Florida Oyster Recovery Science Guidance Series:

003 - Oyster Mapping and Monitoring Data Gaps

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Cover image: Intertidal oyster reef in Guana River. By Nikki Dix, GTMNERR.

The status of oyster habitat mapping, monitoring, and other data gaps is rapidly evolving. This document was prepared by the Florida Oyster Recovery Science Data Gaps Subcommittee with information available as of January 2025. Reader feedback on ways to improve or update the document's utility to the oyster recovery science community is welcomed. Direct suggestions to Katie.Konchar@tnc.org.

Summary of the Florida Oyster Recovery Science Working Group

The Florida Oyster Recovery Science (FORS) Working Group is a network of oyster research, conservation, and management professionals whose vision is to see Florida's oyster habitat thriving and providing ecosystem services, sustainable oyster fisheries, and effective oyster management through plans that are science-based, adaptable to changing conditions, and coordinated through partnerships among interested parties including rights holders, natural resource agencies, academic institutions, non-governmental organizations, and business partners. To achieve that vision, the FORS Working Group aims to: 1) foster the comparability of science-based metrics, methods, and models used to recover and manage Florida's oyster habitats and fisheries, 2) develop science-based guidance products, 3) support status and trends assessments, 4) eliminate barriers to oyster recovery, and 5) share information with the broader community.

Authors and Contributors

This document was created by the FORS Data Gaps subcommittee, which is comprised of members from State and Federal resource management entities, universities and non-governmental organizations. The subcommittee (authors) are as follows:

Sub-committee members:

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Introduction

The Florida Oyster Recovery Science (FORS) Working Group recognizes the need for ecological and environmental data to effectively assess the status, long-term trends, and drivers of fluctuations in oyster populations and habitats. The FORS also recognizes that a full spectrum of environmental and social conditions must be considered to adequately monitor oyster populations and to guide their regulation and management. To support the assessment of status and trends in Florida's oyster habitat and fisheries, this document compiles resources that identify existing oyster mapping, monitoring, and research data gaps. This summary is intended as a resource and to generate further discussion and collaboration to reduce data gaps through targeted mapping, monitoring, and actionable research in coordination with resource management.

Critical Data Parameters

As has been well documented by Baggett et al. (2014) and others, several universal metrics (reef areal dimensions, reef height, oyster density, and oyster size-frequency distribution) and environmental variables (water temperature, salinity, and dissolved oxygen) are key to assessing status and investigating drivers of change for oyster habitats and populations. However, additional data are also necessary to understand and quantify stressors that affect the overall health and resilience of oyster populations. Important metrics include information on species interactions such as predation, disease and competition, dynamics of reproduction, larval dispersal and recruitment, and oyster physiological condition. Stressors include dredging, harvesting, boat wakes, coastal construction, pollution, and climate changes such as increasing temperatures, sea-level rise, and frequency and severity of extreme events (e.g., storms, droughts, and floods). Additional data are needed to understand and quantify the services that oyster ecosystems provide in each estuary and to support ecosystem-service based management of these resources. The critical data parameters needed to support trend assessments, understand drivers of change, develop habitat suitability models, and quantify ecosystem services in Florida are listed in **Table 1**. It was beyond the scope of this effort to assess gaps in all these parameters statewide, but it is recommended that practitioners use this list to identify local research needs as appropriate.

Table 1. Critical data parameters that support trend assessments, drivers of change, habitat suitability models, and quantification of ecosystem services to aid in assessment and management of oysters in in estuarine systems.

Trend Assessments	**Drivers of Change**	**Habitat Suitability Modeling Needs**	**Ecosystem Service Quantification**
● Reef Area ● Reef height ● Reef rugosity ● Oyster density (live) ● Oyster density (live: dead) ● Percent cover (live, dead, box/recently dead oysters, mud, other) ● Oyster shell height ● Shell volume per unit reef area (shell budget) ● Commercial catch per unit effort (CPUE) ● Assessment of recreational harvest	● Water quality (e.g., nutrients, phytoplankton abundance and composition, pH, dissolved oxygen, temperature, salinity, contaminants) ● Harvest level (recreational, commercial) ● Species interactions (predation, parasites, disease, damage by boring sponges and harmful algal blooms, inter- and intra-species competition) ● Metapopulation connectivity ● Boat wakes, wave energy ● Sediment loading ● Storm impacts ● Tidal inundation patterns	● Salinity ● Temperature ● Dissolved oxygen ● Bathymetry ● Hydrographic and hydrodynamic modeling ● Habitat and/or substrate maps ● Larval dispersal data or models ● Nutrients ● Phytoplankton	● Processing of nitrogen, phosphorus, carbon, and plankton by oysters and reefs ● Shoreline protection and stabilization ● Abundance of other species that use reefs ● Commercial and recreational fishery economic values ● Cultural values

