences, who generally operated inshore. Because of the large number of vessels involved, bycatch in this fishery was thought to equal that in the professional fishery, but it was difficult to reduce effort here.

Petra Deimer reported hearing that part-time fishermen may sell their licences when they retire. Karl-Hermann Kock added that the authorities were trying to phase out this practice. This was likely to be a slow process and not very effective as a means for bycatch reduction.

Jonas Teilmann reported that in Denmark anyone may fish with gillnets who has paid a small license fee at the post office, so there was no control. This was fishing very near to the coast, but could still be a problem. He asked that the area in question be defined as the situation differed from place to place.

Lidia Kacalska-Bienkowska reported that Poland had proposed reducing by ten percent the length of nets for cod, a move that would benefit both cod and cetaceans, but the proposal had been rejected. There were no part-time fishermen in Poland. There were no plans to reduce fishery by a specific per-

centage, and scrapping was the decision of individual fishermen, and there was no government incentive to encourage this.

Jarmo Vilhunen reported that in Finland there were many recreational fishermen in addition to professional fishermen using bottom-set gillnets in coastal waters. There were no plans to reduce the coastal fleet in order to reduce harbor porpoise bycatch, which had been very low, with perhaps only one or two cases in ten years. The structural programmes to reduce the fleet with the aid of EU financing were a different matter.

Jessica Hjerpe Olausson reported that Sweden intended to follow the regulation and had reduced fishing effort with drift-nets by the required percentage. There was no programme in Sweden for reducing bottom-set gillnets.

- **Implementation of the use of alternative fishing gear**

Karl-Hermann Kock reported that there had been considerable research into establishing which types of gear were less harmful to harbour porpoises, e.g. replacing bottom-set gillnets by traps, or using longlines in place of drift-nets. This was a slow process, and fishermen needed to be convinced that the alternatives worked, and catch levels remained the same.

Jonas Teilmann reported that many Danish salmon fishermen had changed to longlines to replace drift-nets; this was developing fast, and the outlook was good, although the gear was expensive. There were still some problems, however, and longlines were not an alternative to bottom-set gillnets. Trap nets, which were not a problem for porpoises, were also being used, but only in shallow waters without a rocky bottom as they were anchored by poles.

Iwona Kuklik responded that although trap nets cannot be used in the open sea, they seemed to be a solution for salmon fishing in Puck Bay. She asked for more information regarding benefits from replacing driftnets with longlines in Denmark, and for similar information from other countries.

Jonas Teilmann agreed to provide this information to the meeting of the Advisory Committee.

Jarmo Vilhunen stressed that changing fishermen's habits was a slow process, especially if the new methods were less profitable.

Jessica Hjerpe Olausson noted that Swedish trials with small fish traps for cod had limited success and that these would have limited or no use as alternative fishing gear.

The Group agreed that trials with alternative gear were still limited, and that more research was needed on this subject.

- **Implementation of a pinger programme**

Karl-Hermann Kock reported that EU Regulation 812/04 required the use of pingers on vessels over a certain size. However, up to two thirds of the vessels in use in the Baltic were below that limit and thus not covered by the regulation. They were still likely to catch harbour porpoises. Also, studies[2] (for example in California) had shown that in the long term pingers caused habituation. The EU's STECF had met in 2002 and 2003 to discuss cetacean bycatch, and had suggested that permanent pingers should only be used for a limited period of time for this reason. The Jastarnia Plan recommended that they be used for three years and their use be reconsidered after this period, with the expectation that pinger use would be replaced by other more benign longer-term mitigation measures at that time.

In this context Jonas Teilmann pointed out that more research was needed to establish what circumstances led to a high bycatch risk, and what devices might alleviate this. For example, this summer he

[2] Cf. comment MA2 at Annex 3

was beginning a project to log when precisely harbour porpoises use echolocation. More information was needed on the behaviour of porpoises near pingers.[3]

Petra Deimer asked about trials with "reflective" nets containing barium sulphate. Jonas Teilmann replied that bycatch was indeed reduced during these trials, which had been conducted by Finn Larsen (DIFRES, Denmark) but that the fish catch was also up to 50% lower. It was suspected that this was caused by the increased stiffness of the nets rather than their reflective properties. Rüdiger Strempel added that a report on trials with reflective nets conducted in Canada last year would be presented to AC12, and that he understood that the results were promising.

Iwona Kuklik reported on plans to install a line of pingers across the entrance to Puck Bay to exclude harbour porpoises seasonally. However, before this could be done, it was necessary to analyse the seasonality of their occurrence in the Bay.

Jonas Teilmann stressed that more information was needed about the behaviour of harbour porpoises near pingers. He also reported on a current study on the use of pingers[4] to exclude harbour porpoises from an area, with pods used to record the sounds of the hp. Although only limited, this study might provide more information on habituation etc., and could be extended if more funding were available. Results would be presented as soon as they had been evaluated, hopefully by the end of 2005.

On this point also it was agreed that much more research was needed.

Jonas Teilmann suggested that the four ICES rectangles described on page 12 of the Jastarnia Plan as problematical (3958, 4059, 4159 and 4160) should be included with Puck Bay as areas of reported high bycatch and known use of harmful fishing gear. Jessica Hjerpe Olausson stated that there was a lack of scientific basis for pointing out these areas specifically. She added that there had been no documented bycatch in this area for the last ten years. In highlighting these four ICES rectangles, the Jastarnia Plan referred to a study that was conducted during the years 1985-1998. The bycatches recorded in the study had, however, all occurred at the beginning of the study period. The lack of scientific basis for considering these areas as bycatch hotspots derived from the fact that the study in question had not been replicated for the rest of the Baltic coastline, and thus there was no evidence to suggest that this specific area was a hotspot.

Szymon Bzoma of the Sea Fisheries Institute stated that the decision to ban drift-nets was made without Polish involvement and before Poland joined the EU. The ban was causing anger amongst Polish fishermen, and while it was too late to change this regulation now, it was likely that Poland would vote against bans of further net types, and Poland had requested a derogation from the ban of drift-nets in the Baltic.

Jarmo Vilhunen again stressed that Finland accepted the regulation, but might be requesting derogation for the whitefish fishery, which was not sufficiently researched before the ban was imposed.

Before concluding this section of the agenda, the Group decided to consider the points listed in Appendix 3 of the Jastarnia Plan and analyse what progress, if any, had been made on each and to specify the work that still needed to be done.

The points were as follows:

1a - Collation of data on the distribution and timing of porpoise bycatches in the Baltic, and on the distribution and timing of porpoise observations (including strandings) in the Baltic over approximately the past 50 years:

The report Iwona Kuklik had prepared on this had been presented at MOP4 in Esbjerg and the material was available. The final paper would be published in the second half of 2005, but Iwona

[3] Cf. comment MA3 at Annex 3
[4] Cf. comment MA4 at Annex 3

Kuklik would present a preliminary version to AC12 in April. The report included data on reported bycatch and unspecific reports, although much of the information was very vague.

Jonas Teilmann agreed to provide Iwona Kuklik with additional Danish abundance data. Stefan Bräger pointed out that a German project on this would be starting soon, and might provide more up-to-date information.

The Group agreed to consider this monitoring of population developments as an ongoing project that should continue for many years to come.

1b - Collation of data on fishing effort, following the terms of reference and example data sheet in the Recovery Plan:

Rüdiger Strempel reported that, according to Appendix 3 of the Jastarnia Plan, up to € 70,000 were needed to fulfill that task but that to date only a Danish voluntary contribution of DKK 20,000 (€ 2,684) had been provided and the project could not be carried out until funding was in place. ***The Group felt that AC12 should send a clear signal to Parties to provide the needed funding.***

Terms of reference for a project request should be formulated. The work should be carried out on the basis of the data sheet in the Jastarnia Plan, so the basic line for the ToR was clear. ***Suggestions as to who should carry out the project should be made to the Secretariat.*** However, the concern was raised that the project might be too much for a single scientist in a single country to shoulder. ***Once funding was in place and possible candidates for the execution of the project had been identified, the Secretariat should coordinate the further steps.***

2 - Model pinger function in Baltic conditions:

Rüdiger Strempel reported that finalisation of this had been expected in 2003, but so far there was no news on progress.[5]

After considerable discussion of the relevance of this modelling exercise, it was decided that this step had meanwhile been overtaken by introduction of mandatory pingers by the EU[6].

It was, however, considered that there was still a need for such modelling in the Baltic because of the special conditions prevailing there; ***it was therefore decided that instead of modelling pinger function, pilot experiments should be conducted in areas with conditions similar to those in the Baltic and with a clear halocline.***

[6] Cf. comment MA5 at Annex 3

3 - Send the recovery plan to IBSFC, HELCOM and other relevant bodies:

Rüdiger Strempel reported that this point had been completely covered. Karl-Hermann Kock recalled that at least one HELCOM resolution now called for the protection of the harbour porpoise in the Baltic. The Jastarnia Plan had been presented at a meeting of the IBSFC in 2003. At that time the IBSFC had shown no interest in small cetaceans, but this may now have changed. The Group considered sending either Rüdiger Strempel or Mark Tasker to IBSFC again.

Jonas Teilmann felt it best to approach the bycatch issue through fishery organizations as almost all the Baltic countries were now EU members and subject to strict regulation, forcing them to be interested. Although the IBSFC will shortly cease to exist, giving way to bilateral meetings between the EU and Russia, ***the Secretariat was asked to send the Recovery Plan to IBSFC again and announce that an ASCOBANS observer would attend the next meeting to present it once again.***

4 - Initiate a review of all experiments to date with alternative gear and fishing practices:

Little progress had been made on this point. It was known that ***Finn Larsen*** had been working on this review, and he ***will be contacted to ask if he needs additional funding to complete this work.*** Some funds were available and more could probably be found.

