

Heather Brockbank, Jack Dolan, Emma Holloway, Kate Kechriotis, Hallie Komessar, Ava McCormick, Charles Silver,
Advisors: Eric Schneider, Natalie Hodges, Taylor Derico

Introduction

Cetaceans are air breathing mammals that include whales, dolphins, and porpoises. They are globally distributed with ninety species worldwide. Many are deep diving and can stay underwater for three hours at depths of up to two miles. Cetaceans are understudied due to their vast inaccessible habitat. There are many threats to cetaceans. Global climate change leads to changing water temperatures, which change the distribution of prey and force cetaceans into unsuitable environments. (MacLeod, 2009). An additional threat is the fishing industry's bycatch of cetaceans and also loss of prey sources to the fishing industry. (Read, 2006). Also, sonar disruption of echolocation use causes some whales to rapidly ascend to the surface and cause hemorrhage to their inner ears. (Darlene, 2014).

Objectives

- Recognize which species of cetaceans are utilizing this area
- Attempting to gain a better understanding of the distribution and population abundance of specific marine mammals
- Using previously collected data to establish mean diversity within our study site
- **Hypothesis:** Marine mammal distribution in the Exuma Sound is influenced by water depth and abiotic environmental variables (pH, salinity, sea surface temperature).

Methods

This study was conducted on transects that are 8 mile lines between set GPS coordinates. While following the transect consistent effort is given to scanning the horizon for a 360° view in all directions of the boat, with a 10° overlap in order to be sure that all areas are being observed. Environmental and abiotic factors are collected every 15 minutes (pH, salinity, and sea surface temperature) using a water probe inserted into a sample of surface water. Other environmental conditions such as cloud coverage and sea state are measured because they impact the ability to sight cetaceans. A camera is used to capture the cetacean sightings and later the photos are used to identify individuals. The hydrophane which is an underwater listening device, sits 10m below the surface, and is tethered by 600m of mooring line to the ocean floor. It gathers acoustic data rather than visual, which complements a boat based transect. The hydrophone is listening for 15% of the time that it is underwater.



Figure 1:
ORP
Water
Probe



Figure 2: Researches actively scanning the horizon

Results

This study has been collecting data for the past 3 years and has documented 55 cetacean sightings within the Exuma Sound as well as opportunistic sightings on other southern islands of The Bahamas. During the study, 8 transects were conducted totaling 304 minutes. Sightings besides cetaceans were also documented and sixty-nine (69) flying fish (*Exocoetidae*) were sighted on transect. Using logs of cetacean sightings from the past 3 years, an image of their distribution patterns has been formulated. The results showed three species were sighted the most: 72 short finned pilot whales (*G. Macrorhynchus*), 10 risso's dolphins (*G. Griseus*), and 8 blainville beaked whales (*M. Densirostris*). These species are the most abundant in the Exuma Sound.



Figures 5 & 6: Short-finned pilot whale (*G. macrorhynchus*) dorsal fin; identified to be the same individual

When photos were taken, it was important that these pictures were high quality photographs with minimal sunshine glare. Distinctive features on fins, tails, or body were used to identify recognizable individuals within a specific species. Scars and notches were some of the main distinguishable features on the cetaceans. The cetacean in the pictures above is highly distinguishable due to the collapsed dorsal fin, therefore it is possible to conclude that the two images show the same individual.

