Oyster Integrated Mapping and Monitoring Program

Western Apalachee Bay Oyster Mapping 2025

Ochlockonee Bay, Oyster Bay, Goose Creek Bay, and St. Marks River

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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 (FWC-FWRI), compiles oyster mapping and monitoring data across Florida and works to fill mapping data gaps. The western Apalachee Bay region (Figure 1), including Ochlockonee Bay, Oyster Bay, Goose Creek Bay, and the St. Marks River, was identified as a region in need of updated oyster maps as the last mapping efforts in the region were conducted between 1992 and 2012 (USGS 1992; NWFWMD 2004, 2007, 2010; VanderKooy 2012). This mapping effort was designed to refine published oyster maps and identify new oyster habitat to improve oyster reef mapping for the statewide compilation of live oyster reefs, Oyster Beds in Florida.

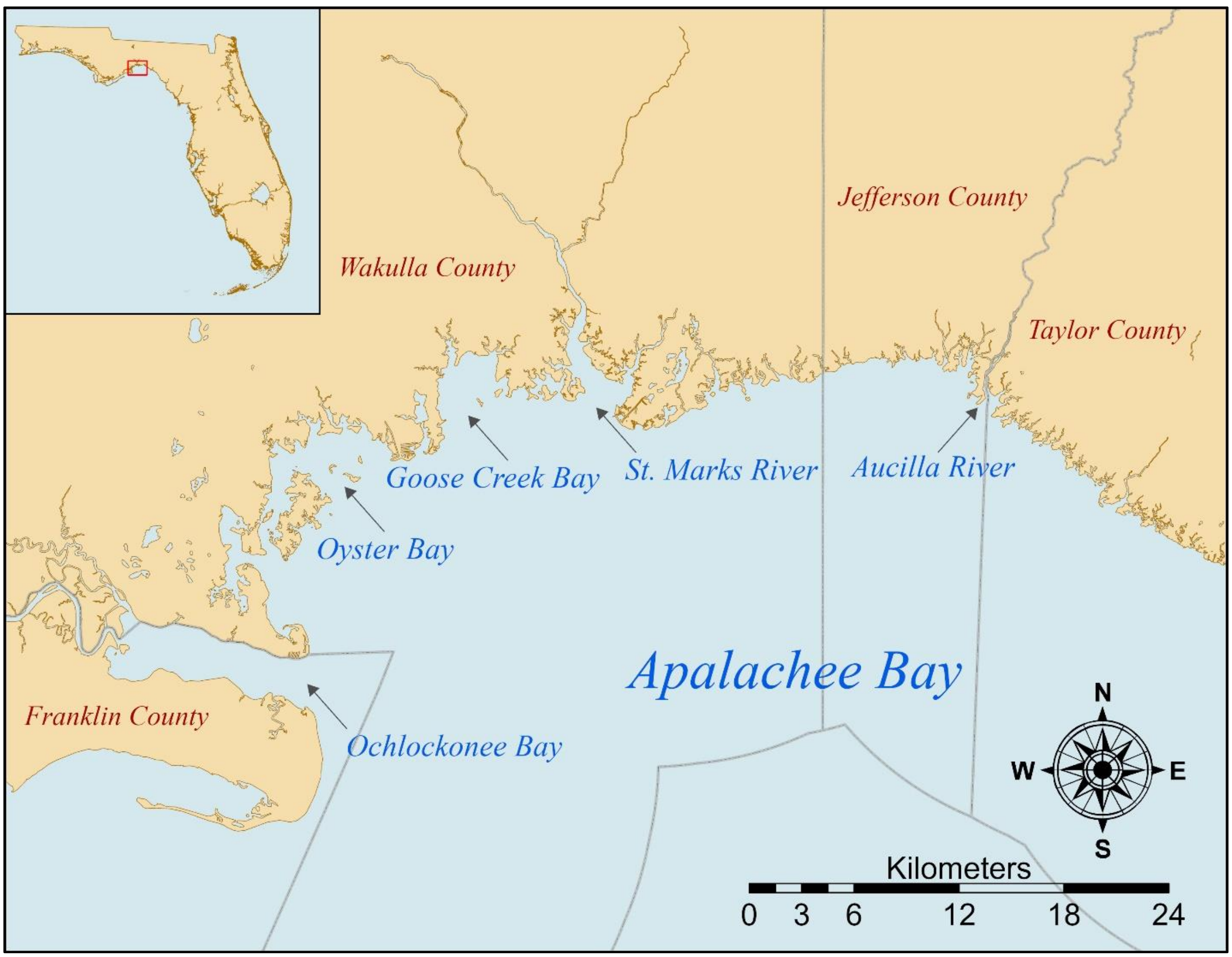

Figure 1. Apalachee Bay, with bodies of water and county boundaries identified.