5 - Initiate communication with competent fishery authorities:

Rüdiger Strempel reported that regrettably there had been no progress on this point, which was still relevant but required considerable coordination and was not an easy issue to tackle. He and the AC Chair and Vice-Chair would continue trying to make progress.

6 - Develop and implement a strategy for getting fishermen to support bycatch mitigation measures:

Karl-Hermann Kock reminded members that fishermen had attended the meeting in Jastarnia, but had shown little interest. Jonas Teilmann considered that, having banned drift-nets and made pingers mandatory, the EU was now responsible for educating fishermen on these mitigation measures. Karl-Hermann Kock felt that suggestions that came from the fishermen themselves rather than from a higher authority were more likely to succeed.

Jarmo Vilhunen noted that Regulation 812/04 required the use of pingers near the Swedish coast as from 1 June 2005 and asked if Sweden had started education of their fishermen. Jessica Hjerpe Olausson replied that some trials with pingers on nets were being undertaken in cooperation with fishermen (but the pingers made no difference, i.e. there was no bycatch in either case). Sweden had established a system within the National Board of Fisheries of establishing personal contacts with the fishermen, with one person ensuring that they all receive the same information and are kept up to date. This was proving quite efficient.

Finally, Jonas Teilmann suggested stressing that this point applied to areas outside the scope of the EU regulation, and perhaps listing those areas.

7 - Improve effort and protocols for data collection on stranded or incidentally caught harbour porpoises in the Baltic:

Karl-Hermann Kock reported that it was usual for bycaught cetaceans to be thrown overboard. Past attempts to educate fishermen had resulted in a considerable short-term increase in reports, but a rapid fall-off when the programme was discontinued. It was common for bycatch or even the existence of harbour porpoises to be denied entirely. He felt that the large number of small boats would make an effective observer scheme impossible, and there seemed to be no way of enforcing mandatory reporting of bycatch.

Iwona Kuklik also considered that voluntary reporting would cease to function, and that without monitoring or observer programmes there would be no more information on bycatch, so these were now crucial. However, the EU regulation did specify observer and scientific programmes for the smaller boats.

Jonas Teilmann considered that the EU monitoring scheme on larger vessels would provide an opportunity to map at least some bycatch and recover those carcasses. Currently there was no recovery of carcasses in Denmark because there was no interest. He suggested ***contacting fisheries organizations to stress the importance of recovering bycaught animals***; this could provide some information to start mapping the bycatch problem. Even a very few carcasses, combined with fishing effort data, would provide some information that had not previously been available, with the addition of the carcasses for analysis. ***It was agreed that this should be done.***

Rüdiger Strempel recalled that at the recent workshop on the recovery plan for the North Sea harbour porpoise, Arne Bjørge had reported on very well-rewarded incentive schemes to encourage the recovery of bycaught animals in Norway.

8 - Once sufficient data are available from items 1 and 2, an analysis should be initiated to evaluate the potential for habitat exclusion caused by pinger use in the Baltic:

Jonas Teilmann remarked that as soon as data on effort or on where fishermen were putting out their nets was available, this exercise could be done. However, item 1b would have to be completed first to obtain data from each country.

5. Research and Monitoring

- **International database on opportunistic sightings, strandings and bycatch**

Karl-Hermann Kock distributed a paper on the Baltic Sea Porpoise Database, a "work in progress". The project was currently being undertaken at the Forschungs- und Technologiezentrum (FTZ) in Büsum, Germany, led by Ulrika Westerberg, but with others involved. This was an international project to pool all the available information on sightings, strandings, bycatches etc. from around the Baltic proper and present them interactively. It was also intended as a forum for researchers to share information, thus facilitating cooperation, but also as an educational tool for the general public. Both input and retrieval of data would be via the internet. The project was being funded initially by the German Federal Agency for Nature Conservation, and so far Latvia, Germany, Poland and Sweden had supplied data, but it was hoped to interest other countries in the project.

Rüdiger Strempel suggested that as the database was a Jastarnia Plan-related project it could be hosted on the ASCOBANS website. Replying to the suggestion that the Secretariat could also be charged with the maintenance of the database he stated that this would require additional staff and funding.

Despite many open questions regarding the functioning of the database and its management, the Group felt that this was a useful initiative to track the development of porpoises in the Baltic. It warned that

the work would be wasted if there was no decision as to who would run the database in the coming years.

Karl-Hermann Kock reported that project funding was guaranteed for only three years but that if it were a success this would probably be continued.

- **Joint Baltic project on genetics – maximum number of samples, best methods;**

Before presenting the joint Baltic project on genetics, Stefan Bräger explained that this was part of the larger German Jastarnia Research Project, begun last year by the German government to implement the Jastarnia Plan. It covered:

- Acoustic monitoring with click detectors east of Rügen and on the Oderbank, in cooperation with Polish experts.
- A database (described in the previous presentation) containing historical and recent information.
- A study of population structure based on genetic differences between populations using samples from different areas, including Poland.
- A survey of reproduction, age structure and health status using 25 samples collected from strandings in Germany and other countries.

Presenting the genetic study in more detail, he reported that it had included 50 samples from the Baltic proper, with none from Finland, Sweden or Denmark, although more were available. Funding for the genetic study was limited to three years.

After some discussion ***the Group decided that it was now important to establish a joint Baltic genetic study to bring together information from the whole Baltic, and that Parties should be asked to provide funding for this.*** Pooling resources would be more efficient, and could result in a good study with a good sample size.

It was also decided that a sub-group of between 5 and 10 people should meet to discuss and agree on the methods to be used. Rüdiger Strempel offered to see if the Secretariat could fund such a one-day workshop. It was agreed that Jonas Teilmann and the Secretariat would organize this meeting, to be held probably in May or June, and that the Secretariat would inform those concerned immediately that this was imminent.

- **Monitoring programmes in fisheries**

The meeting decided that the programmes required under EU regulations were sufficient for the time being and that nothing needed to be added.

The meeting then considered the following points from the Jastarnia Plan that had been added to the agenda:

- **Analysis of stock affinities of harbour porpoises in the "transition zone" of the southwestern Baltic**

Jonas Teilmann felt that although other population studies were needed in this area, genetics was an important sub-point. The key problem was to establish the border of the "transition zone".

Iwona Kuklik felt that ***a genetic study should include the transition zone, the Baltic proper and Danish waters, and consider all three regions.***

The meeting decided to ask the genetics group involved in the joint Baltic project (cf. above) to consider this question in more detail.

- **Develop and apply new techniques for assessing trends in abundance**

Jonas Teilmann reported that many studies had already been done in Poland and Germany. Part of SCANS-II would be conducted in the Baltic using hydrophone arrays, which would also be offered to other vessels surveying in the area. In addition pods were being deployed in at least part of the Baltic range.

Karl-Hermann Kock suggested joining forces with ICES, for example during their systematic surveys in the Baltic for herring and sprat. Jonas Teilmann agreed to enquire if this was possible and whom to contact.

On the subject of pods, Iwona Kuklik reported that to her knowledge these had been used in Estonian waters for several months, and resulted in one record. They were also being used in other areas, such as Puck Bay and on the Oderbank; some records had been made, but the results had not yet been analysed.

- **Investigate the effects of various types of sound disturbance on harbour porpoises**

Jonas Teilmann reported that studies were being conducted on the effects of pinger signals and a report might be submitted to AC12. The review on the effects of wind farms was available on the internet, and a final report on the effects of construction noise would be available in 2006.

Stefan Bräger reported that the German government was financing a major long-term project on the impact of offshore wind parks on birds and marine mammals, starting in April 2005.

It was agreed that a study on noise emitted by vessels should be undertaken. As this was also one of the main recommendations of the North Sea Recovery Plan, the North Sea countries should also be asked to contribute to this, which could be used for both plans.

6. Marine protected areas

- **Cataloguing of marine habitats of NATURA 2000 relevant to harbour porpoise protection and monitoring system of harbour porpoise occurrence within those areas**

Introducing this point Karl-Hermann Kock mentioned that a number of such areas had been established or suggested at a national level to the European Commission, but that there were also areas within national waters that were under national legislation and did not have to be listed under EU regulations. The areas were designed to protect certain benthic species, but harbour porpoises would probably benefit from them.

Stefan Bräger briefly described the total of six protected areas that Germany had declared as marine reserves in its EEZ. There was no specific mention of harbour porpoises as these were protected in all European waters.

Iwona Kuklik reported that Poland was working on establishing protected areas of the marine environment, and several had already been designated. The harbour porpoise was listed as a protected species for some of these, for example the Puck Bay area, but none of MPAs had been dedicated specifically to harbour porpoises.

Jonas Teilmann reported that in Denmark areas had been assigned for Natura 2000, and the harbour porpoise was listed for some of these. There was a problem establishing exactly where these areas should be because the harbour porpoises were constantly on the move.

Penina Blankett reported several marine protected areas, none of them for harbour porpoises because there were so few of these animals in Finnish waters. It was therefore difficult to establish if these areas would be useful to them. Jessica Olaussen echoed this, as the same situation prevailed in Sweden.

It was decided that each country should provide the Secretariat with a map of their areas, or that a list of URLs where maps could be found should be annexed to the report. The HELCOM map of BSPAs would also be useful.

The Group agreed that it would be useful to gain an ***overview of EU legislation relevant to harbour porpoise conservation and therefore to ASCOBANS***. It would be beneficial for the work of ASCOBANS as a whole, not just for the Jastarnia process, to determine which elements of the CFP, the Habitats Directive and possibly other EU legislation could be instrumental in achieving the aims of the Agreement and what shortcomings and gaps existed. ***The Jastarnia Group felt that the next AC should explore the possibility of commissioning or having the Secretariat produce a report on this issue.***

7. Public awareness

- **Standardized Baltic campaign for reporting harbour porpoise occurrence and bycatch**

Introducing, Karl-Hermann Kock reported that this was not difficult in principle. A programme targeted at sailors had been very successful, with several hundred sightings recorded in the first year, and the figure was increasing. Other groups such as fishery patrols, police, military had agreed to cooperate, but cooperation with fishermen was proving extremely difficult if not impossible.

