

Oyster Integrated Mapping and Monitoring Program (OIMMP)

OIMMP workshop

May 22-23 2018

Guana Tolomato Matanzas

National Estuarine Research Reserve

Kara Radabaugh, Ryan Moyer, Steve Geiger

Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute



OIMMP introduction

- OIMMP is funded by Florida's State Wildlife Grants (SWG) Program in order to support the study of high-priority coastal habitats and meet requirements of the State Wildlife Action Plan



OIMMP Team



Ryan P. Moyer, Ph.D. (PI)



Kara Radabaugh, Ph.D. (Coordinator, Co-PI)



Steve Geiger, Ph.D. (Co-PI)



Christi Santi (GIS specialist)

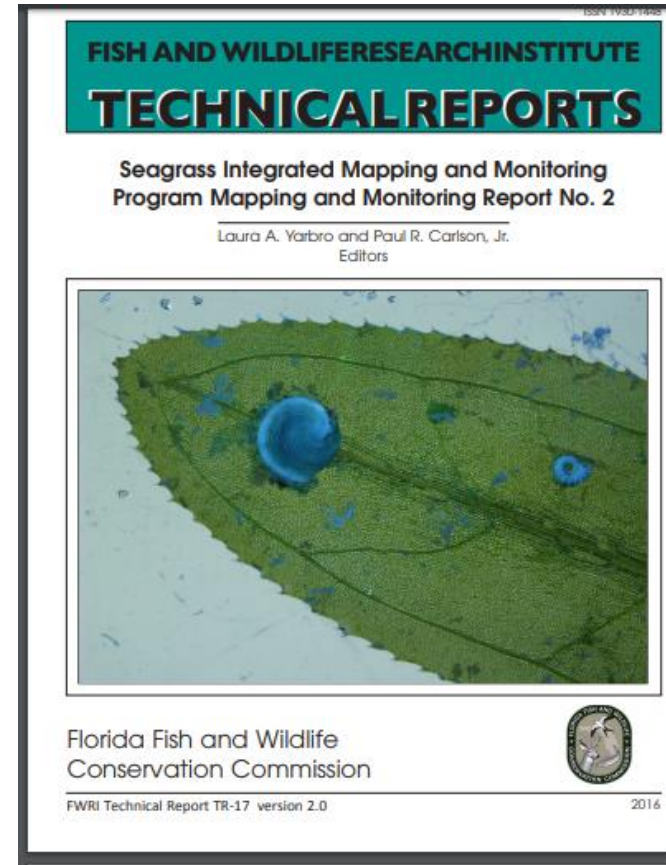


Kathleen OKeife (Geospatial support)

Many statewide collaborators!

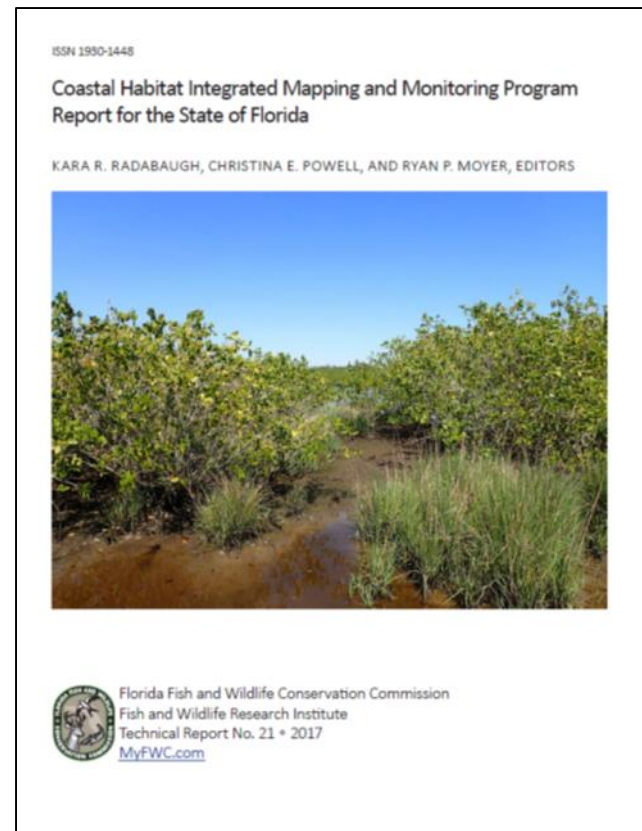
IMMP Origins: SIMM

- Seagrass Integrated Mapping and Monitoring (SIMM) program by Laura Yarbrow and Paul Carlson
- SIMM report:
myfwc.com/research/habitat/seagrasses/projects/active/simm/



IMMP Origins: CHIMMP

- Coastal Habitat Integrated Mapping and Monitoring Program (CHIMMP)
- CHIMMP report made with 48 statewide contributors:
<http://myfwc.com/research/habitat/coastal-wetlands/projects/chimmp/>



IMMP Origins: CHIMMP

- Four year program, 2013-2017 funded by SWG
- Resources and presentations from three workshops available at <http://ocean.floridamarine.org/CHIMMP/>

Coastal Habitat Integrated Mapping and Monitoring Program

[CHIMMP Workshop](#) [Presentations](#) [Resources](#) [CHIMMP Regions Map](#) [2015 CHIMMP Workshop](#) [2014 CHIMMP Workshop](#)

2017 CHIMMP Workshop

The Coastal Habitat Integrated Mapping and Monitoring Program (CHIMMP) is funded by Florida's State Wildlife Grants (SWG) Program in order to support the study of high priority coastal habitats and meet requirements of the State Wildlife Action Plan. CHIMMP's goals include bringing together representatives from mapping and monitoring programs across the State in order to increase communication, minimize duplicate efforts and identify data gaps, needs, and priorities. Additional goals are to create a statewide report on the status of mangroves and salt marshes in Florida modeled after the Seagrass Integrated Monitoring and Mapping Program (SIMM).

2017 Workshop Agenda and Summary

*Workshop CHIMMP
Presentation*

Florida Mapping and Monitoring Resources

2017 Workshop Presentations

Topic: Assessing the Effects of Eutrophication on Mangrove's Resiliency to Sea Level Rise

Presenter: Jeremy Conrad, U.S. Fish and Wildlife Service

Reference Material:

Effects of eutrophication on mangrove resiliency

Topic: Should RSET-MH data be used to forecast the effects of sea-level rise on wetland resilience and carbon sequestration?

Presenter: Randall W. Parkinson, Florida International University

Reference Material:

Should RSET-MH data be used to forecast the effects of sea-level rise



OIMMP goals

- **Inventory existing mapping and monitoring programs**
 - Create publicly available mapping layer and collaborative statewide report
- **Bring together representatives from mapping and monitoring programs across the state**
 - Increase communication
 - Compare current mapping and monitoring methods
 - Identify data gaps, needs, and priorities for future efforts
- **Complete pilot studies of oyster mapping and monitoring**

OIMMP workshops

- First workshop held in February 2017 at GTMNERR
- 2017 presentations available on OIMMP website

<http://ocean.floridamarine.org/OIMMP/>



Oyster Integrated Mapping and Monitoring Program

[OIMMP Workshop](#) [Presentations](#) [Resources](#)

2017 OIMMP Workshop

The Oyster Integrated Mapping and Monitoring Program (OIMMP) is funded by Florida's State Wildlife Grants (SWG) Program in order to support the study of high priority coastal habitats and meet requirements of the State Wildlife Action Plan. OIMMP's goals include bringing together representatives from oyster mapping and monitoring programs across the State in order to increase communication, minimize duplicate efforts, and identify data gaps, needs, and priorities. Additional goals are to create a statewide report on the mapping and monitoring status of oyster reefs in Florida modeled after the Seagrass Integrated Monitoring and Mapping Program (SIMM) and the Coastal Habitats Integrated Mapping and Monitoring Program (CHIMMP).

[2017 Workshop Agenda and Attendees](#)

[Workshop OIMMP Presentation](#)

[Oyster Mapping and Monitoring Resources in Florida](#)





Workshop Agenda

- **Day 1**

- OIMMP updates and resources
- Attendee presentations
- Social event at Mill Top Tavern

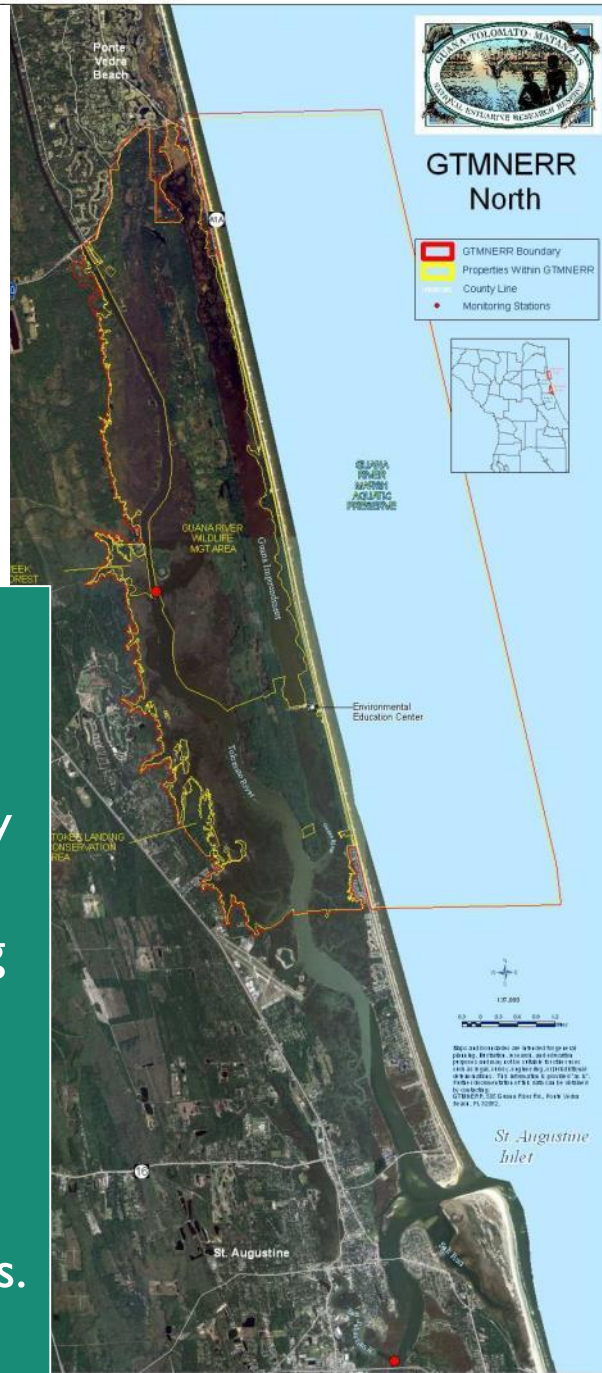
- **Day 2**

- Continuation of attendee presentations
- Breakout groups



MISSION

To achieve the conservation of natural biodiversity and cultural resources by using the results of research to guide science-based stewardship and education strategies.



