

Oyster Integrated Mapping and Monitoring Program (OIMMP) Workshop

*Florida Fish and Wildlife Conservation
Commission*

Fish and Wildlife Research Institute

October 9-10 2019

Kara Radabaugh, Steve Geiger,

Ryan Moyer, Christi Santi



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)



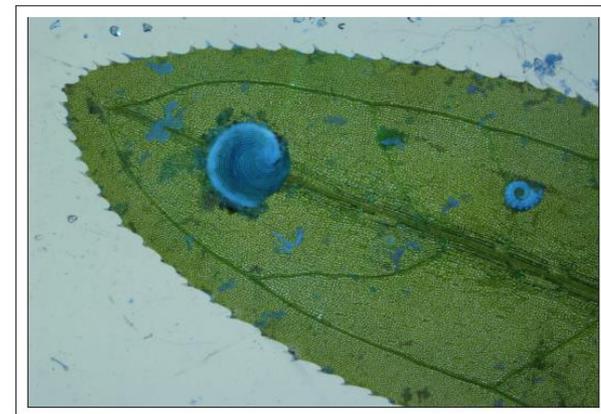
Christi Santi (GIS specialist)

- Many statewide collaborators!
- Workshop attendee introductions

IMMP Origins: SIMM

- Seagrass Integrated Mapping and Monitoring (SIMM) program
- SIMM report:

<https://myfwc.com/research/habitat/seagrasses/projects/active/simm/>



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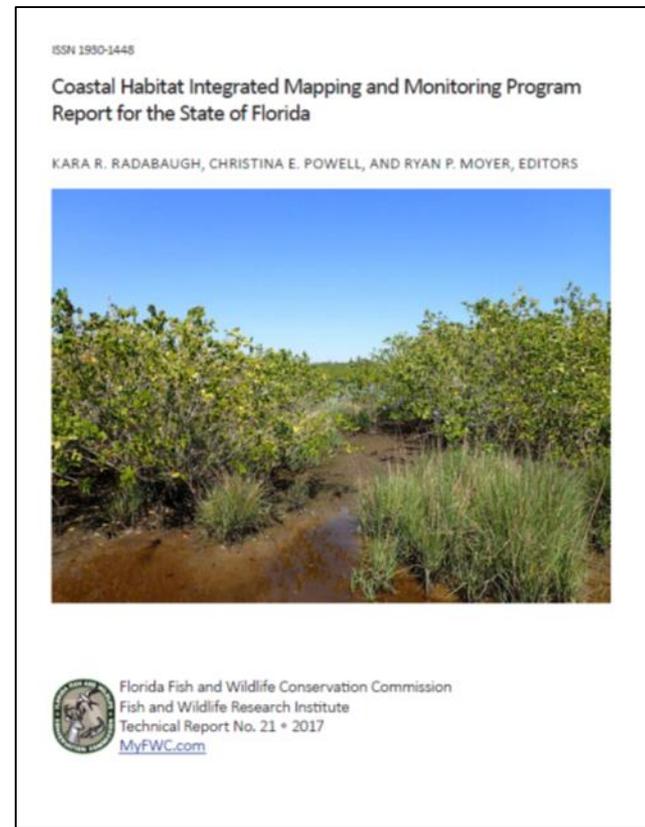


IMMP Origins: CHIMMP

- Coastal Habitat Integrated Mapping and Monitoring Program (CHIMMP)

- CHIMMP report published in 2017

<https://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 <https://ocean.floridamarine.org/CHIMMP/>
- Recently funded (2019-2020) for small-scale report updates
- CHIMMP workshop to be held in Spring 2020



Florida Fish and Wildlife
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[Home](#) > [FWC Fish and Wildlife Research Institute](#) > [Habitat](#) > [Coastal Wetlands](#) > [Coastal Habitat Projects](#) > [Coastal Habitat Integrated Mapping and Monitoring Program \(CHIMMP\)](#)

Coastal Habitat Integrated Mapping and Monitoring Program (CHIMMP)

Salt marshes and mangroves provide valuable ecosystem services to coastal communities in Florida. Coastal wetlands stabilize shorelines, filter surface water runoff, sequester large amounts of organic carbon, and provide important fisheries habitat. However, the statewide extent of coastal wetlands is shifting. Future sea-level rise is expected to cause fragmentation of salt marshes and loss of acreage where hardened shorelines, coastal development, and other obstacles prevent the landward migration of salt marsh vegetation. Mangrove distribution is also changing and mangrove forests are encroaching into marsh habitats in response to climate change and sea-level rise. Thus, a coordinated statewide mapping and monitoring program was deemed necessary to better





OIMMP Goals

- **Inventory existing mapping and monitoring programs in FL**
 - Create publicly available mapping layer and collaborative statewide report
- **Bring together representatives from mapping and monitoring programs across the state and region**
 - 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**

Past OIMMP Workshops

- Workshops I (2017) and II (2018) held at GTMNERR
- Past workshop presentations available on OIMMP website
<https://ocean.floridamarine.org/OIMMP/>





OIMMP Workshop III Agenda

- **Day 1** (Wednesday 9 October)
 - OIMMP updates and publications
 - Available Resources and Needs
 - Attendee presentations
 - Social event at Hollander Hotel 6 - 8 pm

- **Day 2** (Thursday 10 October)
 - Continuation of attendee presentations
 - Breakout Discussion
 - Conference Wrap Up

OIMMP Report Published!