Methods and Results

Previous mapping efforts in the western Apalachee Bay region were conducted by USGS using 1992 aerial images (USGS 1992), the Northwest Florida Water Management District (NWFWMD) using aerial imagery from 2004, 2007, and 2009–2010 (NWFWMD 2004, 2007, 2010), and the Gulf States Marine Fisheries Commission from hand-drawn oyster maps (VanderKooy 2012). NWFWMD maps follow the Florida Land use, Cover and Forms Classification System (FLUCCS; FDOT 1999). The "Oyster Bars" FLUCCS code 6540 is not explicitly defined in FDOT (1999), but it is often interpreted to include land cover such as rubble or shell hash in addition to live oyster reef (NV5 Geospatial 2023).

Mapping was completed in ArcGIS Pro (3.2; ESRI; Redlands, CA) using basemap imagery from Pro and Google Earth (7.3.6; Google LLC; Mountain View, CA). Imagery was examined with consideration of color, shape, texture, and location to distinguish oyster reefs from other habitats (with no minimum mapping unit). Potential reefs included oyster reefs digitized in the previously mentioned mapping efforts (reef boundaries were updated to their current extent in recent satellite imagery) and novel potential reefs. While most potential oyster reefs in the region were visible in satellite imagery, several reefs in Ochlocknee Bay were subtidal and therefore not visible in satellite imagery. For those few reefs, the boundaries from previous mapping efforts were used to determine ground-truthing locations. In total, 835 potential oyster reefs were targeted through this effort and 158 (19%) of these were ground-truthed (Figure 2).