OIMMP Report updates

- Regions for statewide report determined at 2017 workshop



Chapter	Contributor	Affiliation	Chapter	Contributor	Affiliation	
All, report editors	Kara Radabaugh	FWC	Tampa/ Sarasota Bay	Gary Raulerson	TBEP	
	Steve Geiger	FWC		Jay Leverone	SBEP	
	Ryan Moyer	FWC		Allison Conner	CHNEP	
All, GIS	Christi Santi	FWC		Aaron Brown	SWFWMD	
Introduction	Kara Radabaugh	FWC		Kris Kaufman	NOAA	
	Loren Coen	FAU		Andrew Lykens	Tampa Bay Watch	
	Steve Geiger	FWC		Kathryn Meaux	Sarasota County	
	Ryan Moyer	FWC	Southwest Florida	Anne Birch	TNC	
Northwest Florida	Katie Konchar	FWC		Eric Milbrandt	SCCF	
	Katie Davis	FDEP		Mark Thompson	SCCF	
	Patrice Couch	St.Andrew Bay Watch		Thomas Ries	ESA Scheda	
Apalachicola Bay	Ray Grizzle	UNF	Biscayne Bay and FL Keys	Kara Radabaugh	FWC	
	Melanie Parker	FWC		Steve Geiger	FWC	
	Anne Birch	TNC		Ryan Moyer	FWC	
	Megan Lamb	ANERR	Central and Southeast Florida	Melanie Parker	FWC	
	Emma Dontis	FWC		Vincent Encomio	FOS	
Big Bend and Springs Coast	Stephen Hesterberg	USF		Jeff Beal	FWC	
	Sean King	SWFWMD		Phyllis Klarmann	SFWMD	
	Gregory Herbert	USF		Emily Dark	FDEP	
	Peter Frederick	UF		Joshua Breithaupt	UCF	
	William Pine	UF	Northeast Florida	Nikki Dix	GTMNERR	
	39+ statewide contributors				Linda Walters	UCF
Erica Hernandez					SJRWMD	
Annie Roddenberry					FWC	
Stephanie Garvis					UCF	
Matthew Anderson					FDEP	

OIMMP Report

- Introduction to Florida oyster reefs
 - Overview of methods used for mapping and monitoring
 - Summary of benthic habitat classification schemes
 - Summary of oyster reef mapping data
 - Summary of oyster monitoring parameters and resources

Oyster Integrated Mapping and Monitoring Program

[OIMMP Workshop](#) [Presentations](#) [Resources](#)

2017 OIMMP Workshop

The Oyster Integrated Mapping and Monitoring Program (OIMMP) is funded by Florida's State Wildlife Grants (SWG) Program in order to support the study of high priority coastal habitats and meet requirements of the State Wildlife Action Plan. OIMMP's goals include bringing together representatives from oyster mapping and monitoring programs across the State in order to increase communication, minimize duplicate efforts, and identify data gaps, needs, and priorities. Additional goals are to create a statewide report on the mapping and monitoring status of oyster reefs in Florida modeled after the Seagrass Integrated Monitoring and Mapping Program (SIMM) and the Coastal Habitats Integrated Mapping and Monitoring Program (CHIMMP).

[2017 Workshop Agenda and Attendees](#)

[Workshop OIMMP
Presentation](#)

[Oyster Mapping and Monitoring Resources in
Florida](#)



OIMMP report chapter contents

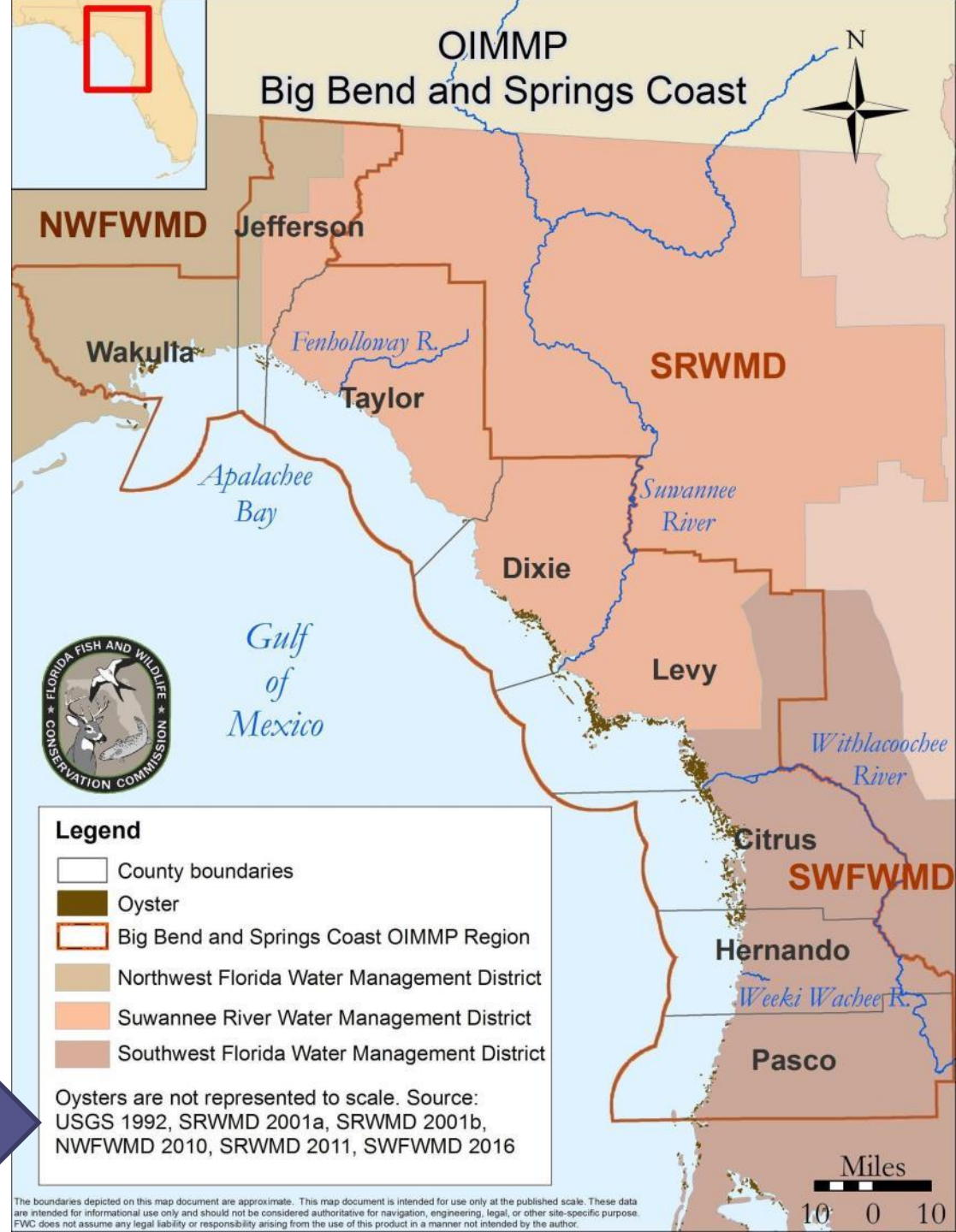
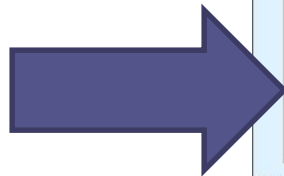
- Regional maps
- Introduction to regional history/ecology, description of local oysters
- Threats to oyster reefs
- Summary of regional mapping and monitoring programs
- Recommendations for management, mapping, and monitoring

OIMMP Report example: Big Bend and Springs Coast

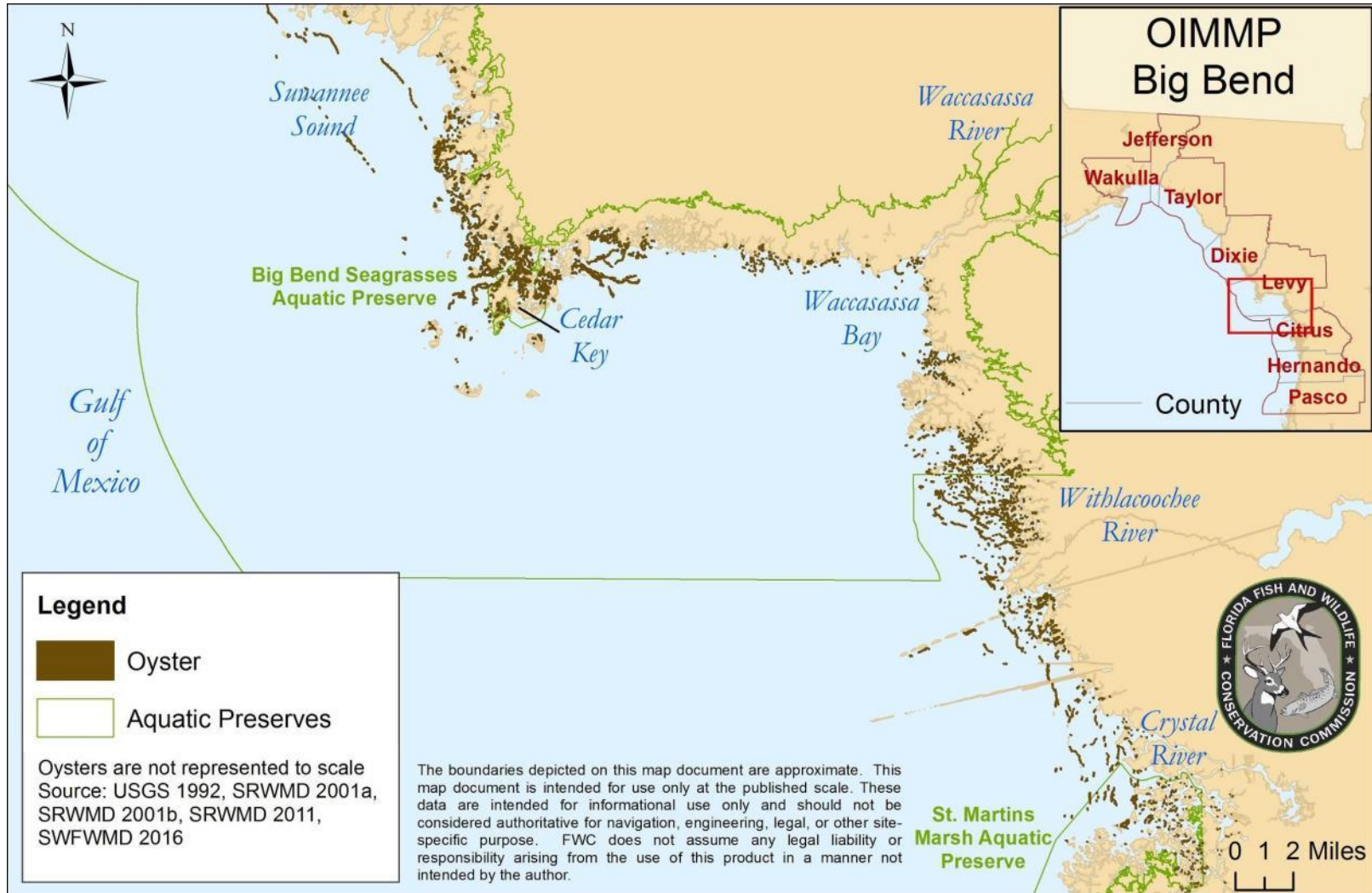
Mapping linked to published
reports and websites