ISSN 1930-1448

Oyster Integrated Mapping and Monitoring Program
Report for the State of Florida

KARA R. RADABAUGH, STEPHEN P. GEIGER, RYAN P. MOYER, EDITORS



Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
Technical Report No. 22 - 2019
MyFWC.com

<https://myfwc.com/research/habitat/coastal-wetlands/projects/oimmp/>

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FWRI Technical Report Process

- Writing & review process
 - Create maps and charts (Christi Santi & Kara Radabaugh)
 - Write draft (Kara Radabaugh & coauthors)
 - OIMMP editor revisions (Kara Radabaugh, Ryan Moyer, Steve Geiger)
 - Technical review & revisions (Bill Arnold, Amber Whittle)
 - Copy editing review & revisions (Bland Crowder)
 - Formatting (Bland Crowder)

OIMMP Regions





OIMMP report chapter contents

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

Oyster Beds in Florida Map



Statewide oyster map available for download at <http://geodata.myfwc.com/datasets/oyster-beds-in-florida>

Statewide Oyster Mapping and FWC GIS Resources



Christi Santi

*Florida Fish and Wildlife Conservation
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Fish and Wildlife Research Institute



Statewide Oyster Progress

- Now 31 total source datasets.
- 3 areas with additions – Indian River Lagoon, Chokoloskee, West Bay
- Minor revision in Choctawhatchee Bay

Statewide Oyster Progress



Statewide Oyster Progress



FWC GIS Data

The screenshot shows a web browser window with the address bar displaying "geodata.myfwc.com". The page title is "GIS & Mapping Data Downloads". A yellow banner contains the following text: "Downloaded data are in a Web Mercator projection. Please project data appropriately before using for measurements and analysis. ESRI provides guidance on projections in their document entitled 'Choosing a map projection.' Additionally, please review [ESRI's Open Data Help](#) for instructions on how to find, filter, and download data." Below this is a light blue box with the text: "For select datasets, FWC develops KMZ files for use in Google Earth. After selecting a dataset from your search results, the KMZ download is available in the 'Download' menu, under the 'Additional Resources'". The main content area is titled "Search Data By Keyword" and features a search box with "oyster" entered. A dropdown menu shows "Oyster Beds in Florida" as the selected result. Below the search box is a "Search Data By Category" section with a grid of eight image-based categories: BOATING, BOUNDARIES, ELEVATION, EMERGENCY RESPONSE, and four others.

On the FWC geodata website type “Oyster” in the Search Box and select the “Oyster Beds in Florida” link.

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

FWC GIS Data

Oyster Beds in Florida | Florida F... x +

Not secure | geodata.myfwc.com/datasets/oyster-beds-in-florida

 GIS & Mapping Data Downloads

Oyster Beds in Florida

Last updated 8 months ago | 31,439 Records



Search data and map

Overview Data

1/24/2019 Feature Layer Custom License

Download APIs

This GIS data set represents oyster coverage for available study areas in the state of Florida. Not all areas have been mapped, but this dataset represents the oyster data available to FWRI as of January, 2019. Source dates vary and many studies are much older than the compilation date. See the Source Information section for more details.

Attributes

Chart Map Visualization

AREA-sq mtr	COMMENTS	last_edited_date	METADATA	OYSTER	SOURCE DATE	SHOW MORE
Number	Text	Date or Time	Text	Text	Text	2 Attributes

About

FWC_OpenData
Shared By: GISLibrarian
Data Source: atoll.floridamarine.org

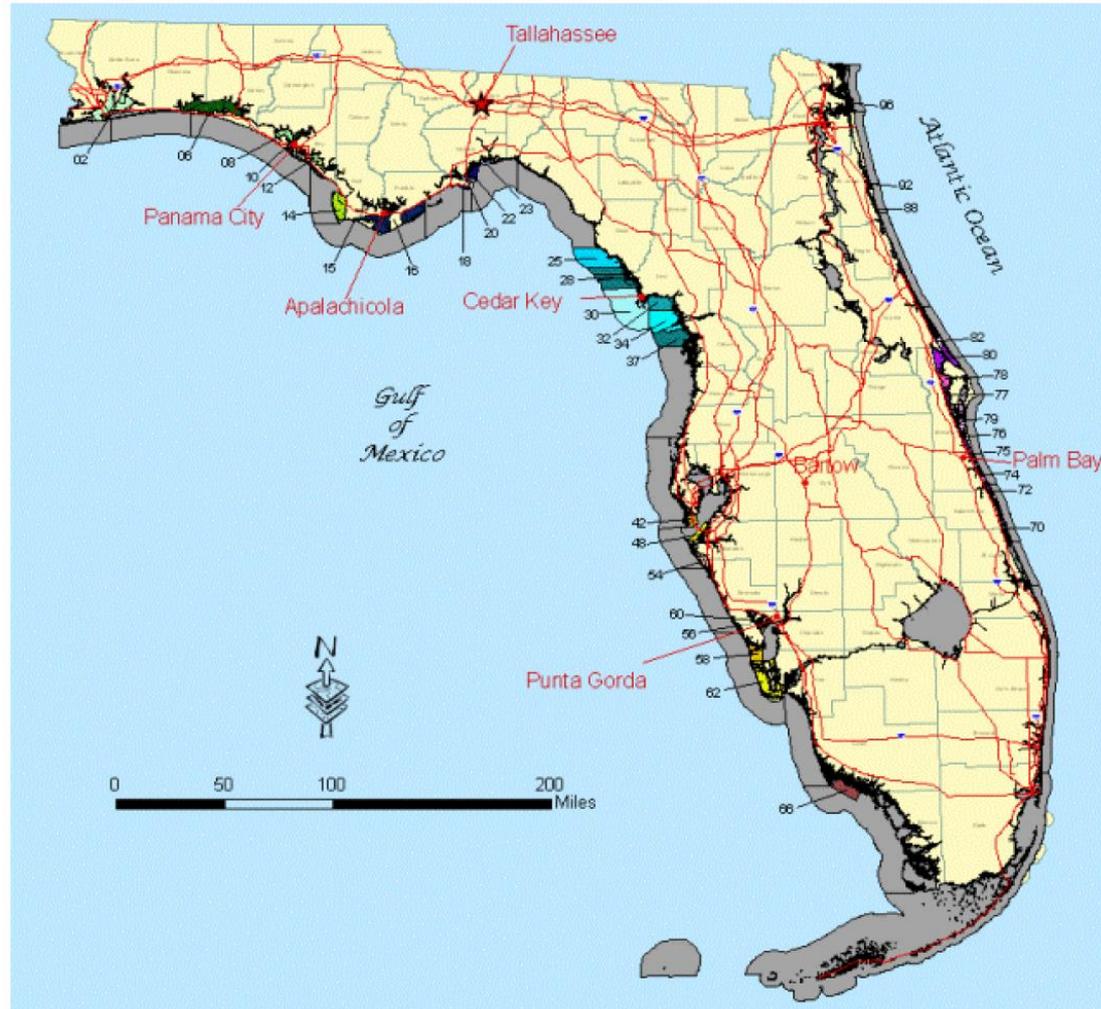
Permanent Link
View Metadata
Create Webmap
Create a Story Map



