



<b>Ecologically Efficient Solutions to Reduce Dolphin By-Catches in Gillnets</b> <i>(Eugen Anton, Gheorghe Radu, Magda Nenciu)</i>	<b>“Cercetări Marine”</b> <b>Issue no. 43</b> <b>Pages 342-349</b>	<b>2013</b>
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## **ECOLOGICALLY EFFICIENT SOLUTIONS TO REDUCE DOLPHIN BY-CATCHES IN GILLNETS**

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### **ABSTRACT**

At the Romanian coast, as well as in other World Ocean areas, every year, tens and even hundreds of cetaceans die tragically as a follow-up of being accidentally by-caught in commercial fishing gear. The interaction between cetaceans and fisheries is an issue which may affect significantly the conservation state of dolphin populations, by causing accidental death due to capture or entanglement in gillnet-type fishing gear. For such reasons, with the view to protecting dolphin populations, research has been carried-out to establish technical solutions to reduce accidental by-catches reported in gillnet-type fishing gear. One of these solutions is fitting the fishing gear with special ultrasound devices - pingers.

**KEYWORDS:** Black Sea, dolphins, turbot gillnets, dogfish gillnets, by-catches, pingers

### **AIMS AND BACKGROUND**

The overexploitation of renewable resources associated with empiric and often defective management has turned into one of the most dynamic forces of deterioration of the natural capital throughout the entire ecosystem, resulting in the erosion of biological diversity.

Excessive exploitation of fish has led and will lead to the decrease of their biomass, because man is often considering only immediate profit.

Fishing activities in the coastal zone and offshore the Romanian seaside with stationary turbot/dogfish gillnets may affect dolphin populations when the sizing of the catch and the fishing capacity are not related to the carrying capacity of the ecosystem.

As it is known, the main source of food for dolphins are fish and the increase of gillnet fishing effort may have both an indirect (reduction of food sources) and direct impact (accidental catch) on these cetaceans.

As a solution to the major problem dolphins are facing at the Black Sea, namely accidental catch in fishing nets, tests at sea were performed by emplacing on the gillnet type fishing gears several acoustic devices for alarming dolphins (pingers). The main purpose of



this research was to obtain data and information required to establish the efficiency of using pingers to reduce dolphin by-catches.

The Agreement for the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), which entered into force on 1 June 2001, opened up a new period for the assessment of populations of dolphins from the Romanian coast of the Black Sea.

In 2004, Order no. 374 of 3 September 2004 of the Ministry of the Environment approved the “Action Plan on the Conservation of Cetaceans in Romanian Black Sea Waters“, which allowed the implementation of actions provided for in the plan.

The project “Action Plan on the Conservation of Cetaceans in Romanian Black Sea Waters“ was drawn-up by NIMRD Constanța, based on monitoring studies performed during 2001-2004, within a LIFE NATURE project.

Starting with 2005, the prerequisites for implementing the actions in the plan were created, by being awarded several projects, as follows:

- “Creation of the Operational Monitoring System of Dolphin By-catches and Strandings in the Romanian Area, Establishing Ways to Mitigate the Impact of Fishing Gears“ (project funded by the Ministry of the Environment);
- “Assessment of the Extent of Current Cetacean By-catch and Strandings in the Romanian Black Sea Area” (project funded by ACCOBAMS - 2006);
- “Reducing the Impact of Marine Bioresource Exploitation by Elaborating Ecologically Efficient Solutions“ (NUCLEU project funded by SRNA 2009, 2012-2013);
- “Monitoring the Conservation State of Species and Habitats in Romania pursuant to Article 17 of the Habitats Directive“ 2012-2014 (INTEGRA III, SOP Environment).

The activities carried-out within these projects allowed acquiring data and information on the current state of dolphin populations and the possibility of drawing-up proposals of measurements for protecting and preserving dolphin populations.

## **MATERIAL AND METHODS**

In order to carry-out the planned research activities, we acquired, after proper prior documentation, the best options of pingers. At the same time, various materials and accessories were purchased, to make the turbot gillnets and the related installations.

