

# MODELING AND MAPPING FISHING IMPACT AND FISH BIOMASS ON SOUTH FLORIDA'S CORAL REEFS

## PROJECT OVERVIEW

Coral reef ecosystem services, including food provisioning from fisheries, are under threat from a wide range of human-caused stressors. To ensure that benefits such as fisheries are sustained, we must incorporate ecosystem services into marine management decisions. To facilitate this, The Nature Conservancy established the *Mapping Ocean Wealth* initiative to describe in quantitative and spatial terms what ocean ecosystems provide today. Under this umbrella, our project aims to map and model coral reef fisheries in South Florida to provide quantitative estimates of fish biomass, an important component of ecosystem benefits.



## PROJECT OBJECTIVES

- Use fishery-independent data to model cumulative fishing impact on Florida's coral reefs
- Create a map of estimated fishing impact to be used in conservation planning
- Use spatially-explicit estimates of fishing impact and biophysical data to model and map biomass of reef fishes on Florida's coral reefs
- Use the fish biomass model to predict fishery outcomes under a range of management and environmental change scenarios
- Post data on the Mapping Ocean Wealth data portal (<https://maps.oceanwealth.org>)

## MODELING AND MAPPING FISHING IMPACT AND BIOMASS

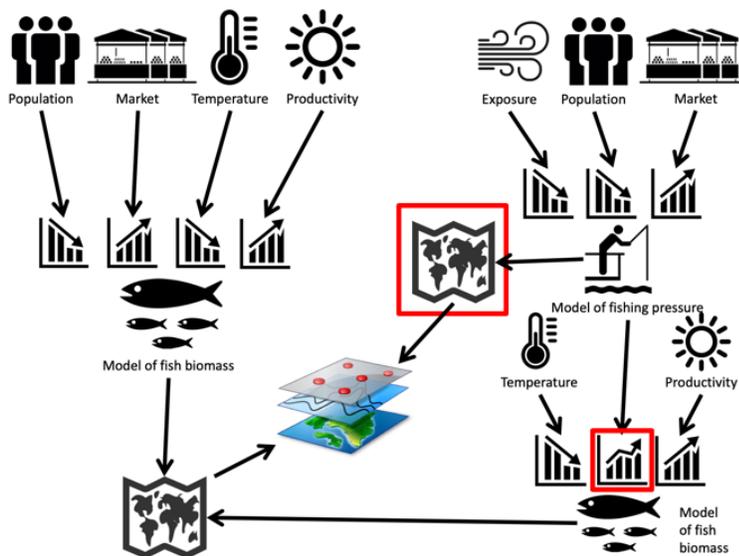


The first step will be to statistically model fishing impact using fishery-independent data on fish abundance and size. These data will be modelled in relation to a wide range of potential predictor variables, including biophysical data characterizing the coral reef and adjacent environment, and socio-economic data providing context to South Florida's fisheries. This model will be used to extrapolate fishing impact (specifically the total cumulative impact of fishing on the fish assemblage) to all coral reefs from Martin County to the Dry Tortugas, and to generate a map reflecting the predicted impact.

With this spatial data on fishing impact, we will then model current fish biomass at an independent set of sites where fish survey data are available. Fishing impact will be a key predictor variable. This model will generate a functional relationship between fishing and fish biomass for the region, while accounting for a range of environmental variables, such as sea surface temperature, that may impact biomass. This model will then be used to extrapolate estimates of current biomass to generate a continuous map that will be made available to fishery and marine managers.

## ANTICIPATED OUTCOMES

The modeled fish biomass and resultant maps will be useful tools for exploring fishery outcomes under a range of management options (e.g. area-based fishing regulations) and environmental change (e.g. a change in coral cover) scenarios. This new 'Ocean Wealth' information can be



used to help set realistic expectations for area-based management outcomes, aid in restoration decision-making, and provide managers information relating to fishery use for areas where few data currently exist. We aim to provide information to managers and stakeholders to improve understanding of ecological trade-offs and potential benefits that are predicted under different management and ocean use scenarios.

## PROJECT TEAM

This project is a collaboration between Alastair Harborne's Tropical Fish Ecology Lab at Florida International University and The Nature Conservancy (TNC). The work supports the Mapping Ocean Wealth initiative, which aims to generate high quality, spatially-explicit data to reveal the economic and social benefits of coastal ecosystems, such as coral reefs, around the world.

For more on the *Mapping Ocean Wealth* initiative, visit <https://oceanwealth.org/>. For questions or to speak with someone about this project, please reach out:

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