Review of Alternative Measures to Minimise Mortality of Endangered Threatened and Protected Species

Brazil yellowfin tuna handline FIP

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Endangered, threatened or protected (ETP) species are important to consider when looking at improving fisheries and taking an ecosystem approach, as should be done to create low impact, sustainable fisheries in the long term.

The yellowfin tuna handline fishery in Ceara State, Brazil, operates within FAO major fishing area 41 (southwest Atlantic) which falls within the ICCAT convention area. Therefore, this fishery must comply with all regulations set by this international body, a number of which cover the management of ETP species, as well as those of its national government and other international bodies. The primary species to consider in terms of fishery interactions or potential mortality are sharks and turtles. However, it should be highlighted that this fishery is low-risk and, therefore, interactions and mortality as a result of the operations of this fishery are unlikely. Nevertheless, we have conducted a review of alternative measures to minimise the mortality of ETP species below.

Sharks and Rays

Measures currently applicable to the Brazilian yellowfin tuna handline fishery

National Brazilian legislation currently includes measures to prevent shark finning, outlined in Normative Instruction No. 14. Article 3 of this regulation states that all shark and ray individuals must be landed 'with all its fins naturally attached to the animal's body.' This measure is designed to allow for shark fisheries to continue without the wasteful overfishing associated with shark fin fisheries.

According to 'Peixe Marinhos e Estuarinos Inclusos na Portaria 445/2014' there are a number of sharks and rays in the region which are at risk of interacting with fisheries. These include, but are not limited to, hammerhead sharks (scalloped and greater), oceanic white tip shark, porbeagle shark, white sharks, whale sharks and the mako shark. These sharks, as well as others, are now all protected under CITES Appendix II which means that international trade of these sharks must be supplied by sustainably managed, accurately recorded fisheries that are not detrimental to the status of the wild populations they exploit in an effort to improve the status of shark populations.

In addition, during the Annual Session of ICCAT in 2022, measures were implemented for southern shortfin mako sharks (Recommendation 22-11) after the species was listed as endangered by the IUCN in 2019. Whilst stock assessments previously showed that north Atlantic mako sharks are overfished and subject to overfishing which led to the implementation of a retention ban, the data available for the south Atlantic stock showed a more positive picture and, therefore, different measures were brought in to ensure more sustainable fishing of the species. These measures included a reduction to 60% of the previous retention allowance, as well as safe handling release procedures including:

- de-hookers and line cutters kept on board all vessels
- saltwater hoses to cool and keep the animal oxygenated line cutters
- Shark harnesses to help move sharks safely if they have to be taken out of the water

All fishers should be trained in these procedures to ensure the measure is effective in practice.

Alternative Measures to Reduce Mortality

Gear Modifications

- By switching from shark lines and wire tracers to monofilament line, chances of survival improve considerably as sharks can free themselves more easily on monofilament lines. Studies in the Pacific, published in 2022, found that longline shark catches reduced by approximately 40% when fisheries switched to monofilament from wire tracers. As the Brazil handline yellowfin tuna fishery already used monofilament line, the fishing line should not need to undergo any modifications in this regard.
- Large non-offset circle hooks, instead of J hooks, ensure that hooks catch organisms by the mouth which increases post-release survival while the likelihood of gut or gill hooking, which can cause lethal internal injuries, is reduce the likelihood of gut or gill hooking, which can cause lethal internal injuries, is reduced.d.
- Use of green LED lights in gears could reduce bycatch as they have proven to reduce elasmobranch catch by 95% in gillnet fisheries.

Safe Release Handling

Further advice on safe release handling can be found through various sources for different fisheries and these measures include:

- Cutting the line as close to the shark as possible while animal is still in the water increases survival (a correlation between line length remaining in relation to shark size has been demonstrated in wild, hooked and released sharks but this should be avoided and lines should always be cut as close to the hook as possible)
- Ensuring that animals are released as quickly as possible in a gentle manner.
- Avoiding exposure to sunlight
- Avoiding fixing the animal on deck by fin or tail, instead carrying the animal with gear and several people to keep the animal free from injury and slide into the water more gently.

