

Recreational Fishing Technical Summary

Overview

Under the Caribbean Regional Oceanscape Project (CROP) Subcomponent 2.1, the Organisation of Eastern Caribbean States Commission (OECSC) engaged The Nature Conservancy (TNC) to develop ecosystem service (ES) models for five countries in the Eastern Caribbean (Dominica, Grenada, Saint Lucia, Saint Kitts and Nevis, and Saint Vincent and the Grenadines) using methodologies developed under TNC's Mapping Ocean Wealth (MOW) initiative, and to develop training and resources to improve data access for decision-makers.

This document provides a technical overview of the Recreational Fishing model created for this project. [Click here](#) to see the full technical report.

The Caribbean is more dependent on the travel and tourism sector than any other region worldwide. This sector is almost entirely focused on coastal areas, notably through beach-based activities, cruise tourism and in-water activities including sailing, and diving, and other vessel-based activities. There has been intentional development of the recreational fisheries sector as an activity for tourists visiting the region and today, much of the recreational fishing in the region takes place from private or chartered vessels or during fishing tournaments. However, historical attempts to collect standardized data on this sector at a regional level have been limited, and spatial characterization of this activity has been especially lacking.

In this study, we have created a data layer depicting the offshore footprint and intensity associated with chartered fishing trips using a combination of image analysis applied to crowd-sourced data from Flickr and TripAdvisor, complemented by participatory mapping and survey data from charter vessel operators, as well as other stakeholder-provided information and guidance.

This dataset will enable a broad range of users from the public to industry to government to better plan and manage both the tourism industry and any other active sectors within the blue economy.

Data Sources

Data Layer	Source
Onshore operators	TripAdvisor & local directory listings provided by TNC Caribbean Division
Participatory mapping points and tracks	Survey and in-person mapping conducted by TNC staff in February 2020
Photos	Flickr & TripAdvisor
Fishing aggregation devices (FAD)	Departments of Fisheries and/or Natural Resources in Dominica, Saint Lucia, and Saint Vincent and the Grenadines
Deep-sea fishing derived from bathymetric contours	Bathymetric contours were derived from bathymetric sounding points digitized from British Admiralty nautical charts by TNC for the ECMMAN project in 2013.

Unless otherwise noted, all data sources were accessed in 2019.

Modelling and Geoprocessing

The methods presented below in the conceptual overview (Figure 1) and the subsequent descriptions are novel methodologies informed by the needs and data availability in the region. Methodologies and interim results were reviewed by stakeholders at in-person and virtual workshops in 2019 and 2020.

AI/ML Methods

Microsoft's Azure Custom Vision (<https://azure.microsoft.com/>) service was used to classify photos from Flickr and TripAdvisor as having been taken on chartered recreational fishing trips. The data used to train the model featured people holding trophy fish on boats and docks, as well as images on vessels featuring fishing rods and reels. The images returned were then standardized such that only one image per TripAdvisor user per attraction was counted (photo per attraction per member, or "PAM"). Very few images were returned from Flickr so there was no need to standardized based on unique users. The photos were then mapped as points based on the attraction to which they were linked, or, in the case of Flickr photos, to the location at which the photo was taken.

For TripAdvisor reviews, we used the web-based tool LightTag to label over 2,000 TripAdvisor reviews according to activities and elements described in each review. For nature-dependent beaches, we trained the model on reviews that mentioned phrases associated with recreational fishing trips (e.g., "sportfishing", "marlin", "fishing charter"). An expert team from Microsoft then applied a random-forest regression model to automatically classify the remainder of the reviews and return a list of reviews that matched each set of criteria. These were then mapped as points based on the attraction to which they were linked.

