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The effect of pingers on cetaceans bycatch and target catch in the turbot gillnets in Bulgarian Black Sea

ZORNITSA ZAHARIEVA[1,2], NELKO YORDANOV[3], VENISLAVA RACHEVA[4], VENTSESLAV DELOV[1]

[1] Department of Zoology and Anthropology, Faculty of Biology, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria, zornica_z87@abv.bg
[2] Balkani Wildlife Society, "Dragan Tsankov 8 Blvd", 1164 Sofia, Bulgaria
[3] "Fisheries Local Action Group - Shabla - Kavarna – Balchik", Shabla, Bulgaria
[4] Department of Ecology and Environmental Protection, Faculty of Biology, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

Abstract. The present study is the first experiment to determine whether acoustic deterrent devices (pingers) reduce cetaceans' bycatch in the turbot gillnets and catch rates of the target fish in the Bulgarian Black Sea territorial waters. During the study period 2017–2019, 12.4 km of turbot gillnets were included in the experiment. They were equipped with 10 kHz Porpoise Pingers "Future Oceans". Observations were carried out on regular bases on active (with pingers) and on control nets (without pingers). The results showed that the pingers used were very effective in reducing cetaceans bycatch in turbot gillnets without affecting the target catch.

Key words: cetaceans, pingers, gillnets.

Introduction

The cetaceans' mortality is a major conservation and welfare issue over the last two decades (Kuiken *et al.* 1994, Read *et al.* 2012, Desportes 2014). In Europe incidental catches are of concern for a number of cetacean species (ICES 2010), especially harbour porpoise which is particularly vulnerable to bycatch in gillnets (Birkun 2002, Read et al. 2012). This global problem also occurs in the Black Sea with the three species of cetaceans found there - Black Sea harbour porpoise (*Phocoena phocoena* ssp. *relicta* Abel, 1905), Black Sea common dolphin (*Delphinus delphis* ssp. *ponticus* Barabash, 1935), and Black Sea bottlenose dolphin (*Tursiops truncatus* ssp. *ponticus* Barabash-Nikiforov, 1935). Turbot gillnet is the most dangerous fishing gear for the dolphins and porpoises in the Black Sea (Radu et al. 2003).

One of the possible solutions to reduce cetacean' bycatch in gillnets is the use of pingers (Kraus *et al.* 1997, Gearin *et al.* 2000, Burke 2004, Gönener & Bilgin 2009). This study presents the first efforts to test pingers effectiveness on the turbot fishing in the Bulgarian Black Sea.

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Material and Methods

The experiment was carried out during the spring seasons (March - April) of 2017 to 2019 years in the Northern and Southern Bulgarian Black Sea Coast. A total of 12.4 km gillnets (124 pieces of nets) with 40 mm mesh sizes were included in the survey. Half of the nets – 6.2 km, were equipped with pingers (active) and the other half – 6.2 km – were without pingers (control). The distance between active and control nets was around 500 meters. The active nets were equipped with Porpoise Pingers ("Future Oceans"). The pingers frequency was 10 kHz and with source level of 132 dB. Pingers were installed according to producer's recommendations and in compliance with the specifics of the gillnets (from 100 to 150 m distance between pingers). Bycatch rates - number of specimens per km of net and number of specimens per soak time (days) were calculated.

Results and Discussion

During the study period a total 12.4 km gillnets were observed. The average soaking depth of the monitored gillnets was 40 meters and the total soak time for the study period was 89 days. A total of 14 *Ph. phocoena*, were bycaught in the control nets (8 in 2017, 3 in 2018 and 3 in 2019), and zero in the active nets. The harbour porpoise was the only cetacean species entangled and all bycaught individuals were dead. The bycatch rate of the harbour porpoise (individuals per km of net) for the control nets was 2.3 and zero for active nets for the whole study period. The bycatch rate in control nets was highest in 2017 (8 individuals) and similar in 2018 and 2019 – 1.2 and 1.11 respectively (Fig. 1).