Mapping and Monitoring Data Gaps

Two programs currently work to collate oyster habitat mapping and monitoring data in Florida at the state level. The Oyster Integrated Mapping and Monitoring Program (OIMMP), coordinated by the Florida Fish and Wildlife Research Institute, relies on a collaborative network of experts and interested parties to assemble mapping and monitoring data from natural reefs, restored reefs, and research projects and develops regional summaries of status and trends (Radabaugh et al. 2019). Data indices managed by OIMMP (e.g., Index of Oyster Maps in Florida, Oyster Beds in Florida) and regional reports can then be used to prioritize the filling of remaining oyster mapping and monitoring gaps within each region. The Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR), coordinated by the Florida Department of Environmental Protection, supports the assessment of status and trends of submerged resources by collating and providing access to data collected from within the statewide network of estuarine and marine Aquatic Preserves, National Estuarine Research Reserves, and the Florida Keys National Marine Sanctuary. Data collected from within this network by various entities are available on the SEACAR Data Discovery site.

The OIMMP and SEACAR programs have shown that the data needed to support the assessment of status and trends in Florida's oyster habitat and fisheries is currently collected across a variety of spatial and temporal scales. Mapping within an individual region may be project-specific rather than completed at the estuary level, and the effort may have occurred years or decades ago to warrant repeating mapping efforts to document current conditions.

Mapping Data Gaps (**Fig. 1**) provides a visual summary of the status of known oyster habitat mapping efforts across the State of Florida as of January 2025. Of the 26 total regions in Florida with known oyster reef habitat, mapping was completed within approximately 15 of those regions within the last 5-10 years including three regions where mapping efforts are currently underway by the Florida Fish and Wildlife Conservation Commission and partners. Mapping is incomplete or mapping data is greater than 10 years old in approximately 11 regions (**Table 2**).

The Oyster Beds of Florida layer used to summarize mapping efforts does not distinguish between natural, restored, cultched, or artificial reefs. Such distinctions could be useful for statewide and local management but defining such categories has proven challenging in recent experiences (e.g., Brooke and Alfasso 2022).

