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SHARED SEAS, SHARED STRUGGLES:

DOLPHIN BYCATCH AND HUMAN-WILDLIFE COEXISTENCE IN PERU

Introduction

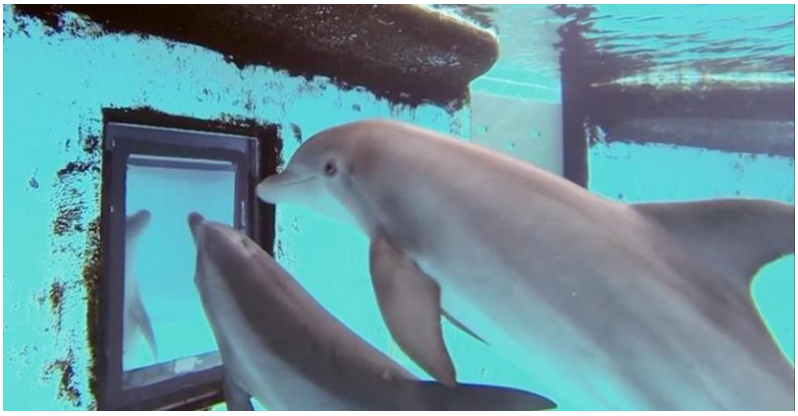
Since the 1960s, Peru has been at the center of global concerns regarding incidental catch, also known as bycatch, of other oceanic species. A 2010 study highlighted this issue, estimating that 2,412 oceanic creatures were caught as bycatch per year off the Pacific coast of Peru. Fisheries have commonly been found to see the three dolphin species in the area: Dusky, Common, and Common Bottlenose Dolphins, all of which have been targeted, leading to increasing concern about their high risk of local extinction. Furthermore, fisheries in 2020 were found to be still using bycatch species, specifically dolphins, as bait for other species, such as sharks, in the region.

Multiple solutions have since been introduced, with the most effective being the use of underwater pingers to redirect dolphin populations away from local fisheries. Additionally, more incentives have been placed on oceanic conservation, which has recently led to the establishment of protected waters along the northern coast of Peru. Unfortunately, concerns persist for the dolphin populations off the Pacific coast of Peru, and the human-wildlife conflict continues to have an impact on both the dolphins and human populations.

Why Care?

Dolphins are incredibly vital for oceanic ecosystems. They are among the most intelligent marine mammals on Earth, inhabiting tropical waters worldwide, including specific habitats such as harbors, bays, and the open ocean.

Their importance in the ocean's food chain as both prey and predators is critical for multiple reasons. As prey, they serve as a crucial food source for sharks and whales; as predators, their roles are even more vital. Dolphins' diets consist primarily of fish, jellyfish, squid, and crustaceans; dolphins maintain balance within the marine ecosystem's food chain as they regulate their prey populations and, even more vitally, they prey upon sick and diseased fish, preventing the spread to other marine populations and the risk of diseased or sick fish making their way to humans.



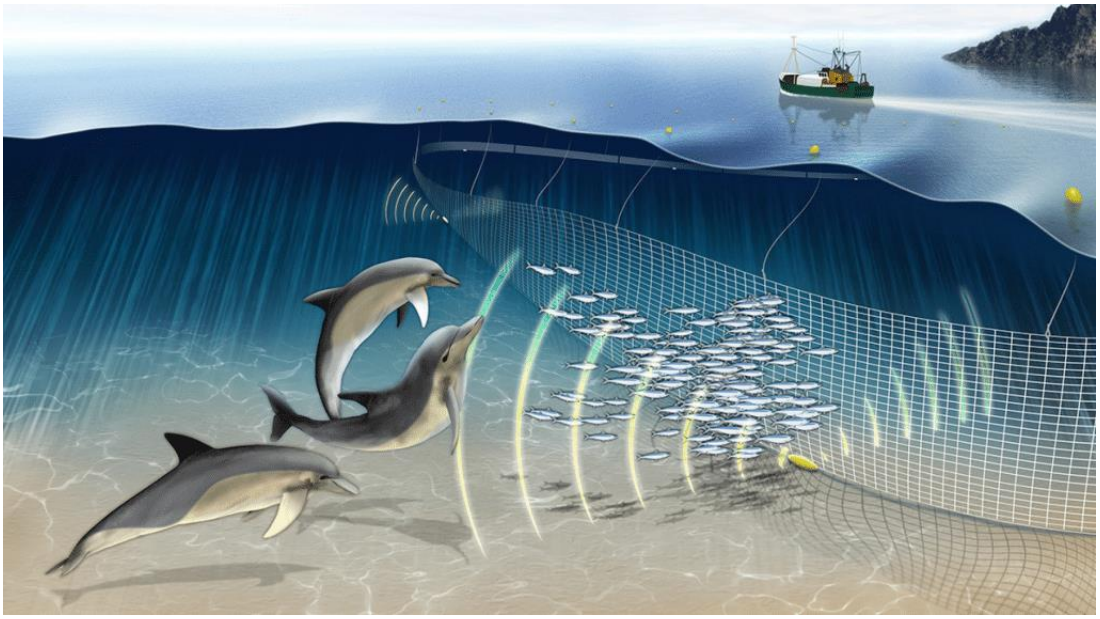
Beyond their ecological roles, dolphins are also known for their similarities to humans, including their intellect, social complexity, and behavioral diversity. Dolphins exhibit sophisticated communication, playful interactions, and even self-awareness. They are heavily dependent on their social interactions, traveling together, and employing complex group tactics for hunting and gathering.