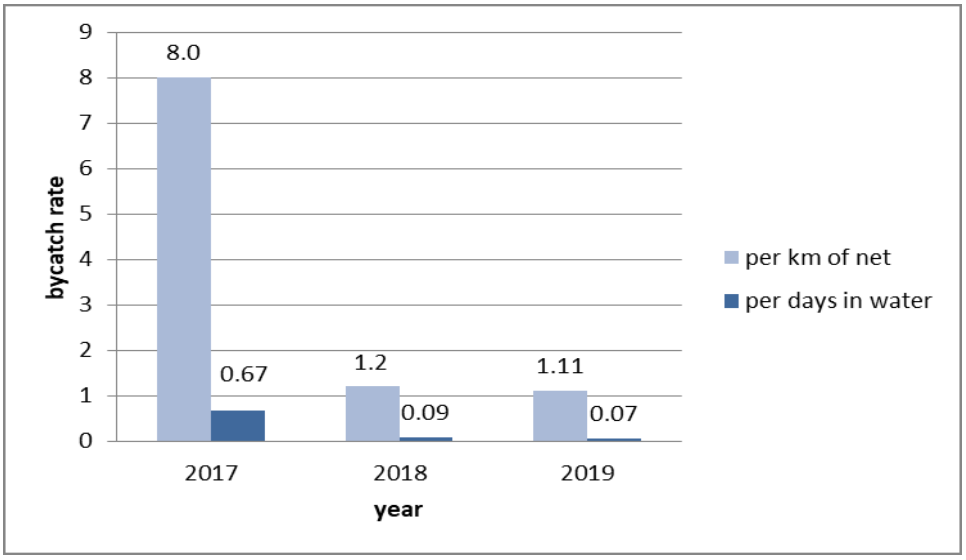

Fig. 1. *Ph.phocoena* bycatch rate (individuals per km of net and per soak time (days) by years in the control nets.

The catch rate (size) of the target species of turbot (*Scophthalmus maeoticus* Pallas, 1814) was 205 kg in the control nets and 479 kg in the active ones for the whole study period. In order to make turbot catch data comparable to cetaceans' bycatch data, kilograms were recalculated as individuals per km of net, as it is assumed that one turbot weighs an average of 3 kg (Fig. 2).

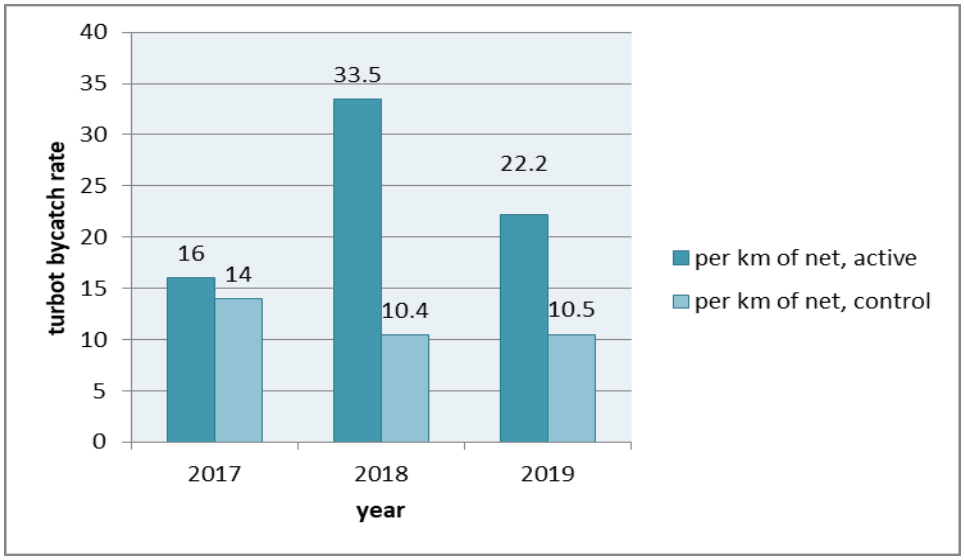

Fig. 2. *S. maeoticus* bycatch rate (individuals per km of net) by years in the active and control nets.

According to a number of studies, the harbour porpoise bycatch almost always represents the major part of the bycatch of cetaceans recorded in different places in the Black Sea (Birkun 2002). Most often, the annual part of *Ph. phocoena* make up 90-100%, while those of *D. delphis* and *T. truncatus* tend to zero (BLASDOL 1999). The results of the current study showed that 10 kHz Porpoise Pingers "Future Oceans" could have significant effect in reducing *Ph. phocoena* bycatch in turbot gillnets without affecting target fish – the turbot. Several other researches with the use of pingers also demonstrated that this method could be effective in reducing the bycatch of small cetaceans in different areas at least in a short term (Kraus *et al.* 1997, Burke 2004). One experiment in the Turkish part of the Black Sea demonstrated that the pingers caused a significant reduction of the bycatch of *Ph. phocoena*, in a turbot gillnets, using pingers with similar technical characteristics. This study showed that in the control nets bycatch rate is 46 times higher than in the active nets and the harbour porpoise bycatch rate is 0.01 for the active nets (Gönener & Bilgin 2009).

No addictive effect was observed throughout the three years study period, because there were no cetaceans' bycatch in the active nets. Probably, the fact that gillnets do not stay in the water for a long time is a reason for not observing this effect, therefore more long-term studies are needed to establish this. The results showed that pingers have no negative effect on the target catch. This result is consistent and with findings in other studies using pingers (Gearin *et al.* 2000, Gönener & Bilgin 2009). In 2017 the bycatch rate of harbour porpoise is very high in the control nets and there is a very small difference in the catch rate of turbot in active and passive nets comparing to 2018 and 2019 but further research is need to find out if this a random event or there is some relation.

The present study shows 100 % success rate of pingers as a means to reduce the incidental catch of cetaceans in the turbot gillnets in the Bulgarian part of Black Sea.

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