Resource links

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

FDACS Shellfish Harvesting Areas



<https://www.fdacs.gov/Agriculture-Industry/Aquaculture/Shellfish-Harvesting-Area-Classification/Shellfish-Harvesting-Area-Maps>

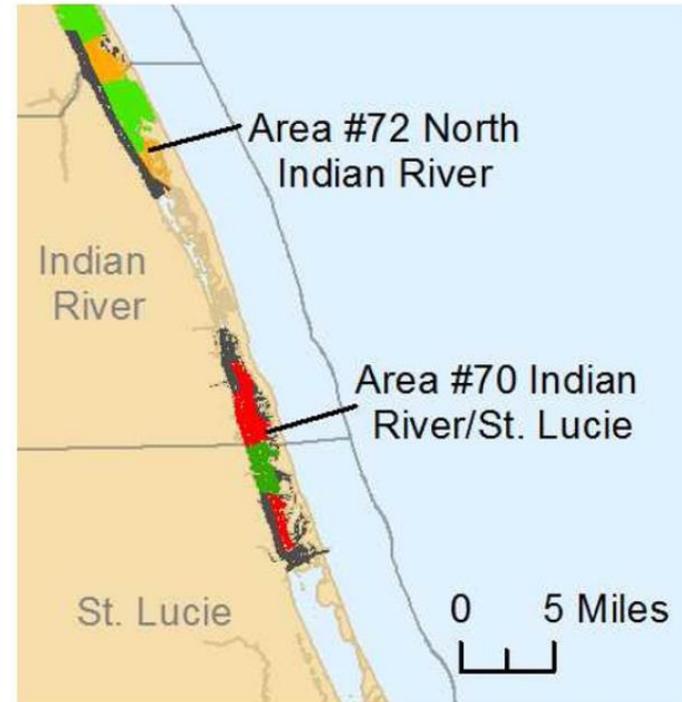
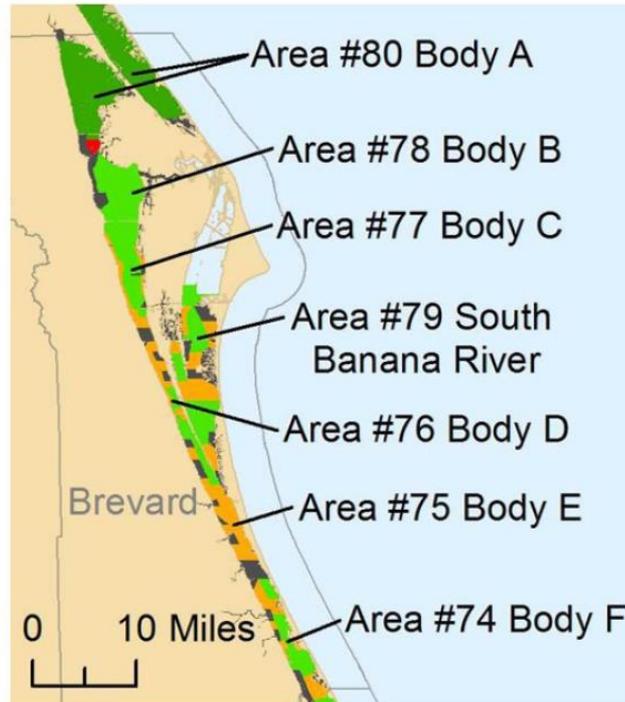
FDACS Shellfish Harvesting Areas



Legend

	Approved
	Conditionally Approved
	Conditionally Restricted
	Restricted
	Prohibited

These data are intended for informational use only and should not be considered authoritative for navigation, engineering, legal, or other site-specific purpose. FWC does not assume any legal liability or responsibility arising from the use of this product in a manner not intended by the author.



