EcoCast: Real-time data tools for dynamic fisheries management

Executive Summary

What we're doing **EcoCast** is a new fishery management tool that will predict in near real-time the spatial distributions of important highly migratory ocean species, including non-target species (such as leatherback sea turtles) and target catch (e.g. swordfish). Using this tool, fishers and managers will be able to evaluate how to best allocate fishing effort across space and time to improve fishery performance. **EcoCast** is being developed by a team of collaborators from several universities, NOAA, and non-profit sectors in direct collaboration with resource managers, the fishing industry and other stakeholders. The analyses for the project are being conducted by the Environmental Research Division of the NOAA National Marine Fisheries Service's Southwest Fisheries Science Center.

Balancing ecological sustainability and economic viability, specifically reducing unwanted bycatch while supporting sustainable target catch, is a growing challenge for fisheries managers in the US and worldwide. The goal of the **EcoCast** project is to create a near real-time, dynamic management decision support tool (DST) that provides information to resource users and managers on probabilities of encounter with target, non-target and protected species in response to changing ocean conditions. The California drift gillnet (DGN) fishery, our focal fishery, harvests healthy stocks of swordfish. However, bycatch of non-target species is common, and has resulted in large-scale fishery closures to prevent bycatch of leatherback sea turtle, small cetaceans, blue sharks and California sea lion, despite continued high demand for swordfish.

We have partnered with the DGN stakeholder community and NOAA West Coast Regional Office, which is responsible for regulating the fishery, to reduce bycatch in support of fishery sustainability. Our approach builds on previous NASA-funded projects, TurtleWatch and WhaleWatch, and other dynamic ocean management applications that are currently in use around the world. In these projects, researchers couple movement data of protected species with remotely-sensed oceanographic data to successfully predict habitat and help to reduce bycatch and other human impacts on protected species. **EcoCast** expands on this approach by considering both target catch and bycatch species and by providing information on higher resolution time scales, a critical need to support fishermen decisions. **EcoCast** will provide resource managers and fishermen information on fisheries-relevant spatial and temporal scales that will allow both

user groups to explicitly consider economic (target species) and ecological (non-target species) objectives of the fishery. This co-delivery of information ensures that **EcoCast** can support sustainable natural resource management as well as protected species conservation.

EcoCast uses several data types to create catch and bycatch probability of encounter models, including remotely-sensed oceanographic data, fishery observer data and satellite tracking data of key species of ecological and regulatory importance (leatherback turtles, California sea lions, and blue sharks).

Why The open ocean is a dynamic environment where ocean conditions, animals and fishing vessels move across space and time. Our project aims to put a powerful modeling tool into the hands of fishermen and managers that predicts the catch and bycatch probability in near real-time as a function of changing ocean conditions to support sustainable swordfish catch with significant bycatch risk reduction. In time, this tool may allow managers to better balance ecological and economic objectives by improving accessibility to valuable swordfish fishing areas when bycatch risk is low.

How Our collaborative research team (SDSU, NOAA SWFSC, Stanford, Old Dominion, University of Maryland) builds dynamic habitat models for pelagic species based on tagging and fishery observer data. These models use oceanographic data (such as sea surface temperature, sea surface height, chlorophyll, bathymetry, etc.) to generate dynamic models that reflect animal distribution as a function of changing ocean conditions. The full **EcoCast** product integrates dynamic models for our four focal species that maps daily probabilities of encounter for target and non-target catch species.

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