Petra Deimer added that this was a GSM campaign, based on a project begun in Denmark. It involved sailors wherever they went, but the sighting reports were mainly from German and Danish waters as few sailed further east. Reporting was on paper, sheets being distributed wherever sailors were on land. The sightings could be found on the GSM website. The campaign was being continued, and interest was growing, with considerable media coverage. The International Day of the Baltic Harbour Porpoise was also important with regard to media attention.

Penina Blankett reported that Finland was continuing a campaign started in 2001, with a sighting campaign announced before the summer holiday season. There was a harbour porpoise web site in Swedish and Finnish and reports could be made online. There had been some observations as a result. This year Finland had produced a new poster about the harbour porpoise and how to identify it, which will be distributed in spring to marinas, ferry companies etc. The main activity in 2005 was to increase public awareness.

Jessica Hjerpe Olausson reported that Sweden had an internet reporting system for sightings, but that there were only very few reports from the Baltic.

Stefan Bräger suggested that the Secretariat might add links to websites with this kind of information to the ASCOBANS website. Rüdiger Strempel agreed this would be done if the Secretariat were given the necessary information.

Iwona Kuklik reported that the Polish approach was very diverse, with a reporting system and dissemination of information to a wide audience, resulting in considerable feedback from many different areas. Polish sailors frequently used mobile telephones to report sightings, and a sticker had been produced with relevant telephone numbers.

The Group felt that varied methods already being used successfully in the various countries, but it would be impracticable to attempt to standardize these as different approaches were most likely to be successful in different countries. This diversity should be respected if optimal results were to be achieved.

A formal re-evaluation of the Plan would not be required until 2008 (cf. Jastarnia Plan, p. 16), however developments related to the achievements of the Plan's aims needed to be continuously monitored and the Plan may needed to be adapted accordingly. The Group acknowledged that an amendment of the Plan itself was beyond its mandate, but that it could and should make recommendations as to what modifications were needed (cf. Recommendations at Annex 1).

With respect to current EU measures, the Group felt that these did not justify a modification of the plan as these measures alone were unlikely to alleviate the problems faced by harbour porpoises in the Baltic. The recommendations contained in the Plan therefore remained valid.

It this context it was noted that the pertinent EU regulations could be interpreted as prescribing a permanent use of pingers[7], whereas the Jastarnia Plan recommended their short-term use on an interim basis, preceding the implementation of more effective mitigation measures. Given the known shortcomings of pingers, this recommendation remained valid. The use of pingers should, moreover, be reconsidered within three years, with the expectation that their use would be replaced by longer-term mitigation measures at that time (cf. Jastarnia Plan, p. 13).

The Group recommended that this re-evaluation be duly undertaken in 2006.

The Group felt that ASCOBANS should write to the EU Commission suggesting that it also re-evaluate the permanent use of pingers. It was suggested that pertinent studies showing the decreasing effectiveness of pingers[8] be brought to the attention of the Commission in support of this suggestion.

10. Any other business

It was agreed that the work of this group should continue without further delays and that a permanent chairman should be elected. Iwona Kuklik proposed Stefan Bräger, and was seconded by Penina Blankett and Jessica Hjerpe Olausson. Stefan Bräger agreed to this nomination, was unanimously elected chairman, and thanked the Group for their vote.

Rüdiger Strempel confirmed that the Secretariat would compile a concise list of recommendations from this meeting. The Secretariat would also send the Chairman an updated list of the Group members, and would circulate this to the members also.

11. Closure of Meeting

Rüdiger Strempel thanked the German government for providing their facilities at such short notice, and Karl-Hermann Kock for chairing the meeting. Karl-Hermann Kock thanked the participants for their contributions and for making this an enjoyable meeting for him as interim chairman.

[7] Sweden does not feel that the Regulation necessarily describes permanent use of pingers. Rather the Commission states in Article 7 that the Regulation shall be assessed in the light of new information made available through the Regulation. Also Sweden questioned the documentation of the decrease of effectiveness of pingers and requested that the studies mentioned during the meeting be attached to the report or quoted in a list of references.

[8] Cf. comment MA6 at Annex 3

Annex 1

Recommendations

The Group formulated the following recommendations, to be submitted to the upcoming 12th Meeting of the Advisory Committee:

1. In light of the still limited number of trials with alternative fishing gear, research on this subject should be stepped up.
2. More research should be conducted on the behaviour of harbour porpoises near pingers.
3. The monitoring of population developments should be considered an ongoing project that should continue for many years to come.
4. Collation of data on fishing effort following the terms of reference and example sheet in the Recovery Plan was still outstanding. Therefore:
    - AC12 should send a clear signal to Parties to provide the needed funding
    - Terms of reference for a project request should be formulated
    - Suggestions as to who should carry out the project should be made to the Secretariat;
    - Once funding is in place and possible candidates have been identified, the Secretariat should coordinate the further steps.
5. Pilot experiments with pingers should be conducted in areas with conditions similar to those in the Baltic and with a clear halocline.[9]
6. The Secretariat should once again send the Jastarnia Plan to IBSFC, announcing that an ASCOBANS observer would attend the next meeting to present it again.
7. Finn Larsen should be contacted to inquire as to the need for additional funding for the finalization of his review of all experiments to date with alternative gear and fishing practices.
8. Fisheries organizations should be contacted to stress the importance of recovering bycaught animals.
9. A joint Baltic genetic study should be undertaken to bring together information from the whole Baltic; Parties should be asked to provide funding for this.
10. A sub-group of 5 – 10 people should meet for a one-day workshop to discuss and agree on the methods to be used in the above study. The Secretariat should explore the possibility of funding the workshop, which should be organized jointly by Jonas Teilmann and the Secretariat, probably in May or June 2005.
11. The genetics group should be asked to consider the question of including the transition zone, the Baltic proper and Danish waters in its study.
12. A study on noise emitted by vessels should be undertaken; North Sea countries should be asked to contribute to this as the findings were relevant to both recovery plans.
13. The Advisory Committee should explore the possibility of commissioning or having the Secretariat produce a report on EU legislation relevant to harbour porpoise conservation and therefore to ASCOBANS.
14. National focal points for public awareness should be established.
15. A re-evaluation of the use of pingers should be undertaken in 2006, as provided for in the Jastarnia Plan.
16. ASCOBANS should write to the EU Commission suggesting that it re-evaluate the permanent use of pingers in particular in the light of the documented decrease in effectiveness of pingers.

[9] Cf. comment HW at Annex 3

Annex 2

List of relevant map sources

http://www.bfn.de/marinehabitate/en/downloads/erlaeuterungstexte/Map6_NATURA

http://www.bfn.de/09/090501.htm

http://www.helcom.fi/gis/helcom_atlas/en_GB/atlas

Annex 3

Comments and documents submitted by Sweden

The following comments were submitted by Mats Amundin (MA) and Håkan Westerberg (HW), who were unable to participate in the meeting.

Comments by Mats Amundin

MA1(cf. page 2)

In view of the strong opposition by Polish fishermen to the ban on driftnets it might be appropriate to suggest the use of pingers on driftnets. There are strong reasons to believe that pingers would be as efficient on driftnets as on bottom set gillnets. On driftnets they would need to be attached to the lead line, which would not cause any problems.

It would be useful to know the range of water-depths and the height of the nets in this Polish fishery.

MA2 (cf. page 4)

It would be useful to know which studies were referenced here. Habituation is not very likely to become a problem, since porpoises have no motivation to become habituated/desensitized. Even is some habituation did occur the pinger sounds will allow the porpoises to detect nets, which may be the main problem in this bycatch. See also comments below.

MA3 (cf. page 5)

In another ongoing Nordic programme, called the NIPPER project (involving Denmark, Sweden and Norway) a new "interactive" pinger concept is being tested. This type of pinger also includes a POD (porpoise detector unit), logging the sonar activity of porpoises in the vicinity of a simulated set net setup. The results so far are very promising, but more trials and needed to fully evaluate the concept. It includes "alerting" sounds, which entice the porpoises to aim their sonar beams towards the pinger unit. Additional trials will be conducted in May and June 2005. This kind of pinger/POD unit will be able to collect valuable data on the behaviour of porpoises near pingers. A progress report to the Nordic Council of Ministers, which funds this project, is attached.

MA4 (cf. page 5)

It would be useful to have some indication and more details as to the kind of trials undertaken.

MA5 (cf. page 6)

Håkan Westerberg has done and reported on this modeling, and concluded that there was no reason to suspect that pingers would function less effectively in the Baltic (cf. Håkan Westerberg, John Spiesberger, "The range of acoustic pingers in the Baltic and North Sea, AC10/Doc. 47, Bonn, 2003)[10]. On the contrary: if a thermocline or halocline entrapped the deterrent sounds from a bottom-set net, this would most likely increase the deterrent effect of the sound. If a porpoise was allowed to move freely above, such a net would not put it at any higher risk of entanglement.

MA6 (cf. page 13)

[10] Secretariat's note: this document was acknowledged but not discussed in detail by AC10

It should be pointed out that if such habituation effects have occurred, these involved the "Ducane"-type pingers with one type of deterrent sound emitted at regular four-second intervals. The pinger type mostly used in Europe, the "PICE" type, has a varied interval between five and 30 seconds, and eight different sound-types. Hence the risk of habituation will be much lower if the PICE type is used. A new "interactive" concept is presently being tested in the field in Denmark. With this concept the deterrent sound is triggered by the sonar of the porpoises, and hence is emitted even less frequently, thus delaying any possible habituation even further. This pinger type will also decrease the risk of the pingers acting as "dinner bells" to the grey and harbour seals occurring in the Baltic. This risk has been raised as a serious concern by Baltic fishermen.