Dolphins are incredibly adaptable, being able to thrive in most habitats, and their intellect and viability in oceanic ecosystems make them crucial indicators for ocean health and biodiversity. Their human-like social structures and behaviors make them not only fascinating but also more empathetic with humans than most other animals on the planet.

What is working now?

An experiment conducted in 2013 used "Pingers" as a deterrent for bycatching. The results found that pingers had a 37.2% in bycatch. This study was primarily targeted at smaller cetaceans, rather than specifically dolphins, but it also noted that these pingers were used for larger oceanic mammals, such as whales and dolphins. However, another study in 2022 found that pingers were 83% more effective in helping dolphins breed. The research and all the data collected around pingers indicated potential positive effects of bycatch on the coast of Peru. However, many issues arise with the use of pingers.

The



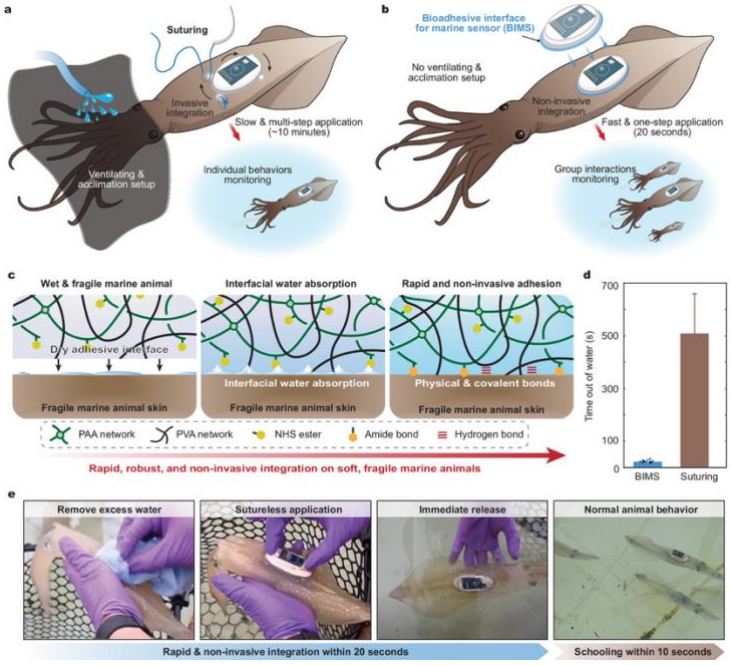
overarching issue with the use of pingers is the potential harm they can cause to other marine life. In the 2022 study, while the pingers were 83% effective at deterring dolphins, they also

found that the same nets with pingers caught eight whales. Another issue arose regarding the productivity of the fisheries goal of seeing sharks. The same study also notes a 33% decline in shark catches in nets equipped with pingers.