Map shapefiles available for
downloads at

<http://geodata.myfwc.com/datasets/oyster-beds-in-florida>



OIMMP Report example: Big Bend and Springs Coast



OIMMP Report example: Big Bend and Springs Coast

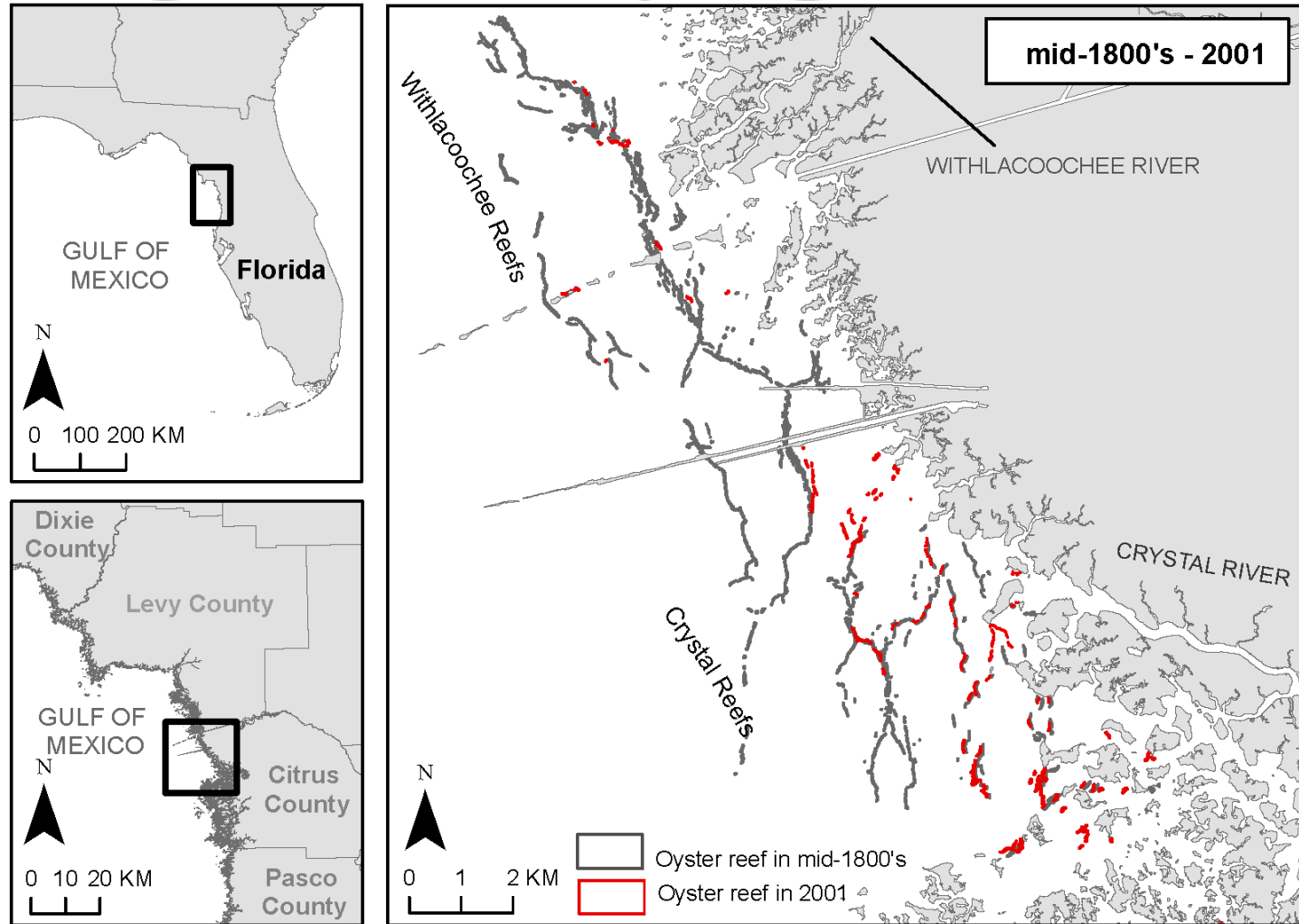
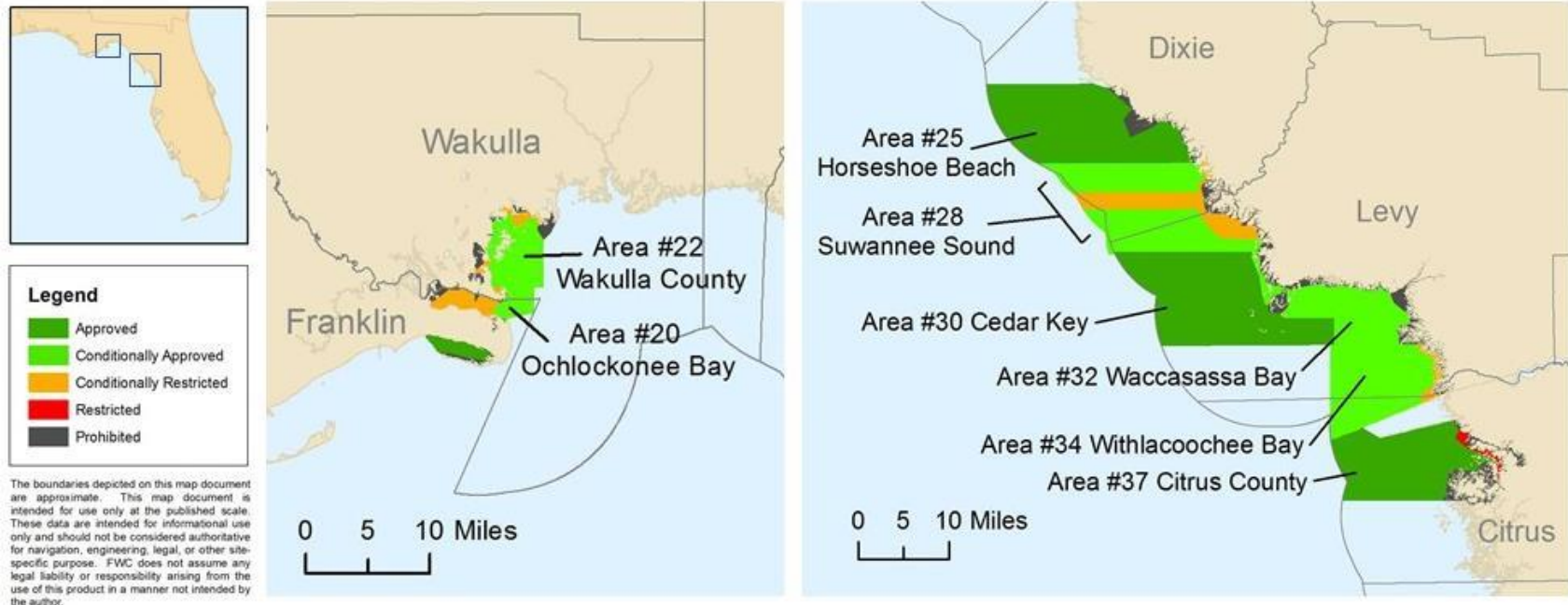


Figure 4.7. Oyster reef extent offshore of Withlacoochee and Crystal rivers in the mid-1800s and 2001. Map by Stephen Hesterberg. Data sources: Raabe et al. 2004, SRVMD 2001a.

OIMMP Report example: Big Bend and Springs Coast



FDACS Shellfish Harvesting Areas (SHAs) downloadable shapefiles:

Winter SHAs:

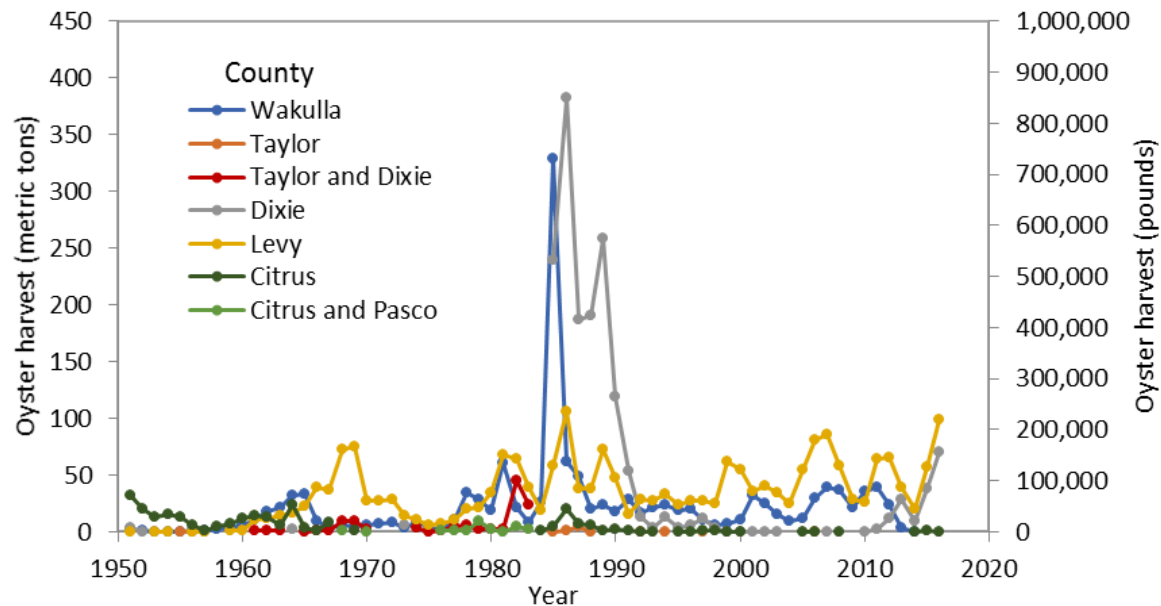
<https://www.arcgis.com/home/item.html?id=ac228ede47b04ac0ad69abcdc06e3a1f#overview>