NIMRD Constanța’s boat CT 171 TOMIS (Fig. 3) and the “Flamingo“ trawler vessel of S.C. Miadmar Fishing (Fig. 4) were used for sea trips to set-up the turbot gillnets (20 pieces) and fitting them with the purchased pingers (AQUAmarck 200 and AIRMAR) (Fig. 1 and 2).

The testing of pingers was made in various locations along the Romanian coast, at depths of 20-50 m.



**Fig. 1 - AQUAmark 200 pinger**



**Fig. 2 - AIRMAR pinger**



**Fig. 3 - CT 171 TOMIS boat**



**Fig. 4 - "Flamingo" trawler**

## **RESULTS AND DISCUSSION**

Both in 2012 and in 2013, testing at sea of the two pinger types, AQUAmark 200 and AIRMAR, was performed.

From the construction point of view, AQUAmark 200 pingers are 164 mm long and 58 mm wide, weight in the water 135 g, maximum employment water depth approx. 200 m and lifespan approx. 2 years. The frequency of acoustic signals emitted by this pinger type is 5 - 160 kHz, while the level of the source is (dB re 1  $\mu$ Pa @ 1 m) 145 dB re 1  $\mu$ Pa @ 1 m. The construction sizes of the AIRMAR pinger are slightly smaller than the AQUAmark 200 pinger, its length/width being 156/53 mm, weight in the water 130 g, maximum deployment water depth approx. 275 m and lifespan approx. 1 year. The frequency of the acoustic signals emitted by this type of pinger is 10 kHz, while the source level is (dB re 1  $\mu$ Pa @ 1 m) 132 dB re 1  $\mu$ Pa @ 1 m. The action range of this pinger type is approximately 100 m, which is why it is recommended to place such devices on turbot gillnets at distances smaller than 200 m.

Specialized literature revealed that the AQUAmark 200 pinger covers the entire frequency range emitted by the dolphins' echolocation system, while the AIRMAR pinger is recommended as most advisable for cases of dolphins stealing fish caught in gillnets. Unlike the AQUAmark pinger, which is encapsulated (when the energy supply battery uses up, the pinger is no longer usable), the AIRMAR type pinger has the advantage of changing the energy supply battery after it has used up.

The testing of pingers was made abeam the Mamaia Bay, Tuzla and Olimp, at 20-25 m water depths.

In order not to influence the operation geometry and, implicitly, the operational parameters of gillnets (operating position, vertical/horizontal set-up coefficients etc.) when they are fitted with such devices, we attempted to cancel the weight in the water of the pinger by adding expanded polyesther corks, whose floatability was calculated at 80 g each.

For testing, two strings (gillnet strings) 10 gillnets each were used. One gillnet string was launched in the water without being fitted with pingers, being the witness, while the other string was fitted in the first half with AQUAmark 200 (Fig. 5) pingers and in the other half with AIRMAR pingers (Fig. 6). The pingers were set on the gillnet strings at approx. 200 m intervals (Fig. 7).



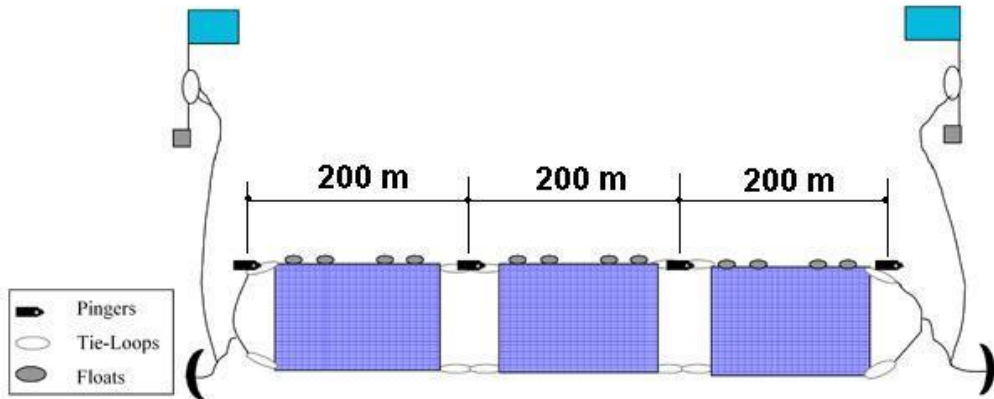
**Fig. 5 - Fitting the gillnet strings with AQUAmark 200 pingers**