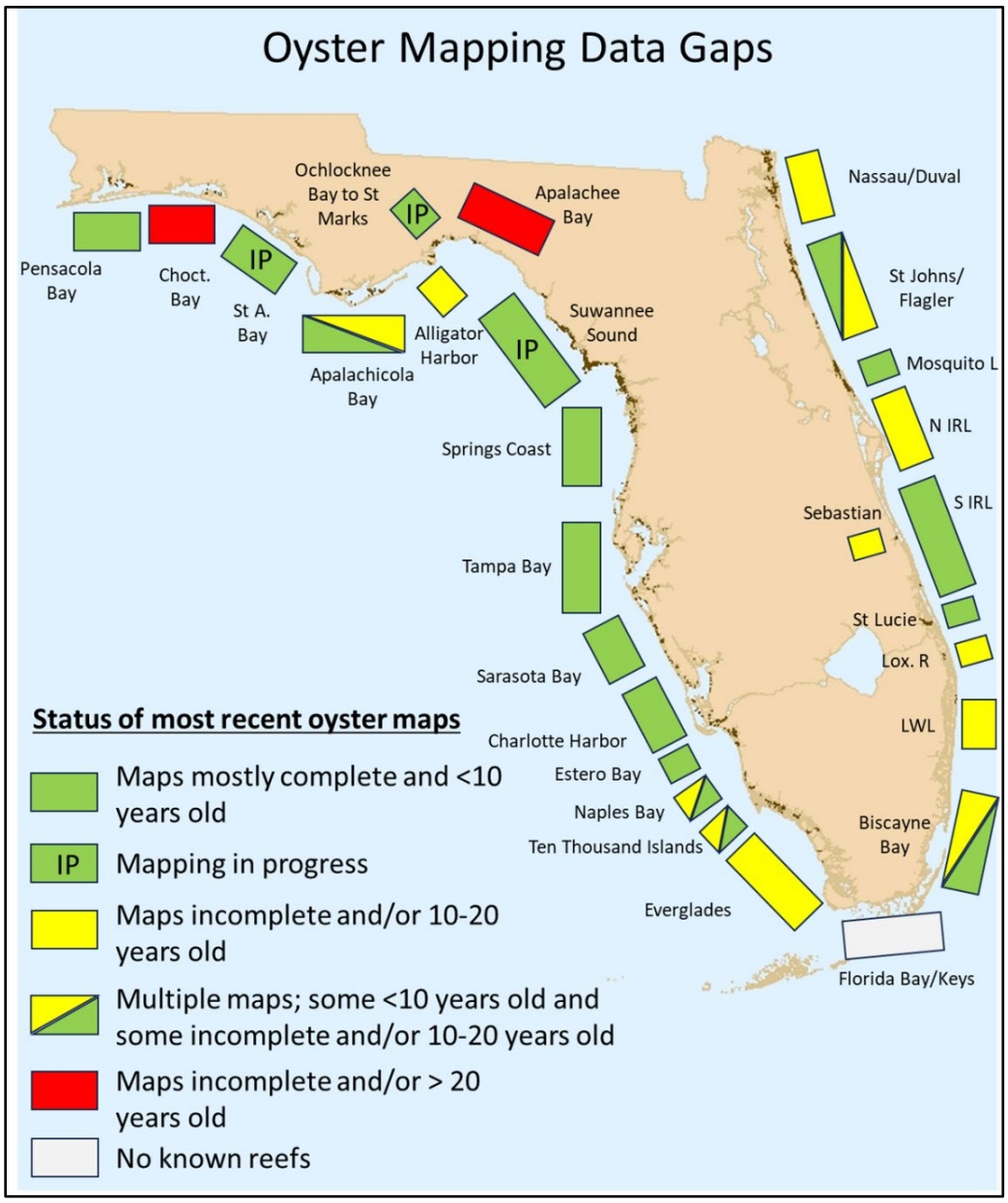

Figure 1. Status of known oyster habitat mapping across Florida as of January 2025. See Oyster Beds in Florida and associated metadata for the most recent data layers available in Florida.

The status of monitoring, extent of available data, and/or metrics included in monitoring efforts also varies at both spatial and temporal scales across the State of Florida. Monitoring is often project specific and/or time-bound based on available project funding.

Monitoring Data Gaps (**Fig. 2**) provides a visual summary of the status of known oyster habitat monitoring efforts across Florida as of January 2025. Of the 24 identified regions with known oyster monitoring data, monitoring was completed within approximately 17 of those regions within the last 5-10 years. However, the amount of oyster reef monitored within 3 of those 17 regions is less than 25%. Monitoring data is between 10-20 years old in approximately 7 regions, and 6 of those regions have <25% monitoring coverage. (**Table 2**).