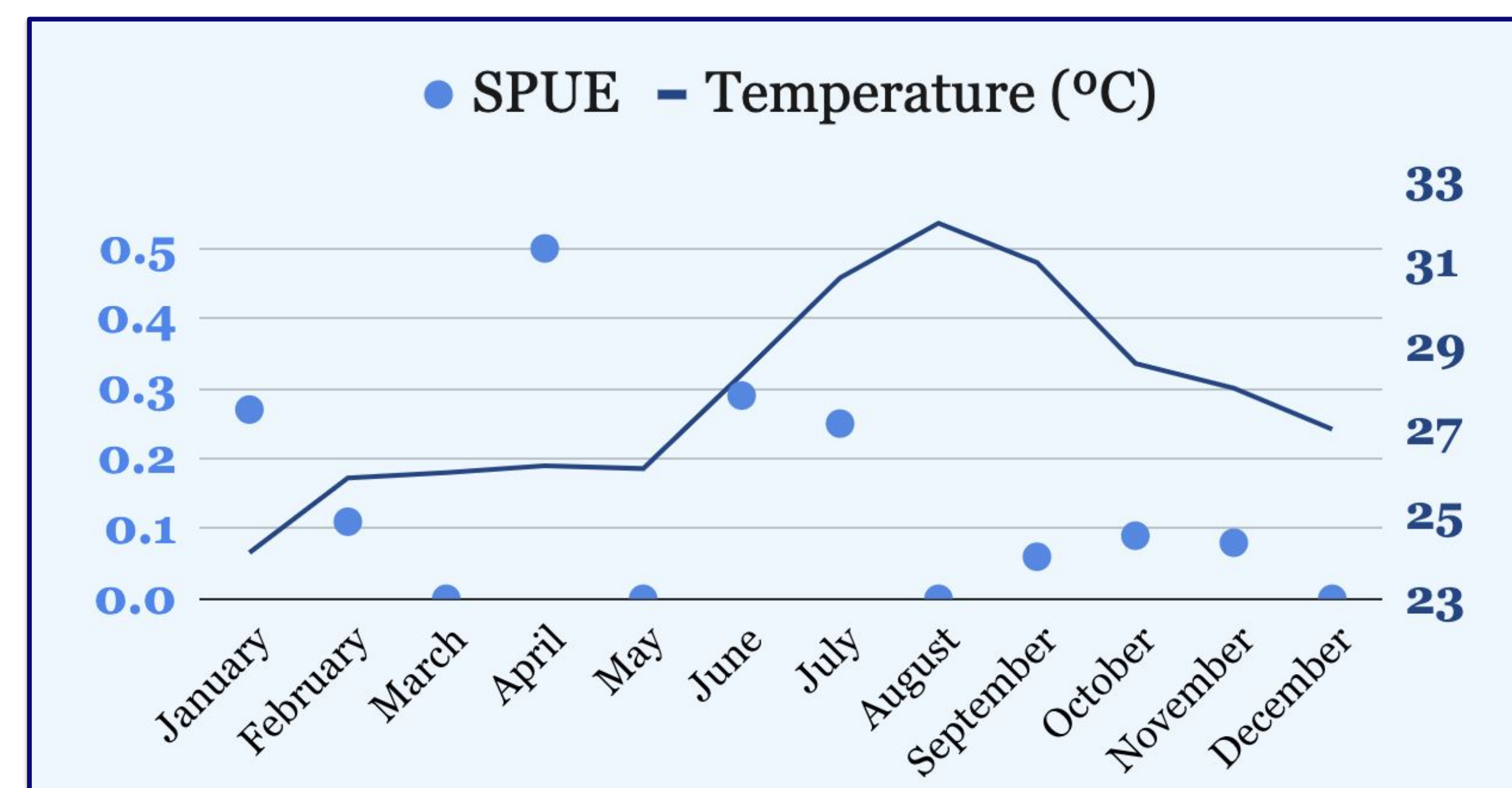


Figure 4: Seasonality chart that compares the months in a year to both the water temperature (°C) and the probability of sightings, measured in SPUE (sightings per-unit effort).