Comment by Håkan Westerberg
(cf. page 14)
Recommendation 5 should be removed in light of the existence of the Westerberg/Spiesberger report submitted as Document 47 to AC10, Bonn, 2003.[11]

[11] Secretariat's note: this document was acknowledged but not discussed by AC10

Annex 4

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STATUS REPORT

1. Project Title etc.

Project Title:	NIPPER – Nordic Interactive Pinger for Porpoise Entanglement Reduction.		
Project number:	2003-431-2002	Filenumber in NMR:	2003-431-0002
Project completion date according to contract:	31.12.2005	Revised completion date (if applicable):	
NMR Project Advisor:	Danfriður Skarpheðinsdottir, Ásmundur Guðjonsson		

2. Grant Recipient

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Project Leader: Tel (direct)/e-mail:	Dr. Geneviève Desportes +45 65 32 57 83 # 25 / +45 21 24 30 03 / genevieve@fjord-baelt.dk

3. The project's status

Has the project followed the goals established in project tasks/project plan	Yes ☐	No X

Give brief account of the project's most important results so far:

The objective of the NIPPER project is to test the interactive pinger in a set-up simulating a bottom set gillnet fishery, i.e., to expand from one interactive unit (NAPER project) to an array of units, allowing for a more realistic evaluation of the concept. The array of interactive pingers was to be deployed in an area of high porpoise density (Fyns Hoved), and the behaviour of individual porpoises (diving pattern and acoustic activity) was to be compared between 3 experimental regimes: a) baseline, b) emission of enticing sounds alone (deterrent units present but inactivated) and c) emission of enticing sounds and deterrent system activated.

The planned field trials were conducted from Fyns Hoved between August 1 and September 6. A preliminary evaluation was presented in the September Status Report. The main points were that the method used for monitoring the porpoise behaviour from a landbased station, the acoustic listening system as well as the logging function added, or POD function, added to the interactive pinger unit, performed satisfactorily. However the interactive deterrent system did not seem to conform with the specified requirements and have the expected effects on the porpoises. It was therefore decided to stop testing the effect of the interactive deterrent system and to concentrate on testing the effect of enticing sounds. In addition to the initially planned data collection, unique data allowing the calculation of the source level of the sonar clicks of wild porpoises were collected. These constitute the first existing data on source level from wild porpoises and are needed to optimize the design of the interactive pinger. More precisely these data are necessary for finding the optimal trigger level of the interactive pinger.

Although the number of actual trial day was limited by weather constraints and technical problems (20 days out of 35 days), the high density of porpoises allowed the project to in fact collect an overwhelming amount of data, especially acoustic data. Since September, the registration, validation and evaluation of the data has been going on and the work is nearly completed, but for some of the acoustic data. The analysis of some of the data is well in progress.

The most important results obtained so far can be summarized as follows, while a more detailed report can be found in appendix 1. The observations totalled 140 hours and contained 276 tracks of porpoise surfacings, but only 206 tracks are included in the analysis, including 24 Zero-baseline tracks (no equipment in place), 78 Baseline tracks (inactive pingers deployed; only the POD function activated), 66 Enticing sound tracks (enticing sounds emitted semi-randomly with 30-60 sec intervals; POD function activated) and 38 Whole system tracks (enticing sounds emitted and deterrent unit activated).

The analysis of the data, although far from completed, brightens the picture from the summer and showed that the interactive pinger-POD units produced in fact promising results.

- Despite the lack of response to the displacement sounds exhibited by some of the porpoises, the distribution of the porpoises is significantly different in the 0-50m and 100-150m intervals around the array of pingers when comparing the Whole system tracks and the Enticing sounds tracks. There was no significant difference in the distribution of porpoises during Baseline tracks and Zero-baseline tracks. The median of the closest approach distance was 75m for the Whole system tracks compared to the 27m found for the Enticing sound tracks and 36m for Baseline tracks.
- The effect of the enticing sounds is still unclear and it needs to be further investigated, with special focus on their effect on the acoustic response of the porpoises.
- The preliminary calibrations of the pinger-POD indicate that the source level was too low, which may explain of absence of displacement observed in some of the porpoises, although the overall response showed a displacement.

Further trials are needed to fully evaluate the interactive pinger and POD functions and especially understand why some animals did not react to the deterrent sounds. They are planned for May-June 2005.

4. Project account status

State account period from start to date of status *Start date:* **April 1, 2004** *Status date:* **December 31, 2005**		*Currency:* **DK Kr.** **Budget**	**Account**
Income	Funds from the Nordic Council of Ministers	500.000	237.500
	Other income	353.742	365.532
	Total income (A)	853.742	603.032
Expenses	Salaries, social duties etc.	398.622	343.142
	Travel	31.000	12.454
	Arrangement of results, incl. printing	25.000	0
	Evaluation	0	0
	Other expenses	334.000	260.332
	Overhead	65.232	37.559
	Total expenses (B)	853.854	653.487
	The project's financial position per. status settlement, total (A-B)		**- 50.455**
	Project funds not yet disbursed from the Nordic Council of Ministers Secretariat	**262.500**	

Comments to the account

A detail of the account is given in appendix 2. External funding has been obtained from the Kolmården Insamlingsstiftelse (KIS, Kolmården Fundraising Fundation: DKK 125.000), Fiskeriverket (FV, Swedish National Board of Fisheries: DKK 36.000) and through DFU (DKK 123.000).

The expenses do not include the price for the deterrent system, which did not perform according to the specification required and of which payment settlement is awaiting the completion of the evaluation of the problem.

If, in the project tasks or grant confirmation, there is a more detailed specification of what the project funds can be used for, the final report shall have the same specification enclosed and submitted instead of the above form. Regarding auditing and storing of accounts material, please see pt. 6 in standard conditions for project contracts from the Nordic Council of Ministers.

5. Other information

Other, e.g. experience from the project, which could be submitted to the Nordic Council of Minister's Secretariat, for example regarding the project process.

It is planned to conduct another 3-4 weeks field trial in May/June 2005 to complete the tests of the deterrent system. By then the pinger manufacturing company will have adjusted and improved the units, so they fulfil the specifications.

The expenses related to this unbudgeted field period can be paid in part from the savings made on MiFi funding during the completed field trials (still available DKK 212.157)). Complementary funds have to be found for salaries, some field work expenses and data analysis. A total of DKK 125.000 has already been secured from KIS for M. Amundin and G. Desportes salaries, while F&B and KD have agreed to cover social levies. DFU has agreed to cover F. Larsen salary, social levies and personal expenses. HFI agreed to cover A. Bjørge salary and social levies. DKK 300.000 remains to be found and have been applied for to MiFi.

A press release has been distributed during the field summer season (appendix 3) and forwarded by Ritzau Bureau. The project, including MiFi financial support, has been reported in several local and national newspapers, incl. Berlingske Tidende, Politiken, Jyllands Posten, Midtjyllands, Fyens Stiftstidende, Avis and the very local Kerteminde Avis (see appendix 4 for a few examples).

The students acting as observers came from the Universities of Copenhagen, Aarhus, Odense and Plymouth, two of them use NIPPER data in their university curriculum. Niels. K. Petersen is currently doing a master project on 'Repetition rate pattern in the sonar of free ranging harbour porpoises' at the university of Copenhagen, under the extern supervision of M. Amundin. Linda. R. Poulsen is currently looking for funding for a PhD project with the title 'Mitigation of harbour porpoise by-catch – Testing an interactive pinger'.

The status of the project at present is as follows:

- Analysis in progress,
- Detailed calibration of the output of the deterrent system in progress.
- Fund raising for and preparation of the 2005 field trials.

6. Signatures

For the grant recipient *(see. pt. 6 under Conditions)*

Date, Signature 1 (Signatory)

Date, Signature 2 (Financial accountable)

Project Leader

Date, Project Leader

Appendix 1: Detailed status report

STATUS REPORT – NIPPER 2004

'Nordic Interactive Pinger for Porpoise Entanglement Reduction'

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And
Linda R. Poulsen, Fjord&Bælt, Kerteminde, Denmark
Niels K. Petersen, Fjord&Bælt and Copenhagen University, Denmark

GENERAL AIM OF THE NIPPER PROJECT

The ultimate goal of the NIPPER project is the development of a more porpoise and environment friendly by-catch mitigation method: a.o. less sound emitted to the environment and short animal reaction.

Interactive pingers represents an interesting alternative to traditional, "beacon mode" pingers because the emission of the deterrent/displacement sounds is triggered by the porpoise own sonar, which means they are only emitted when there are porpoises in the vicinity of a net, i.e when they are useful. This reduces greatly the emissions, compared to traditional pingers. Field trials with a single interactive pinger prototype (NAPER Project) demonstrated that it emitted 3% of the deterrent sounds that would have been emitted by a "beacon mode" pinger (Poulsen 2004, Poulsen *et al.* ms).

Following the NAPER project, which was testing a single prototype, the NIPPER project is taking the testing of the interactive pinger concept a step further, going from testing a single prototype (NAPER project) to testing an array of interactive pingers, thus approximating a fishery situation.

The first set of trials was conducted on wild naïve porpoises between the 1st of August and the 6th of September 2004 in the waters off Fyns Hoved. Visual observations and underwater acoustic monitoring should allow comparing the distribution and the echolocation activity of porpoises before and after a displacement sound had been triggered and estimating the displacement distance of the porpoises.

PRELIMINARY REPORT FROM THE 2004 FIELD TRIALS

1) GENERAL METHODOLOGY

The Northwest side of Fyns hoved was chosen as experimental area because of its high porpoise density, and because of a 21m high cliff, which provided a suitable platform for the visual, landbased observations.

