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1. Introduction

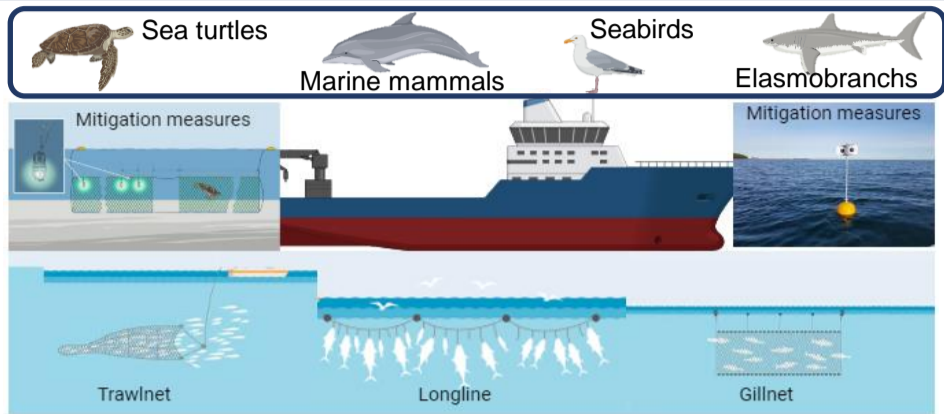


Figure 1. Visual scheme showing the 4 groups of species affected by the different fishing gears (trawlnet, longline and gillnet), as well as an example of a mitigation measure, in this case for sea turtles.

2. Methodology: Literature review



3. Results and discussion

It was found that there were significant differences between the locations of the different groups ($\chi = 153.79$, $df = 51$, $p < 0.001$, $n = 18$) around the world, with the Americas being the continent where the most studies have been carried out. **Figure 2** shows an overall reduction of the by-catch of the 4 groups of species by 100%, using the different types of mitigation. However, more specifically, **Figure 3** shows a 100% reduction in by-catch for marine mammal species such as *Neophocoena asiaorientalis* in Japan (1), sea turtles such as *Caretta caretta* in Italy (2), seabirds such as *Thalassarche chlororhynchos* in Namibia (3) and elasmobranchs such as *Lamna nasus* in the USA (4).

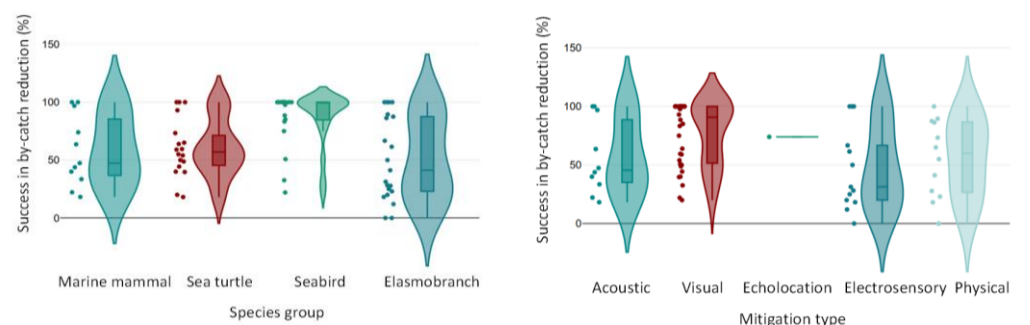


Figure 2. Violin plot illustrating the % of by-catch reduction obtained, on the left, for the species groups (marine turtles, marine mammals, seabirds and elasmobranchs) and, on the right, with the types of mitigation used (acoustic, visual, echolocation, electrosensory and physical). The line in the box plot corresponds to the mean.