The viability of pingers is still being studied, but the likelihood of every single net across Peru's Pacific Coast having pingers and the fisheries adhering to the laws is low. It is essential to point out that bycatch and the use of dolphins as bait have been illegal in Peru for decades now, but the issue is still prevalent. So that leaves many questions:

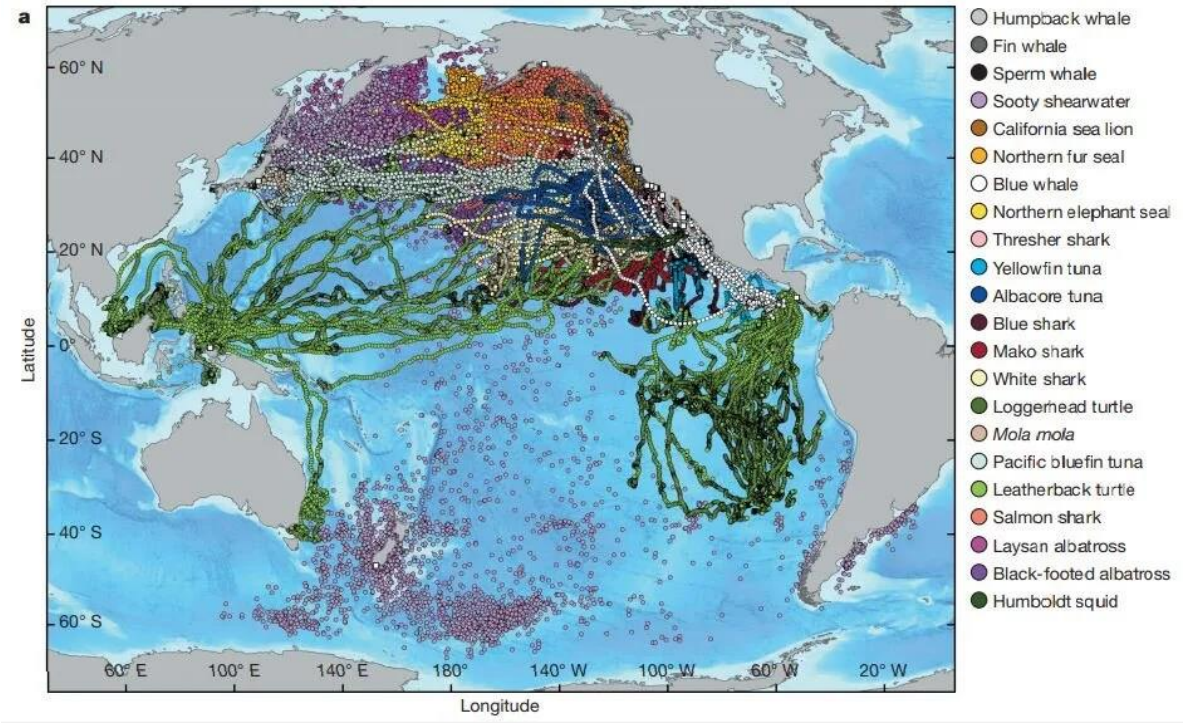
1. What solutions offer both effective results in decreasing bycatch and keeping the targeted catch productivity unharmed?
2. What solutions are not harmful to ALL marine life?
3. Moreover, what solution is an incentive for fisheries to abide by?

Potential Solution



A potential solution must follow and answer the previous questions. The studies and research behind the use of pingers have shown potential, but they have also been found to be harmful to many marine species, particularly whales. This is due to the frequencies that the pingers use; this frequency is also likely the cause of the decrease in targeted shark catching. To find a better solution, we must look away from pingers. A potential replacement is the use of bioadhesive tags instead.

Bioadhesive tags are non-invasive tags that do not rely on the harmful hooks required by standard tags. Implementing bioadhesive tags would address the issue of harm to other marine species and maintain the productivity of fisheries targeted at shark catching. The implantation of bioadhesive tags, while directly aimed at addressing the bycatch issue, would also provide crucial data about dolphins on the Peruvian coast.



Tags could help us recognize behavioral patterns, social dynamics, dietary habits, and population demographics. Fisheries could then use bioadhesive tags to survey the waters around them to avoid dolphins, rather than having dolphins avoid them, and the data collected would then be used to identify the areas where dolphins are regularly found. Having each fishery boat equipped with a data system that tracks the location of each tag would help decrease the likelihood of bycatch occurring while also serving as a trace for law enforcement to identify fisheries that knowingly cause bycatch.