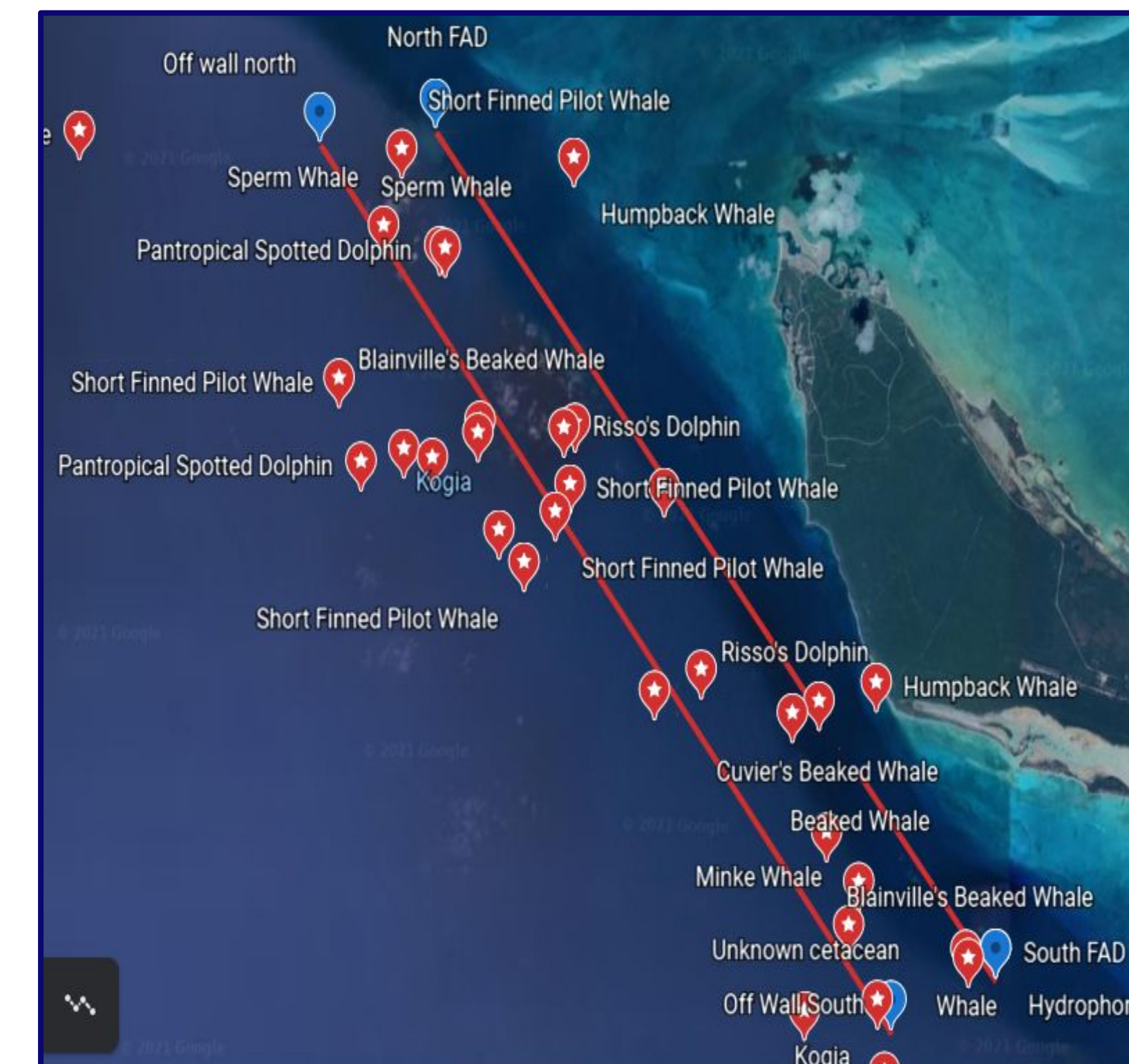


Figure 3: Species sightings recorded along both transects along the Exuma Sound.

Discussion

Figure 4 demonstrates the variability of cetacean sightings within the cooler months of the year in comparison to the warmer months where there is a consistent decline of sightings. It was predicted the cetaceans are more common in the spring and one of the leading factors to support this is the presence of pelagic fish. Most of the cetaceans studied have similar prey to the pelagic fish. Even though the springtime brings harsher climate conditions that make sighting harder, the data shows more sightings in the spring which further suggests these cetaceans are indeed seasonal in this specific area.

Gathering data about the **distribution**, **abundance**, and **seasonality** of cetaceans in the Exuma Sound creates a baseline data set on the population in this area.