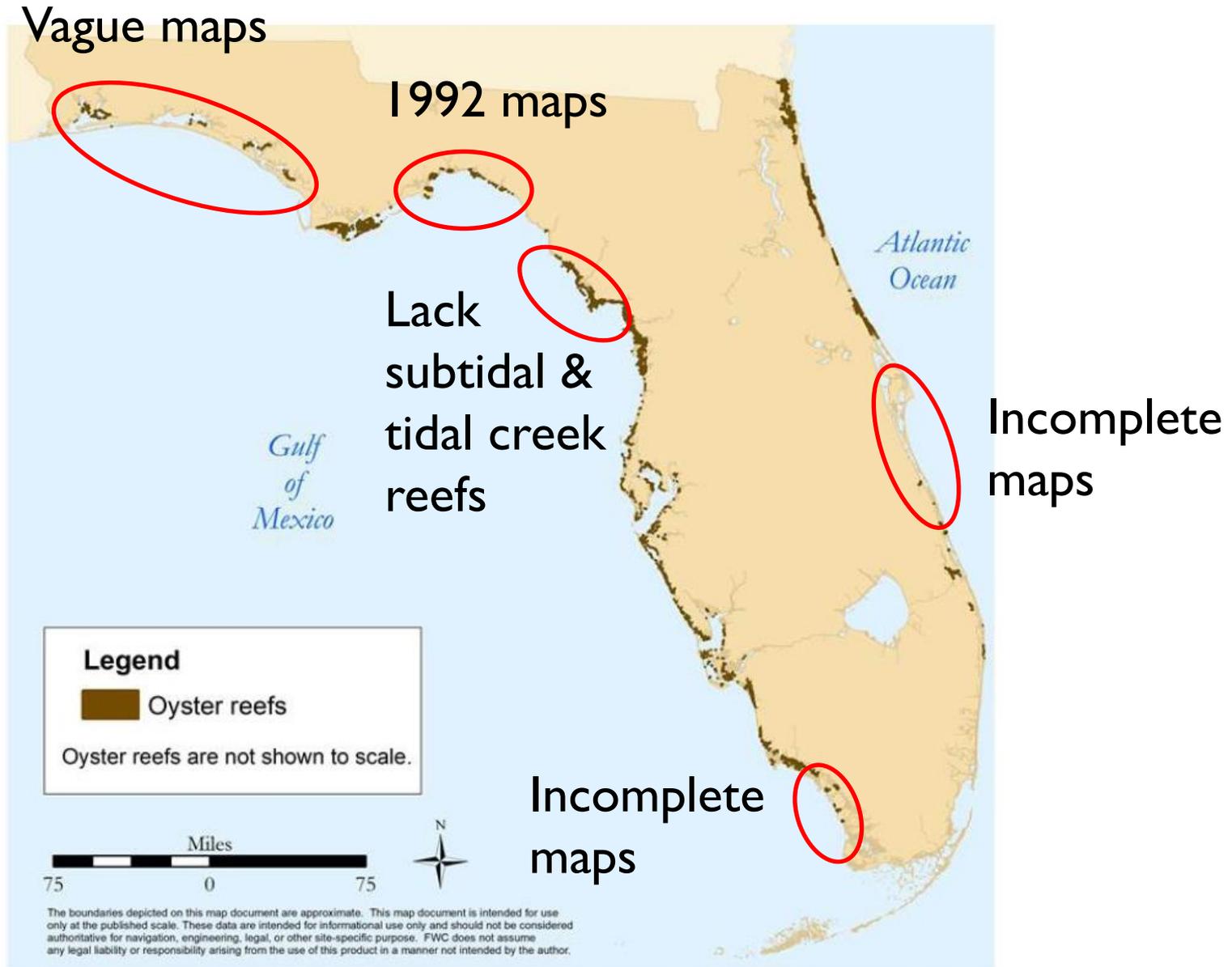
- Maps in each regional chapter
- Shapefiles available for download at <https://ocean.floridamarine.org/OIMMP/>



