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# RESEARCH SERIES

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Most RFMO bycatch mitigation efforts fall short of best practices.

## BYCATCH REDUCTION IN GLOBAL TUNA FISHERIES

### A SUMMARY OF NEW SCIENTIFIC ANALYSES:

Gilman, Eric L. 2011. Bycatch governance and best practice mitigation technology in global tuna fisheries. *Marine Policy* 35: 590–609.

SINCE THE EARLY 1950s the global demand for tuna has risen from less than 0.2 million tonnes to a peak of 6.4 million tonnes in 2006. Greater fishing effort has also increased the number of seabirds, sea turtles, sharks and marine mammals that are caught incidentally by tuna fishers. Bycatch can exacerbate overexploitation of some populations and change the behavior and diet of animals that feed on discarded catch. Yet, large knowledge gaps persist in the ecological impacts of bycatch and the effectiveness of efforts to manage bycatch.

Dr. Eric Gilman of Hawaii Pacific University reviewed pelagic longline and purse seine fishing bycatch problems and mitigation best practices for seabirds, sea turtles, sharks, marine mammals and juvenile tunas. He also examined the current binding conservation and management measures, intended to mitigate bycatch, of the Regional Fisheries Management Organizations (RFMOs), which oversee high seas tuna fisheries. The author found that the five tuna RFMOs have had mixed progress in alleviating bycatch, and many of their measures fall short of current standards. Requiring best practice approaches, improving monitoring of bycatch problems, improving enforcement mitigation measures and utilizing market-based incentives hold promise for reducing bycatch levels. This *Lenfest Ocean Program Research Series* report is a summary of the scientist's findings.

## BYCATCH MITIGATION: RFMO MANAGEMENT AND BEST PRACTICE TECHNOLOGIES

Dr. Gilman identified the best known fishing gears and methods for mitigating bycatch in pelagic longline and purse seine tuna fisheries. These fishing gears can cause significant bycatch problems as they hook and entangle other animals, including seabirds, sea turtles, marine mammals, sharks and juvenile fish. He also examined current international bycatch regulations in place at the five RFMOs that oversee the global tuna fishing industry.

The study shows that although there are a wide variety of approaches available to mitigate bycatch, RFMO progress toward identifying and reducing bycatch in tuna fisheries has been mixed (Figure 1). RFMOs are not consistently requiring best practices to mitigate bycatch; moreover, they lack adequate monitoring to detect bycatch problems, resources for surveillance and enforcement and performance standards to evaluate bycatch measures.

Dr. Gilman suggests a number of potential approaches to improving the management of bycatch in tuna fisheries, including:

- **Implementing legally binding measures to require best practice gear technology because voluntary adoption and implementation have been limited.** According to the author, many existing RFMO control measures deviate from best practice gear technology (see Figure 1).
- **Identifying for different bycatch reduction methods the potential for conflicts or shared benefits across different species.** For example, the use of circle hooks in place of narrower J-hooks to reduce turtle bycatch rates in pelagic longline fisheries was found to also reduce seabird bycatch rates by about 80 percent. Alternatively, restrictions on purse seine fishing around dolphins resulted in more purse seine fishing on fish aggregating devices (FADs), man-made or naturally occurring objects used to attract fish, which increased bycatch of young tunas, sharks and sea turtles.
- **Improving monitoring, surveillance and enforcement capabilities.** Dr. Gilman suggests placing more observers on fishing boats to collect data on bycatch amounts and the performance of mitigation measures in real world settings. He notes that observer coverage is close to 100 percent for large purse seiners in the Pacific Ocean, but is extremely low in all other pelagic longline and purse seine tuna fisheries across the five tuna RFMOs. Standardized monitoring and data recording methods could utilize a diversity of datasets and help determine if observed patterns are long-term trends, or cyclical, short-term patterns. Open access to regional and national level observer program datasets, including those from the five tuna RFMOs, could support broader research efforts.
- **Considering market-based mechanisms.** With increased market penetration, eco-labeling for marine capture fisheries, adoption of sustainable seafood sourcing policies by retailers and other market-based mechanisms may be feasible options to improve the ecological sustainability of fishing practices and management.

### WHAT IS BYCATCH?

- The retained catch of non-targeted but commercially valuable species (also called incidental catch or byproduct).
- Catch discarded for economic or regulatory reasons.
- Unobserved mortalities including catch that falls from the fishing gear before it is retrieved; “ghost fishing” from lost or abandoned gear; and catch that is released alive but is in such poor condition that it dies soon thereafter.