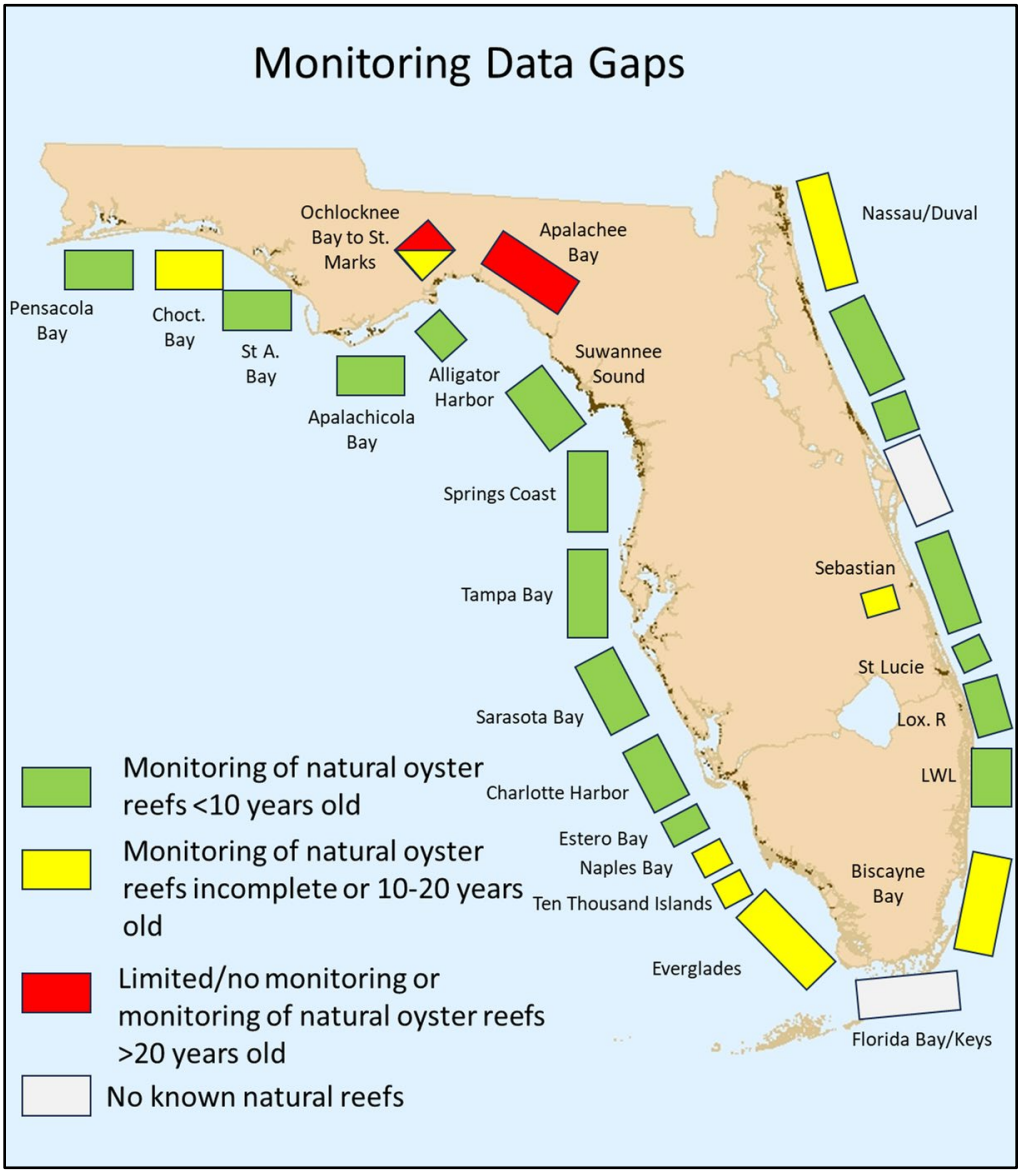

Figure 2. Status of known oyster habitat monitoring efforts across Florida. See Table 2 and the Oyster Integrated Mapping and Monitoring Program report for descriptions of regional monitoring programs.

Summary of Mapping & Monitoring Spatial and Temporal Data Gaps

Table 2 provides a summary of the status of mapping and monitoring data across a total of 27 major Florida estuaries. Using a traffic light rating system, mapping and monitoring data are rated with respect to both total area of coverage and data age for each estuary. Mapping status is noted as complete (green) in estuaries where mapping has been completed across more than 90% of the estuary or mapping data age is less than 10 years, in-progress (yellow) where mapping is underway or mapping data age is 10-20 years, and incomplete (red) where additional mapping coverage is needed or mapping data age is greater than 20 years. Monitoring status is noted as complete (green) in estuaries where monitoring data is available from 75-100% of the known reef area or data age is less than 5 years, in-progress (yellow) where monitoring data is available from 25-50% of the known reef area or data age is less than 10 years, and incomplete (red) where less than 25% of the estuary has been monitored or data age is greater than 10 years. References used to summarize mapping and monitoring data gaps are also provided in Table 2.

Table 2. Status of mapping and monitoring of current and historical oyster reef habitat across 26 of Florida's estuaries. See Oyster Beds in Florida metadata for full citations of current mapping layers.

		Mapping Status		Monitoring Status		
Region	**Estuary**	**Reef Area**	**Mapping Data Age (years)**	**Amount of Oyster Reef Monitored***	**Monitoring Data Age (years)**	**Monitoring Citations**
Northwest	Pensacola Bay	*Complete*	<5	*Most*	<5	NRDA 2014; ACER 2017; Johnson 2021a,b,c; FDEP RCP & CPAP 2021, 2024
Northwest	Choctawhatchee Bay	*Incomplete*	20+	*Few*	<10	NRDA 2014; CBA 2017
Northwest	St. Andrew Bay	*In-Progress*	<5	*Most*	<5	NRDA 2014; ACER 2017; FDEP RCP & CPAP 2021, 2024; FDEP RCP & ANERR 2024; Current FWC monitoring
Northwest	Apalachicola Bay	*Incomplete*	<5 and 10-15	*Most*	<5	FWC 2012; NRDA 2014; UNH 2016; ACER 2017; NUMSC 2019; FDEP RCP 2018; FDEP RCP & CPAP 2021, 2024; Radabaugh et al. 2021; Current FSU monitoring
Northwest	Alligator Harbor	*Incomplete*	10-20	*Most*	<5	Bueno et al. 2024
Northwest	Ochlockonee Bay to St. Marks	*In-Progress*	<5	*Few*	<10	Kimbro et al. 2016
Big Bend	Apalachee Bay	*Incomplete*	20+	*None*	none known	
Big Bend	Suwannee Sound	*In-Progress*	<5 and <10	*Some*	<5	Seavey et al. 2011; Kaplan et al. 2016; Frederick et al. 2016; Brush et al. 2017; FDEP RCP 2018; Moore et al. 2020; Current FWC monitoring
Big Bend	Springs Coast	*Complete*	<5	*Few*	<5	Estevez 2007; WAR 2010; Hesterberg et al. 2020; FWC 2021; SWFWMD 2018; Current FWC monitoring
Southwest	Tampa Bay	*Complete*	<5	*Some*	<5	Arnold et al. 2008; Parker et al. 2013; FWC 2021; Current FWC monitoring
Southwest	Sarasota Bay	*Complete*	<5	*Some*	<5	Sarasota County 2023; USF Water Institute Sarasota County Water Atlas