Conceptual Overview

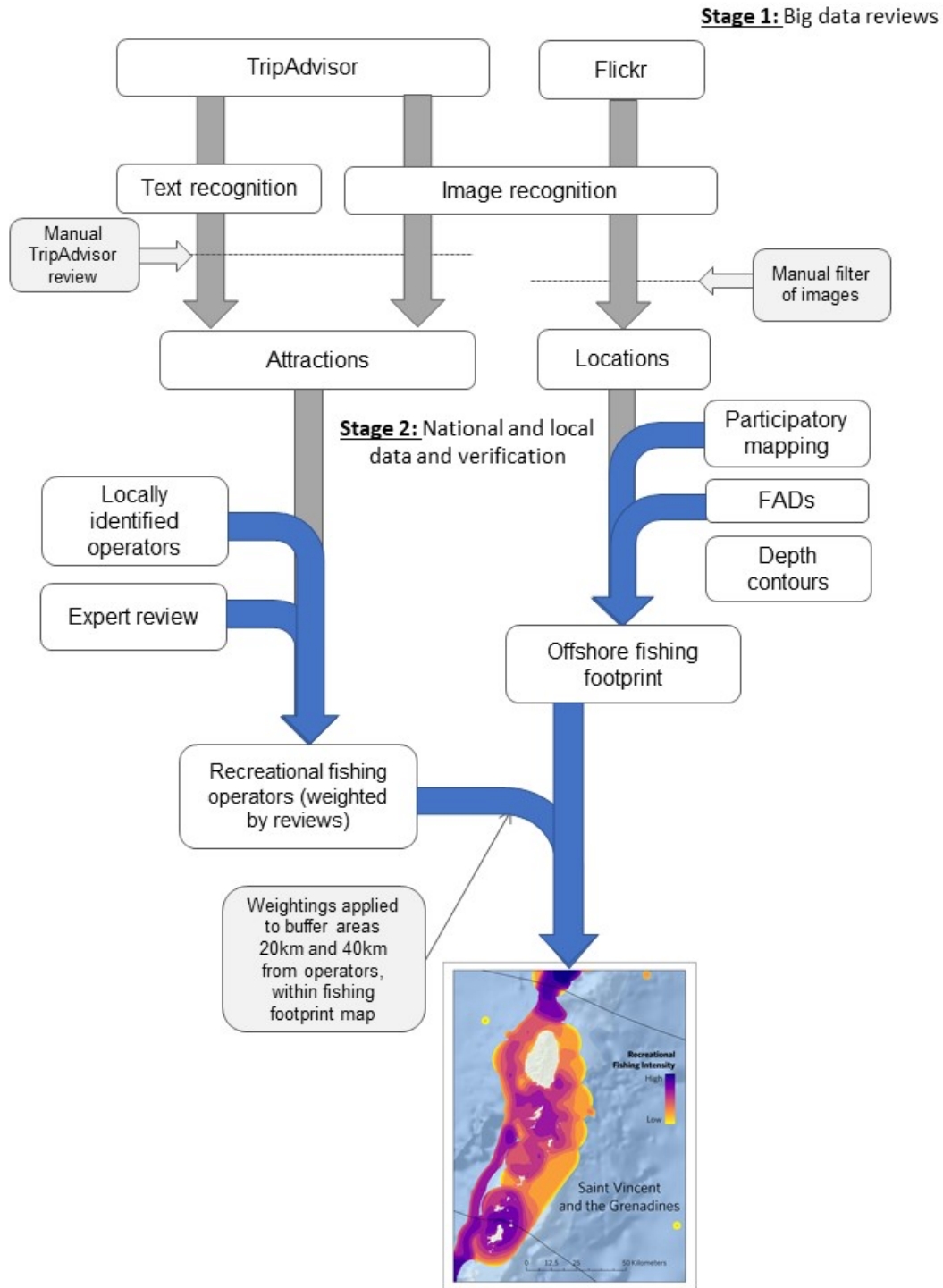


Figure 1. Conceptual overview of the Recreational Fishing modelling process

Developing intensity maps

To develop the offshore fishing intensity footprint, we applied buffers to the following layers:

- Participatory mapping points (10km)
- Flickr photos (10km)
- FADs (2km)

We also buffered 1000m and 2000m depth contours so that they covered depths ranging from 800m to 2200m.

The intensity maps assumes that each departure location of fishing tours (i.e., shore-based locations of tourism operators) can be used to map a wider offshore area of fishing, weighted by offshore factors influencing fishing activity. A point-based map of onshore operators was generated using data from TripAdvisor, supplemented by information from TNC staff based in the region. Each attraction was weighted using a score based on the number of PAMs and reviews from TripAdvisor (see above).

The model also assumes diminishing fishing effort with distance from shore, and while the participatory mapping points and Flickr images represent known fishing locations, the onshore operators, FADs and preferred deep sea fishing grounds do not. For the onshore operators, we spread to their associated fishing intensity weightings between an immediately adjacent fishing area (up to 10km), and were further distributed to the deep-sea fishing layer in an effort to spread the density of activities from the operator locations to the offshore locations where fishing is occurring. For FADs we likewise developed a distance weighting for likely fishing intensity, using the assumption that FADs located further offshore are likely to attract less recreational fishing effort.

Each of the resulting layers was combined and their fishing weightings summed to develop a merged layer of fishing intensity. These final maps were then smoothed across a zone of 2.5km, using a focal statistics tool to better represent the likely blurred boundaries expected in open water fishing.

Economic value

Data gathered during the participatory mapping exercise also enabled us to generate approximate data on tourism spending. From the survey results, we calculated for each country the average # of trips per week in both the high and low seasons and the number of months in the high and low seasons. By multiplying these values, we estimated the number of trips/year/operator. We then multiplied these by the average cost/trip recorded from the survey, and then that number by the number of operators by country in order to estimate the annual charter sportfishing tourism expenditure, in \$USD. Unlike other Mapping Ocean Wealth data products, these values are not distributed across the intensity maps. This was based on the fact that the activity takes places across a variety of benthic and pelagic habitats, rather than being tied to one specific habitat. Stakeholder consultations confirmed that this approach was appropriate.

Limitations and Caveats

These are modelled data products based on a series of assumptions, including the motivations and activity patterns of tourists and charter operators. Model assumptions have been vetted by experts, stakeholders, and data where possible. The model is also based on crowd-sourced data points, which may be subject to bias. As such, interpretation the model, especially for very small areas, should be treated with caution. Areas not represented on the map are not necessarily completely unused for recreational fishing. Values associated with the spatial data are unitless and should not be used for quantitative analysis.

Suggested Citation

Spalding MD, McNulty VP, Longley-Wood K. 2020. Recreational Fishing in the Eastern Caribbean. Produced by The Nature Conservancy for the Organisation of Eastern Caribbean States under the Caribbean Regional Oceanscape Project

Data Access

[Click here to download modelled data](#)