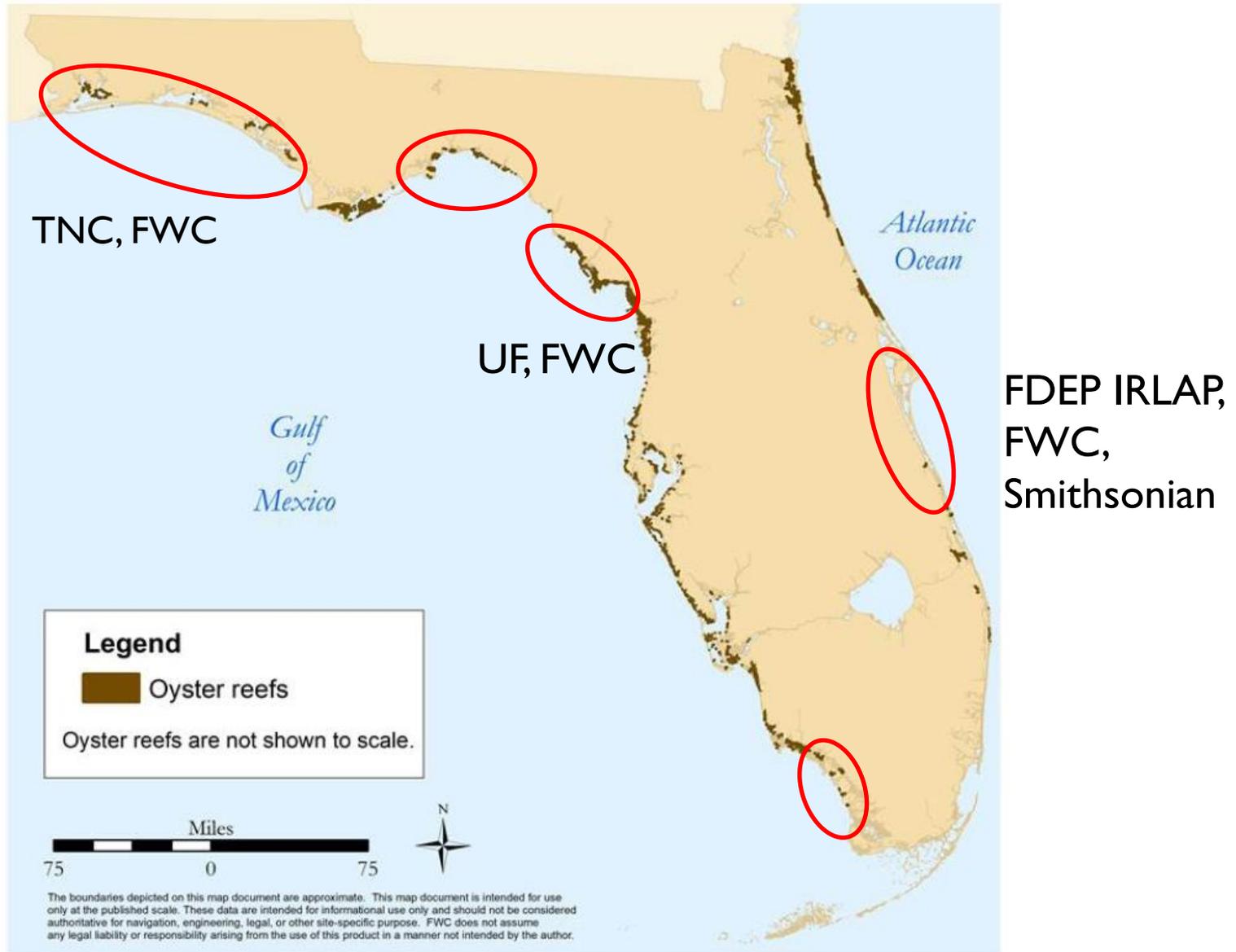
Mapping Needs in Florida

- Fill mapping gaps
- Update old maps
- Map oysters in peripheral habitats
- Complete estimates of historical extent
- Differentiate between live and dead sections of reefs

Florida Mapping Gaps - 2018 Workshop



Filling Florida Mapping Gaps



Mapping Peripheral Oyster Habitats

- Include oysters on mangrove roots, under vegetation, seawalls, pilings, etc.
- Difficult to see in aerial imagery
- In some cases, only type of oyster aggregations present (e.g. SE FL)



Mapping Peripheral Oyster Habitats



- Sarasota County best example of mapping peripheral oyster habitats

Habitat Characterization Codes	
Habitat	Code
Oyster Clumps/Reef	CR
Mangrove Apron	MA
Mangrove Root Oys.	MRO
Seawall	SW
Rip Rap	RR

Figure from Meaux et al. 2016

Methods manual available from <https://sarasota.wateratlas.usf.edu/oysters/>

Historical losses of oyster reef

Pensacola Bay

72% loss
(Schmid et al.
2006)

Apalachicola Bay

95% loss of
commercial
harvest (2017 vs.
peak harvest in
1981)

Suwannee Sound

66% loss (Seavey et
al. 2011)

Tampa Bay 90% loss
(Estevez 2010, Kaufman
2017)

Charlotte Harbor 90%
loss (Boswell et al. 2012)

Naples Bay 82% loss
(Schmid et al. 2006)

Mosquito Lagoon

24% loss (Garvis
et al. 2015)

Biscayne Bay 100%
loss (Meeder et al.
2001)

Map Reef Quality

- Map dead margins or unconsolidated reefs to track reef migration or change in quality
- Oyster reefs shifting away from boat wakes in Intracoastal Waterway (Grizzle et al. 2002; Wall et al. 2005)



Mosquito Lagoon reef with dead margin. Photo credit: Linda Walters

Map Reef Quality

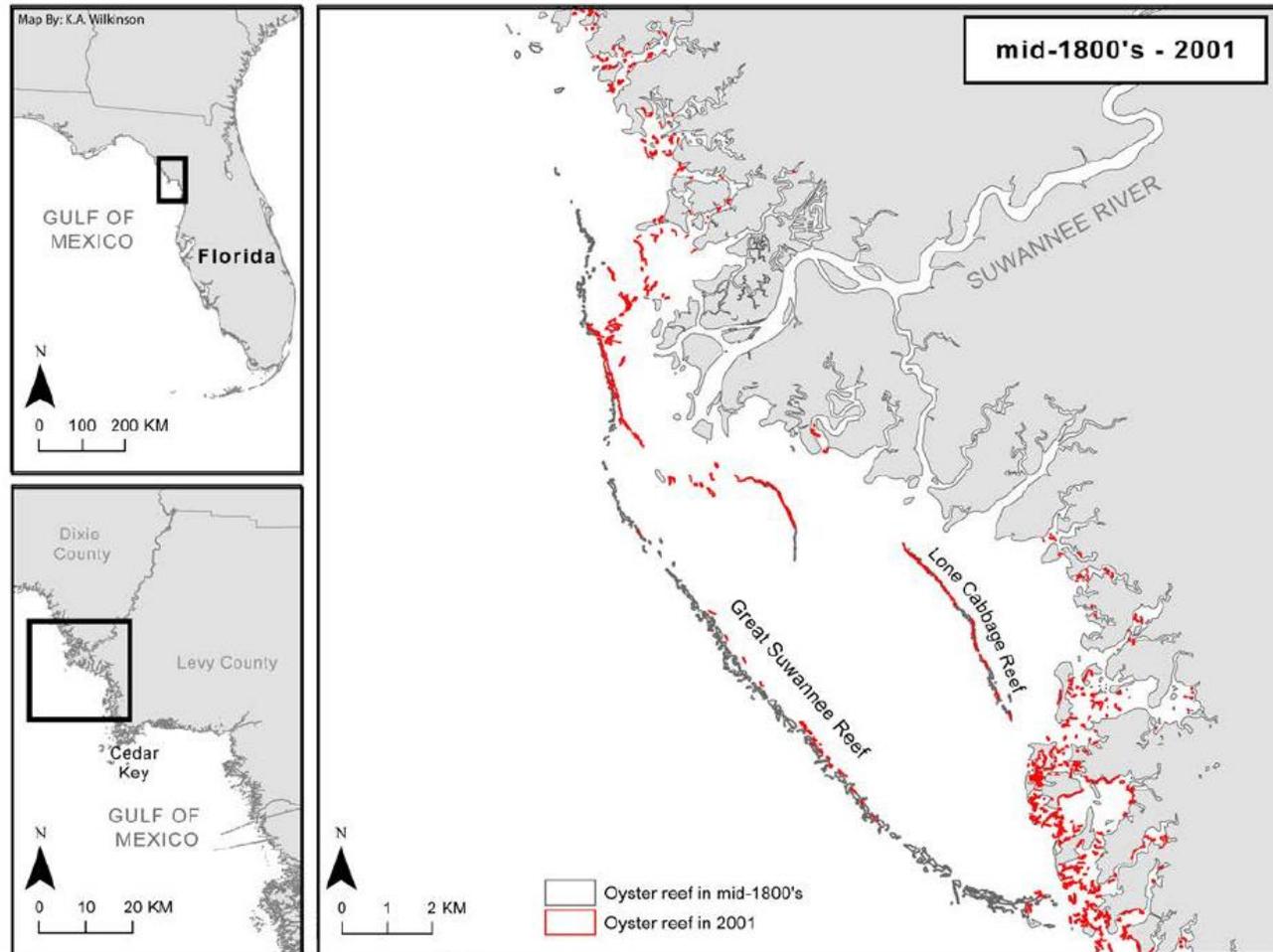
- Shell rakes common in NE FL along Intracoastal Waterway