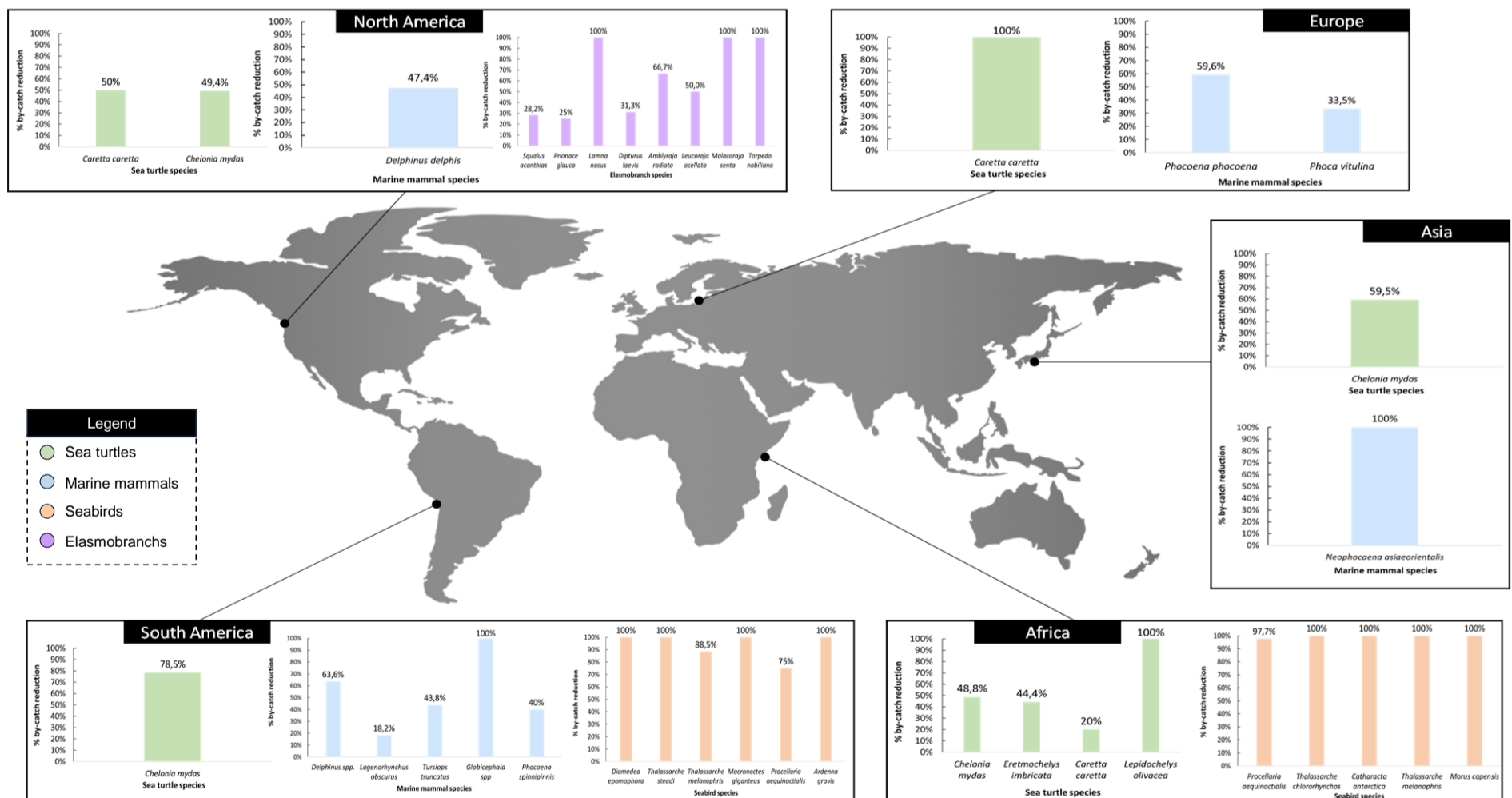


Figure 3. World map showing the % by-catch reduction for each group (sea turtles, marine mammals, seabirds and elasmobranchs) by continent (America divided into North (1) and South (2) America, Africa (3), Europe (4), Asia (5) and Oceania (6)) obtained by the most frequently used mitigation measure: LEDs for sea turtles, pingers for marine mammals, tori lines for seabirds and SMART hooks for elasmobranchs.

4. Conclusions

- The fishing gear with the highest percentage of by-catch is the gillnet.
- The most affected species in each group are: *Phocoena phocoena*, *Caretta caretta*, *Procellaria aequinoctialis* and *Prionace glauca*.
- The elasmobranch group is the least studied. The most effective mitigation measure to avoid their by-catch is uncertain.
- The most effective mitigation measure to reduce sea turtle by-catch is LED lights; for marine mammals, pingers and, for seabirds, tori lines.

5. References

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