# WHALES & VESSELS

## Economic Valuation of Whale Watching and Marine Spatial Planning Surrounding Dominica

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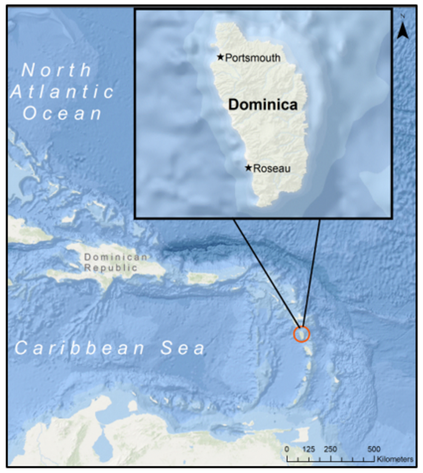
## Background

Ship strikes are a known source of significant mortality for sperm whales and other large whales worldwide. The west coast of Dominica attracts heavy vessel traffic in and out of two primary ports, but does not currently use shipping lanes to regulate vessel traffic. As a result, **the local eastern Caribbean sperm whale community** faces ship strike threats from unregulated vessel traffic.

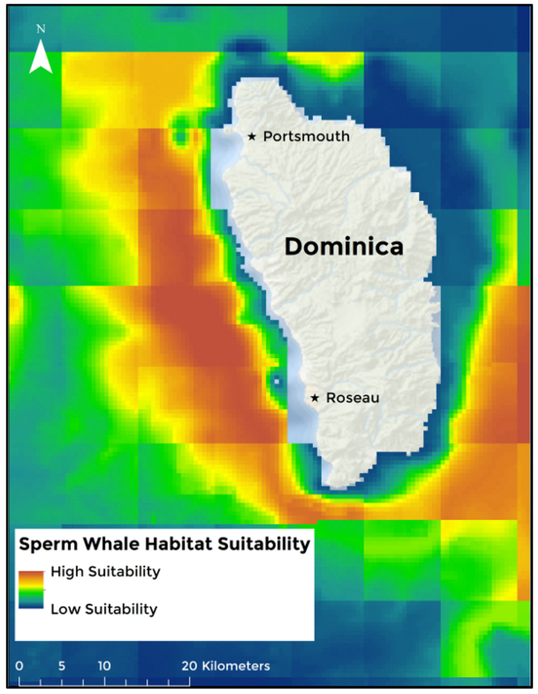



- The eastern Caribbean sperm whale community could reach a low population size by 2030.
- The Dominica Sperm Whale Project (DSWP) has found that this sperm whale community is geographically and behaviorally isolated and unique.
- Up to 33% of Dominica's gross domestic product (GDP) comes from tourism and travel.
- The decline in Dominica's sperm whale community threatens the stability of whale tourism within this Small Island Developing State.

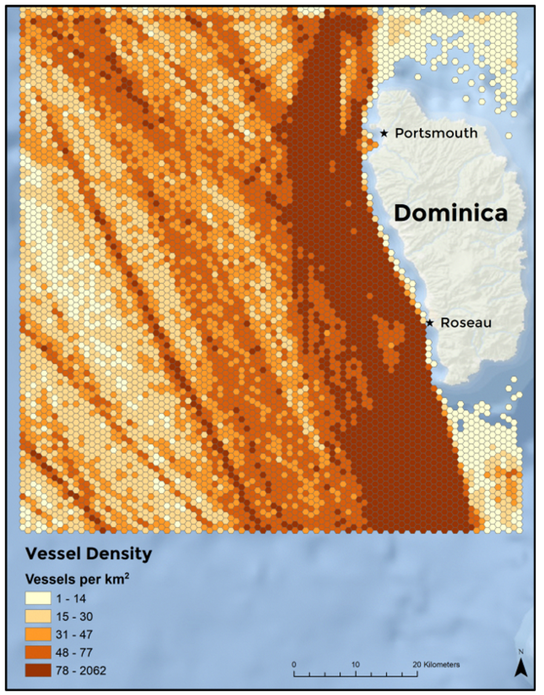
## Objectives

1. Develop a **marine spatial plan** that regulates vessel traffic and reduces vessel speed within sperm whale habitat
2. Determine the monetary value of sperm whale tourism in Dominica through an **economic valuation**

