

Oyster Integrated Mapping and Monitoring Program

Horseshoe Beach and Deadman Bay Oyster Reef Mapping 2021



Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute

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Overview

The [Oyster Integrated Mapping and Monitoring Program](#) (OIMMP), based at the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute in St. Petersburg, Florida, compiles and contributes to oyster mapping and monitoring information across Florida. Mapping efforts for 2021 focused on oyster reefs in the Big Bend of Florida, including the coastal waters of Horseshoe Beach and Deadman Bay. These maps were designed to be added to the [Oyster Beds in Florida](#) statewide compilation of oyster reef maps in order to update the data set with previously unidentified oyster reefs and to replace outdated maps for the region.

Methods and Results

Oyster reefs were identified and delineated in ArcMap version 10.7 (ESRI, Redlands CA), with no minimum mapping unit. Imagery used for photointerpretation included ESRI base imagery (NASA Blue Marble: Next Generation and i-cubed Nationwide Prime 1-m resolution imagery) and Google Earth version 7.3.3 satellite and aerial historic imagery (Google Inc., Mountain View CA). Oyster reefs were classified following the 6540 (Oyster Bars) code from the Florida Land Use, Cover and Forms Classification System, originally developed by the Florida Department of Transportation (FDOT 1999).

A total of 532 potential oyster reefs were identified along the coast of the Big Bend in a focus region extending north of Horseshoe Beach (29.4388°N) to Hagens Cove Park (29.7724°N), located north of the Steinhatchee River. These potential reefs were divided into “low-confidence” and “moderate-confidence” reefs based upon the confidence in interpretation by the mapper and the clarity of the potential reef in the base imagery. Many of the potential locations had an ambiguous appearance and required ground truthing. All 104 low-confidence reefs and a random 25% (105) of the moderate-confidence reefs were selected for ground truthing (for a total of 209 potential ground-truthing sites).

Ground-truthing efforts were conducted by OIMMP personnel in April 2021, and 179 of the 209 targeted ground-truthing locations were evaluated (Fig. 1, Table 1). Not all ground-truthing sites were able to be visited due to difficulty with site access or tide and time constraints. Only sites with live, intact oyster reefs qualified for classification as an oyster reef. Sites with scattered dead shell or diffuse clusters of live oysters were not classified as reefs (Table 1) and were omitted from the final map.

Confirmation of oyster reef presence was mandatory for all low-confidence reefs to be included in the final map; low-confidence reefs that were not ground truthed were omitted from the final map. The appearance and location of reefs that were correctly and incorrectly identified during ground truthing were then used to re-evaluate all moderate-confidence reefs. Only reefs with a high confidence of accuracy were retained in the final map. The final map contained 443 oyster reefs.

A compilation of statewide oyster reef maps, including these newly mapped reefs, is available from the Oyster Beds in Florida layer from <https://geodata.myfwc.com/datasets/oyster-beds-in-florida>. This 2021 mapping effort was used to replace previously mapped oysters from 29.4388°N to 29.7724°N in the Oyster Beds in Florida layer. While there had been some

previous mapping efforts that extended to Deadman Bay (USGS 1992) and the Horseshoe Beach region (SRWMD 2001, FWC 2019), many oyster reefs in the region had never been mapped. Prior to this effort, the only oyster map available in Deadman Bay was from a 1992 seagrass mapping effort that had also mapped some oyster reefs (USGS 1992). The extent of ground truthing by the 1992 mapping effort is unknown.

A previous OIMMP mapping effort focused on the Suwannee Sound region (FWC 2019) also delineated some oyster reefs north of Horseshoe Beach, although 2019 ground-truthing efforts did not extend north of Horseshoe Beach. This 2021 mapping effort was used to ground truth those reefs mapped by FWC (2019) which were located north of Horseshoe Beach.

Table 1. Error matrix of ground-truthing results for Horseshoe Beach and Deadman Bay oyster reef field assessments.

Ground-truthed substrate	Moderate-confidence potential reefs	Low-confidence potential reefs	All potential reefs
Oyster reef	79	67	146
Sand or mud	9	17	26
Oyster shell	3	2	5
Scattered live oyster clusters	2	0	2
Total classified correctly	79	67	146
Total sites	93	86	179
Accuracy (%)	85%	78%	82%