Photo credits: GTMNERR (Nikki Dix) and UCF (Linda Walters)

Map Reef Quality

- Oyster collapse in Suwannee Sound led to apparent “increase” in reef area as dead shell was spread over a larger area (Seavey et al. 2011)
- Oyster reefs shifting inland following salinity regimes. Seen in Big Bend and Everglades (Volety et al. 2009)



Oyster reef extent in Suwannee Sound in the mid-1800s (gray) and 2001 (red). Map by Krystan A. Wilkinson. Data sources: Raabe et al. 2004 (from 19th century topographic sheets), SRWMD 2001a (from 2001 photographs).

Questions or comments?



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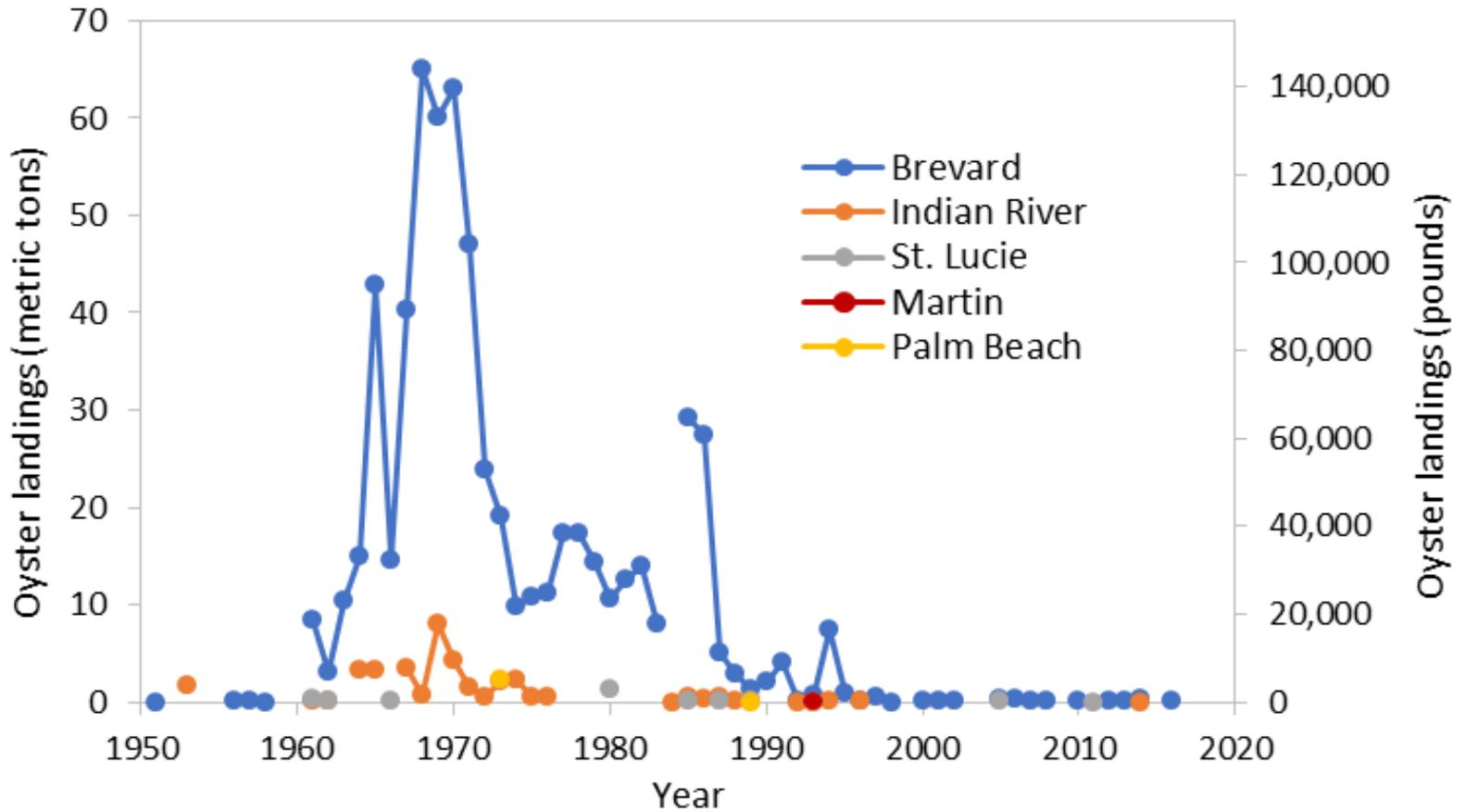


Historical Oyster Data Sources

- Oyster harvesting data
- Historical mapping data and imagery



Commercial Harvest Data



- County harvest data included in each chapter

Commercial Harvest Data

Table A-1. Reported commercial yields of pounds of oyster meats harvested annually 1950–1983.