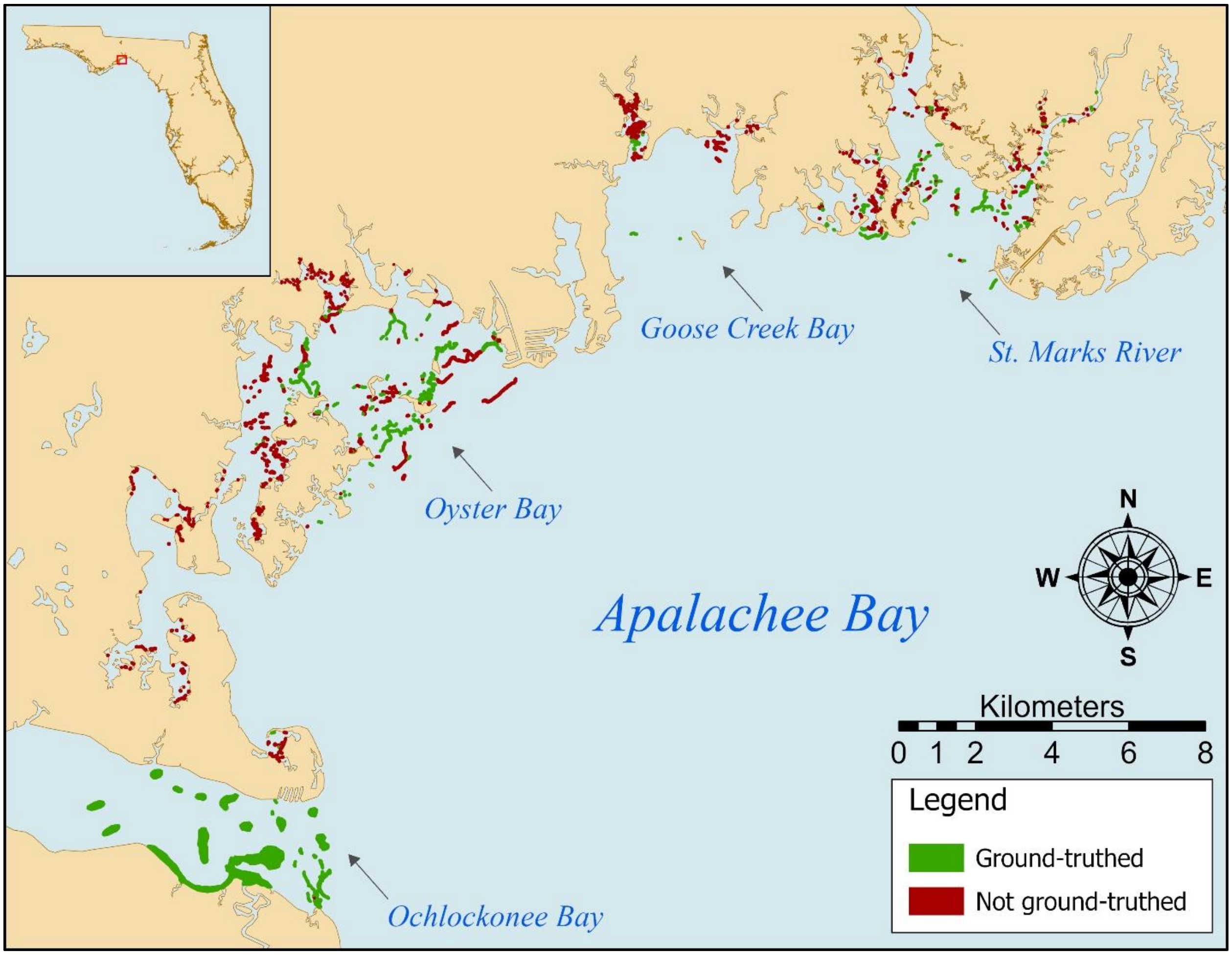

Figure 2. Study area with all potential oyster reefs color-coded according to whether they were ground-truthed. Oyster reefs are not to scale.

Potential oyster reefs were ground-truthed by FWC staff in May 2025. At each site, the substrate was visually inspected, probed with a pole, and/or examined using oyster tongs, then classified as either being (1) a high-density reef, (2) a low-density reef, (3) scattered oyster, (4) shell or shell hash, (5) sand or mud, or (6) other (Figure 3). This classification scheme was adapted from Baggett et al. (2014), and the specific conditions identifying each classification are outlined in Table 1. For this mapping effort, only sites classified as high-density reef and low-density reef were included in final maps of live oyster reef.

Figure 3. A probe pole (left) and oyster tongs used for ground-truthing the presence of live oysters (right).

Table 1. Substrate classification scheme used.

Substrate classification	Characteristic
High-density reef	Live oyster cover exceeds 25%
Low-density reef	Live oyster cover ranges between 10 and 25%
Scattered oyster	Live oyster cover less than 10%
Shell or shell hash	Shell and/or shell hash present, but no live oyster cover
Sand or mud	No live or dead oyster cover
Other	Other, to be described in more detail by ground-truther

Results for the 158 ground-truthed sites are presented in Tables 2, 3 and 4, and Figure 4. High-density reefs were most abundant (30%), followed by low-density reefs (27%), shell or shell hash (18%), scattered oyster (17%), and sand or mud (8%). Most potential oyster reefs in Ochlockonee Bay (84.6%) were not live reef and were simply sand or mud. However, most potential reefs in the St. Marks River (85.7%) were confirmed to be live oyster reefs. Examples of high-density reef, low-density reef, scattered oyster, and shell/shell hash sites are shown in Figure 5.

Table 2. Distribution of ground-truthed sites across substrate classifications and proportion of sites within each classification.

Substrate classification	Number of sites	Proportion
High-density reef	48	30.4%
Low-density reef	43	27.2%
Scattered oyster	26	16.5%
Shell or shell hash	28	17.7%
Sand or mud	13	8.2%
Other	0	0.0%

Table 3. Distribution of live reefs (which include high-density and low-density reefs) and not live reefs (which include scattered oyster, shell or shell hash, and sand or mud categories) across all ground-truthed sites in the study area.

Body of water	Live reef (#)	Live reef (%)	Not live reef (#)	Not live reef (%)
Ochlockonee Bay	4	15.4%	22	84.6%
Oyster Bay	30	47.6%	33	52.4%
Goose Creek Bay	3	50.0%	3	50.0%
St. Marks River	54	85.7%	9	14.3%

Table 4. Distribution of the area covered by live reefs and not live reefs across all ground-truthed sites in the study area.