Non-Winter SHAs:

<https://www.arcgis.com/home/item.html?id=6cf9f4ec8edb4dd8949cb23bb591745a#overview>

Oyster harvest data

- 1950 – 1983 data from printed copies of Summaries of Florida Commercial Marine Fish Landings
 - Will be available on OIMMP website and published as a report appendix
- 1984 – present data from <https://public.myfwc.com/FWRI/PFDM/ReportCreator.aspx>
- 1986 – Initiation of mandatory FWC reporting system



Oyster harvest data

- 1984 – present data from

<https://public.myfwc.com/FWRI/PFDM/ReportCreator.aspx>



Ask FWC About Contact News Calendar Get Involved

Florida Fish and Wildlife Conservation Commission

Fishing Boating Hunting Licenses & Permits Wildlife Viewing Wildlife & Habitats Research Education Conservation

Commercial Fisheries Landings Summaries

Filters

Years: -

Species Set: ☐ Aquaculture ☒ Food and Bait ☐ Marine Life

Species *:

MISC. INVERTEBRATES
MOJARRA
MULLET, BLACK
MULLET, BLACK, ROE
MULLET, SILVER
OCTOPUS
OYSTERS
PERMIT
PINFISH
POMPANO
PORGIES
RAYS & SKATES
SAND PERCH (SERRANIDAE)
SARDINES, SCALED
SARDINES, SPANISH
SCAD, BIGEYE (GOGGLE EYE)
SCAD, ROUND (CIGARET FISH)

Standard Output Columns

Year, Species, and Trips

Additional Output Columns

☐ Area, Area Description, Pounds, Average Price, and Estimated Value

☒ County, Pounds, Average Price, and Estimated Value

☐ Coast, Pounds, Average Price, and Estimated Value

☐ Month, Pounds, Average Price, and Estimated Value

☐ Statewide: Pounds, Average Price, and Estimated Value

Actions

* When species are selected, only they will be included in the report. Otherwise, all shown species will be included.

* Number of trips cannot be summed across species because more than one species can be harvested on a single trip.

OIMMP Report Status

- Approved for FWRI Technical Report publication
- Drafts written for 5 (of 9) chapters and well underway for 3 more chapters
- Writing & review process
 - Write draft (Kara Radabaugh & coauthors)
 - OIMMP editor revisions (Kara Radabaugh, Ryan Moyer, Steve Geiger)
 - Technical review & revisions (Bill Arnold, Amber Whittle)
 - Science & copy editor review & revisions (Bland Crowder)
 - Formatting (Bland Crowder)

Statewide Oyster Mapping and FWC GIS Resources



Christi Santi

*Florida Fish and Wildlife Conservation
Commission*

Fish and Wildlife Research Institute



Statewide Oyster Progress

- Data were added from 15 sources in additional areas or updates to existing areas.
- Any overlaps between multiple data sources were resolved.
- Additional “Comments” are added to retain details present in source data.