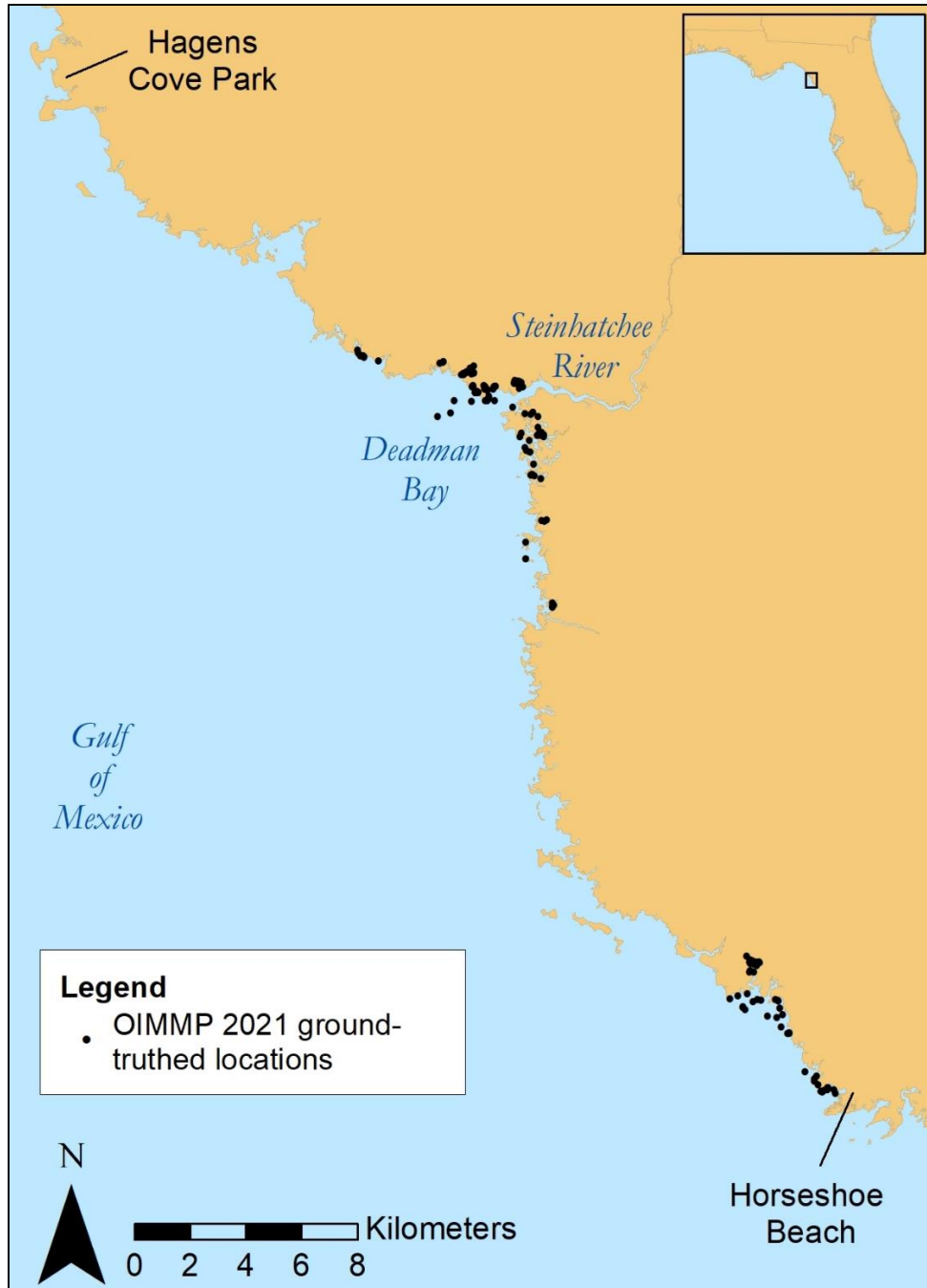


Figure 1. Map of ground-truthed locations near Horseshoe Beach and Deadman Bay in the Big Bend region of Florida.