**FIGURE 1: RFMO USE OF BYCATCH MITIGATION MEASURES**

**BEST PRACTICES TO REDUCE BYCATCH IN TUNA FISHERIES INCLUDE SOME OF THE FOLLOWING ...**

**Purse seine**      **Examples**      **Pelagic longline**

<p><b>Seabirds</b></p>	<p>Not applicable</p> <p>Purse seines are underwater, so they generally do not affect seabirds.</p>	<p><b>J-hook</b> can be swallowed and cause internal damage or death.</p> <p><b>Circle hook</b> is designed to hook only in corner of mouth.</p>	<ul style="list-style-type: none"> <li>● Avoid peak times seabirds search for food.</li> <li>● Discourage seabirds from taking baited hooks by using “<b>tori</b>” lines.</li> <li>● Make baited hooks less easy to find using blue-dyed or artificial bait.</li> </ul>
<p><b>Sea turtles</b></p>	<ul style="list-style-type: none"> <li>● Restrict use of fish aggregating devices, or FADs, and recover them when no longer in use.</li> <li>● Avoid encircling turtles, and release turtles entangled in FADs.</li> </ul>	<p>FAD</p> <p>Concrete anchors</p>	<ul style="list-style-type: none"> <li>● Use wide <b>circle hooks</b> and large whole fish as bait rather than J-hooks and squid as bait.</li> </ul>
<p><b>Sharks</b></p>	<ul style="list-style-type: none"> <li>● Restrict use of <b>FADs</b>, a buoy, plank or other object used to attract fish (can be anchored or free-floating).</li> </ul>		<ul style="list-style-type: none"> <li>● Make bait less attractive to sharks.</li> <li>● Prohibit wire leaders.</li> <li>● Set gear in deeper in the water.</li> <li>● Use fish and not squid for bait.</li> </ul>
<p><b>Young or small fish</b></p>	<ul style="list-style-type: none"> <li>● Restrict use of FADs.</li> </ul>		<ul style="list-style-type: none"> <li>● Use circle hooks instead of J-hooks.</li> <li>● Restrict the use of <b>lightsticks</b>.</li> <li>● Put fishing gear in deeper waters.</li> </ul>
<p><b>Marine mammals</b></p>	<ul style="list-style-type: none"> <li>● Use the “Medina dolphin safety panel” of fine mesh rather than netting.</li> <li>● Prohibit night sets of fishing gear.</li> </ul>		<ul style="list-style-type: none"> <li>● Communicate among fleets about location of mammals, so they can avoid them.</li> <li>● Use “<b>weak</b>” hooks, which can straighten and allow mammals to escape.</li> </ul>

**... BUT RFMO MEASURES FALL SHORT**

The RFMOs have adopted a limited number of measures to mitigate bycatch, but many of these measures are difficult to enforce and generally not considered best practices. ■ = Animals protected by mitigation measures

Partial list of measures adopted by RFMOs\*

	CCSBT	ICCAT	IOTC	WCPFC	IATTC
Adopted longline gear measures					
Adopted purse seine gear measures					
Restrict finning and prohibit retention of thresher sharks					
Use quantifiable performance standards					
Legally binding measures include time/area restrictions, catch retention					

\*CCSBT = Commission for the Conservation of Southern Bluefin Tuna; ICCAT = International Commission for the Conservation of Atlantic Tunas; IOTC = Indian Ocean Tuna Commission; WCPFC = Western and Central Pacific Fisheries Commission; IATTC = Inter-American Tropical Tuna Commission

\*\*Dolphin mortality in purse seine fishing is not problematic in regions overseen by the other RFMOs.



## CONCLUSIONS

Dr. Gilman suggests that it may be possible to reduce bycatch in tuna fisheries to much lower levels using currently available best practice approaches to changing fishing gear and methods. However, the majority of fishing fleets are not legally required to employ best practices. The author notes that current consensus-based requirements and opt-out provisions of the tuna RFMOs may limit the adoption of some of these bycatch mitigation measures. The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and the Inter-American Tropical Tuna Commission (IATTC), for instance, require unanimity by all members for all decisions. The author argues that more effective bycatch reduction measures would more likely be adopted if decisions were made via a qualified majority and opt-out provisions eliminated. Changes in RFMO management of bycatch reductions are likely to be gradual, however. Dr. Gilman suggests considering other bycatch reduction approaches, such as market-based ones, in conjunction with governance improvements.

### About the Author:

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