**Fig. 6 - Fitting the gillnet strings with AIRMAR pingers**







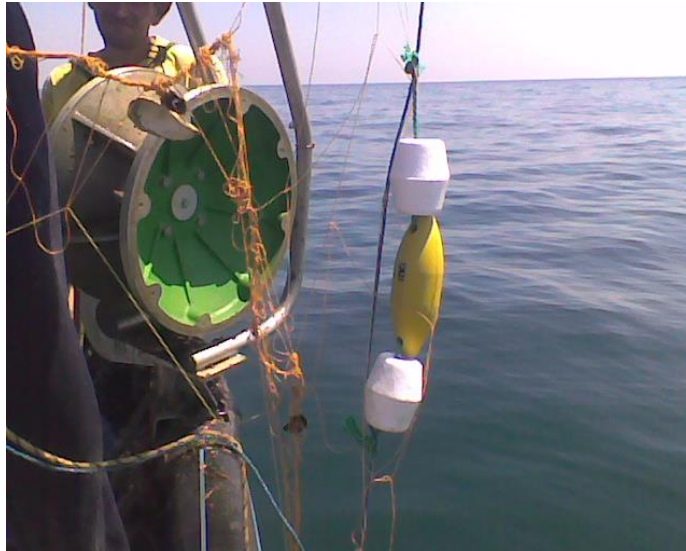
**Fig. 7 - Pinger set-up diagram on turbot gillnets**

The verification of the operation of AQUamarck 200 and AIRMAR pingers, used to equip the turbot gillnets with the aim of reducing dolphin by-catches, was made by the CT 171 TOMIS boat, at 4-7 days intervals, depending on the weather (Fig. 8).



**Fig. 8 - Verifying the turbot gillnets fitted with pingers**

As previously mentioned, the testing of pingers was also made with the “Flamingo” trawler vessel, owned by S.C. Miadmar Fishing. In order to simplify/ease the lifting aboard operations of the gillnets, the vessel was fitted with a winch for mechanical recovery (Fig. 9). In this case, the gillnets were set-up at greater water depths, 40-50 m.



**Fig. 9 - Mechanical recovery of turbot gillnets aboard the “Flamingo”**

Throughout the whole period during which turbot gillnet strings were launched in the water, no dolphin by-catch was reported, despite the fact that during the regular controls (each 3-7 days, depending on weather conditions) at the installations, cetaceans of all three species in the Black Sea (*Phocoena phocoena*, *Tursiops truncatus* and *Delphinus delphis*) were reported swimming close by.

We also mention that pingers had no negative influence on fishing resources, as such, during the verification of gillnets set-up with such devices, turbot catches were reported, as well as other demersal species: common stingray and thornback stingray.

Testing in the field of the AQUAMARCK 200 and AIRMAR pingers confirmed the efficiency of using these devices for fitting gillnet type fishing gears, thus confirming that they are ecological technologies, useful both for dolphins and fishermen.

## CONCLUSIONS

Pursuant to Regulations no. 812/2004 EC and 88/98 EC, Romania must inventory dolphin by-catches and, in the near future (European Parliament Regulation Proposal, 2013, on the application of measures to reduce dolphin by-catches), it shall be compulsory to fit turbot and dogfish gillnets with pingers, with the aim of reducing cetacean by-catches. Under such circumstances, we considered it useful to establish in due time the most efficient pinger models to reduce dolphin by-catches at the Romanian coast.



The research performed revealed that, by fitting AQUAmarck 200 or AIRMAR pingers on turbot gillnets, dolphins do not come close to these fishing gears anymore, which proves that such hydroacoustic devices have an extremely significant role in reducing by-catches.

In order to secure the conservation and efficient protection of dolphin populations at the Romanian coast, it is required to create and accordingly financially support a permanent monitoring, control and surveillance system of cetacean populations at the Romanian Black Sea coast.

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