

Interactions of Peruvian small scale fisheries with
threatened marine vertebrate species

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Jeffrey C. Mangel

Abstract

Marine vertebrate species face unprecedented and ever increasing pressures as a result of human activity, primarily fishing, in the global oceans. One area of growing concern has been for the impacts of small-scale fisheries on these species. Over the past decade it has become increasingly clear that these under-studied fisheries have sizeable levels of catch and bycatch of many threatened and endangered species of sea turtles, seabirds and small cetaceans. This thesis presents a collection of chapters that investigate aspects related to the interactions of small-scale fisheries with threatened marine vertebrates.

We identify sizeable rates of bycatch of small cetaceans and seabirds for multiple small-scale longline and gillnet fisheries in both Peru and Ecuador. Catch rates of small cetaceans by the Peruvian small-scale driftnet fleet are estimated to exceed 10,000 dolphins and porpoises annually. A trial of acoustic alarms (pingers) in this same fishery showed a 37% reduction in small cetacean bycatch while not reducing target catch and represents a promising bycatch mitigation measure. Seabird bycatch was also found to be high in both longline and gillnet fisheries and included a wide range of seabird species including the critically endangered waved albatross (*Phoebastria irrorata*). Through post-capture satellite tracking of loggerhead turtles (*Caretta caretta*) we show that these turtles are present in pelagic waters off the coasts of Peru and Chile for extended periods during which they are at risk of repeat interactions with small-scale longline fisheries operating throughout their foraging habitat. Through scan and focal sampling of the endangered marine otter (*Lontra felina*) we also show that otters making den sites in human fishing communities face additional risks due to entanglement in fishing gear or interactions with feral animals but, if properly managed, these sites could serve as stepping stones for marine otters along the coast.

The results presented here, gathered using a wide range of techniques, including onboard observer and shore-based monitoring, satellite tracking, bycatch quantification, and bycatch mitigation experiments, represent an attempt to better characterize and quantify the interactions of small-scale fisheries with threatened marine vertebrates toward identifying solutions that can lead to sustainable fisheries and populations of these protected marine species.

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