Body of water	Live reef (km^2)	Live reef (%)	Not live reef (km^2)	Not live reef (%)
Ochlockonee Bay	0.104	9.0%	1.050	91.0%
Oyster Bay	0.166	82.2%	0.036	17.8%
Goose Creek Bay	0.011	78.6%	0.003	21.4%
St. Marks River	0.079	82.3%	0.017	17.7%

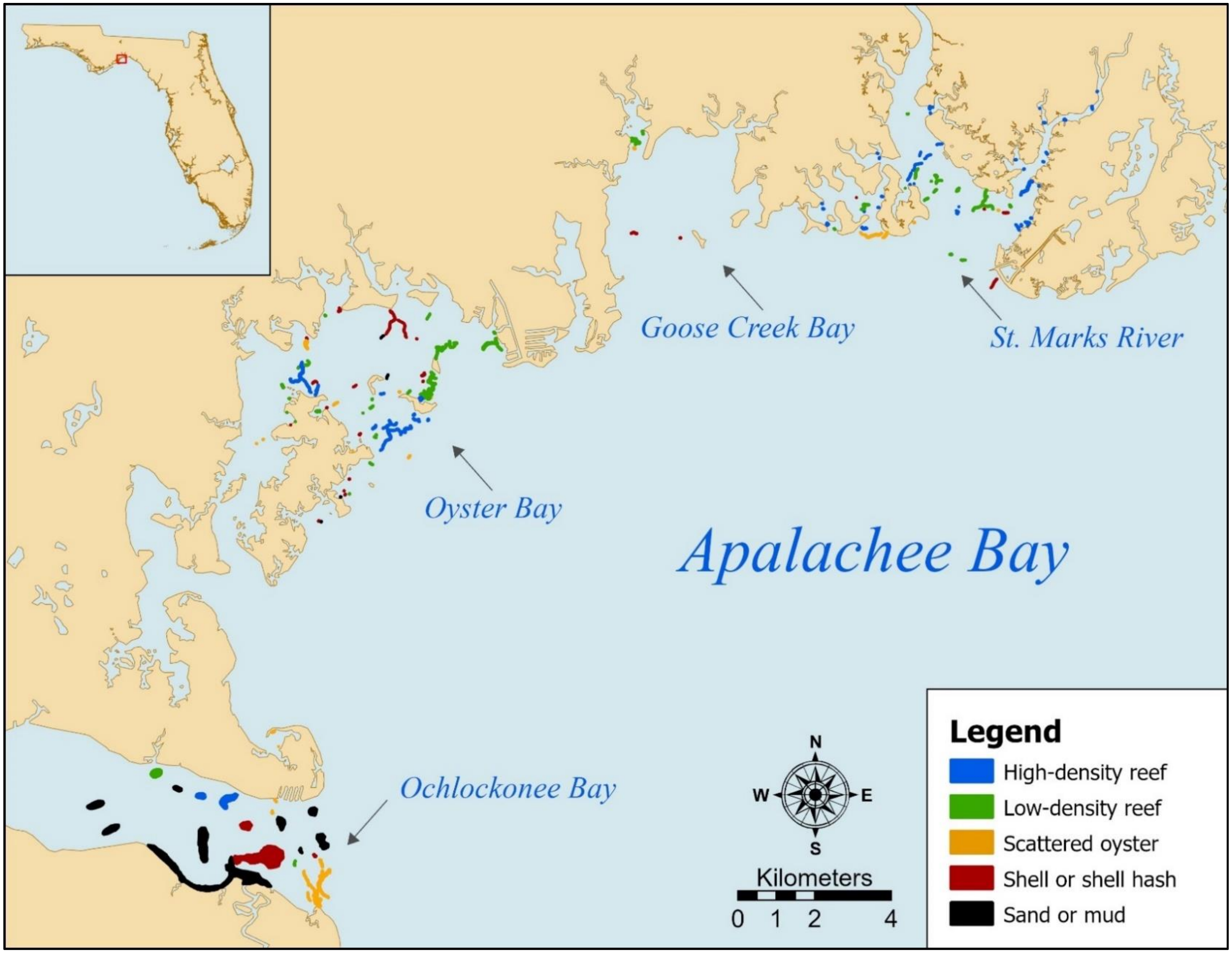

Figure 4. Study area with all ground-truthed sites color-coded according to substrate classification. Oyster reefs are not to scale.

