



Experimental Fishing Gear Projects

We collaborate with the Consortium for Wildlife Bycatch Reduction to research and develop new and innovative fishing devices and methods that reduce the threat of bycatch to sea turtles, large whales, sharks and other marine animals.

Metallic Repellents

Sharks are frequently caught as bycatch by commercial and recreational fishermen when they are captured on baited hooks. Since sharks are very sensitive to the presence of metal in the water, we are working with several different types of electromagnetic materials to develop an effective shark repellent for fishing hooks.

We have completed initial studies, which tested the reactions of captive spiny (*Squalus acanthias*) and smooth (*Mustelus canis*) dogfish to two metals—a lanthanide/cerium alloy (mischmetal) and a rare-earth magnet (neodymium-iron-boride). Dogfish are small, coastal sharks that are frequently captured as accidental bycatch in hook-based New England fisheries.

Over a period of two months, we tested how each species responded to the various baits and metals. In each species-specific trial, we presented animals with squid-baited fake hooks. Each fake hook was “protected” by either the mischmetal, the magnet or an inert decoy (eg. stainless steel). We ran tests under a variety of conditions in order to test the effects of hunger and shark density on the bait selectivity of each species.

We have not yet completed our statistical analysis, but initial data suggests that the repellent effects of each metal will likely vary from one species of shark to another. The spiny dogfish were more averse to the mischmetal, while the smooth dogfish was more discouraged by the magnet. Both species were less likely to be affected by the repellents if they were hungry, and neither species was affected by the density of sharks in the experimental tanks.

These initial results suggest that metallic repellents may help reduce the bycatch rate of specific shark species, but their repellent qualities may be too specific to work with all species of sharks. Additional research is needed to better understand how other species of sharks respond to these and other metallic substances

Ropes

Fishermen use ropes to set gillnets in the water column and anchor their lobster pots and traps to floating buoys and one another. This gear presents a hazard to whales and large fishes that may become tangled in the ropes if they swim too closely.

The critically endangered North Atlantic right whale, in particular, has a long and tragic history of fatal entanglements with ropes used in the commercial fishing industry, and approximately 70% of right whales alive today bear scars from past entanglements.

We are working to reduce this threat by developing new ropes for the fishing industry:

A highly durable, sinking groundline for pot and trap fisheries that stays at or near the ocean bottom, avoiding potential conflicts with whales.

Ropes manufactured strong enough to use as vertical lines in pot and gillnet fisheries but that break under the pull of an entangled large whale.

Vertical lines for gillnet and pot fisheries that are more visible to large whales and other marine animals.

Gillnets

These large mesh or rope nets are hung vertically in the water, often anchored on the ocean floor or suspended from floating buoys on the surface. These nets frequently capture unwanted species, including whales and dolphins, sea turtles and non-targeted fishes. We are working to reduce this rate of bycatch by developing innovative modifications to traditional gillnets.