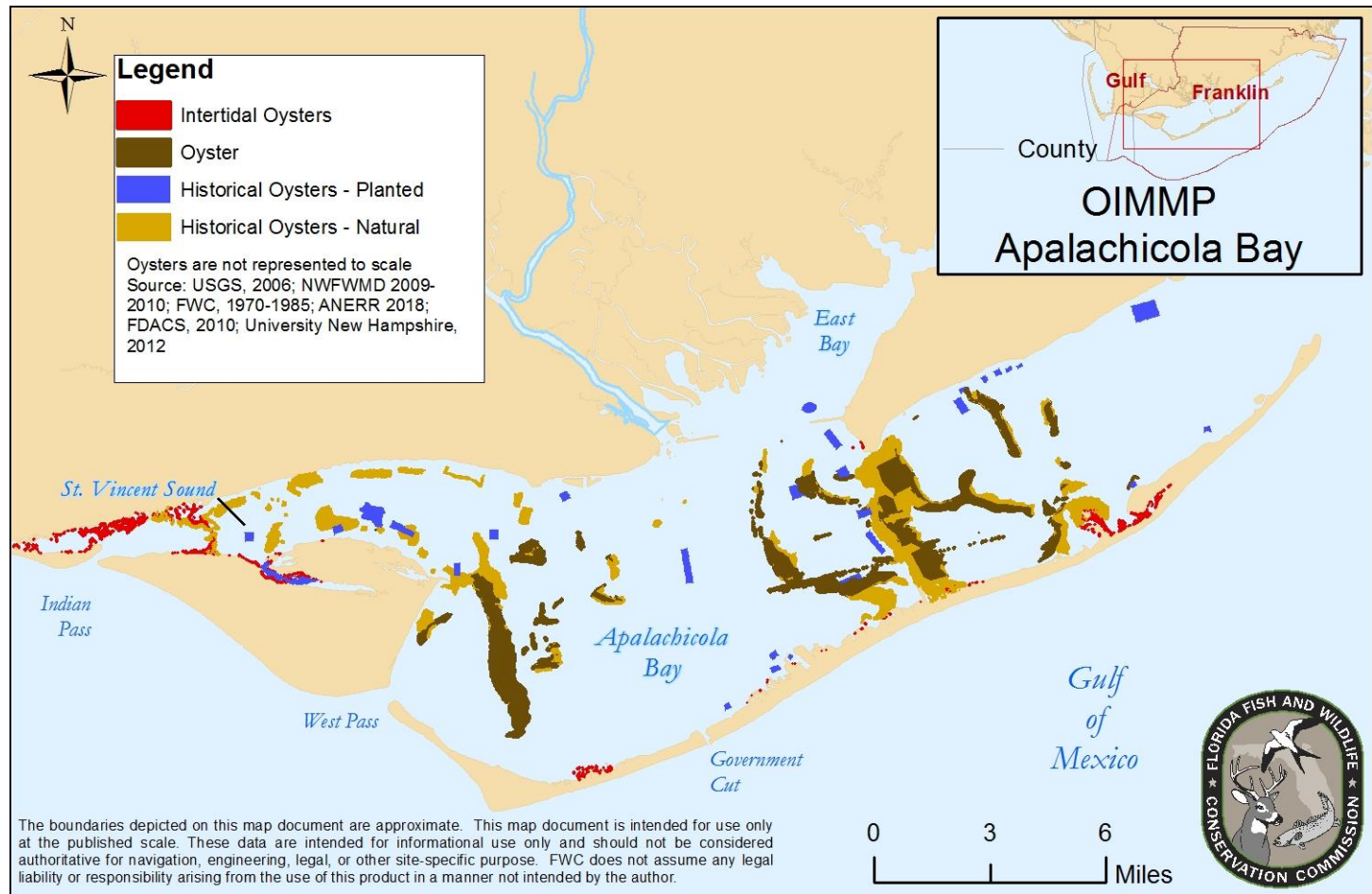
Statewide Oyster Progress



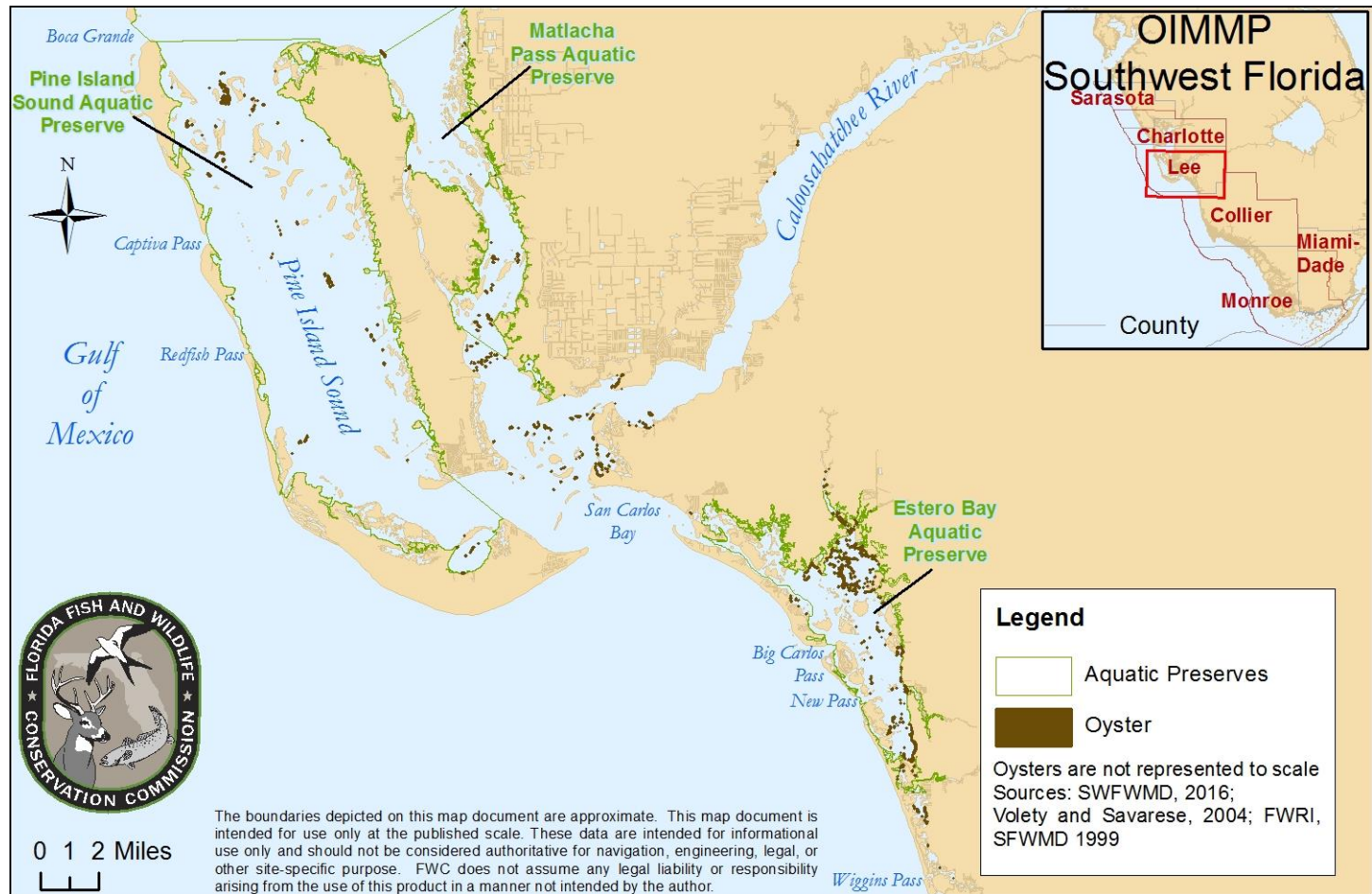
Statewide Oyster Progress



Updated Area: Apalachicola Bay



Updated Area: Lee County



Mapping Gaps

Vague maps

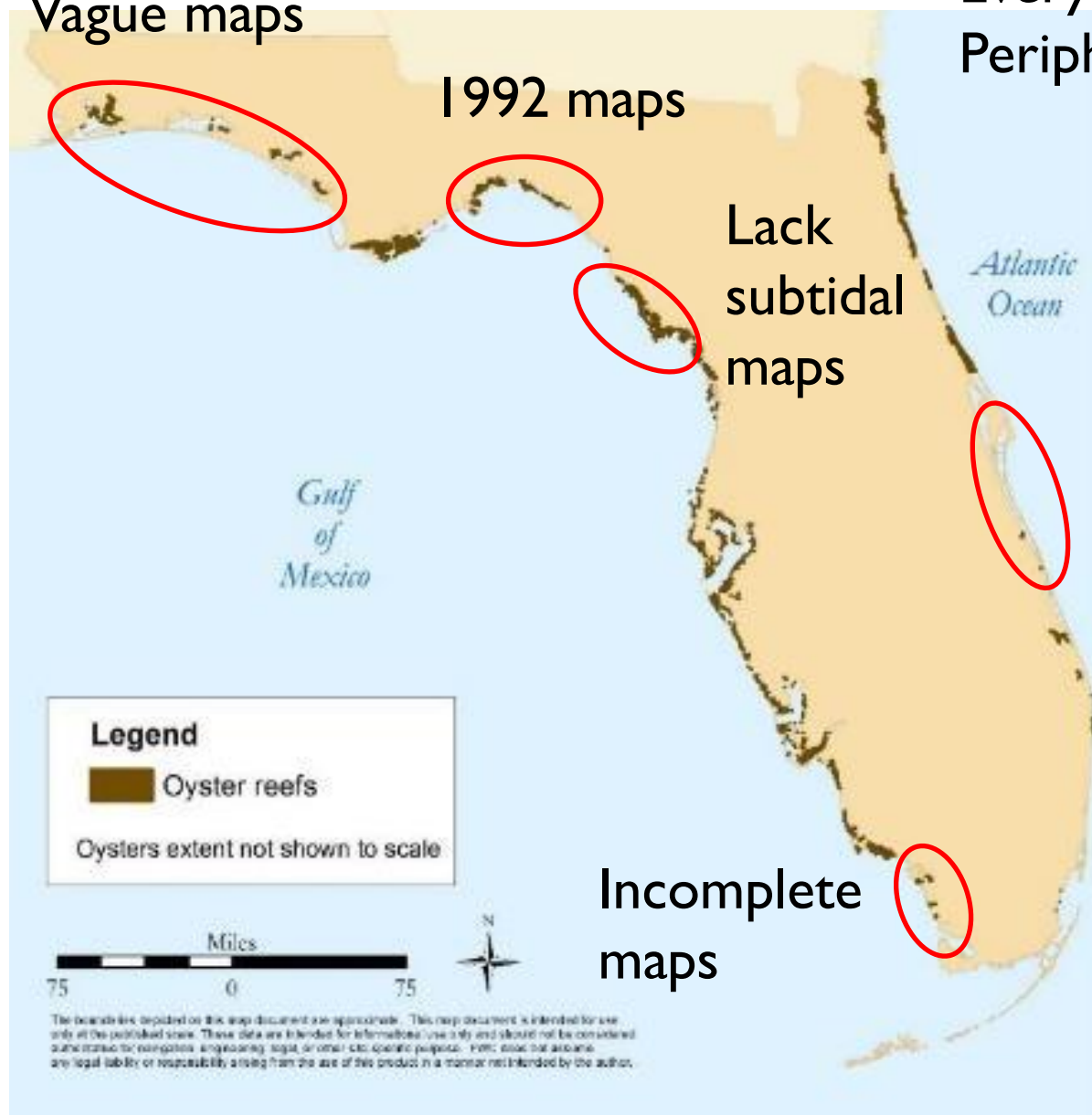
1992 maps

Lack
subtidal
maps

Everywhere:
Peripheral oysters


Incomplete
maps

Incomplete
maps



The boundaries depicted on this map document are approximate. This map document is intended for use only at the published scale. These data are intended for informational use only and should not be considered authoritative for navigation, engineering, legal, or other critical scientific purposes. NOAA does not assume any legal liability or responsibility arising from the use of this product in a manner not intended by the author.

FWC GIS Data

**Florida Fish and Wildlife
Conservation Commission**


Sign In

Welcome to the Center for Spatial Analysis

The Center is part of the Information Science and Management section and produces, analyzes, and manages scientific data and information used by federal, state and local governments and the public to aid in the conservation of fish and wildlife.

The Center for Spatial Analysis develops a variety of products in response to the needs of the community including our popular Boating and Angling Guide series, multiple Geographic Information Systems (GIS) web applications and seagrass and coral reef mapping.

Additionally, through the use of GIS technology, the Center for Spatial Analysis assists the U.S. Coast Guard, the National Oceanic and Atmospheric Administration, and the Department of Environmental Protection in the event of an oil spill. These analyses assist decision-makers in developing response and clean-up strategies, in prioritizing response efforts, and in assessing damage after a spill.



A historic map of the State of Florida published in 1846.

Applications and Map Products

Web Mapping Applications are online mapping tools designed to allow users to view spatially referenced data, create customized queries, design printable maps, view Federal Geographic Data Committee (FGDC) compliant metadata, and download GIS layers for use within a desktop GIS. FWRI's Web-based GIS technologies allow efficient viewing and sharing of GIS data via the Internet in support of efforts to conserve and manage habitats important to fish and wildlife. Below, FWC's web mapping applications are organized according to three generalized ecosystems:

[GIS & Mapping Data Downloads](#)
The GIS & Mapping Data Downloads page is an indexed catalog of FWC's spatially referenced data available for users to view, filter, query, and download data for use on a desktop GIS.

[Marine](#)
The Marine pages hosts information and applications that target a variety specific resources within the marine environment. The Marine group includes FWRI's Boating and Angling Guide series and the Marine Resources GIS (MRGIS) application, which comprehensively catalogs marine habitat, species distribution, and boating amenities.

[Terrestrial](#)
The Terrestrial page hosts a collection of applications and information related to habitat and species conservation. The Terrestrial Resources GIS (TRGIS) application allows visual comparisons of species distribution, habitat models and land management actions. This grouping also features species specific applications for wild turkey, Florida black bear, Florida panther, and more.

[Freshwater](#)
The Freshwater page hosts a collection of applications and information related to freshwater resources and habitats. Online mapping tools include applications targeting freshwater fisheries and wading birds.

FWC GIS Data

Search GIS & Mapping Data



oyster beds in florida

Downloaded data are in a Web Mercator projection. Please project data appropriately before using for measurements and analysis.
If you have questions regarding projections, [click here](#).
For instructions on how to find, filter, and download data, [click here](#).



[Boating](#)



[Boundaries](#)



[Elevation](#)



[Emergency Response](#)



[Fish and Wildlife
Habitat](#)



[Fish and Wildlife
Management](#)



[Fish & Wildlife Species
Locations](#)



[Freshwater Ecosystems](#)



[Harmful Algal Bloom](#)



[Imagery](#)



[Land cover](#)



[Location](#)



[Contact the GIS
Librarian](#)



[Manatees](#)



[Marine Ecosystems](#)



[Shoreline](#)



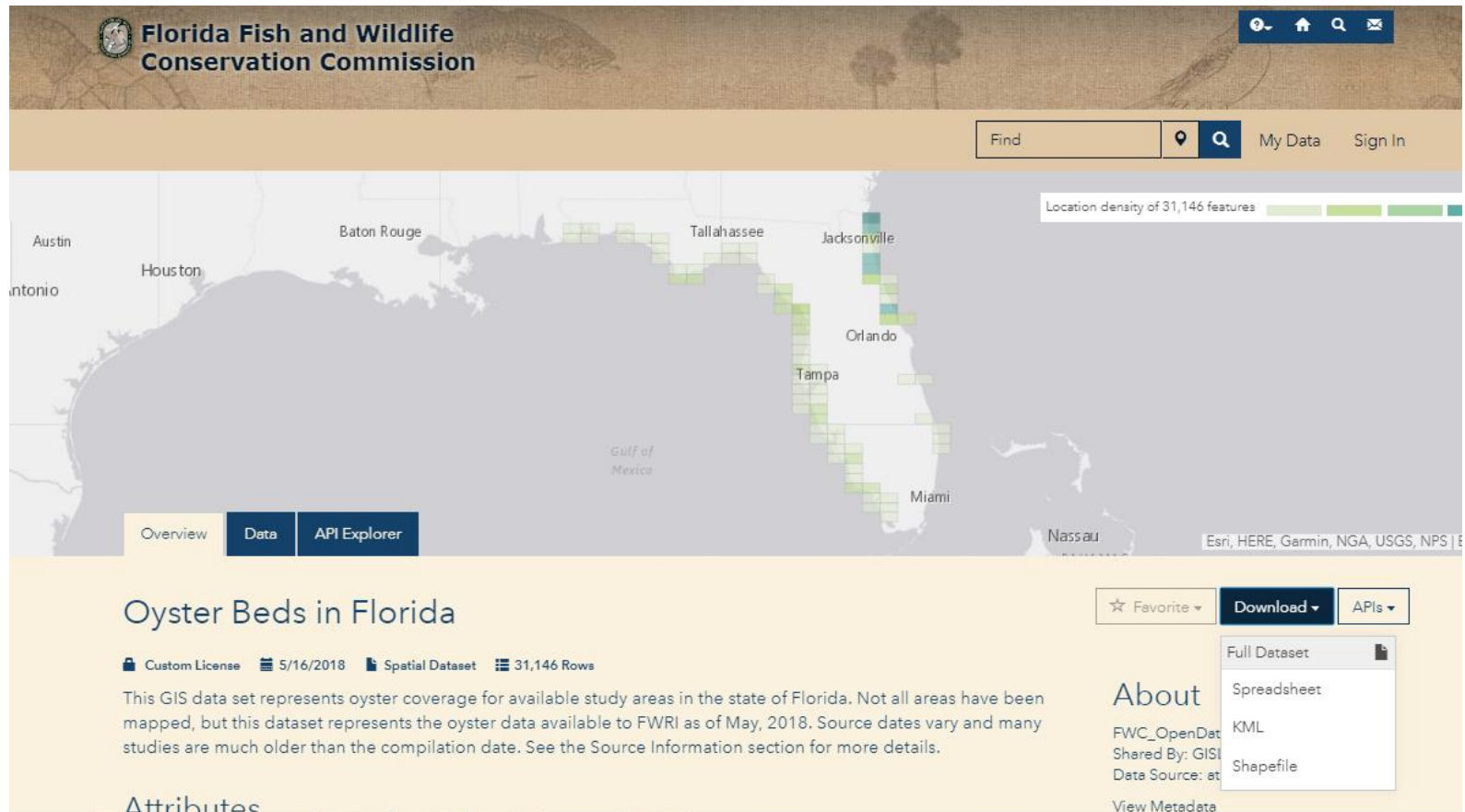
[Transportation](#)



