Florida Trustee Implementation Group

Manatee River Subtidal Oyster Reef Mapping 2023

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Overview

The Deepwater Horizon Natural Resource Damage Assessment Florida Trustee Implementation Group awarded the Florida Fish & Wildlife Conservation Commission (FWC) funds to map, monitor, and create habitat suitability analyses in order to identify optimal locations for oyster restoration along the Gulf coast of Florida. Six estuaries of interest were selected for habitat analyses: Pensacola Bay, St. Andrew Bay, Suwannee Sound, Withlacoochee River, Crystal River, Tampa Bay, and Charlotte Harbor. This mapping effort was designed to identify any previously unmapped oyster reefs for inclusion in the statewide compilation of live oyster habitat, Oyster Beds in Florida. Maps will also be used to help create regional oyster habitat suitability analyses. Mapping was divided into subtidal or intertidal efforts due to differing methodologies. This report encompasses subtidal oyster habitat mapping of the Manatee River, a part of the Tampa Bay watershed.

Methods and Results

The potential presence of subtidal oyster reefs was noted on Manatee County's public GIS interface high-resolution, aerial imagery collected on days with relatively high water clarity between 2015 and 2023 (available from https://www.mymanatee.org/gisapps/gis/clipzipship/map2.html). Infrared (IR) images from the same time period were then obtained from Manatee County and used to identify and delineate subtidal reefs. IR imagery is a commonly applied technique for mapping intertidal oyster reefs, though its use is less common for mapping subtidal habitat (Le Bris et al. 2015, Román et al. 2023). Potential oyster reefs were digitized in ArcGIS Pro 3.0 (ESRI; Redlands, CA) with no minimum mapping unit.

All potential reefs were ground-truthed as their subtidal nature made it difficult to confidently confirm visual signatures of an oyster reef. Ground-truthing efforts were conducted by personnel from FWC, Manatee County Government, and Oyster River Ecology, Inc. in July and November 2023. The substrate of each ground-truthed reef was probed with a pole, visually confirmed, and/or verified while wading or snorkeling. The substate of each location was then classified as oyster reef, sand/mud, oyster shell/shell hash, or scattered live oyster. Oyster reefs were defined as areas with a minimum of 30% oyster coverage (estimated visually); sites with less than 30% cover were classified as scattered live oyster (Baggett et al. 2014). Only confirmed, live oyster reefs were included in the final map.

Within the Manatee River Estuary, 105 potential reefs were digitized and ground-truthed. Of these 105 potential reefs, 62 were confirmed to be live oyster reefs, resulting in a ground-truthing accuracy of 59% for the region (Figures 1 and 2). Potential reefs that were determined during ground-truthing to be misclassified had substrates composed of sand-mud (26.7%), followed by oyster shell/shell hash (7.6%), and scattered, live oyster (6.7%).

Subtidal oyster reefs were first noted in the Manatee River in an 1887 survey by the United States Army Corps of Engineers (USACOE 1888). More recent mapping efforts in the Manatee River region were conducted by the Southwest Florida Water Management District using 2016, 2018, and 2020 imagery (SWFWMD 2016, 2018, 2020) and FWC using 2020 imagery (FWC 2020). These maps focused primarily on intertidal oysters. This current mapping effort focused solely on subtidal reefs in previously unmapped habitat and so the resulting map is complementary to other existing intertidal oyster maps.

The following characteristics were notable for the Manatee River:

- Newly identified reefs were predominantly east of the Braden River while subtidal oyster reefs were entirely west of the Braden River in 1888 (USACOE 1888), suggesting upriver migration of oyster habitat. A handful of reefs were also peripheral to concrete infrastructure supporting high-power transmission lines crossing the river (Figure 1).
- Detailed interpretation of high-resolution aerial imagery collected on days with favorable water clarity can provide insight for opportunities to identify subtidal oyster reefs. IR imagery can also highlight contrast of subtidal reefs where aerial imagery cannot (Figure 3), though extensive ground-truthing or cross-validation with multispectral data is still necessary. Images from IR lack the resolution to determine texture (surface roughness) of oyster reefs or to differentiate between live reefs and scattered shell (Choe et al. 2012, Le Bris et al. 2015, Chand and Bollard 2021, Chand et al. 2021).
- Divers noted the presence of the Florida crown conch (*Melongena corona*), macroalgae, ribbed mussels (*Geukensia demissa*), barnacles, boring sponge, and other epibionts among oyster reefs (Figure 4).