A 300 m long simulated bottom set gill-net was deployed. There was no mesh, but the floatline was kept at the intended depth (2m above the seabed) by thin vertical lines attached to the leadline at 5 m intervals.

Four independent interactive pingers, each supplemented with a separate, broadband hydrophone, were deployed at 100m intervals, close to the simulated net, and at the same depth as the float-line. Hydrophones were used to pick up the echolocation of the porpoises. Each was connected by a underwater cable lying on the sea bed to a listening and recording station on the beach, operated by one 1-2 observers. A special POD (POrpoise Detector) unit built in each pinger also recorded the underwater acoustic activity.

A digital theodolite in combination with a custom made tracking software was used to monitor and evaluate the response of the porpoises to the different sound transmissions. It was operated from the top of the cliff by 3-4 observers.

It was planned to use four different treatments:

1. Zero-baseline: no equipment deployed
2. Baseline: Only logging function running, i.e. passive listening with hydrophones and POD function, no sound output
3. Enticing sounds: Enticing sounds transmitted with pseudo-random intervals of 30 sec – 1 min, irrespective of triggering by porpoises, POD function activated.
4. Whole system: Interactive pinger system activated (a displacement sound emitted when triggered by porpoises, and the unit then continuous in beacon mode transmission for a set of 4 emissions). Enticing sounds are transmitted pseudo-randomly and the POD logging function is activated.

Observations were made during daylight, for as many hours as the weather permitted, i.e., they were interrupted if the sea state was exceeding Beaufort 2 or if it was raining heavily. Effort and weather conditions were recorded every half an hour and whenever weather changes occurred during the entire observation period.

2. METHODS

2.1. The interactive pinger array

Four buoys were deployed with 100m intervals in a straight line perpendicular to the coastline in front of the cliff used for the visual observations. The buoy closest to the shore was approximately 75m from the coastline. Four independent pingers were deployed with a hoist system on the anchor cable of each buoy and fixed approximately 2m above the seafloor.

A saltwater switch activated both the trigger and the POD function of the pingers when they were lowered into the water and deactivated them when taken out of the water. These events were marked with a time stamp in the POD unit.

2.2. The acoustic listening system

The passive listening of the porpoise sonar activity was accomplished by unsing four 13mm spherical hydrophones (HS/150, Sonar Research and Development, Ltd, East Yorkshire, UK) connected to a waterproof preamplifier container. The hydrophones were fixed to the anchor cable of each of the buoys immediately below the pingers. Individual cables resting on the seafloor connected each hydrophones to a custom made four-channel porpoise envelope click detector unit (ECD-1, NewLeap Ltd, Cardiff, Whales, UK). The click detectors had a high pass filter, which eliminated most of the boat and wave action noise, and allowed for the detection of porpoise echolocation signals in the frequency band 100-150 kHz.

A speaker was connected to each click detector output, allowing the observer at the listening post to monitor the underwater acoustic events, including the interactive pinger emissions. Each time echolocation clicks were heard from one of the four hydrophone channels, the two Sony mini-disc recorders (MZ-R55), also connected to the click detector outputs, were manually started. Thus all acoustic events, including the transmission of displacement and Enticing sounds in connection with porpoise interactions were recorded.

The observers at the listening post made detailed notes on a digital dictaphone on the start and end time of the recordings, of any boats passing by and of other events affecting the underwater recordings.

2.3. The visual observations

The visual observations were conducted from a cliff top facing the experimental area, approximately in line with the array of pingers. The observers tracked the surfacings of porpoises in the area with a digital theodolite (Geodimeter 468) connected to a laptop running a custom-made tracking software (Cyclopes, The University of Newcastle, Callaghan, NSW 2308, Australia). The theodolite recorded a horizontal and vertical angle to all surfacings along with a timestamp, and joining subsequent positions of the surfacings formed the tracks. The observers always tracked the porpoise spotted closest to the array of pingers and each track continued until either the porpoise were out of sight or another pod of porpoises was spotted closer to the array of pingers.
The position and height over the ground of the theodolite was the same during all observations. In addition the horizontal angles recorded by the theodolite were calibrated before each observation session by the use of a reference point with a known compass bearing.

Three observers conducted these observations, and the primary job for them was to keep their eyes on the water surface in search of harbour porpoises and tracking the porpoises spotted closest to the pinger. In relation to this, all the relevant information regarding the track was noted in the tracking software run on the laptop (pod size, number of calves, behaviour etc.). Secondarily these observers recorded boat traffic (a few track positions, indicating the speed and direction of course) and the limited changes in the position of the pinger buoys caused by tidal currents, wind etc. As mentioned earlier, weather changes were noted and they included: sea state, wind

direction, swell height and direction, degree of cloud cover, position, strength and angle extensionof the sun glare, tide and sea-level, visibility (distance at which a porpoise could be easily spotted with naked eye) and sightability (subjective impression of the conditions for spotting porpoises, all parameters combined).

2.4. Treatment period

The minimum treatment period was set to a full day, since lifting the pingers out of the water and connecting them to a laptop running the AQUAtec software (AquaTalk), was the only means of changing the treatment type. This might cause unnecessary and immeasurable disturbance, and therefore we chose not to change treatment during an observation day. Hence, the pingers were deployed prior to the beginning of an observation day and picked up immediately after an observation day had finished.

3. RESULTS AND DISCUSSION

The analyses are not completed and hence we present in this preliminary report the problem encountered with the deterrent system, the results from the visual observations, and the status of the other ongoing analyses.

3.1. Problem encountered with the deterrent system

The trig and the POD function did not work at first, and the Aquatec representative on site was finally able to pin down the problem to the built-in hydrophones not being sensitive enough. In spite of his efforts, it was not possible to remedy this on site, so the units had to be sent back to the UK. After they were rebuilt and returned, several new versions of the software had to be provided via Internet and installed in the units. Primarily the new software was reducing boat and other noise that false triggered the unit and filled the memory.

When the system and software were considered working satifactorily, the trials started. However, it soon became apparent that a few animals showed little or no reaction when they triggered the displacement sounds. A mother-calf pair in particular played around the pinger closest to the shore for several hours in spite of triggering it several times. Due to this completely unexpected lack of response, it was decided to abort the whole system testing until a careful calibration of the output of the units had been carried out to check whether the output signal was fulfilling the requirements given. However this calibration was not possible to do within the timeframe available for the field trials. Therefore only the trials with treatment 1, 2 and 3 were carried out, so at least the effect of Enticing sounds and the function of the POD unit could be tested.

3.2. Data obtained

Of the 35 days scheduled for the study, 7 days were planned for setting up and packing down and 28 days were planned for observation. However, primarily due to constraining weather conditions, but also due to the technical problems mentioned above, only 20 days could be used for observation. During these 20 days, the weather conditions permitted 140 hrs of observation to be carried out. This gave an average of 7 hrs of observation per day, while a normal day was scheduled to 12 hrs of observation plus data extracting/entering.

Nevertheless, because of the relatively high density of porpoises, compared with the previous years, a total of 276 tracks of porpoise surfacing were obtained.

Of these 276 tracks, 206 tracks are included in the analysis. The excluded tracks are the ones conducted during the malfunctioning "whole system treatment", tracks outside the pre-defined maximum 400m range around the observation platform and tracks with boat disturbances. Hence, the analysis will be based on 24 Zero-baseline tracks (no equipment in place), 78 Baseline tracks (inactive pingers deployed; only the POD function activated), 66 Enticing sound tracks (Enticing sounds emitted semi-randomly with 30-60 sec intervals; POD function activated) and 38 Whole system tracks (enticing sounds emitted and deterrent unit activated; the tracks obrained before this treatment was aborted).

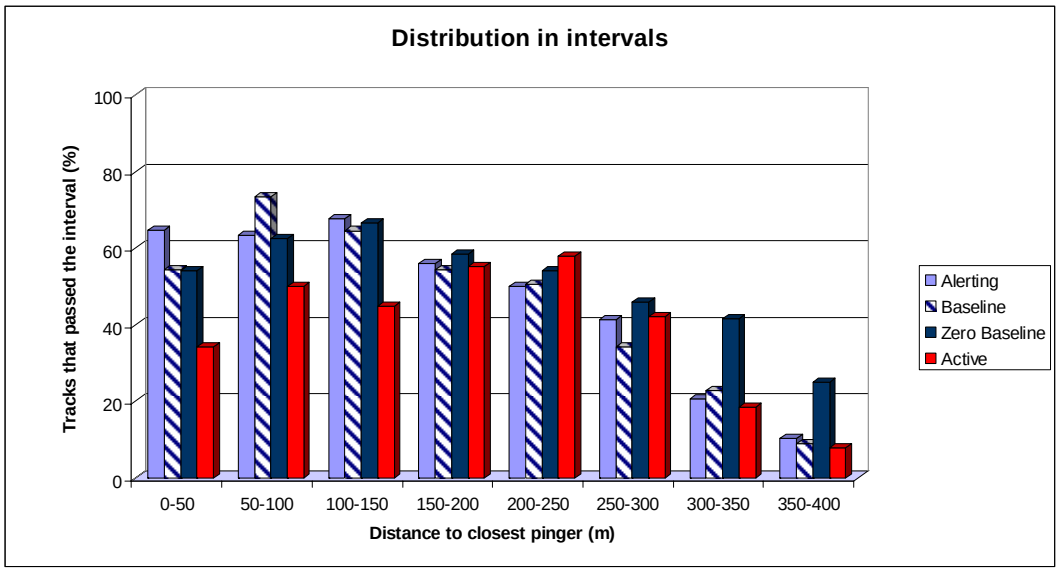
3.3. Distribution of porpoises

The observation area was divided into eight concentric ovals surrounding the linear pinger array up to a distance of 400m. Each interval had a width of 50m. For each track it was determined whether or not the porpoise had surfaced within each of the eight intervals. The proportion of porpoises present in each interval during the baseline treatment was tested against the distribution of porpoises during both Zero-baseline and Enticing sound treatments using χ^2 tests.