[Quick Maps for Google
Earth](#)

<http://geodata.myfwc.com/>

FWC GIS Data



Resource links

- FWC GIS Downloads and Map Products:
<http://geodata.myfwc.com/>
- FWC GIS Email:
GISLibrarian@MyFWC.com

Mapping Gaps

Vague maps

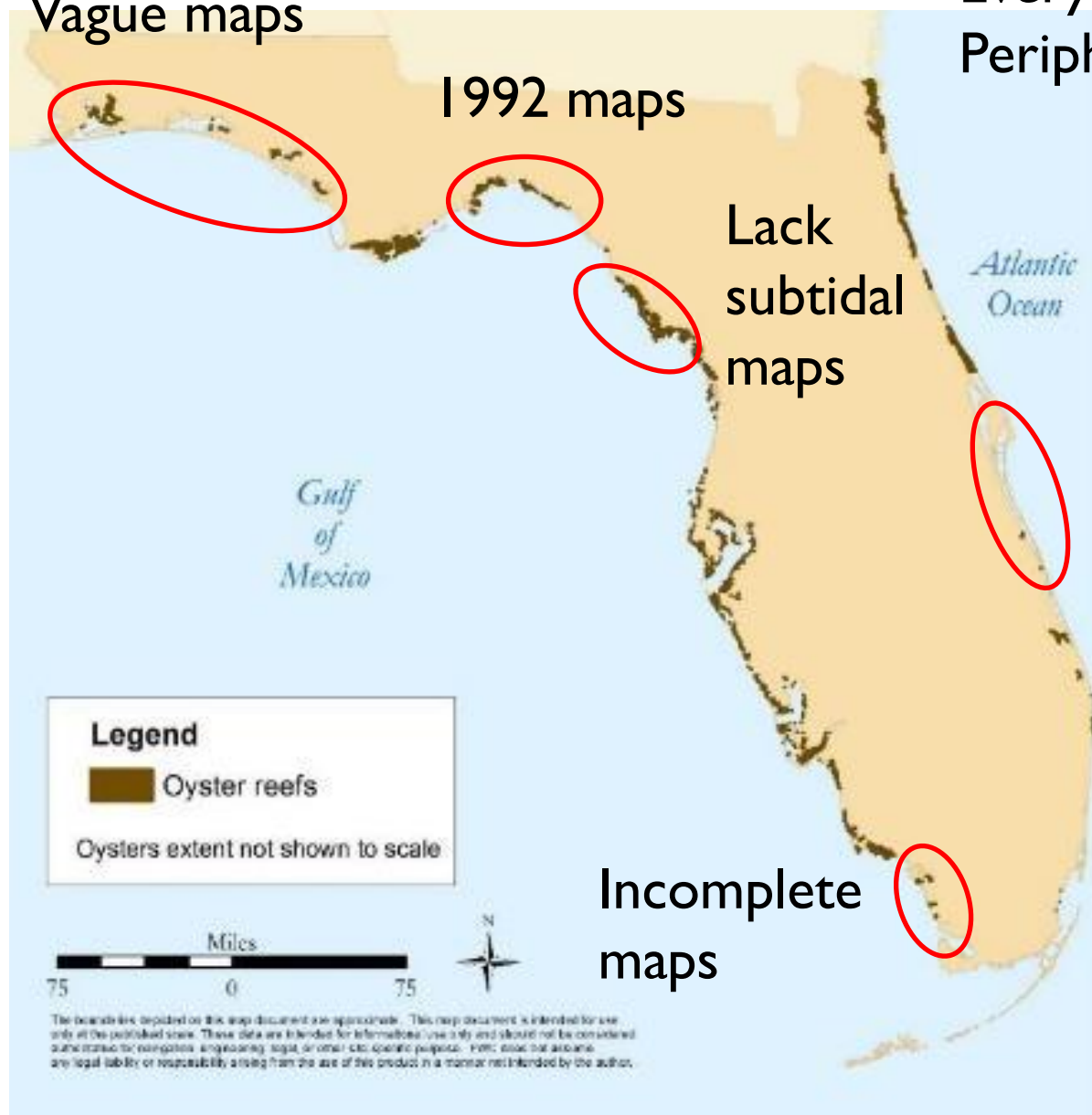
1992 maps

Lack
subtidal
maps

Everywhere:
Peripheral oysters

Incomplete
maps

Incomplete
maps





Monitoring Gaps

- Monitoring efforts highly localized
 - Limited comparison among bays
 - (but note Parker et al. 2013 Journal of Shellfish Research 32:695–708)
 - Not all bays monitored
 - Need standardized, long-term monitoring
- Need data hub
 - FDEP's SEACAR program
 - <https://floridadep.gov/fco/fcmp/content/seacar-goals>
- Need transition of data to management
 - Need harvest management plan



Major Threats

- Altered hydrology
 - Salinity (predation, disease, mortality)
- Loss of substrate
 - Dredging, sedimentation, harvest
 - Shoreline construction
- Climate change & sea-level rise
- Metapopulations

Pilot monitoring study

- Comparison of monitoring methods used by FWC and Northern Coastal Basin group (Walters et al. 2016)



Effort to fill mapping gaps

- Collaboration with UF to map subtidal oysters in Suwannee River sound





Online Resources

- SIMM/CHIMMP/OIMMP websites
- FWC oyster compilation shapefile
- FDACS Shellfish harvesting areas shapefiles
- Oyster harvesting data
- Oyster restoration workgroup
- Oyster fisheries data
- Historical habitat data

Online Resources

- Oyster restoration workgroup
- <http://www.oyster-restoration.org>



Oyster Restoration Workgroup

HOME MEMBERS RECENT & NEW INFO RESOURCE CENTER RESTORATION PRACTICES SPONSORS

Search for: Search

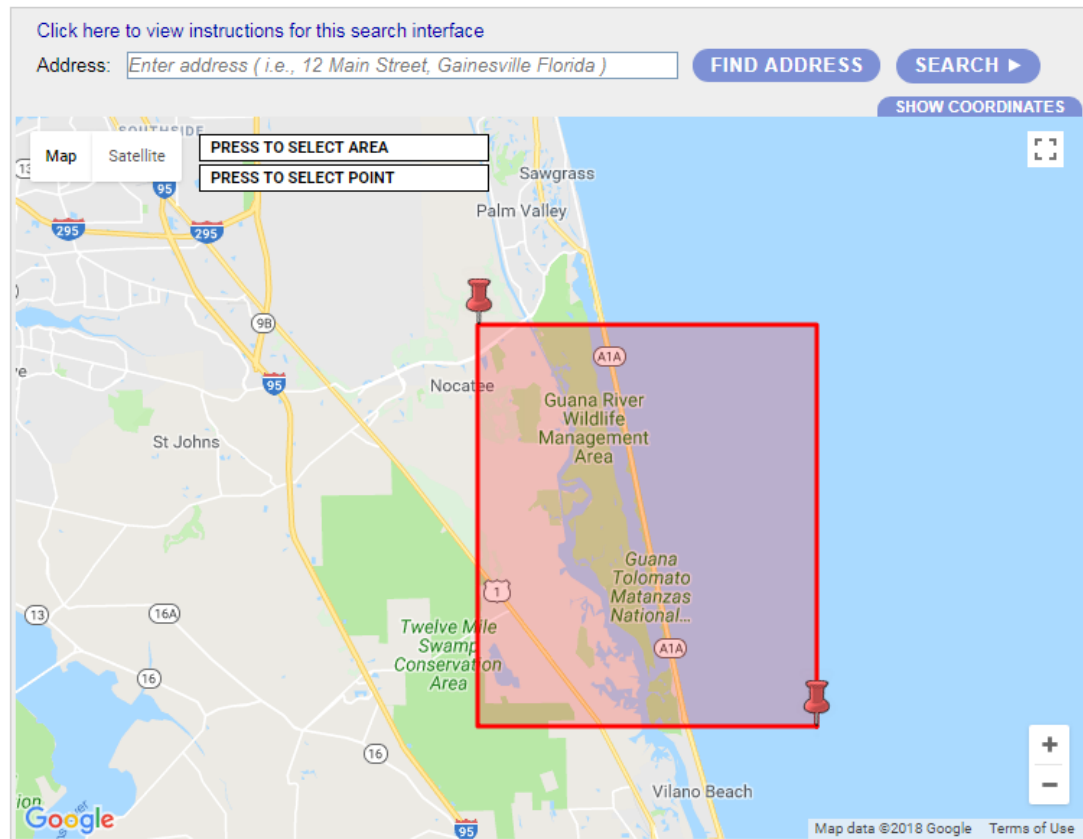
Oyster "consumer" on intertidal beds, Wilmington, NC (LDC)

Mission Oyster Restoration News Recent and Upcoming Events & Conferences

Online Resources

- Historical habitat data
- University of Florida Aerial Photo Library

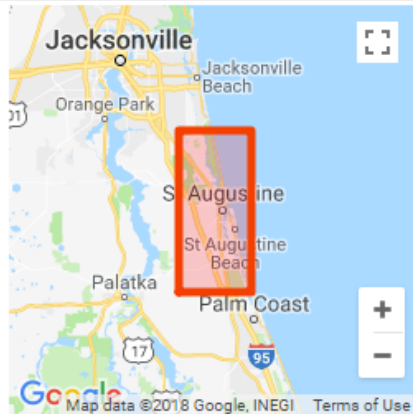
<http://ufdc.ufl.edu/aerials>



Online Resources

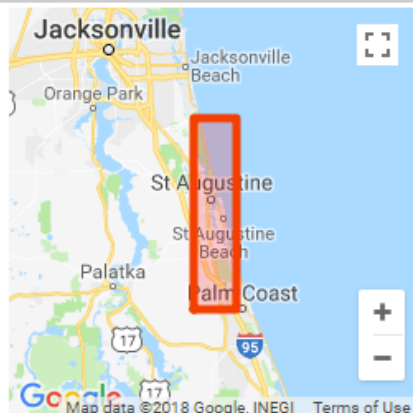
- Historical habitat data
- University of Florida Aerial Photo Library