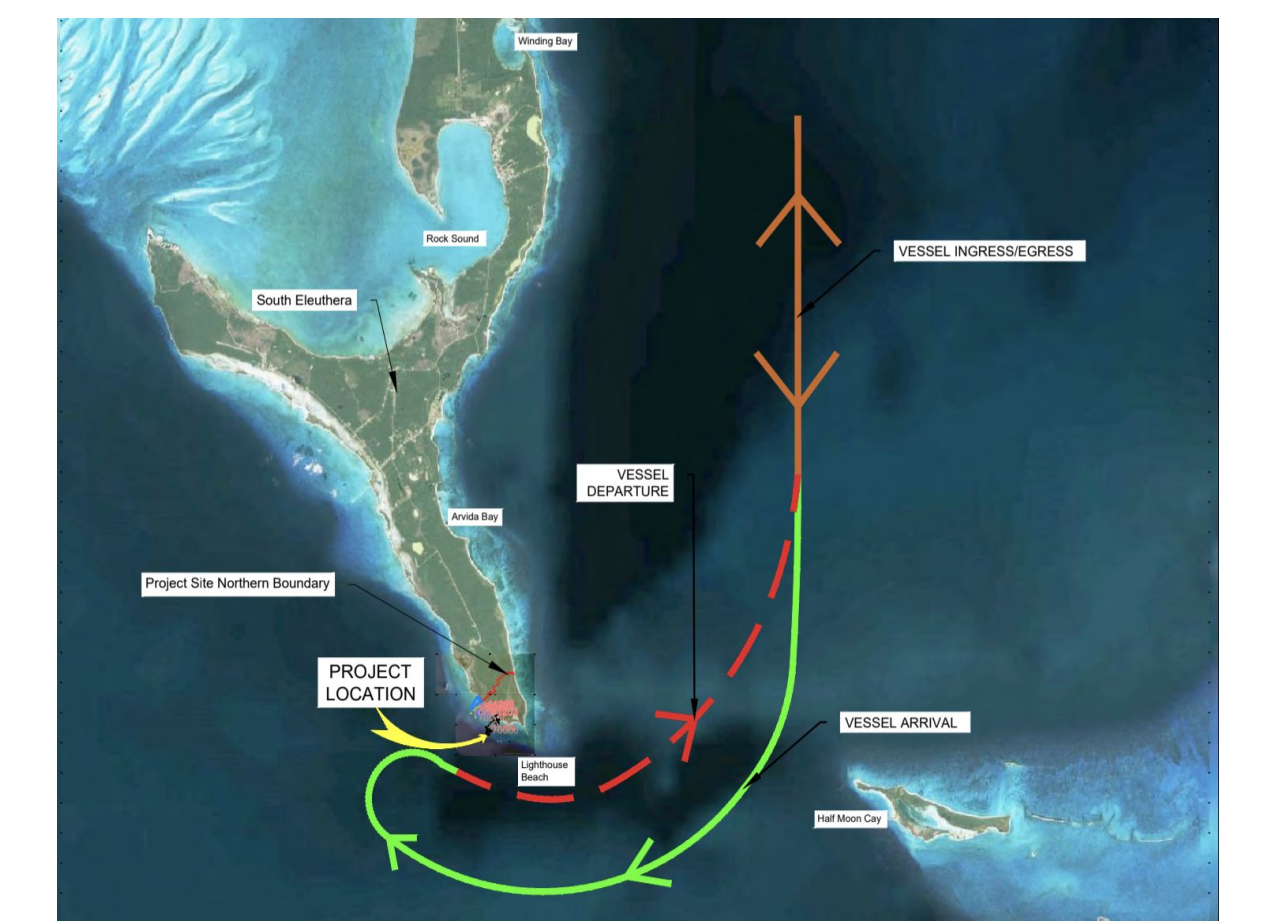


Figure 7 & 8: Lighthouse Point Disney Cruise Port Development Plan

The baseline can later be used as a reference point to analyze the environmental impact of increased ambient noise, new infrastructure (such as Lighthouse Point development into cruise port by Disney), and shipping channels.

Literature Cited

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