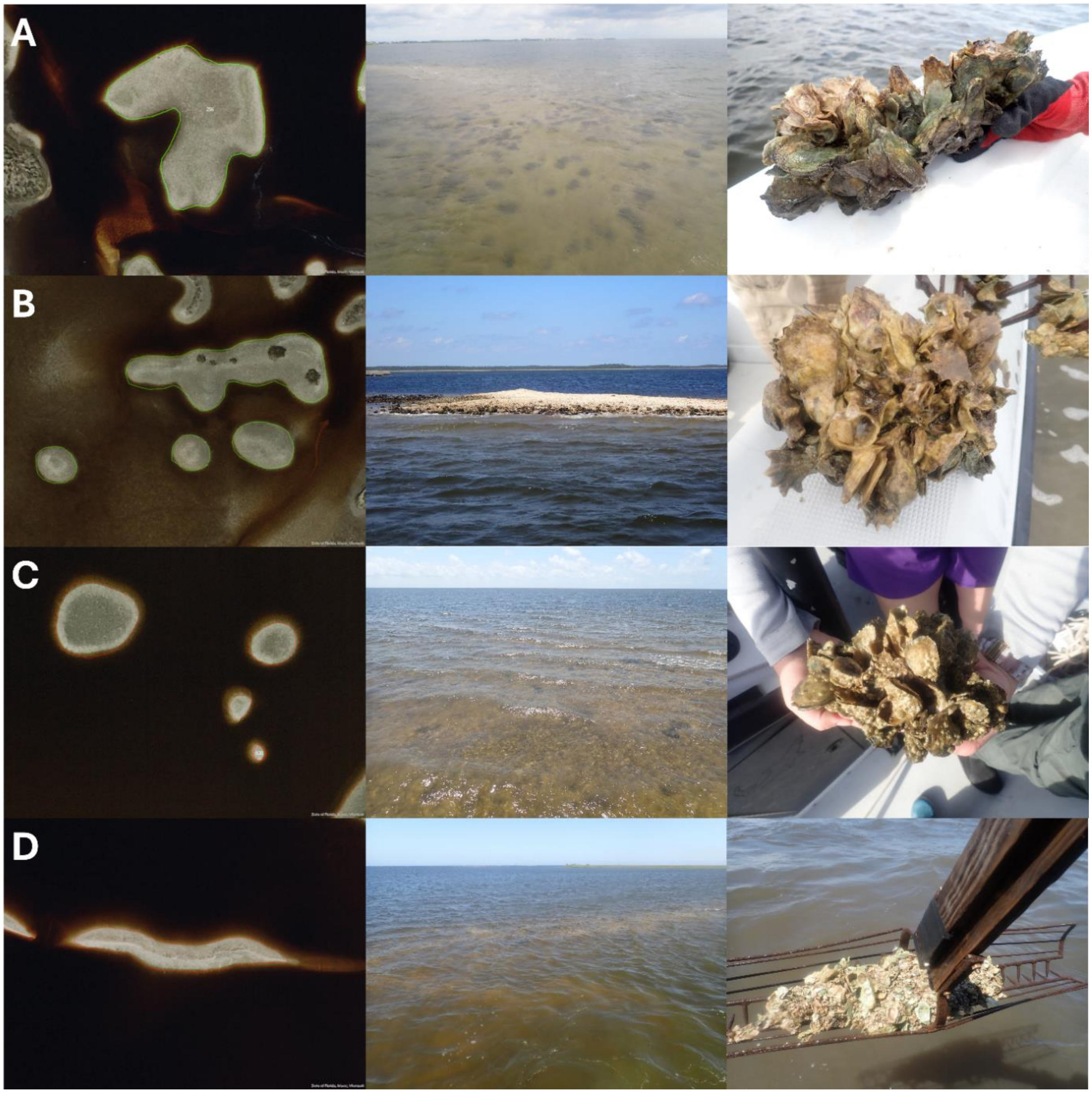

Figure 5. Representative examples of (A) high-density reefs, (B) low-density reefs, (C) scattered oyster sites, and (D) shell/shell hash sites, as seen in person and aerial imagery.

Results for the 58 ground-truthed sites that were part of previously published oyster maps are presented in Table 5. Note the definitions used to originally classify "oyster" may differ across mapping efforts and therefore may not be directly comparable to these ground-truthing data (e.g., previous mapping efforts may have included shell hash in oyster reef polygons).

Table 5. 2025 substrate classification of ground-truthed sites previously mapped by USGS (1992), NWFWMD (2010), and VanderKooy (2012).