<http://ufdc.ufl.edu/aerials>



Aerial photographs of Flagler County - Flight 10 (1952)

Publication Date: 1952
Creator: U.S. Department of Agriculture
Publisher: U.S. Department of Agriculture
Format: Flight of aerial photography
Source Institution: University of Florida



Aerial photographs of St. Johns County - Flight 4C (1942)

Publication Date: 1942
Creator: U.S. Department of Agriculture
Publisher: U.S. Department of Agriculture
Format: Flight of aerial photography
Source Institution: University of Florida

Online Resources

- Historical habitat data
- University of Florida Aerial Photo Library

<http://ufdc.ufl.edu/aerials>

UF | George A Smathers Libraries

University of Florida Digital Collections

UFDC Home | Aerial Photography: Florida

myUFDC Home | Help

Aerial photographs of St. Johns County - Flight 4C (1942)


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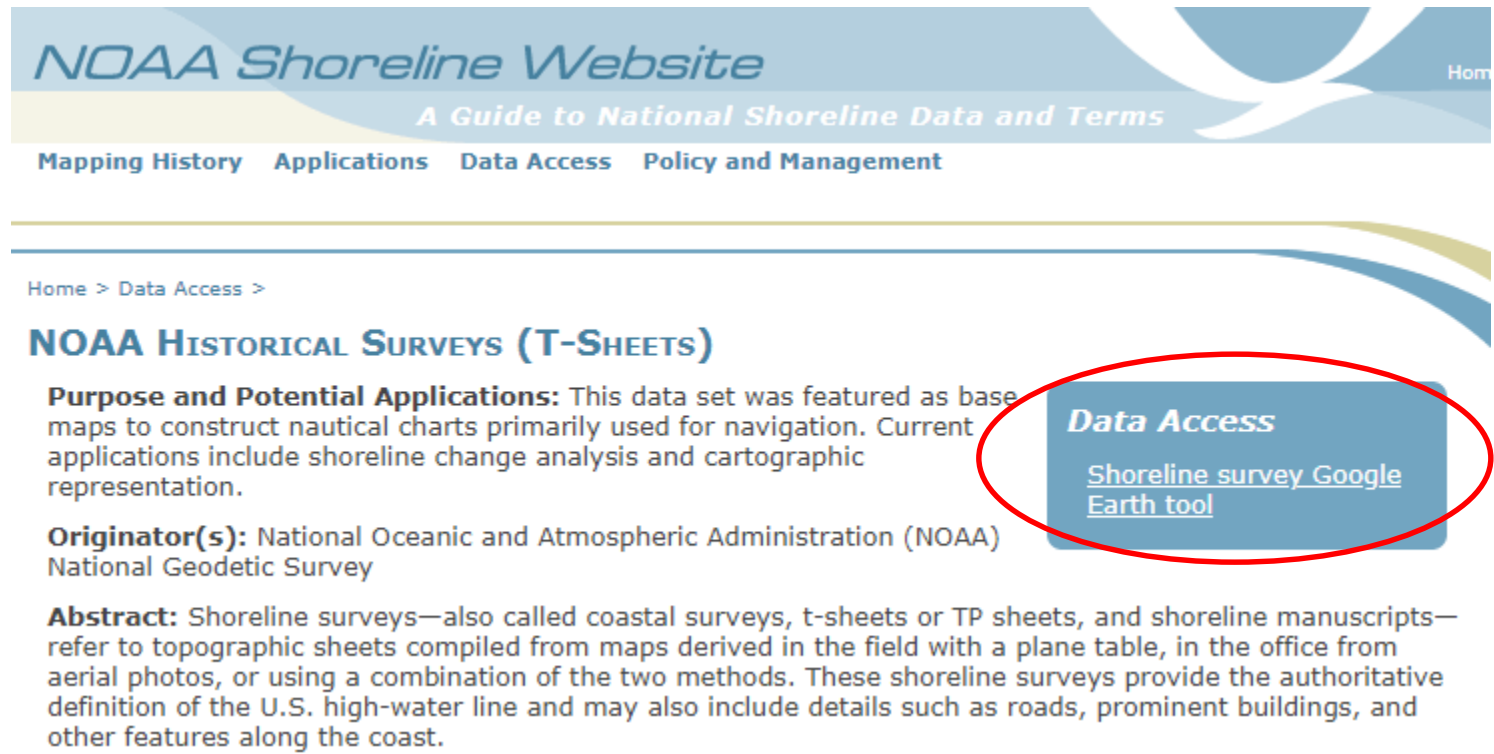
UF | Map and Imagery Library

STATE LIBRARY AND ARCHIVES OF FLORIDA



Online Resources

- Historic habitat data
- NOAA topographic surveys (T-sheets)
- <https://shoreline.noaa.gov/data/datasheets/t-sheets.html>



The screenshot shows the NOAA Shoreline Website. The header includes the title "NOAA Shoreline Website" and the subtitle "A Guide to National Shoreline Data and Terms". Navigation links for "Mapping History", "Applications", "Data Access", and "Policy and Management" are present. The breadcrumb trail shows "Home > Data Access >". The main heading is "NOAA HISTORICAL SURVEYS (T-SHEETS)". The "Purpose and Potential Applications" section describes the data's use in nautical charts and shoreline analysis. The "Originator(s)" section identifies NOAA and the National Geodetic Survey. The "Abstract" section defines shoreline surveys. A blue box labeled "Data Access" contains the link "Shoreline survey Google Earth tool", which is circled in red.

NOAA Shoreline Website
A Guide to National Shoreline Data and Terms

Mapping History Applications Data Access Policy and Management

Home > Data Access >

NOAA HISTORICAL SURVEYS (T-SHEETS)

Purpose and Potential Applications: This data set was featured as base maps to construct nautical charts primarily used for navigation. Current applications include shoreline change analysis and cartographic representation.

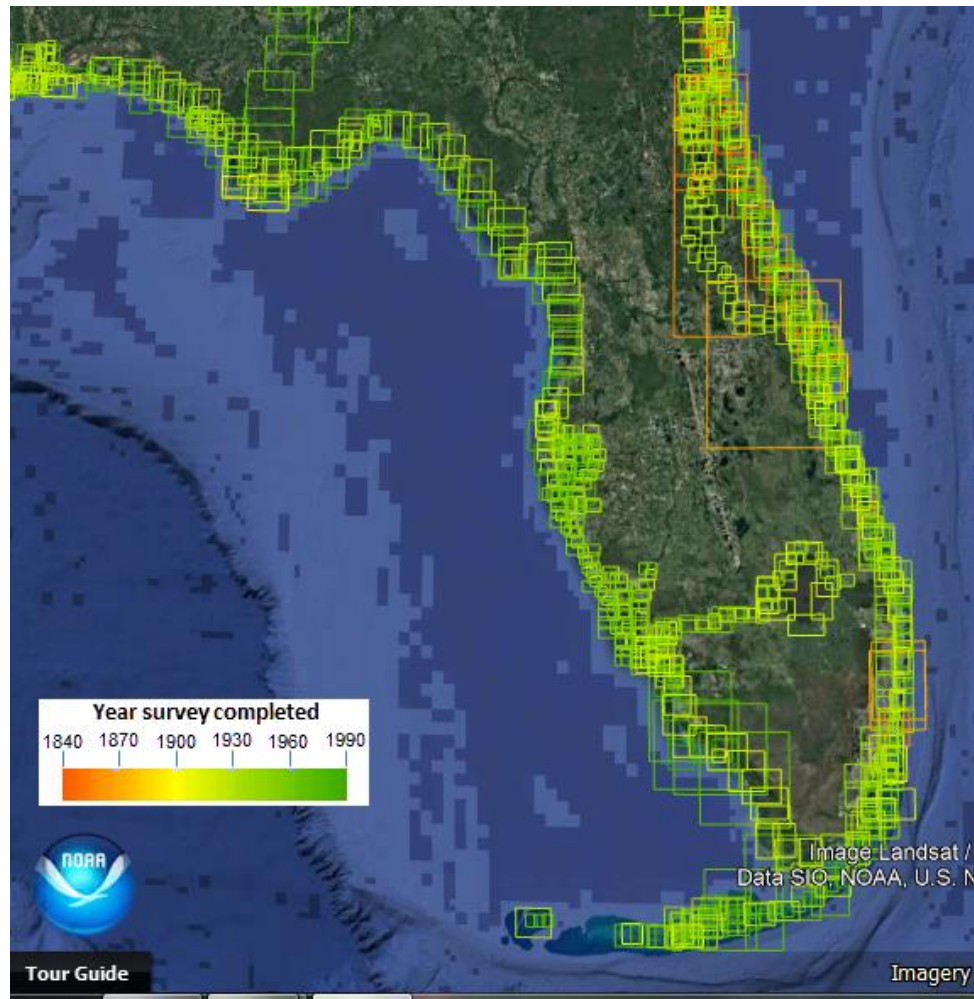
Originator(s): National Oceanic and Atmospheric Administration (NOAA)
National Geodetic Survey

Abstract: Shoreline surveys—also called coastal surveys, t-sheets or TP sheets, and shoreline manuscripts—refer to topographic sheets compiled from maps derived in the field with a plane table, in the office from aerial photos, or using a combination of the two methods. These shoreline surveys provide the authoritative definition of the U.S. high-water line and may also include details such as roads, prominent buildings, and other features along the coast.

