

# A NEW WARNING DEVICE

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## HARBOUR PORPOISE BYCATCH

There are many reasons why Harbour Porpoises fail to detect gillnets in time. The murky water makes the nets hard to see. Toothed whales produce clicks to detect prey and obstacles, but thin nets only give a weak echo.

Increasing numbers of Harbour Porpoises are stranding along Germany's Baltic coast (150 reported in 2016 as opposed to an annual average of 30-40 at the turn of the century) with most attributable to gillnet by-catch.

Expanding protected areas and establishing fishery closures might please conservationists but would strongly affect the industry. Gillnet-fishing is size-selective and sustainable in relation to its target species; but is bad for by-catch.

Acoustic warning devices ("pingers") could help reduce Harbour Porpoise by-catch. They emit loud noises that keep marine mammals at a distance, but also exclude them from their habitat and feeding grounds. Pinger noise startles Harbour Porpoises, reducing echolocation activity, which may lead to higher by-catch.

### NEWLY DEVELOPED WARNING DEVICE PAL

Harbour Porpoises interpret upswEEP chirps as warnings. Based on this, the PAL has been developed and patented. It imitates Harbour Porpoise alarm signals at a frequency of 133 kHz, which is the one the animals use.

Unlike other pingers, the PAL floats and can withstand rough handling on board vessels, reaches a source level of up to 145 dB. Its batteries last 1½ years when continuously operating and are replaceable. The PAL hardware can be reprogrammed for different operating requirements. PALs have to be mounted on the net float lines every 200 metres and the method of attaching the devices to nets was improved in consultation with fishermen.

### PAL FISHERY TRIALS

PAL was tested between 2014 to 2016 by the Thünen Institute of Baltic Sea Fisheries in the professional Danish and German gillnet fishery in the Baltic leading to a significant reduction in bycatch. In 1,000 trials, fishermen retrieved 6,400 km of nets and by-caught 22 Harbour Porpoises: 5 in nets fitted with warning devices and a statistically significant 17 in nets without them, showing that PAL could reduce by-catch in the Baltic by over 70%.

While results of tests in the Western Baltic Sea show that PAL effectively protects Harbour Porpoises from gillnets, the results of trials in the North Sea are not conclusive, requiring more tests and possibly research with alternative signals.

### REACTIONS OF HARBOUR PORPOISES TO PAL

During trials in the Danish Belt Sea the reactions of Harbour Porpoises to PAL signals and customary pingers were compared, and the animals' response was recorded. The results show that Harbour Porpoises react to PAL by maintaining high levels of echolocation activity (twice in intensity compared with pingers), without being excluded from their habitat. Thus, by-catch reduction is probably due to echolocation activity, which allows the animals to detect the nets and avoid collision.

As part of a validation study, the Baltic Sea Info-Center is planning to deploy 1,680 PAL in Schleswig-Holstein. From that same region, already 220 fishermen engaged in the gillnet fishery entered a voluntary agreement to reduce by-catch.

Photo by Boris Culik, Thünen Institute for Baltic Sea Fisheries

PAL might also mitigate by-catch if deployed in Mecklenburg-Western Pomerania, on the Danish and Swedish Baltic Sea coasts and beyond.

### FURTHER APPLICATIONS

PAL could be adapted for other populations and species - Mexican Vaquita and species susceptible to mass strandings e.g. Pilot or Sperm Whales.

Preliminary tests showed that specific signals attract Harbour Porpoises which focus their attention on the acoustic detector nearby, so another application could be to attract whale species for scientific research or to lure them away from hazardous areas.

Finally, PAL hardware could be adapted to deter marine mammals to protect them from sound or explosive injuries related to seismic studies, military exercises, construction work for offshore wind farms and harbour installations or controlled munitions' explosions.

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As gillnets are thin, they do not produce a strong echo that can be detected by echolocation. As such, gillnets represent one of the biggest sources of bycatch for HARBOUR PORPOISES.

The PAL WARNING DEVICE works by replicating the Harbour Porpoise alarm signal, causing the porpoises to increase their echolocation activity, improving their ability to detect the nets.

PAL has proven very effective in protecting Harbour Porpoises from gillnets in the Western Baltic Sea, showing more than 70% REDUCTIONS in bycatch after a 2-year trial period.