Southwest	Charlotte Harbor	*Complete*	<5	*Some*	<5	Volety et al. 2008; Volety et al. 2009b; Volety et al. 2012; Volety et al. 2014; FDEP RCP 2018; SWFWMD 2018; Parker & Radigan 2020; SCCF 2024; USF Water Institute Oyster Habitat Restoration Program; Current FWC Comprehensive Everglades Restoration Plan (CERP) monitoring
Southwest	Estero Bay	*Complete*	<5	*Some*	<5	FDEP RCP 2018; FDEP RCP, EBAP, 2024; Current FDEP monitoring
Southwest	Naples Bay	*Complete*	<10 and 10-20	*Few*	<5	Pinel 2021 (only monitoring restoration sites)
Southwest	Ten Thousand Islands	*Incomplete*	<10 and 10-20	*Few*	10-20	Volety et al. 2009a
Southwest	Everglades	*Incomplete*	10-20	*Few*	10-20	Volety et al. 2009a
Southeast	Florida Bay/Keys	*n/a*	n/a	n/a	n/a	No known reefs
Southeast	Biscayne Bay	*Incomplete*	<5	*Few*	10-20	Parker & Garrett 2003; Gambordella et al. 2007
Southeast	Lake Worth Lagoon	*Complete*	10-20	*Some*	<5	Arnold et al. 2008; Parker et al. 2013; Parker et al. 2015; Scarpa & Laramore 2010; LWLI 2013; Parker & Radigan 2020; Current FWC CERP monitoring
Southeast	Loxahatchee River Estuary	*Complete*	10-20	*Some*	<5	Bachman et al. 2004; Arnold et al. 2008; Loxahatchee River District 2013; Parker et al. 2013; Parker et al. 2015; Parker & Radigan 2020; Current FWC CERP monitoring
East-Central	St. Lucie	*Complete*	<10	*Some*	<5	Arnold et al. 2008; Parker et al. 2013; Parker et al. 2015; Parker & Radigan 2020; Current FWC CERP monitoring
East-Central	Southern Indian River Lagoon	*Complete*	<10	*Few*	<5	Laramore et al. 2017; FDEP RCP 2018; Smithsonian Marine Station 2023; Current IRL Aquatic Preserves & Smithsonian Marine Station monitoring

East-Central	Sebastian	*Complete*	10-20	*Some*	<10	Arnold et al. 2008; Parker et al. 2013; Parker et al. 2015; Parker & Radigan 2020; Past FWC CERP monitoring
East-Central	Northern Indian River Lagoon	*Incomplete*	<10	n/a	n/a	Brevard Zoo 2024 (only point data of living shorelines/restored reefs); No known natural reefs
East-Central	Mosquito Lagoon	*Complete*	<10	*Some*	<5	Arnold et al. 2008; Parker et al. 2013; Parker et al. 2015; Parker & Radigan 2020; Past monitoring by UCF, FAU & FWRI; Past FWC CERP monitoring
Northeast	St. Johns/Flagler	*Complete*	<10 and 10-20	*Some*	<5	FDEP RCP 2018; SJRWMD et al. 2016; FDEP RCP & GTMNERR 2024; Current GTMNERR monitoring
Northeast	Nassau/Duval	*Complete*	10-20	*Few*	<10	SJRWMD et al. 2016

* Amount of oyster reef monitored estimated based on available resources and classified as most (75-100%), some (25-50%), few (0-25%), or none (0%).

New mapping and monitoring information will become available overtime. Researchers and managers seeking to fill data gaps listed above are encouraged to check for updated maps on sources that are updated frequently (e.g., the Oyster Beds in Florida layer, the Index of Oyster Maps in Florida, or the SEACAR data discovery interface) to ensure they have located the most recent information. Researchers and restoration practitioners are also encouraged to engage with local managers and other researchers to avoid duplication of effort and maximize compatibility among studies.

Additional information on data gaps is also available in other FORS guidance documents, including FORS Guidance Series: 001 - Oyster Habitat Mapping (Anderson et al. 2023) and FORS Guidance Series: 002 – Oyster Habitat Monitoring (Birch et al. 2025).

Data Gaps Identified in Other Resources

In addition to the above information compiled by the FORS Data Gaps Subcommittee, Table 3 provides a summary of data gaps identified by other resources at the state, regional, or estuary-scale.

Table 3. Summary of mapping and monitoring data gaps identified in other resources.