Data Access
[Shoreline survey Google Earth tool](#)

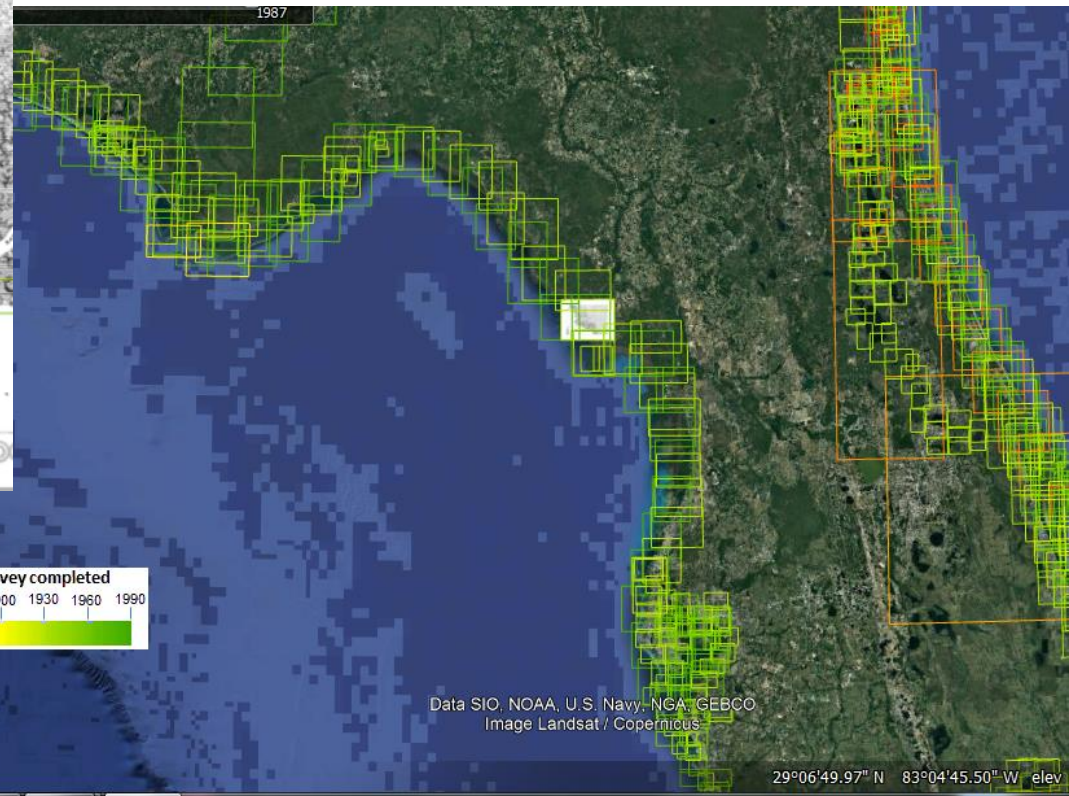
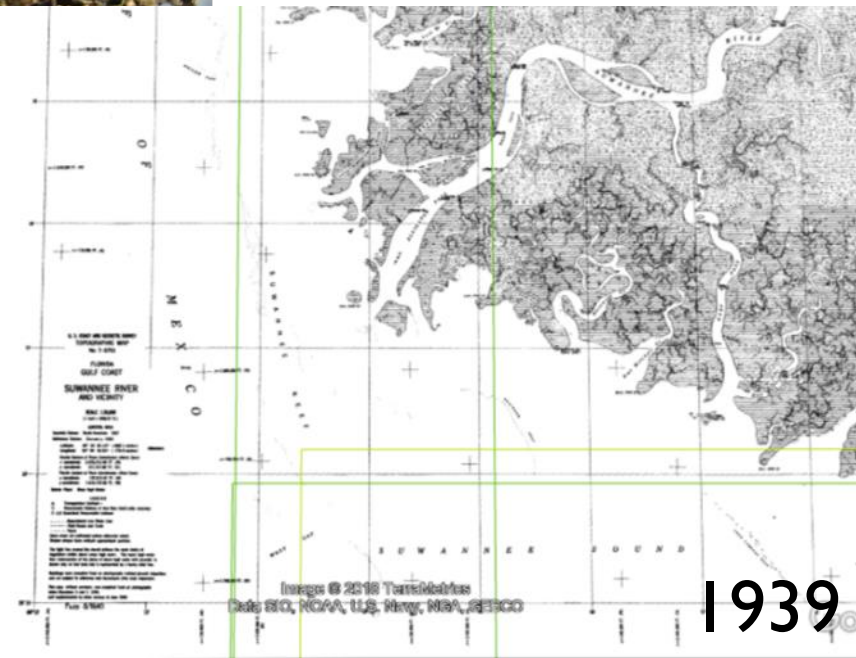
Online Resources

- Historic habitat data
- NOAA topographic surveys (T-sheets)



Online Resources

- Historic habitat data
- NOAA topographic surveys (T-sheets)



Online Resources

- Historic habitat data
- NOAA topographic surveys (T-sheets)
 - Not all georeferenced (especially older T-sheets from 1800s)



Non-georeferenced NOAA Shoreline Survey Scans (t-sheets and tp-sheets)

[Survey Index 1 \(50MB PDF\)](#)

[Survey Index 2 \(44MB PDF\)](#)

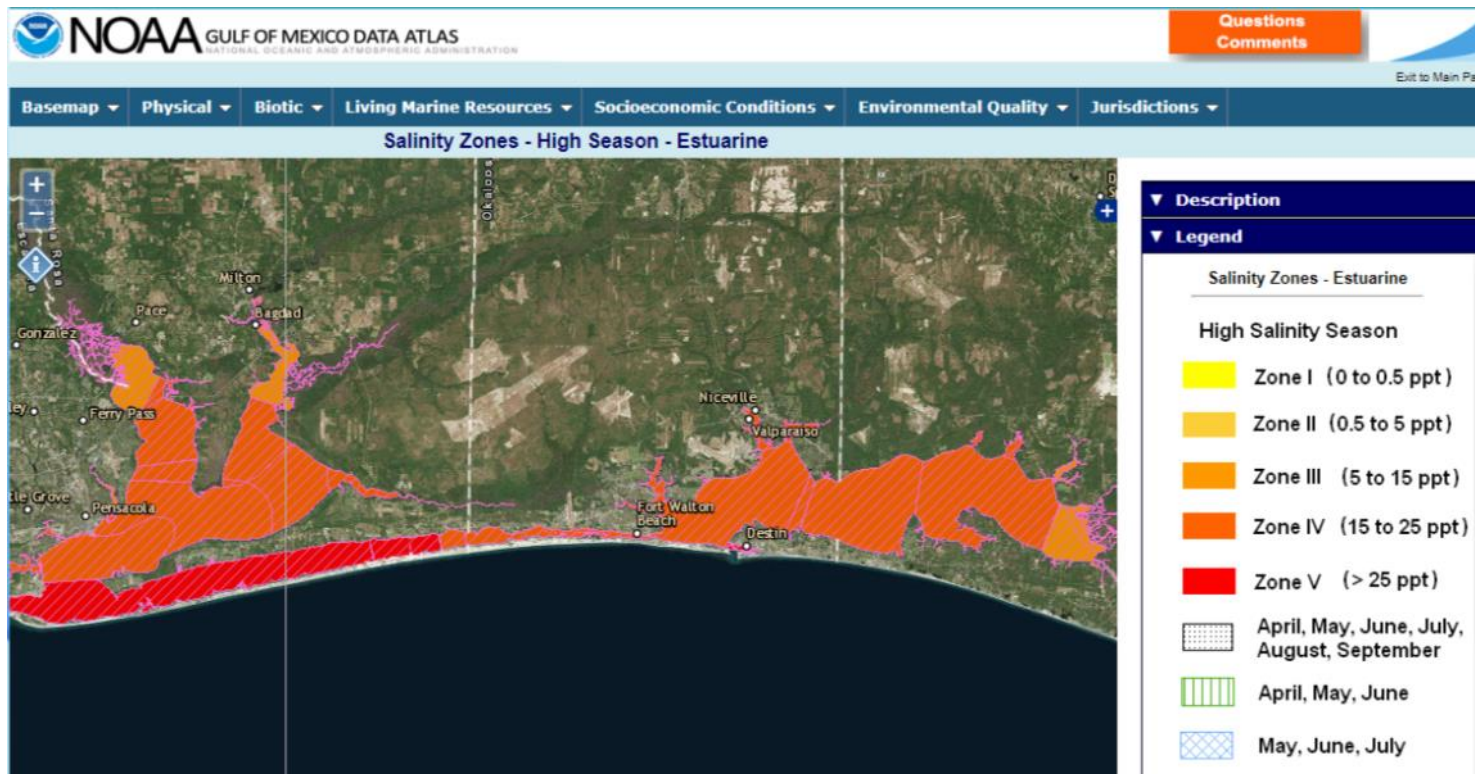
[NOAA Historical Shoreline Survey Viewer](#)

[NOAA Historical Shoreline Su](#)

T-00106	T-00380_1	T-00380_2	T-00381_1a	T-00381_1b	T-00381_2a	T-00381_2b
T-00466b	T-00731a	T-00731b	T-01032a	T-01032b	T-01139aa	T-01139ab
T-01140ab	T-01140ba	T-01140bb	T-01141a	T-01141b	T-01141ba	T-01141bb
T-01142b	T-01143aa	T-01143ab	T-01143ba	T-01143bb	T-01144aa	T-01144ab
T-01147ab	T-01147ba	T-01147bb	T-01157aa	T-01157ab	T-01157ba	T-01157bb
T-01187b	T-01383aa	T-01383ab	T-01383ba	T-01383bb	T-01383ca	T-01383cb

Online Resources

- Salinity model for bays along the Gulf of Mexico
- <https://www.ncddc.noaa.gov/website/DataAtlas/atlas.htm?plate=Salinity%20-%20Zones>



Monitoring resources

<http://ocean.floridamarine.org/OIMMP/>

Name	Association	Focus	Reference
Design and monitoring of shellfish restoration projects	The Nature Conservancy	Instructional guide for bivalve restoration projects and monitoring	Brumbaugh et al. 2006
Oyster habitat restoration monitoring and assessment handbook	NOAA, TNC, University of South Alabama, Florida Atlantic University	Instructional guide for monitoring and characterization of oyster restoration sites	Baggett et al. 2014
Science-based restoration monitoring of coastal habitats	NOAA	Volume 1: A framework for monitoring plans under the estuaries and clean waters act of 2000; Volume 2: Tools for monitoring coastal habitats	Thayer et al. 2003, Thayer et al. 2005
Best management practices for shellfish restoration	Interstate Shellfish Sanitation Conference, TNC, NOAA	Methods for shellfish restoration including community outreach and harvesting concerns	Leonard and Macfarlane 2011
Restoration goals, quantitative metrics and assessment protocols for evaluating success on restored oyster reef sanctuaries	Chesapeake Bay Program	Monitoring protocols and success metrics for restored oyster reefs	Oyster Metrics Workgroup 2011
Effective monitoring to evaluate ecological restoration in the Gulf of Mexico	National Research Council	General and specific guidelines for monitoring numerous restored habitats, including oyster reefs	NRC 2017
Oyster-generated marine habitats: their services, enhancement, restoration, and monitoring.	Florida Atlantic University, University of Rhode Island	TBD, in press	Coen and Humphries, in press
Oyster Condition Assessment Protocol	UCF, SJRWMD, GTMNERR, NE Florida Aquatic Preserves	Instructional guide for standardized oyster reef monitoring	Walters et al. 2016

Questions or comments?