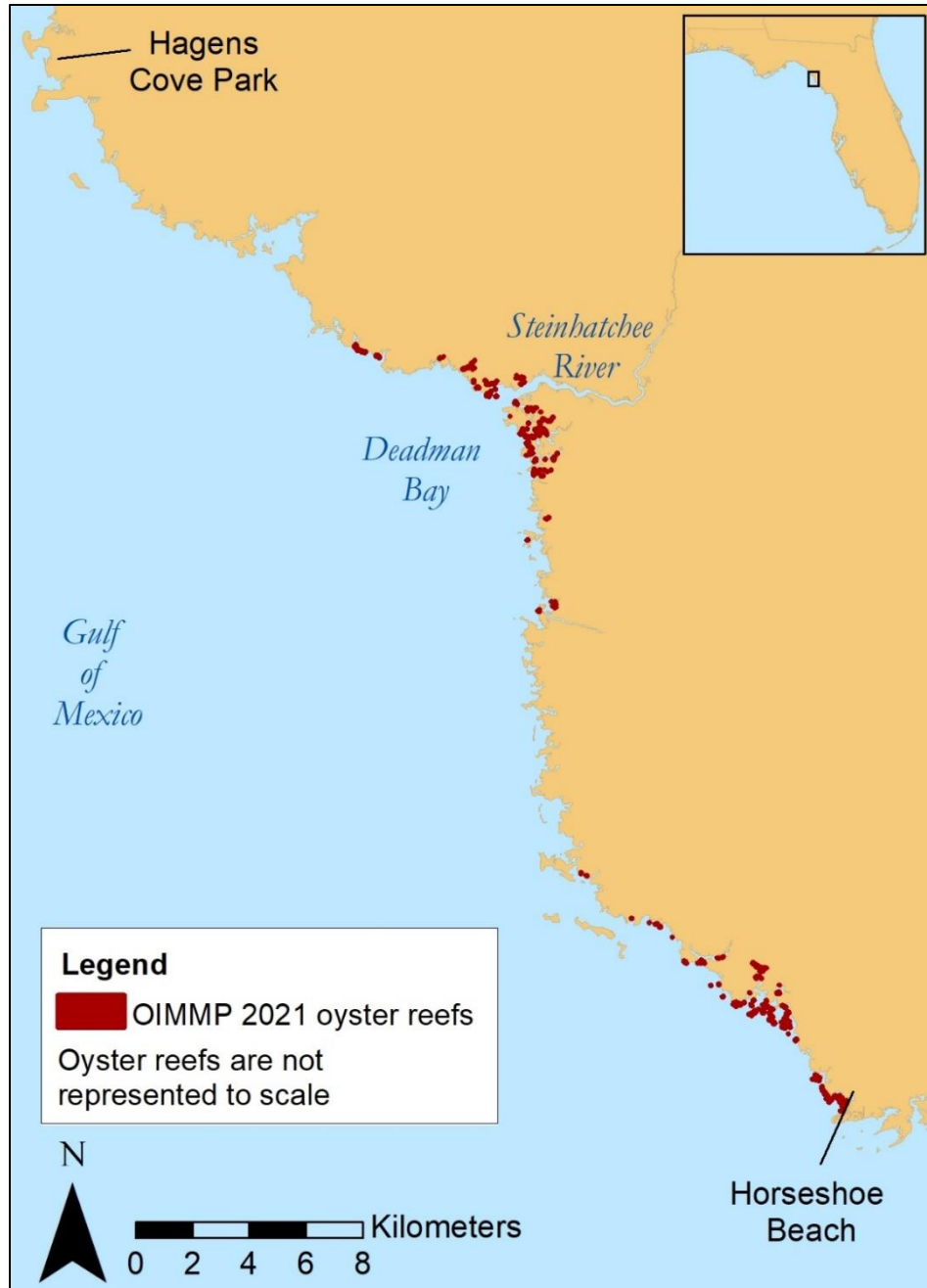


Figure 2. Oyster reefs identified by this OIMMP 2021 mapping effort. These mapped reefs were added to the statewide Oyster Beds in Florida map (FWC 2021).

Reefs were identified in available imagery based upon their color, shape, texture, and location. The following characteristics were notable for the region:

- Lighter-colored shell hash was sometimes visible in the center of the reef, surrounded by a darker outline on the edges of the reef (presumably due to algae or mud on the margins of the reef).

- Reefs were more abundant near rivers or tidal tributaries than in locations with minimal freshwater input (Fig. 3).
- Several reefs previously mapped by USGS (1992) in Deadman Bay did not support live oysters. These reefs were omitted from the final map (Fig. 3) and were removed from the Oyster Beds in Florida statewide map (FWC 2021).
- The textured nature of oyster reefs was often visible in imagery with sufficient resolution. However, many reefs were difficult to distinguish from textured sand or mud flats in remote imagery (Fig. 4). The similar appearance of some oyster reefs and sand or mud flats highlights the need for extensive ground truthing of oyster maps in the region.