Year	Published east coast total	Published west coast total	Published statewide total	Bay, Gulf, and Washington	Bay and Gulf	Bay	Bay and Washington
1950†	22,715	872,553	895,248				
1951			735,304			42,368	
1952	20,907	542,080	562,987			30,304	
1953*	21,576	563,780	585,356		59,956		
1954	17,907	667,589	685,496		67,992		
1955	19,340	630,241	649,581	48,141			
1956	32,304	856,431	888,735		89,830		
1957	24,754	710,124	734,878		68,961		
1958	29,759	794,970	824,729		60,206		
1959	40,045	1,414,953	1,454,998		93,934		
1960*	44,644	1,930,756	1,975,400		89,458		
1961	72,542	3,254,059	3,326,601		127,367		
1962	67,091	4,952,680	5,019,771		259,664		

1950 – 1983 data from printed copies of summary of Florida commercial marine fish landings. Data are available in OIMMP Report Appendix A and at <https://ocean.floridamarine.org/OIMMP/>

Commercial Harvest Data



The screenshot shows the Florida Fish and Wildlife Conservation Commission website. The header includes the logo and navigation links: Ask FWC, About, Contact, News, Calendar, Get Involved. The main navigation menu includes Fishing, Boating, Hunting, Licenses & Permits, Wildlife Viewing, Wildlife & Habitats, Research, Education, and Conservation. The page title is "Commercial Fisheries Landings Summaries".

Filters

Years: 2019 - 2019

Species Set:

- Aquaculture
- Food and Bait
- Marine Life

Species *:

- ALL FOOD AND BAIT
- AMBERJACKS
- BAIT FISH
- BALLYHOO
- BLUE RUNNER
- BLUEFISH
- BUMPER, ATLANTIC
- CATFISH
- CHUB, BERMUDA
- CLAMS, HARD, BUTTON
- CLAMS, HARD, CHERRY
- CLAMS, HARD, CHOWDER
- CLAMS, HARD, LITTLENECK
- CLAMS, HARD, MIDDLENECK
- CLAMS, HARD, TOPNECK
- CLAMS, HARD, UNGRADED
- CLAMS, SUNRAY VENUS