A significant difference in the distribution of porpoises was found for the distance interval 50-100m from the pingers, when comparing Baseline and Enticing sound tracks. No significant difference in the distribution was found for any of the intervals when comparing Zero-baseline and Baseline tracks.

In spite of the displacement sounds apparently having little or no effect on some animals, the distribution of the Whole system active tracks was significantly different from the Enticing sound tracks in the 0-50m and 100-150m intervals.

The median of the closest approach distance to the pinger array was 46m for Zero-baseline tracks, 36m for Baseline tracks and 27m for Enticing tracks, but no significant difference was found between these treatments. The median of the closest approach distance was 75m for the Whole system tracks.



3.4. Dive specific response

Preliminary results have been calculated for the following dive parametres:

1) Average dive length: Zero-baseline = 23m, Baseline = 24m and Enticing sounds = 21m (no significant differences)
2) Average dive duration: Zero-baseline = 19s, Baseline = 20s and Enticing sounds = 22s (no significant differences)
3) Change in distance to the pingers during the 5th dive in each track: No significant changes between Zero-baseline, Baseline or Enticing sound tracks.
4) Dive length, duration and changes in distance to the pinger for the dive closest to the pingers: no significant differences between Baseline and Enticing sound tracks.

3.5. Acoustic activity of porpoises

In 38 Baseline tracks the porpoises swam through the array, and in 37 of the remaining Baseline tracks, the porpoises got within an arbitrarily chosen range of 100m from the pinger array. An ongoing analysis is examining how often echolocation clicks were heard during these tracks and in which click repetition rate pattern.

The acoustic activity will also be analysed for the 41 Enticing sound tracks, where the porpoises swam through the hydrophone/pinger array, and for the 18 tracks, where they came within 100 m of one of the pingers.

3.6. Data obtained from the POD function, added to the original deterrent unit

The POD recordings (1-4 files per pinger per day) will be compared with the acoustic recordings from the four hydrophones, in order to assess the POD and the trig function of the pinger.

During baseline treatment no sounds were emitted from the pingers, but it is still interesting to know when and how often the porpoises echolocated at the pinger. The POD recordings can, for example, reveal in which situations during baseline treatments the pingers would have been triggered by porpoise echolocation clicks, if the pinger had been activated. The POD recordings will also be used to analyze the sonar use of the porpoises with special focus on inter-click-interval and inter-click train-interval. Also it will be possible to calculate how many false triggerings, caused by ambient and boat noise, occurred.

In spite of the noise rejecting algorithms being added to the software of the pinger, the POD function was still triggered by many outboarders passing at close distance. Besides filling the limited memory, it also made it necessary for post-processing in order to extract the porpoise clicks. If not possible to improve the noise rejection, the memory size will have to be increased, since in several long deployments, the POD unit memory was full before the deployment was terminated.

So far, algorithms in Excel have been designed to extract the porpoise click trains. Although perfectly doable, it is a rather slow process, and ways to improve it is presently investigated. When the filtering of the porpoise clicks versus the noise has been carried out, the analysis can continue and the amount of false triggering by boat noise can be estimated.

3.7. Data on the source level of sonar clicks in wild porpoises

Recordings allowing for the calculation of the source level of sonar clicks from wild porpoises were carried out. This was not planned in the original proposal, but the possibility to borrow new equipment from DIFRES made it possible to add this to the setup, without interrupting the other data collection. Source level measurements on wild harbour porpoises have never been carried out before, and such data is necessary in order to optimise the design of the interactive pinger; especially the trigger function of the POD unit. Also it will make it possible for us to assess whether porpoises can detect a gillnet, and if so at what distance, and hence to assess other solutions than using active acoustic alarms for reducing the bycatch.

The full frequency bandwidth recordings were based upon a well-established technique, using a linear three-hydrophone array, deployed below a small dingy. The distance between the hydrophones were 2 m. Each of the hydrophones were connected via two Etec preamplifiers (26 dB, 10 kHz high pass filter and 40 dB) to a National Instruments DAQPad 6070E in combination with a Dell Inspiron 8600 laptop, running a custom designed LabVIEW script which controlled the DAQPad. A NewLeap envelope detector (ECD-1) was connected to a speaker, providing an acoustic feedback to the operator.

The ongoing analysis will be based on the different time of arrival of the clicks to the three hydrophones. The time delay between the three channels varied from close to zero to 1,31 msek, the latter the result of the porpoise being in line with the array (sound speed in sea water ca 1530 m/sec). Provided that the porpoise is within a sector roughly perpendicular to the array, a direction and distance to it can be calculated with sufficient precision to allow for the click source level to be calculated by adding the transmission losses to the measured click amplitude. A MatLAB script for this analysis has been provided by Magnus Wahlberg, Århus University.

The recordings were carried out over two days, September 4, 2004, between 10:02 am and 7:44 pm and September 5, between 09:21 am and 6:19 pm.

On the 4th, 9 click train sequences, with clicks present on all three channels, were extracted from a total of 22 recordings. Each recording file was 2,3-7 MB and mostly recorded with a sampling frequency of 400 kHz.

On the 5th, 80 useful click train sequences were extracted from a total of 204 recordings, representing 22 different theodolite tracks. The remaining recordings included 32 click train sequences, recorded with a 1,12 MHz sampling rate, in order to make it possible for very detailed frequency and time series analysis.

3.8. Miscellaneous project

In connection with an ongoing Master study on environmental enrichment for bottlenose dolphins kept in human care at the Kolmården Dolphinarium, extensive recordings with the POD-units have been conducted. The noise level in the pools is very low, and under these circumstances the POD correctly recorded the echolocation activity as well as ultrasonic social sounds. After converting the POD files to excel format, they will be subjected to a variety of analyses, e.g. of the inter-click-intervals, click amplitude (in 4 by 4dB classes), and 24hr echolocation activity distribution. These recordings may be possible to use as reference for the Nipper analyses.

3.9. Pinger calibrations

After the observations that some porpoises triggered the pinger at very close distance without showing any displacement, the testing of this function was aborted. It was feared that the porpoise might habituate to the sounds, which would jeopardise the proper testing of the concept.

Later in the fall of 2004 a partial calibration of the pingers was carried out in a small marina, close to the Kolmårdens Djurpark. The pingers were deployed from a pontoon pier with a fixed distance of 1,1 m to a HS/150 hydrophone, which was connected via Etec preamplifiers to the DAQPad 6070e and the Dell Inspiron 8600 laptop. A total of 71 files were collected:

pinger #1:	1 deterrent sound file;	4 alerting sound files
pinger #2:	6 deterrent sound files;	2 alerting sound files
pinger #4:	13 deterrent sound files;	7 alerting sound files
pinger #5:	12 deterrent sound files;	7 alerting sound files
AquaMark100	19 deterrent sound files (serial number 06/04 100 6782)	

with the pingers in different orientations relative to the hydrophone.

The analyses of these recordings are ongoing, but a preliminary finding is that the amplitude was varying considerably within the deterrent sound emission, with the highest amplitude being found in the start and at the end of the sound. These maximum amplitudes were around 140 dB_{p-p} re 1 µPa. Due to the variations the amplitude throughout the sound was recalculated into RMS. It was found to be around 134 dB_{rms} re 1 µPa (range 126-142 dB_{p-p} re 1 µPa). The amplitude of the Aquamark100 sounds was also varying, and the peak amplitude, found in the end of the sound, was 140 dB_{p-p} re 1 µPa. RMS-recalculations are pending. According to the specifications the source level should have been 145 dB re 1 µPa @1 m. It is not specified if this was measured as peak-peak or RMS. The frequency distribution was similar in both the pinger-PODs and the Aquamark 100, but differed somewhat in details from the original PICE units. The possible implications of these differences could not be assessed. Conclusion: the SL of the deterrent sounds was much lower than specified (134 vs 145 dB re 1 µPa @1 m), and this may explain the lack of displacement in some of the animals triggering the device. Also the amplitude should have been even throughout the full duration of the sounds.

The alerting sounds of the interactive pingers were also recorded, and preliminary findings indicate that they had a source level of around 130 dB_{p-p} re 1 µPa. The indivudal clicks were multi-cycle and approximately 175 µsec long. They had two frequency peaks, at 102 and 135 kHz, with the latter being ca 4 dB stronger than the former.

Conclusion: The SL of the alerting sounds was according to the required specification (130-135 dB re 1 µPa @1 m) and the duration was similar to that of a porpoise sonar click, but the frequency spectrum should have been more narrow-band, with only one energy peak at 135 kHz. Further analysis of the sound recordings is needed to assess if the SL was high enough to have the intended effect on the porpoises.

4. CONCLUSIONS

Although based on preliminary results, the interactive pinger-POD units produced promising results. After the initial technical problems, requiring considerable trimming and rebuilding, the POD and trigger function appeared to work fine. However, the problems encountered and the time taken to solve them limited the number of trials that could be carried out. Also the lack of response to the displacement sounds, shown by some of the porpoises, made it necessary to abort the trials with the full system activated. It was suspected that this lack of response might be due to the sounds not being strong enough or distorted in some ways compared to the commercial Aquamark100 pinger sounds they were supposed to transmit, and the deterrent effect of which has been demonstrated on porpoises. Therefore, careful calibrations have been initiated, and the analysis of these is ongoing. Based on the results from these calibrations, adjustments of the pinger PODs will be made beforenew trials will be conducted. Such trials are planned for the summer of 2005. Close contact with the company providing the pinger-PODs will ensure that the units will be ready for full scale trials by then.

The ongoing analyses described in the report will be continued and expanded.