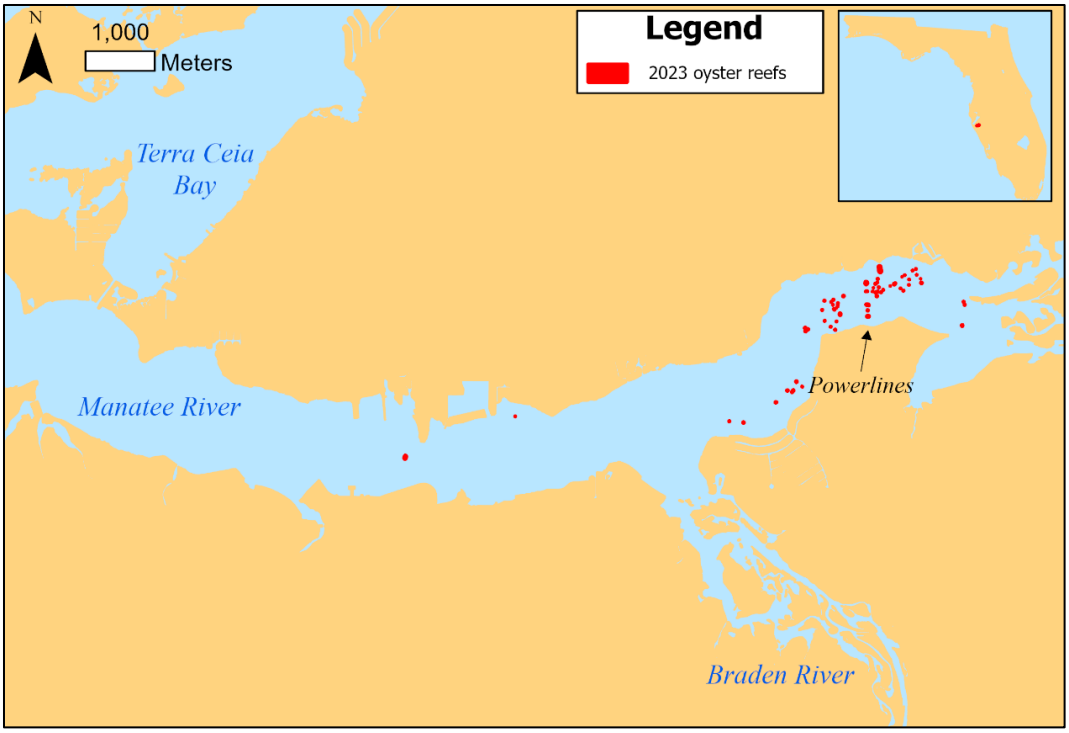

Figure 1. Subtidal oyster reefs of the Manatee River identified during this mapping effort. Oyster reefs are not represented to scale.

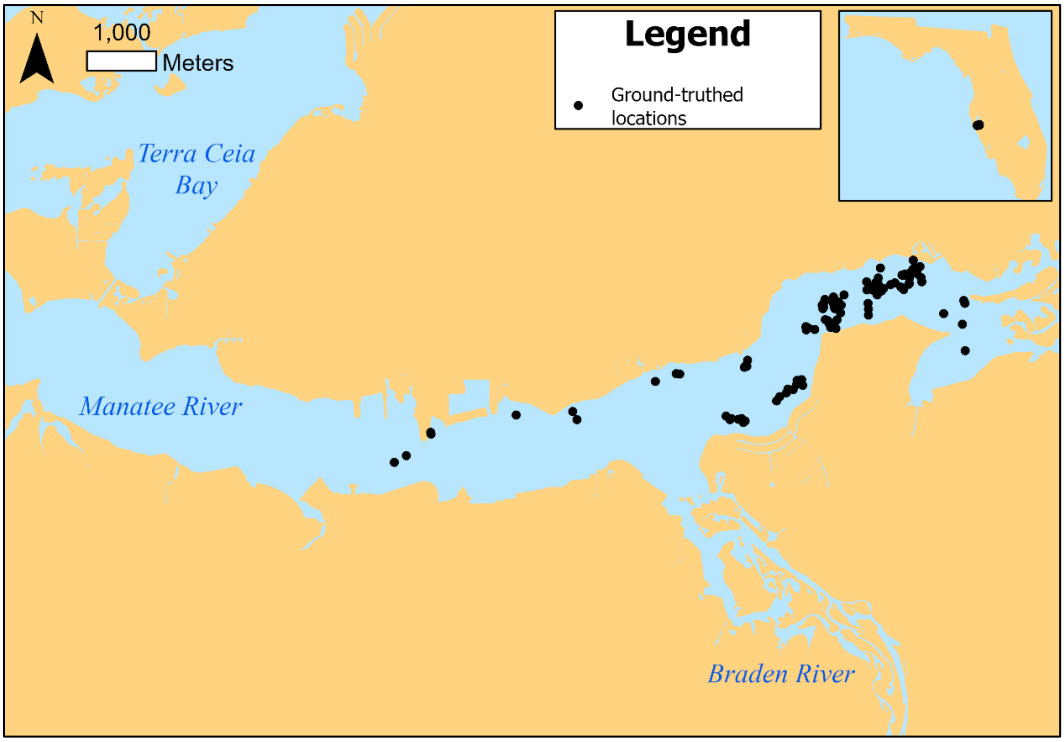

Figure 2. Map of ground-truthed locations of potential oyster reefs in the Manatee River.