Substrate classification	Number of sites	Proportion
High-density reef	13	22.4%
Low-density reef	18	31.0%
Scattered oyster	12	20.7%
Shell or shell hash	7	12.1%
Sand or mud	8	13.8%
Other	0	0.0%

After ground-truthing, aerial imagery of the remaining 677 sites that were not visited was reanalyzed for color, shape, texture, and location, then classified as live reef (a category including both high- and low-density reefs) or not (i.e., scattered oyster, shell or shell hash, sand or mud). In total, 367 (54%) were classified as live reef, while 310 (46%) were not. Only live reef polygons were included in the final map (Figure 6) for incorporation into the Oyster Beds in Florida layer. The final mapping product of all live reefs from both ground-truthed and non-ground-truthed sites is shown in Figure 6.

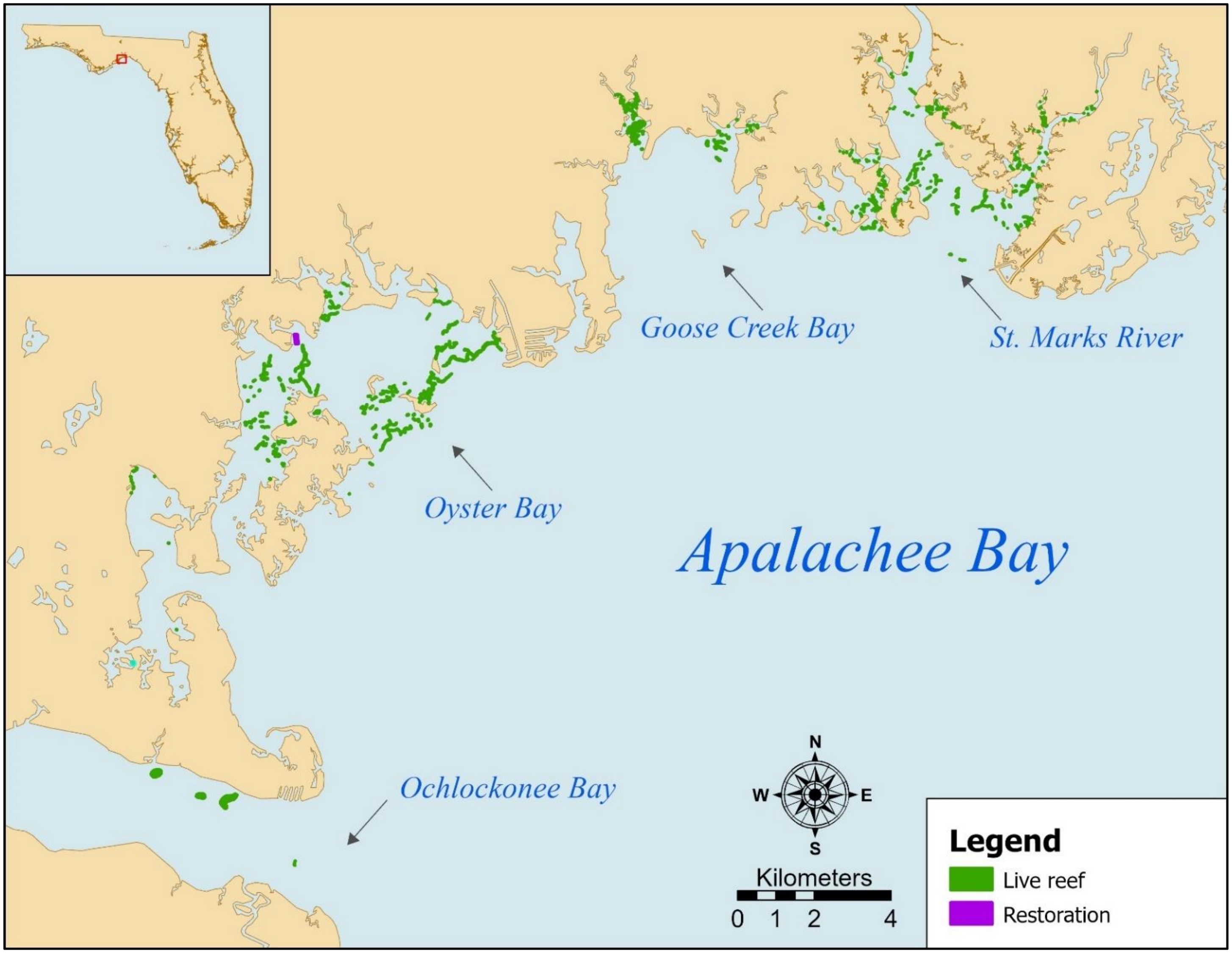

Figure 6. Study area showing live oyster reefs and a single restoration site created by the Wakulla Environmental Institute. Oyster reefs are not to scale.