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Agenda Item 4.1: **ASCOBANS Baltic Recovery Plan ("Jastarnia Plan") – Implementation**

The range of acoustic pingers in the Baltic and the North Sea

Submitted by: **Sweden**

ASCOBANS

NOTE:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF THESE DOCUMENTS TO THE MEETING

The range of acoustic pingers in the Baltic and the North Sea

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Background

Acoustic pingers have been used as deterrents to avoid cetacean bycatch in fishing gear during a decade. Several trials have shown that pingers can reduce entanglement risk (Lien *et al*., 1992, Kraus *et al.*, 1997, Larsen, 1999 Larsen *et al* 2001). A comprehensive review was made recently by the ICES Working Group on Marine Mammal Population Dynamics and Habitats (ICES CM 2002/ACE:02).

The ASCOBANS recovery plan for harbour porpoise in the Baltic (Jastarnia plan) recommends implementing pingers on a short term basis. This was opposed during the 2002 Advisory Committee meeting on the ground that the acoustic conditions in the Baltic is special and that the pinger signal may behave differently there compared to the in areas where pingers had been tested. It was decided that a simple modelling exercise should be conducted to study if pingers will function in the Baltic as they do elsewhere.

No analysis has been made of the sound propagation in any other area where pingers have been used. To make a modelling of the conditions in the Baltic meaningful a study also had to be done for the area in the northern North Sea, where the successful Danish pinger experiments have been made.

The modelling has been made with initial conditions representative for the cases where interaction is most probable – in the Baltic for the salmon drift net fishery and cod gillnets the whole year and in the North Sea bottom set gillnets in the autumn. The characteristics of the acoustic source was chosen to simulate the Aquatec Sub-Sea Ltd Aquamark 100^{TM}. In running the model the distance to where the pinger signal transmission loss was 56 dB was calculated in the vertical plane through the pinger. This loss is equal to the transmission loss at 300 m range in homogenous water, combining spherical spreading and sound absorption.

Input data

The Baltic Sea is a brackish, shallow sea with a strong salinity stratification. The upper 50-60 m are nearly isohaline. This surface layer is separated from the deep water by a smooth halocline at between 60-80 m depth, where the salinity increase is 3-4 psu and the increase in temperature is 2-3 deg. During the summer a variable seasonal thermocline develops in the upper 10-20 m, see Figure 1.

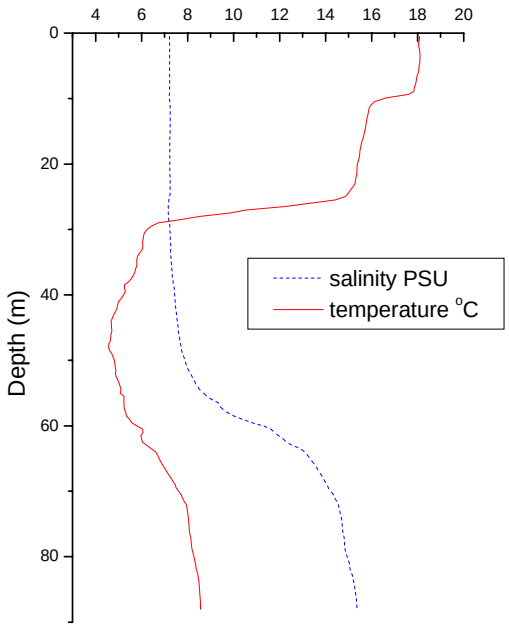

Figure 1. Stratification in the Bornholm deep in summer.

The southern North Sea is tidally well mixed, but to the north and east of the Dogger bank, at depths larger than 50 m, the water column is stratified. This is the region where the Danish experiments with pingers were made 1997. Compared to the Baltic Sea the salinity variations are small, but the seasonal thermocline is similar in strength in the two areas. A comprehensive review of the hydrographic conditions both for the Baltic and the North Sea can be found in Rodhe (1998).

Representative CTD casts were chosen to calculate the vertical sound velocity profile in the two areas. For the Baltic the Swedish hydrographic monitoring database was used to select a summer and a winter profile from the Gotland basin and a summer profile from the Bornholm basin. For the North sea the ICES archive was used and two autumn profiles were chosen from the Danish fishing area (Larsen 1999). The positions of the CTD stations is shown in Figure 2.

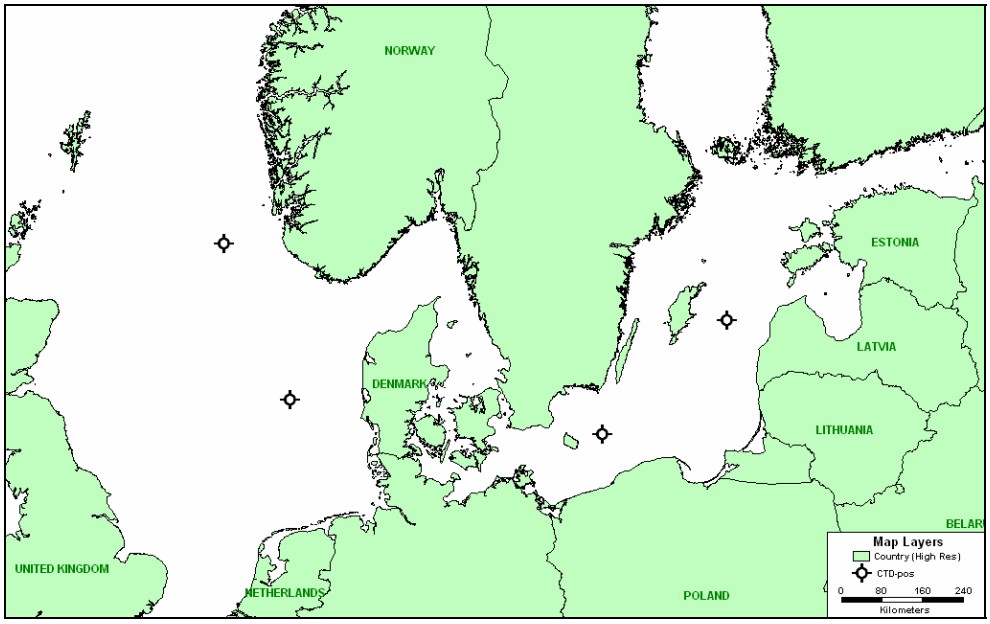

Figure 2. Positions of the hydrographic data used in the model.

The Swedish fishery with bottomset gillnets in the Baltic is mainly for cod and flatfish. The central and southern Baltic proper, where the conflict with harbour porpoise is most probable, is also the area with the highest fishing effort with gillnets. This is also where most of the driftnetting for salmon takes place. The depth distribution of the gillnetting is shown in Figure 3. The cod fishery is concentrated to the cold water below the thermocline and down into the halocline layer. Most of the flatfish fishery takes place above the thermocline.

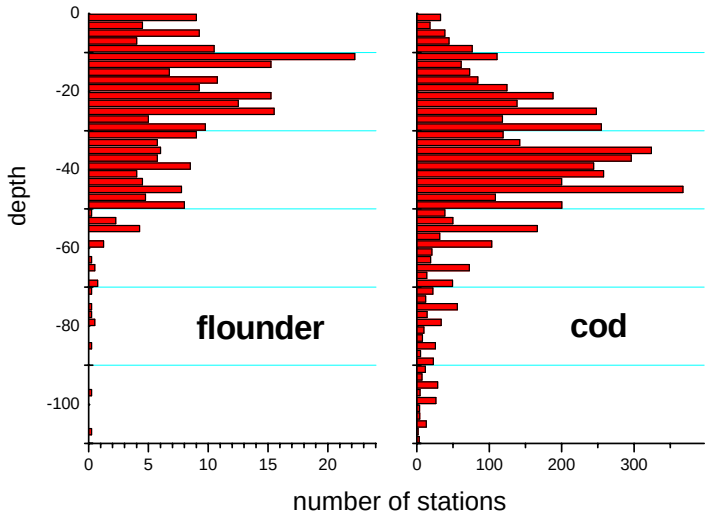

Figure 3. Depth distribution of bottomset gillnet stations in the Baltic fishery.

Methods

The transmission loss from a sound source with a frequency sweep from 20-160 kHz and a pulse length of 300 ms was computed in an x-z grid (where x is range and z is depth) using the ray-tracing program ZRAY (Spiesberger et al 1994). In each gridpoint the program scans through the different eigenray arrivals and uses the loudest to calculate the transmission loss for that point. The z values are spaced evenly in depth with a separation of from 2 to 6 m increasing with the bottom depth in the model. Horizontally the grid interval was 20 m out to 1000 m from the source. For each depth the distance in the x direction where the transmission loss equalled 56.14 dB was interpolated between gridpoints. This transmission loss is equal to that at 300 m distance for spherical sound propagation in a homogenous medium, and was chosen as a reference level, based on the observations that pingers in behaviour studies seems to give avoidance at approximately that distance.

The sound velocity profile was calculated using Del Grosso's algorithm (Del Grosso 1974) for the three cases in the Baltic and two in the North Sea. For each of those cases a range calculation was made with the sound source at 1 m depth and the full water depth of the profile, to simulate a pinger deployed at a drift net. The vertical grid spacing was 5 m for those calculations. To simulate deployment on a bottomset gillnet the bottom depth was varied from 10 to 60 m with 10 m intervals and the sound source was 2 m above the bottom for each such model run. The acoustic properties of the bottom sediments in the areas are not accurately known and a constant transmission loss of 20 dB was used for each bottom bounce, which means that the reflected rays have negligible effect on the loudness measured at the receivers.

In total 5 simulations were made for a pinger close to the surface and 28 simulations with the source 2 m above the bottom.

Results

The range calculations for the source depth 1 m below the surface is shown in Figure 4.