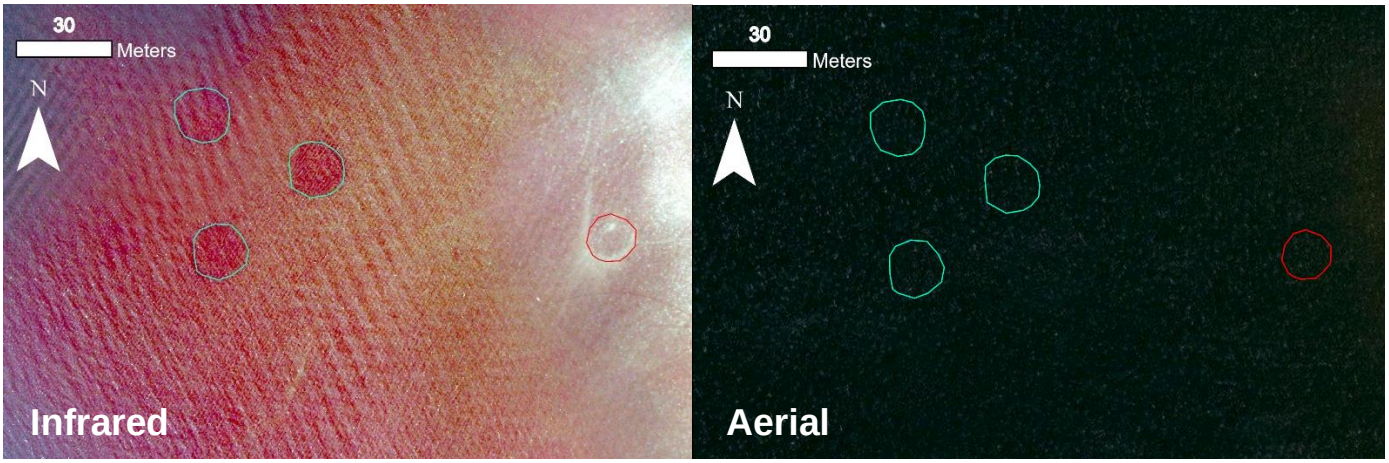

Figure 3. Outline of four potential oyster reefs in the Manatee River in infrared and aerial imagery. Three were confirmed oyster reefs (blue outline); the fourth was sand/mud (red outline). IR imagery can highlight contrast of subtidal reefs when aerial imagery cannot, though ground-truthing or cross-validation with multispectral data is necessary.

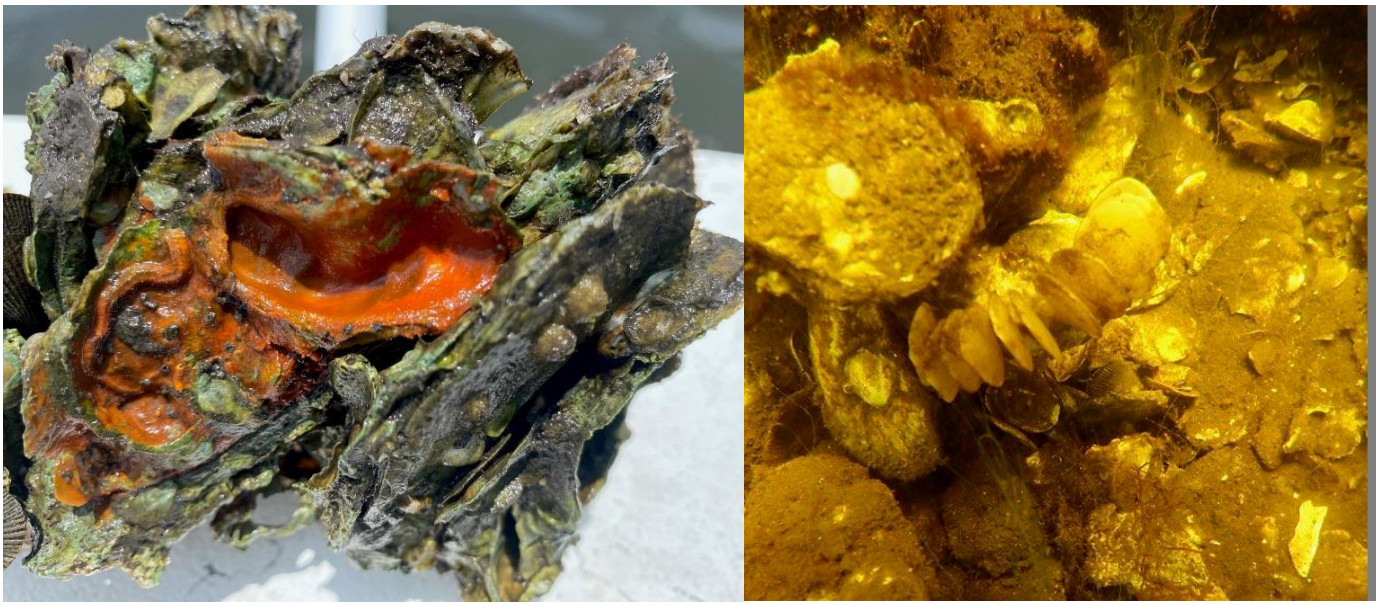

Figure 4. Close-up of an oyster cluster (left) and subtidal oyster reef from the Manatee River (right). Divers noted the presence of Florida crown conch, macroalgae, ribbed mussels, barnacles, boring sponge, and other epibionts among oyster reefs.

Acknowledgements

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