Statewide Resources					
RESOURCE	**SCALE**	**PURPOSE**	**END USER**	**DATA GAPS IDENTIFIED BY RESOURCE**	**RESOURCE LINKS**
Oyster Integrated Mapping and Monitoring Program (OIMMP) – Oyster Beds in Florida GIS layer	Statewide; OIMMP works to summarize mapping, monitoring, and research project data from natural reefs in each region of Florida.	Georeferenced polygons outline live oyster reef. The Oyster Beds in Florida is intended to provide the most up-to-date map of live oyster reefs in Florida. The layer is updated periodically as new maps are made.	Oyster researchers, managers, and stakeholders.	• Maps are incomplete or over 20 years old in Choctawhatchee Bay & Apalachee Bay. • Maps are incomplete or over 10 years old in Ochlockonee Bay, Alligator Harbor, parts of Naples Bay and Ten Thousand Islands, Everglades, Biscayne Bay, Lake Worth Lagoon, Loxahatchee River, St. Lucie, Sebastian River. • Other gaps include the mapping of peripheral oysters (on mangrove roots or hardened shorelines), determining the historical extent of oyster reefs, and mapping both live and dead areas of reefs.	Oyster Beds in Florida is updated as needed to provide the most recent maps of live oyster reef coverage across Florida. Coverage is limited to live oyster reef extent.
Oyster Integrated Mapping and Monitoring Program (OIMMP) – Index of Oyster Beds in Florida	Statewide; OIMMP works to summarize mapping, monitoring, and research project data from natural reefs in each region of Florida.	The Index of Oyster Maps in Florida is meant to be a repository of all known mapping layers, and includes older layers and polygons other than live reef (such as bottom type, surrounding vegetation, dead reef, loose shell)	Oyster researchers, managers, and stakeholders.	Spatial mapping gaps are same as row above.	The Index of Oyster Maps in Florida provides a record of all available oyster maps in Florida. Maps may include coverage of live oyster reef, oyster shell, and other substrate types.

Oyster Integrated Mapping and Monitoring Program (OIMMP) report	Statewide; OIMMP works to summarize mapping, monitoring, and research project data from natural reefs in each region of Florida.	The OIMMP report is designed to be a literature summary documenting the status and trends of oyster reefs in each region of Florida and summarizing recent mapping and monitoring programs. There are no limitations on metrics. While restored reef information is provided, it is not a complete summary of all restoration work in each region and is not a monitoring data repository.	Oyster researchers, managers, and stakeholders.	There is need to: 1) conduct standardized and long-term monitoring; 2) assess genetic diversity, life history, and habitat characteristics of high-salinity oyster reefs; 3) quantify size structure and shell budget of oyster populations; and 4) continuously monitor abiotic parameters that influence oyster survival.	The OIMMP report website links to the PDF report and updated chapter revisions. The OIMMP Workshops and Resources website provides workshop presentation PDFs, mapping and harvest information, and is a repository for other relevant links.
Florida Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR)	Statewide monitoring data aggregation and analysis; Some information is limited to FDEP's Office of Resilience and Coastal Protection's managed area boundaries.	SEACAR utilizes current knowledge and scientific data, provides standardized data to help coastal managers and planners prioritize and focus management and restoration efforts, assesses the status and long-term trends of submerged habitats.	Scientists, managers, planners, and stakeholders.	• Methodological consistency and coverage (spatially and temporally) in sample collection. • Quantity/quality of evidence for long-term trends in shell height, density, and percent live indicators is low to medium in all regions of Florida, although NE FL tends to have more consistent/robust data collection than other regions. • Documentation of statistical power, protocols and quality assurance procedures for monitoring programs.	The Florida SEACAR Data Discovery site provides program information, data, and mapping for oyster monitoring efforts in Florida. SEACAR Data Visualization Dashboard

Oyster Habitat Restoration & Management Needs Assessment	Interviewed 18 academic, NGO, and state management agency representatives statewide	To understand oyster restoration goals, expectations, and successful outcomes; facilitators and barriers to restoration and management; future outlooks and oyster resource needs	Resource managers and restoration practitioners	• Thematic needs identified include 1) alternative mindsets (e.g., shift from fisheries to habitat focus); 2) removal of uncertainty (e.g., baseline conditions; drivers of oyster depletion). • Needs summarized for Apalachicola: 1) Reef area that currently supports oysters; 2) Reef area needed to ensure sufficient spat production and the development of sustainable populations. • Overall data needed to inform effective restoration and management: Threshold for acceptable fishery-related mortality	Hintenlang et al. 2023 Hintenlang 2024
Regional or Multi-Estuary Resources					
RESOURCE	**SCALE**	**PURPOSE**	**END USER**	**DATA GAPS**	**RESOURCE LINKS**
Florida Fish and Wildlife Research Institute(FWRI): Conducting Habitat Suitability Analyses to Identify Optimal Oyster Restoration Locations Along Florida's Gulf Coast	Charlotte Harbor, Tampa Bay, Springs Coast, Suwannee Sound, St. Andrew Bay, and Pensacola Bay.	Fill gaps in mapping and monitoring to enable development of habitat suitability indices (HSIs) for restoration.	Restoration practitioners (including future FWC restoration)	• Mapping was needed in Charlotte Harbor, Tampa Bay, Springs Coast, Suwannee Sound, and St. Andrew Bay. • No updated mapping is needed for Pensacola Bay. • Monitoring implemented in the above estuaries. • HSIs will be developed as needed.	FWRI Restoration Planning Activity Implementation Plan FWRI 2022 Interim Monitoring and Adaptive Management Progress Report

Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR) Technical Advisory Group (TAG)	GTMNERR & Northeast Florida	The GTMNERR TAG met to discuss current research related to oysters and fish. These notes summarize those presentations, discussions, and data gaps as perceived by the meeting participants	Northeast Florida scientists and natural resource managers	• Filling geographic data gaps between GTM NERR and Mosquito Lagoon and north of GTM. • Oysters as biological indicators of water quality. • Understanding the value of oysters in relation to other habitats. • Creating habitat sustainability metrics for restoration planning. • Assessing recreational harvest and developing guidance for best harvest practices.	Friends of the GTM Research Reserve Technical Advisory Group GTM TAG 8/21/2024 Meeting Notes
Estuary-Scale Resources					
RESOURCE	**SCALE**	**PURPOSE**	**END USER**	**DATA GAPS**	**RESOURCE LINKS**
Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Estuary-Specific and Adaptive Habitat Suitability Index Model for the Eastern Oyster *Crassostrea Virginica* in the Pensacola Bay System	Pensacola Bay System (East, Escambia, Blackwater and Pensacola Bays, excluding Santa Rosa Sound)	The Plan provides the PBS community with a roadmap for long-term and sustainable restoration and management of oysters in the PBS. Actions needed to achieve the Plans goals will also benefit other bay habitats (e.g., seagrass and salt marsh) and the community's economic and social well-being.	Primary end user audiences include the community, oyster fishers, scientists and natural resource managers.	• The Oyster Habitat Suitability Model developed as part of the OFHMP evaluated oyster biology, environmental and socio-economic metrics in PBS. • Metric evaluation included an assessment of data resolution, age, relevance to oyster biology and other uses of Bay space. • Data gaps identified in the study include distribution of larval oysters, spat settlement, effects of predators and parasites, and distribution of live oyster habitat and its condition (now filled).	Birch et al. 2021 Geselbracht et al. 2024

Pensacola and Perdido Bays Estuary Program Comprehensive Monitoring Strategy 2022-2027	Pensacola and Perdido Bay Systems	Long-term monitoring of the Pensacola and Perdido Bays watersheds to assess environmental status and trends, and track implementation of actions and programmatic success towards achieving measurable goals as part of the PPBEP CCMP.	Community, oyster fishers, scientists, natural resource managers and elected officials.	Top priority data gaps identified in the CMS for the estuary and directly relevant to oysters and the oyster fishery are as follows: • Water Quality (dissolved oxygen, pathogens, chlorophyll-a, nutrients), • Sediments (in the water column and toxins in sediments), and • Estuarine fauna (esp. potential predators).	Pensacola and Perdido Bays Estuary Program Comprehensive Monitoring Strategy 2022-2027
Gulf-wide Resources					
RESOURCE	**SCALE**	**PURPOSE**	**END USER**	**DATA GAPS**	**RESOURCE LINKS**
Moving Toward an Oyster Modeling Framework for the Gulf of Mexico: Informing Gulf-Wide Oyster Restoration, Final Report from Oyster Modeling Workshop (2022)	U.S. Gulf Coast and estuary-specific scale depending on the metric used for models	Summary of workshop findings organized by The Pew Charitable Trusts as part of the Gulf of Mexico Conference held in April 2022 in Baton Rouge, LA. Restoration practitioners, modelers, resource agency managers, and other oyster professionals discussed “how to best maximize modeling efficiencies, reduce the disconnect between how models are developed by scientists and used/accessed by natural resource managers, and advance towards a single modeling framework to guide Gulf-wide oyster habitat restoration.”	Oyster resource managers	• Need more validation and calibration of data for model use. • Need increased collaboration across state lines. • Need forward predicting models for climate change implications along the U.S. Gulf Coast. • Need to use management guidelines to inform modeling questions. • Need to build models to inform specific restoration objectives. • Need model training opportunities for oyster resource managers to use models	Gancel 2023

Oyster Model Inventory: Identifying Critical Data and Modeling Approaches to Support Restoration of Oyster Reefs in Coastal U.S. Gulf of Mexico Waters	U.S. Gulf Coastal Waters (evaluated 28 estuaries & coastal areas)	This resource examined the current state of data and model development across the U.S. Gulf Coast with the goal of providing an overview of oyster modeling approaches and an inventory of available data and existing oyster models. The report was prepared to provide background on data, model needs, and data and model availability for Gulf coast oyster restoration planning.	Oyster restoration scientists; Oyster resource managers	• Variations in temporal and spatial coverage of data is a significant challenge to modeling and management. • Modeling requires data on 1) ecological, 2) water quality, and 3) physical drivers of on-reef oyster processes and larval transport processes that connect reefs. • Parameters for each of these drivers include dermo infection, predator abundance, salinity, water temperature, food availability (Chlorophyll a), dissolved oxygen, water depth, oyster bed/cultch, cultch cover, water flow, and water circulation. • Coordinated, spatially distributed continuous data recorders and long-term monitoring programs are needed. • Future condition model availability also varies.	La Peyre et al. 2021