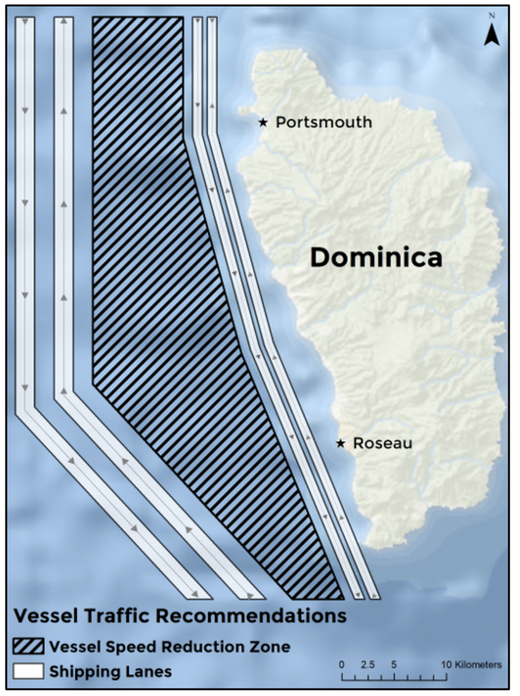
## Marine Spatial Plan




A **species distribution model** based on sperm whale presence data and environmental factors allowed us to identify, analyze, and visualize data on sperm whale presence. From this, we could identify areas of high predicted habitat suitability (in red) for sperm whales off the west coast of Dominica.




A **vessel traffic density analysis** allowed us to visualize vessels that pose the greatest lethal ship strike risk; these include cruise ships, merchant vessels, and high speed ferries traveling at 10 knots or greater. We see that the highest vessel traffic density overlaps with high sperm whale habitat suitability areas.




We created a **marine spatial plan** for suggested vessel traffic management based on the species distribution model and vessel density analysis. Offshore and inshore shipping lanes (white) are split into northbound and southbound lanes (arrows). Vessels should not exceed 10 knots in the vessel speed reduction zone (diagonal black lines).

## Recommendations

**Vessel Traffic Schemes.** The Dominican government should implement shipping lanes and a vessel speed reduction zone off the west coast of Dominica. These measures could reduce ship strike threats by routing vessels around high suitability sperm whale habitat, and slowing vessels down when traveling through sperm whale habitat.

**Travel Impacts.** Vessel management decisions should incorporate added time and other costs associated with the vessel speed reduction zone, so that vessels traveling through this zone can account for these costs.

**Ongoing Economic Evaluation.** DSWP and the Dominican government should continue to collect more complete economic data to improve the estimation of sperm whale tourism's monetary value in Dominica. We have designed a economic valuation spreadsheet that can update our estimates based on new information.

## Economic Valuation

The goal of our economic valuation was to find the **annual net profit** generated from the three main business groups for sperm whale tourism in Dominica: whale watching tour operators, swim-with-whale tour operators, and cruise lines.

**$3 million**
ANNUAL NET PROFIT OF WHALE TOURISM IN DOMINICA

**$1 million**
ANNUAL ECONOMIC BENEFITS TO DOMINICA

### Whale Watching and Swim-With-Whale Economic Model

$$NPW = (WET * W) - E$$

- **NPW** = Annual net profit from sperm whale tourism
- **WET** = Average whale tourist expenditure per trip
- **W** = Number of whale tourists per year
- **E** = Average expenses for whale tour operator

## Acknowledgements

We would like to thank our faculty advisor, Dr. James Frew, our PhD mentor, Niklas Griessbaum, and our external advisors, Dr. Ben Best, Dr. Darcy Bradley, and Dr. Andrew Plantinga. We would also like to thank the Bren School at UCSB, and our client, Dr. Shane Gero with the Dominica Sperm Whale Project.