The following characteristics were notable from this mapping effort of the western Apalachee Bay region:

- Many potential reefs were long and linear, often containing smaller areas of live oyster interspersed among larger areas that were primarily shell or shell hash (e.g., center photo of Figure 5B). As long as a significant portion of the structure contained high- or low-density reef, the polygon was still classified as live reef in the final maps.
- An oyster restoration site comprised of 1,000 concrete oyster domes installed by the Wakulla Environmental Institute is present in western Oyster Bay and was included in the final map (Figures 6 and 7).
- Western Apalachee Bay contains several designated shellfish harvesting areas and aquaculture use zones (Figures 8 and 9). Aquaculture areas were not included in the final maps of live oyster reef but likely interact with native oyster populations in the area.
- Areas with shell and shell hash substrate may be candidates for future restoration.

Figure 7. Oyster domes deployed by the Wakulla Environmental Institute in western Oyster Bay as part of an oyster restoration project.

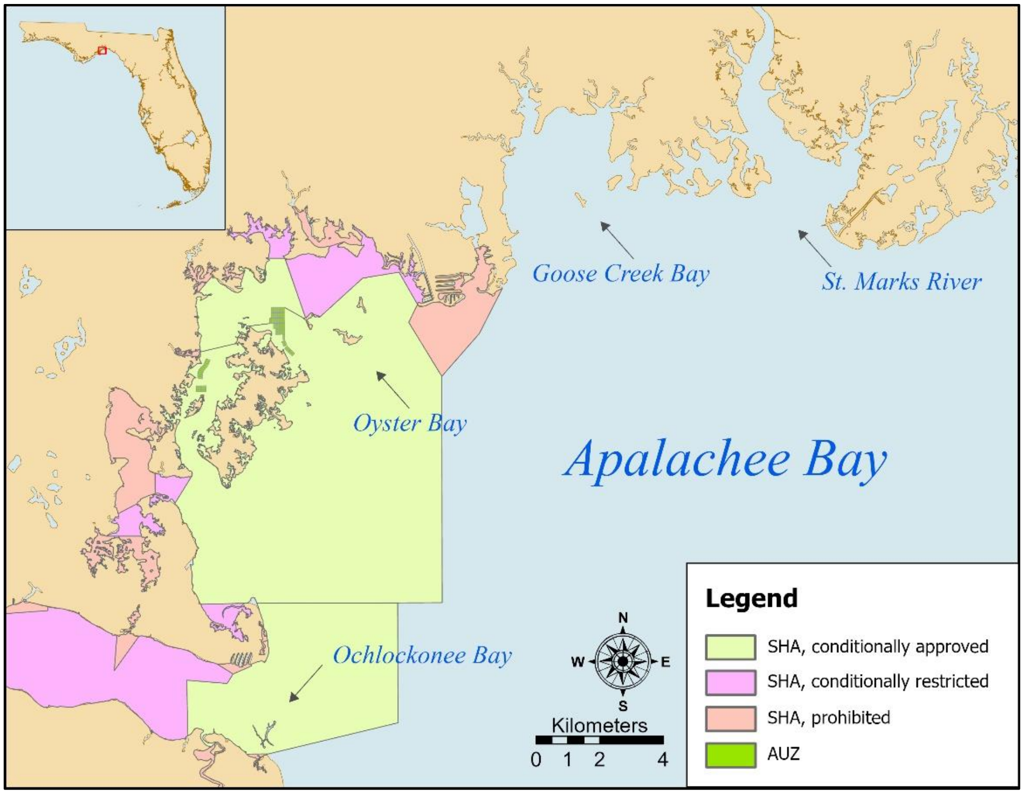

Figure 8. Shellfish harvesting areas (SHA) and aquaculture use zones (AUZ) managed by the Florida Department of Agriculture and Consumer Services in Ochlockonee Bay and Oyster Bay ([Florida Department of Agriculture and Consumer Services]()).

Figure 9. An aquaculture farm located in Oyster Bay.

Acknowledgements

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