An Acoustic Alert System to mitigate dolphin depredation of fishing nets


A. Raffa

Alessandra Raffa[1], Dario Garofalo[1], Stefano Floridia[1], Clara Monaco[1]

[1] Marecamp Association, Lungomare Scardamiano 1, Aci Castello, 95021 Catania, Italy

info@marecamp.com

alessandra.raffa92@gmail.com

www.marecamp.com

ID 53

Introduction

Fishers around the world claim an increase in the number of cases of dolphins destroying fishing gear and taking advantage of the catch. This dolphin opportunist behavior is an increasing issue as it may endanger both the viability of fisheries and wild dolphin populations (Bearzi, 2002). Conflicts between dolphins and fishers should be necessarily avoided in order to improve fisheries sustainability and marine animal conservation.

Fig. 1

The Acustic Alert System

Previous research, has revealed that acoustic deterrents like pingers are useless for preventing dolphins from consuming fishing gear (Dawson et al., 2013). A different solution was explored in the Gulf of Catania, our studying area in the centre of Mediterranean Sea (Fig. 1) in the framework of the Depredation-2 project. Previous works data (Monaco, 2020) was used to evaluate a "Acoustic Alert System" (AAS) as a potential remedy for avoid the damage from depredation events in the small scale fisheries. When dolphins approach the fishing gear, the mechanism is intended to warn fisher. The existence and frequency of feeding noises made by dolphins nearby the nets can be detected by an AAS. During this trial was simulating manually, with operators at sea, the alarm, detecting and indicating the presence of dolphins as well as the occurrence of feeding sounds emitted by them close to the nets. As well as sound detection, were included visual and acoustic surveys carried out in proximity of trammels and single wall nets deployed at sea, during the whole fishing set. Two scenarios have been followed for testing the utility of the system during a depredation events:

1) to alert the fisher and haul up the net (AAS ACTIVATED)
2) not alert the fisher without interrupting the fishing set (AAS DISABLED)

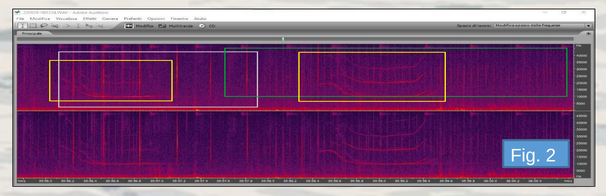


Fig. 2

A case of bycatch

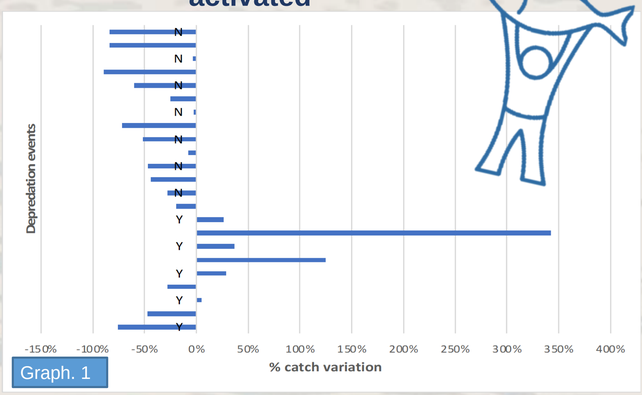
During one of the surveys, we were able to record the vocal behavior of a bottlenose dolphin pod during the entanglement (and inevitable death) of a sub-adult individual in a fishing net for the first time ever (Fig.4). It appears that it got caught in the rope of the final piece of gear rather than the net itself, indicating that potential adjustments to this type of nets could prevent a repeat of similar events without affecting the success of fish catches (Terranova et al., 2022).


Fig. 4

Results

Preliminary data indicate that, when the AAS is in activated mode (Y) during a depredation event, there is a lowering in the number of damages of the nets and, in some cases, an increase of captures for the fisher. This variation in the quantity of catch (kg %) in relation to the AAS activated (Y) or deactivated (N), as shown in Graph. 2, in some events has a positive trend in terms of catch with the active System (Y) and always a negative trend when it's disabled (N). Another important result in this preliminary study was the collection of a list of the noises that define the Gulf of Catania's underwater soundscape, including cetacean vocalization like echolocation clicks (green and grey) and whistles (yellow), as shown in Fig.2 .


Fig. 3 A big hole on a single-layer net (monofilo gear) caused by dolphin depredation in the Gulf of Catania



Graph. 1

Conclusion and future works

According to the AAS's early results, this System may be a way to decrease the number of depredation events and to reduce the damage of fishing gear, with a consequent reduction of economic losses and improved bycatch prevention. However, the future and final AAS must separate the vocalizations of nearby dolphins feeding from all the other sounds that could be a "false alarm" and are quite prevalent in the study area's acoustic environment. The continuation of a project like this could be based on the technology for passive acoustic monitoring based on hydrophones that passively monitor acoustics in the water in order to collect sounds of odontocetes, particularly by identifying the trains of echo-location sounds they produce to detect their prey, orient themselves, and communicate (Jacobson, 2017; Paitach et al., 2021).

Adknowledgment

The authors thanks all of the individuals who helped the Depredation-2 project come to fruition. A special thanks to the Marecamp association crew that participated in fieldwork. A particular thank you to all the fisher who took part in the study because they trusted science. We gratefully acknowledge MAVA Foundation's support of the Depredation-2 initiative. In addition, many thanks to the General Fisheries Commission for the Mediterranean (GFCM) Secretariat, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) Secretariat, the Regional Activity Centre for Specially Protected Areas (RAC/SPA), and the Low Impact Fishers of Europe (LIFE) platform for their great coordination of the project.

References:

Bearzi G. 2002. Interactions between cetacean and fisheries in the Mediterranean Sea. In: G. Notarbartolo di Sciara (Ed.), Cetaceans of the Mediterranean and Black Seas: state of knowledge and conservation strategies. A report to the ACCOBAMS Secretariat, Monaco, February 2002. Section 9,20 p.

Dawson, S. M., Northridge, S., Waples, D. & Read, A. J. *To ping or not to ping: The use of active acoustic devices in mitigating interactions between small cetaceans and gillnet fisheries*. Endanger. Species Res. 19, 201–221 (2013).

Monaco, C. (2020). *Interaction between cetaceans and small-scale fisheries in the Mediterranean. The case of the Central Mediterranean, Sicily, Italy*. Published by Low Impact Fishers of Europe.

Jacobson, E. K. (2017). *Developing a passive acoustic monitoring network for harbor porpoise in California*. University of California, San Diego.

Paitach, R. L., Amundin, M., Teixeira, G., & Cremer, M. J. (2021). Echolocation variability of franciscana dolphins (Pontoporia blainvillei) between estuarine and open-sea habitats, with insights into foraging patterns. *The Journal of the Acoustical Society of America*, *150*(5), 3987-3998.

Terranova, F., Raffa, A., Floridia, S., Monaco, C., Favaro, L. (2022). Vocal Behaviour of a Bottlenose Dolphin Pod During a Deadly Bycatch Event in the Gulf of Catania, Ionian Sea. *Journal of Marine Science and Engineering*. 2022; 10(5):616. https://doi.org/10.3390/jmse10050616