Gulf of Mexico Alliance: A Blueprint for Regional Data Sharing in the Gulf of Mexico: Oyster Data Sharing	Gulf of Mexico	Reports the results of a stakeholder engagement workshop with oyster managers from around the U.S. Gulf Coast, held in January 2020. GOMA's strategy for regional data sharing that includes 1) stakeholder engagement to identify data uses, gaps, and barriers; 2) data identification; and 3) data connection through the GOM Open Data Platform	Regional experts in fisheries management, restoration, aquaculture, and researchers as stakeholders in developing a future Community of Practice (which has since been convened).	• Water quality data (e.g., real-time stations near oyster reefs; bottom & surface monitoring); • Geospatial data (e.g., historic extent of oysters bottom type); • Threats to oysters (e.g., Dermo disease, predator abundance); • Results from restoration projects; • Modeling hydrology e.g., real-time and future freshwater inflows; salinity regimes oyster larval transport) • Data collection and management needs • Barriers to data access and use	Gulf of Mexico Alliance 2020 (Download available from Publications - Gulf of Mexico Alliance)
Ecological Resilience Indicators for Five Northern Gulf of Mexico Ecosystems, Chapter 5. Ecological Resilience Indicators for Oyster Reefs	Northern Gulf of Mexico	Summarizes spatial distribution and density of recommended oyster ecosystem indicators in the Northern Gulf.	Resource managers	• Recommend ecologically informed oyster indicators to inform sustainable ecosystem and living marine resource management. • Ecological integrity metrics include salinity, dissolved oxygen, reef percent cover, disease prevalence, reef area, reef height, live oyster density, species richness, and biomass of resident species. • Ecosystem service metrics include: macrofaunal population status, oyster fishery status, erosion reduction, and recreational fishery perceptions.	Shepard et al. 2018

Charting the Gulf: Analyzing the Gaps in Long-term Monitoring of the Gulf of Mexico	Gulf of Mexico	Compiled following Deep Water Horizon oil rig explosion, this document identifies critical gaps in monitoring and observation that may hinder restoration. Includes an inventory of existing and past natural resource monitoring efforts and an assessment of long-term monitoring trends.	Gulf Coast Ecosystem Restoration Council, National Fish and Wildlife Foundation, NRDA, Restoration program managers	• Mapping efforts not coordinated • Gulf-wide metrics not standardized • Oyster harvest activities are the most rigorously tracked	Love et al. 2015
The effects of atrazine on the microbiome of the eastern oyster: Crassostrea virginica.	Statewide & estuary-scale	In Chesapeake Bay, the resource illustrates that soil toxins, in particular, atrazine, have adverse effects on the microbiome of juvenile oysters and could affect their health and reproductive success.	Resource managers and restoration practitioners.	How much atrazine is in our estuarine soils and is it affecting the health and reproductive success of oysters? (There may be other chemicals of concerns for Florida as well.)	Britt et al. 2020

Conclusions and Recommendations

Oysters play a vital role in sustaining the health of Florida's coastal ecosystems and communities. They support healthy estuaries and surrounding human populations by improving water quality, providing habitat for estuary-dependent species, expanding opportunities for recreational fishing and wildlife viewing, stabilizing shorelines, and revitalizing both commercial harvesting operations and emerging aquaculture ventures.

Despite numerous oyster habitat mapping, monitoring, and research efforts over time, most have been limited in scale and duration. Monitoring tends to focus on areas with high oyster or human population density, leaving significant gaps across the state. These gaps often stem from challenges accessing remote regions or limited attention to areas with sparse oyster populations. Event regions with recent data – such as the Big Bend – require continued study due to the abundance of habitat and their dynamic nature. Additionally, oysters growing peripherally (e.g., on seawalls, mangrove roots, or other structures) are rarely included in mapping and monitoring efforts.

This document offers a high-level overview of existing oyster data gaps in Florida with a focus on summarizing where and when oyster mapping and monitoring have occurred or are currently underway. It is intended to spark dialogue and collaboration aimed at closing these gaps, which are key to guiding effective oyster conservation strategies. While a statewide accounting of oyster habitat mapping and monitoring frequency and consistency was beyond the scope of this document, it remains a critical next step. Standardized mapping and repeated monitoring - especially efforts that distinguish between live and dead reef areas – are essential for tracking changes in reef extent and condition over time.

Coordinated, statewide data collection is essential to inform oyster restoration planning and habitat management. Addressing these data gaps must be a priority for the State of Florida. Science-based oyster habitat recovery plans are needed to ensure the long-term sustainability of oyster habitats and populations. Adequate and sustained funding is critical to filling the data gaps highlighted here and to improve the restoration and stewardship of Florida's oyster resources. Prioritizing data gaps in the most productive estuaries of the state is a practical and achievable next step.

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