Now it comes down to how to incentivize fisheries to abide by this solution. A possible idea is to have the fisheries do the tagging. To tag the dolphins, they would need to be caught and handled. A proposal is to have the fisheries tag the dolphins that are seen in their bycatch and then release them. This would not only be the fastest but also the most inexpensive process. To incentivize the fisheries to abide by and conduct the tagging, a proposition would be to offer the fisheries either financial or market benefits.

Peru is one of the world's largest exporters of fish products. Peru's fisheries export to many of the world's largest countries, including China and the United States. By providing these fisheries with financial benefits, including tax reliefs and market gains, such as granting specific fisheries primary selling/exporting rights, Peru can increase its economic gain.

In 2019, Peru's Ministry of Production raised the fishing rights fee from 0.25% to 0.43%. For this solution, an incentive for larger fisheries could be reducing the cost to 0.25%. This would come from one, the number of bioadhesive tags that fisheries apply to dolphins; and two, when the majority of tags have been used, how few dolphins' fisheries catch and release. This could be implemented as a ranking system, where fishers compete for the most dolphins tagged with a bioadhesive tag; the one that tags the most would receive a smaller fee.

Another incentive is export tariffs. Again, Peru is one of the world's largest fish exporters, and as of recently, the United States imposed a 10% tariff on most goods, including fish from Peru.

Either the United States could lift or decrease tariffs on specific fisheries, or the Peruvian government would pay the tariff for the fisheries that's tags reduce bycatch.

These incentives aim directly at the negative behavior that is bycatch. Fisheries would have more incentive to help decrease bycatch rather than the potential productivity that comes from using dolphins as bait for shark-catching.

What is the whole process, required resources, and challenges?

The process would again begin by approaching stakeholders to discuss the implemented solution, addressing their questions, and, most importantly, informing them about their roles, responsibilities, and the incentives they would receive.

Then it would come down to the fisheries and the crews, who would apply the bioadhesive tags to the dolphins and begin collecting the data. Once the majority of dolphins in the region have been tagged, it would come down to giving the fisheries that contribute the most their financial or market gain.

Over time, there would still be dolphins that would need to be tagged, whether they are new groups that migrated into the region or new generations. The application of tags would be a lifelong solution. Lastly, it will involve monitoring the locations of dolphins and fisheries deterring away from regions with larger populations of dolphins.

This solution would require a more expensive approach than pingers. Standard tags typically range from $3,000 to $5,000. The expenses that would come from the government and incentives would also be more costly. However, this solution addresses the previous concerns that pingers had, while being a long-lasting application that not only decreases the amount of bycatch but also addresses the use of dolphins for bait.

The most considerable challenge stems from the fact that fisheries would need to be incentivized; if fisheries are not incentivized or, over time, revert to using dolphins as bait, revisions would be necessary to the viability of the solution. Another challenge is the actual application of the bioadhesive tags to dolphins. This stage of the solution is ongoing, meaning that expenses associated with bioadhesive tags and the need for constant data monitoring will always be present.

Conclusion

The overall viability of this proposed solution offers multiple benefits, particularly in comparison to the current method of pingers. For one, pingers are both harmful to marine life, and second, they affect the productivity of shark catches. Additionally, pingers also rely on fisheries adhering to them and following the law regarding bycatch and the use of dolphins for

bait. The proposed solution, which involves using bioadhesive tags, directly addresses both concerns. For one, they do not use harmful frequencies that also reduce shark catches while monitoring fisheries, so they abide by the law and incentivize them to be part of the solution rather than the problem.

Dolphins are incredible and essential marine mammals that have vital effects on all aquatic ecosystems. They help balance populations and decrease the number of sick and diseased fish, which can then affect other animals, including humans. Using bioadhesive tags not only helps solve the bycatch and bait problems in Peru, but also provides valuable data and information about dolphins in the region, which in turn could lead to a more effective solution.

It is not just essential to find a solution for bycatch and bait for dolphins and marine ecosystems, but also for humans. We need to address the fact that in Peru, human-wildlife coexistence is at risk, and this solution directly addresses this issue. Promoting human-wildlife coexistence is crucial not only for dolphins but also for us, and it requires the implementation of practical solutions to achieve this goal.

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