Turtles

Measures currently applicable to the Brazilian yellowfin tuna handline fishery

During the 23rd Special Meeting of the Commission in November 2022, ICCAT agreed upon measures to protect sea turtles from fishing-related mortality and by-catch (Recommendation 22-12). All fisheries which have documented and reported interactions with sea turtles to the Standing Committee of Research and Statistics (SCRS), in line with pre-standing regulations, are obliged to reduce and ultimately eliminate these interactions. Fisheries can do so through a number of options including:

Time-area Closures

- By avoiding fishing operations in locations or seasons which are heavily associated with turtle bycatch - for example nesting or mating seasons when turtles gather in certain areas - large amounts of bycatch can be avoided. The ICCAT Scientific Committee are to provide more direct information for Atlantic fisheries.

Gear Modifications

- Like with sharks, large non-offset, circle hooks, instead of J-hooks, ensure that hooks catch organisms by the mouth which increases post-release survival and the likelihood of gut or gill hooking, which can cause lethal internal injuries, is reduced.

Finfish Bait

- The bait used also changes the risk of capturing turtles on hooked gear. Turtles tend to bite chunks from finfish baits, thereby avoiding the hook, but they typically swallow squid baits whole, with the hook, and then become caught as bycatch.

When turtles are caught in fishing gears in the ICCAT convention area, fisheries must 'take all reasonable steps to ensure the turtle is safely released in a manner that maximises the likelihood of their survival' such as ensuring de-hookers and line cutters are on-board and that all equipment is used in line with the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations, developed in 2009. These safe handling measures include:

- Minimising tension on the line of a caught turtle
- Not bringing the turtle aboard by a fishing line attached to or entangled upon its body.
- If hooked externally or hook is fully visible, hooks are to be removed from sea turtles as quickly and carefully as possible. If a hook cannot be removed from a sea turtle, the line shall be cut with line cutters as close to the hook as possible prior to releasing the sea turtle

- Live sea turtles should be returned to the sea after handling while the vessel is stopped and the vessel should not move into the turtle is observed to be far away from the vessel.

All fishers should receive training in proper mitigation and handling techniques.

Alternative Measures to Reduce Mortality

Gear Markings visible to Turtles

- The theory for LED lights to avoid shark bycatch as mentioned above is actually built on research which began in turtles. A 2016 study of gillnet fisheries in Peru found that green turtle bycatch was reduced by more than 60% in illuminated nets. However, other studies on loggerheads have found lesser results. If a handline fishery was struggling with turtle bycatch, LED deterrents could be a good solution, depending on the species.

Further Safe Handling Measures

- Turtles should always be handled in the water unless they are not moving in which case they should be brought aboard using both hands and lifted by the shell, not the fins. The turtle should be placed in a cool, shaded part of the boat with a cool damp cloth over its back. Crew should raise its hind legs about 20 cm off the deck using wood or a container for it to rest on to also let potential water drain from its lungs. The turtle should be given time to recover and then released gently back into the water.

Turtle Excluding Devices

- In net fisheries, turtle excluder devices allow turtles to avoid entering nets of target catch smaller than themselves and have proved to be very effective in preventing bycatch and subsequent mortality. (Goodwiller, B. and Carpenter, W., 2022),

Smaller Mesh Sizes and Thinner Twine

- Studies as far back as 2015 in Australia have found that nets with larger mesh sizes and thinner twine increase the likelihood of turtle entanglement. More recent studies have supported these findings as, in the Maldives, the probability of entanglement increased as the mesh size increased but decreased when floats were present.
- In terms of bycatch mitigation by ghost gear and buoys, there is some uncertainty. 2016 research found buoyless designs to reduce mortality, however, later research in the Maldives found the opposite in ghost gear - that no floats increased risk of entanglement, potentially as gear was harder for turtles to spot.