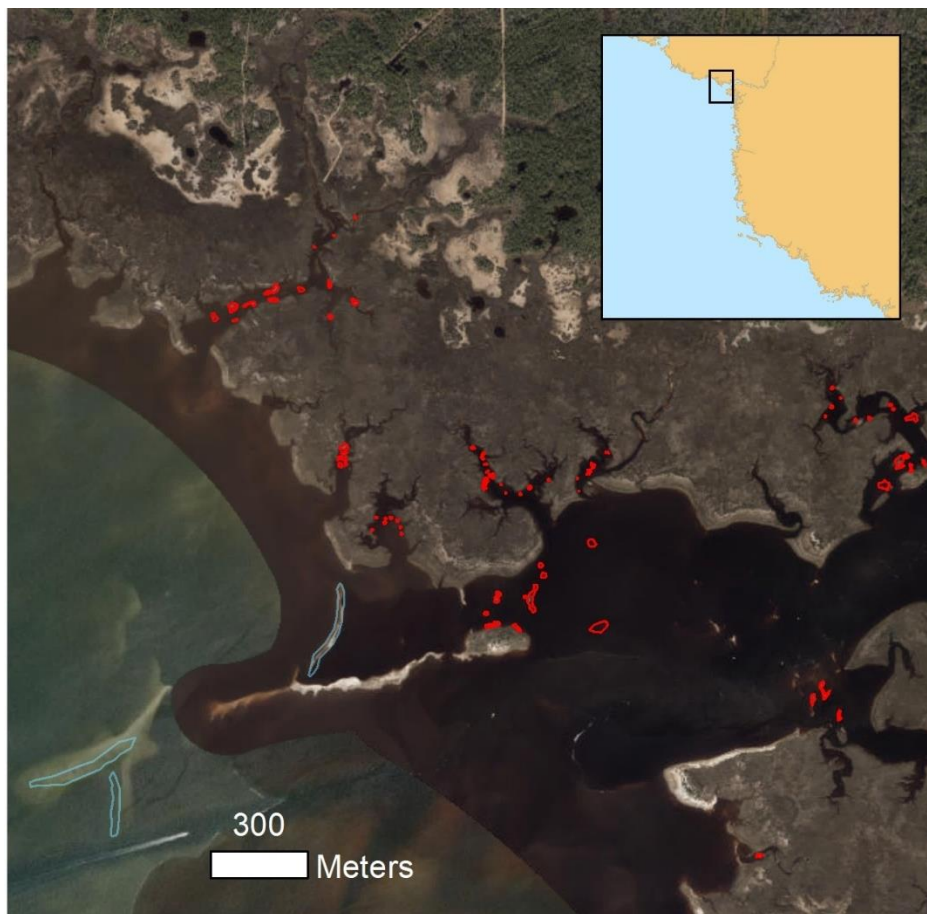


Figure 3. Map of oyster reefs delineated by the 2021 OIMMP mapping effort (red outlines) near Deadman Bay and the mouth of the Steinhatchee River. Some areas previously identified as offshore oyster reefs by USGS (1992; shown in blue outlines) were ground truthed and no live oysters were found. These reefs were removed from the statewide Oyster Beds in Florida map (FWC 2021).

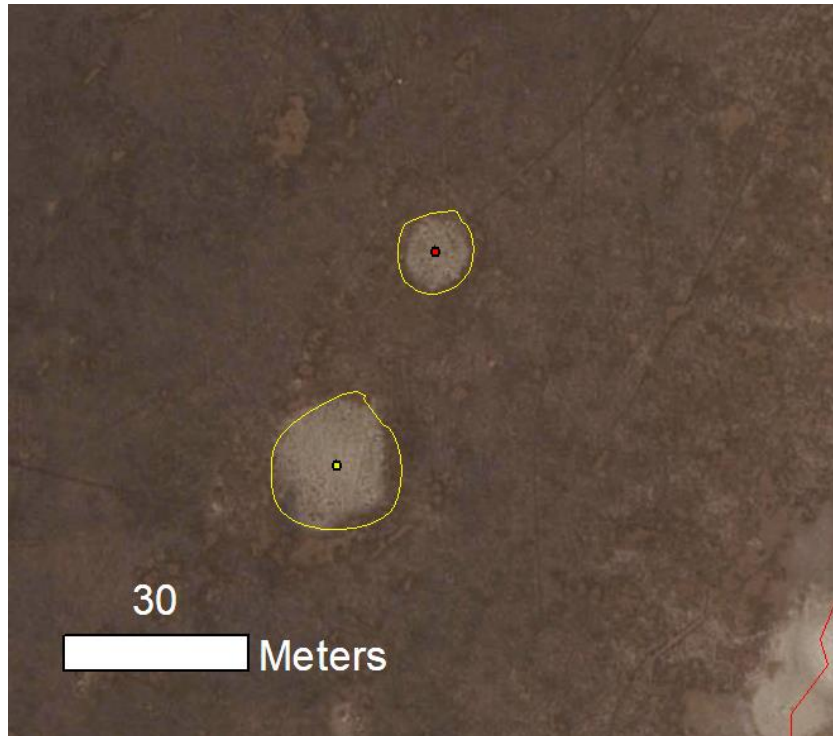


Figure 4. Outline of two potential (low-confidence) oyster reefs. The yellow-green dot in the lower reef indicates the outlined area was confirmed to be a live oyster reef during ground truthing. The red dot in the upper region outlined was found to be a mud flat during ground truthing. The similar appearance of these two areas highlights the need for extensive ground truthing in this region to verify mapped oyster reefs from remote imagery.

Acknowledgements

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