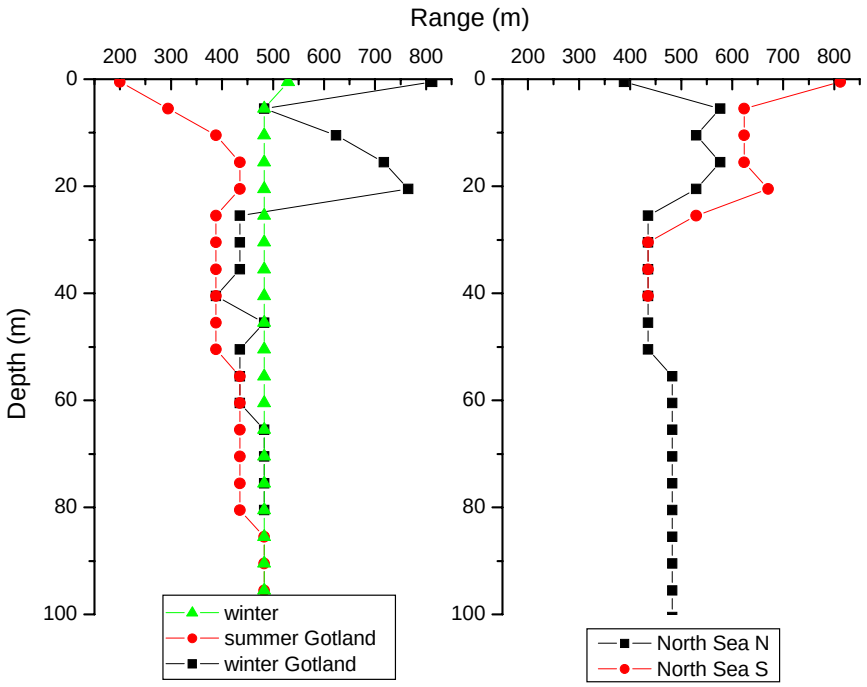

Figure 4. The range with a source at 1 m depth for a transmission loss of approximately 56 dB (equivalent to 300 m range with spherical propagation in homogenous water) as a function of receiver depth.

The results of the model runs with the source close to the bottom are presented in a contour plot for each sound velocity profile. These maps (Figures 5-7) show a schematic vertical section with a sloping bottom and with range contours in 25 m intervals. A point in the map shows the range with 56 dB transmission loss at the depth given by the y-co-ordinate, and with a source 2 m above the bottom at a bottom depth corresponding to the x-co-ordinate of the point.

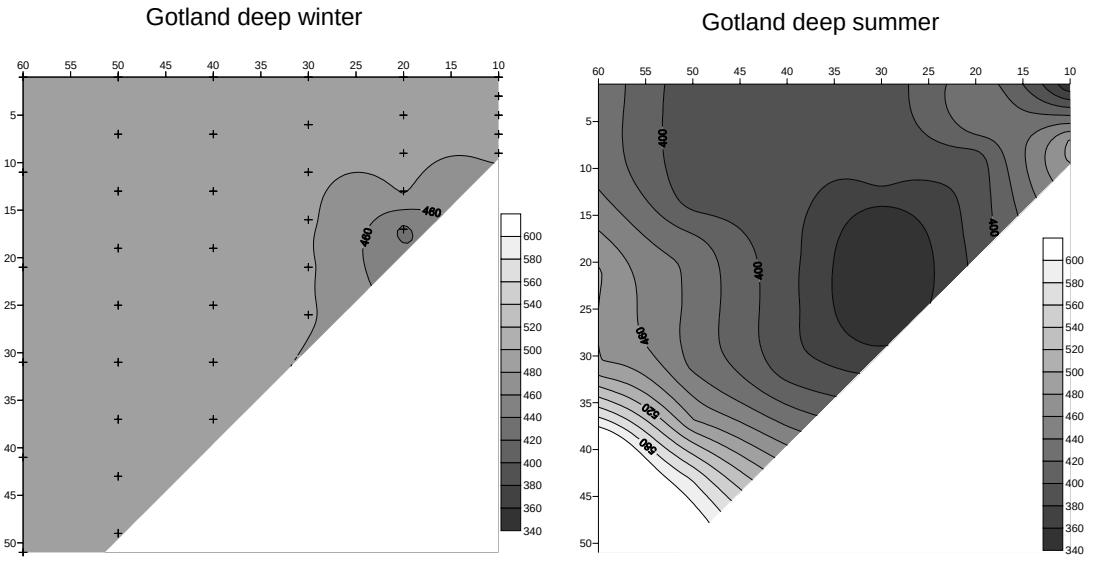

Figure 5. Range in m of a pinger 2 m above the bottom in the Gotland deep in the Baltic. For interpretation of the map see text.

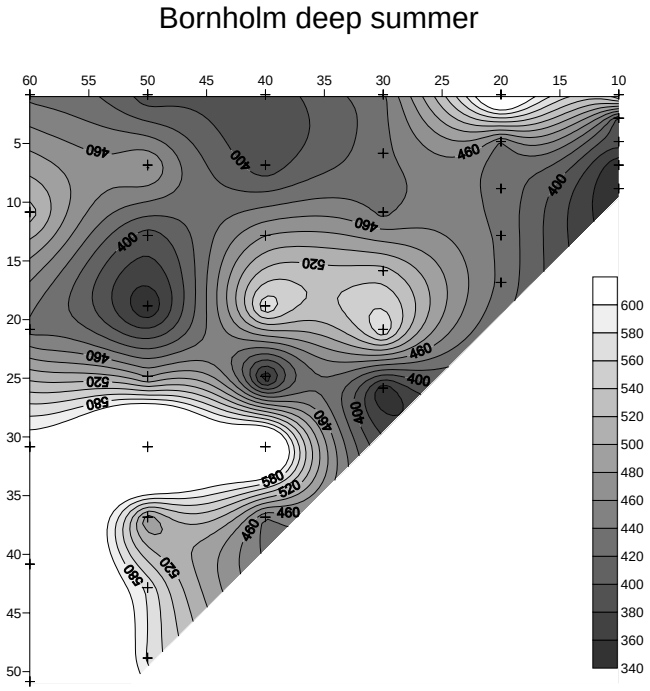

Figure 6. Same as Figure 5 for the Bornholm deep in the southern Baltic Sea.

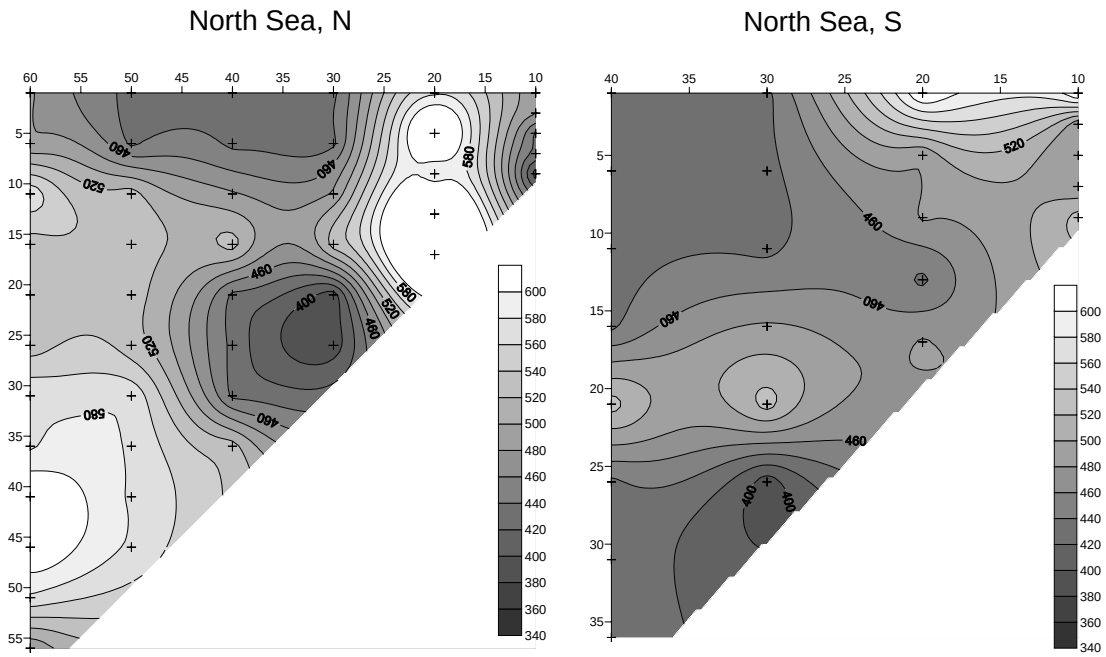

Figure 7. Same as Figure 5 for two CTD-stations in the North Sea during autumn.

The minimum range calculated for the Baltic is 341 m and the maximum 811 m for a source close to the bottom. Table 1 shows the range variation for each sound velocity profile that was modelled.

Table 1. Maximum and minimum range calculated with pinger 2 m above the bottom.

Model area	Minimum	Maximum
Gotland deep winter	435	482
Gotland deep summer	341	670
Bornholm deep summer	341	881
North Sea north	388	623
North Sea south	388	717

Discussion

First it should be pointed out that the ranges calculated in the model are just comparable values that show equal transmission loss of signal strength, and that this signal strength is arbitrary and not the range where a harbour porpoise is known to react to the pinger. No measurements of the signal strength have been made in the behavioural studies of reaction distance.

The main conclusion of the study is that the perceived signal strength of a pinger can vary considerably, depending on the hydrographic conditions and the depths of both the pinger and the receiving whale. As seen in Table 1 a factor of two in reaction distance will be typical depending on those factors. There are no indication of severe restriction of the signal range however. In essentially all cases the actual transmission loss is smaller than in a case with homogenous medium and spherical sound distribution.

Comparing the Baltic and the North Sea there is no evident differences in how a pinger is likely to function acoustically. The conclusion is that the results regarding the effectiveness of pingers as by-catch mitigation can be transferred to the Baltic.

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