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

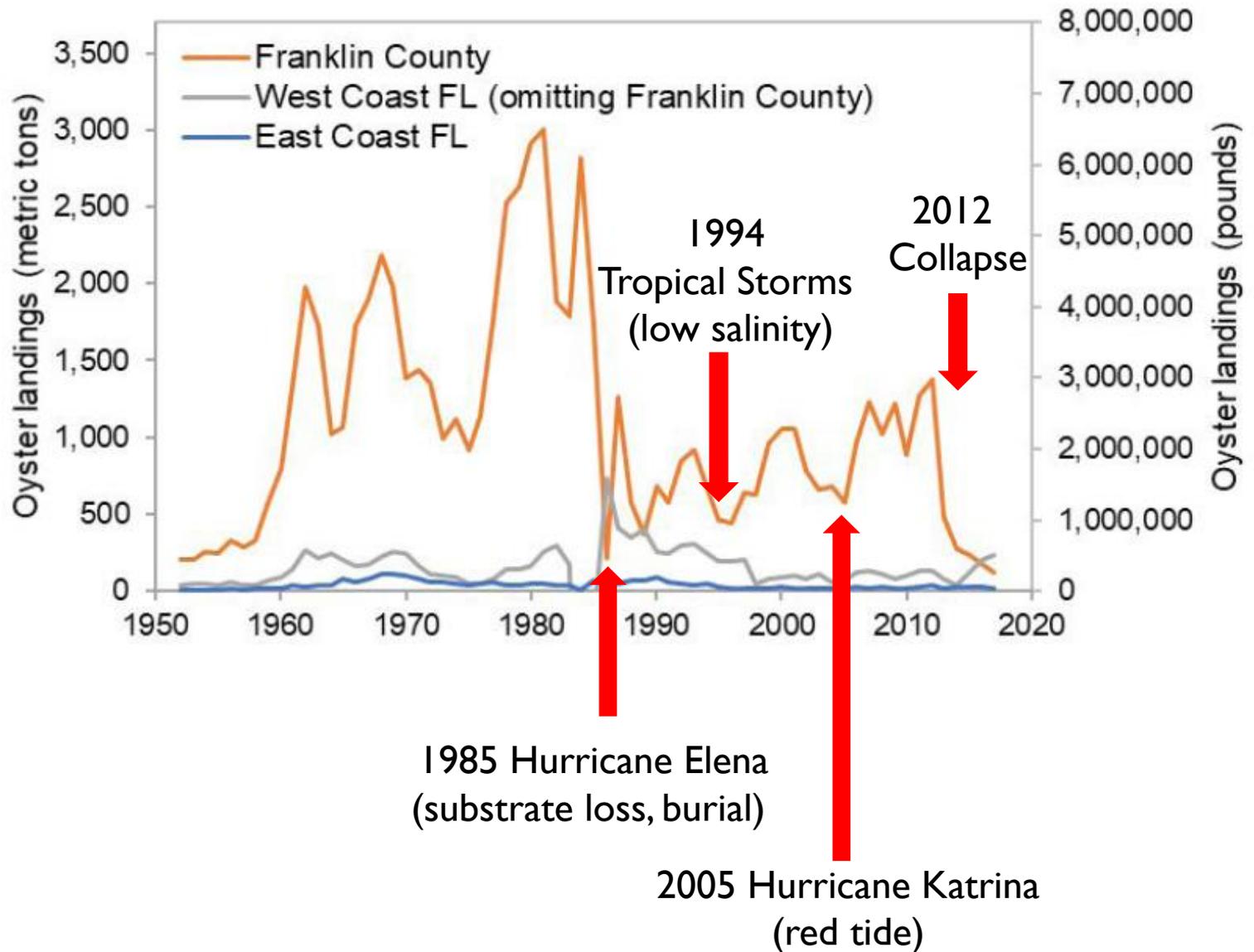
Actions

* 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.

Commercial Fisheries Landings Summaries - About - Privacy Policy
Contact Number: 727-896-8625

- State assumed control of reporting landings in 1984 and instituted a mandatory trip-ticket program in 1986
- 1984 – present data available from <https://public.myfwc.com/FWRI/PFDM/ReportCreator.aspx>

1951-2017 Commercial FL Oyster Harvest



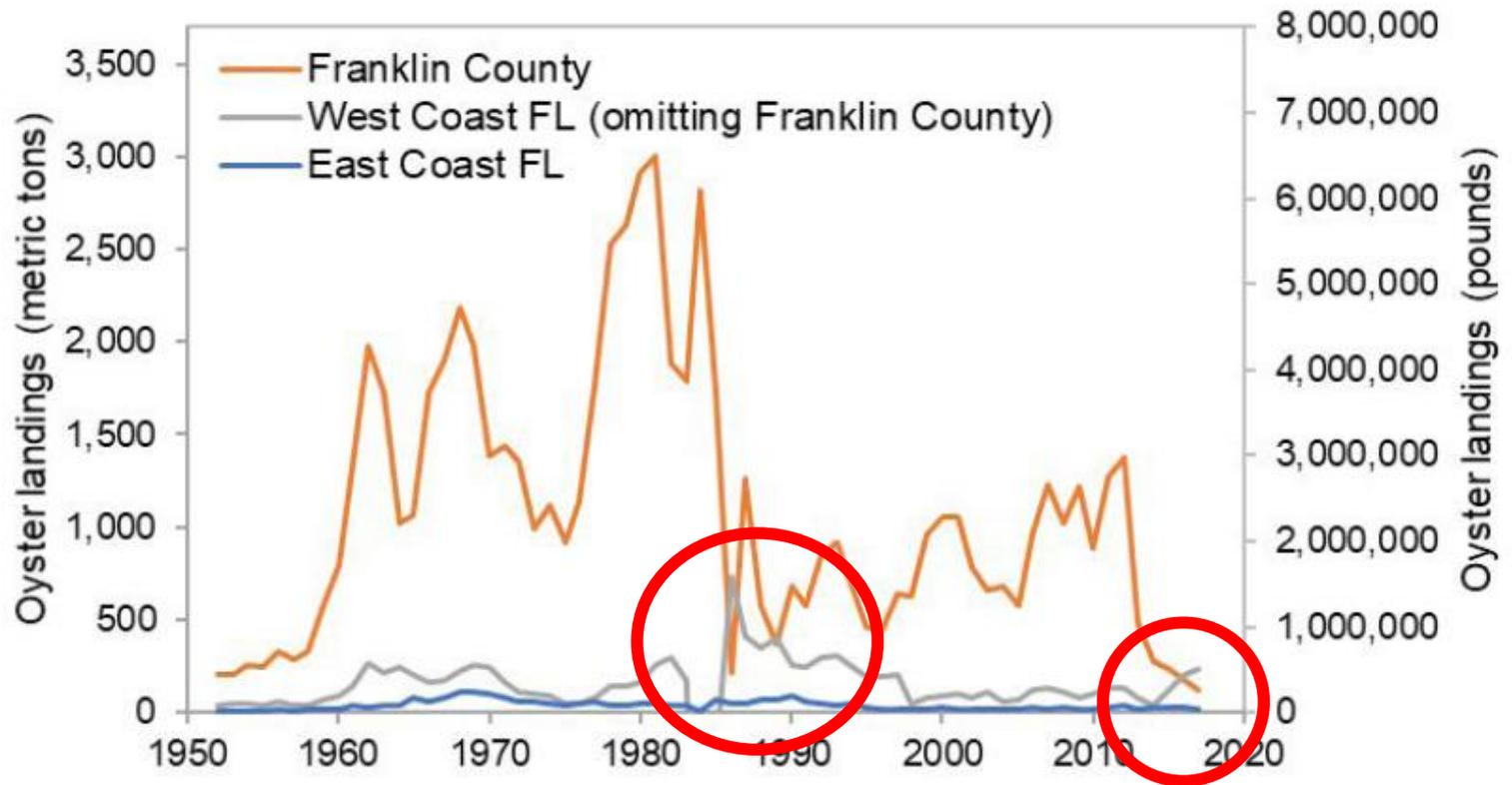


2012-2013 Apalachicola Collapse

Camp et al. 2015 (Ecology and Society 20(3):45):

- (1) low river flow led to increased salinity in Apalachicola Bay for a multiyear period;*
- (2) which likely led to increases in oyster parasites, predators, or unknown pathogens;*
- (3) causing elevated mortality, particularly among juvenile oysters;*
- (4) which led to recruitment failure, potentially exacerbated by shell removal from fishing or environmental events; and then*
- (5) population collapse of adult oysters*

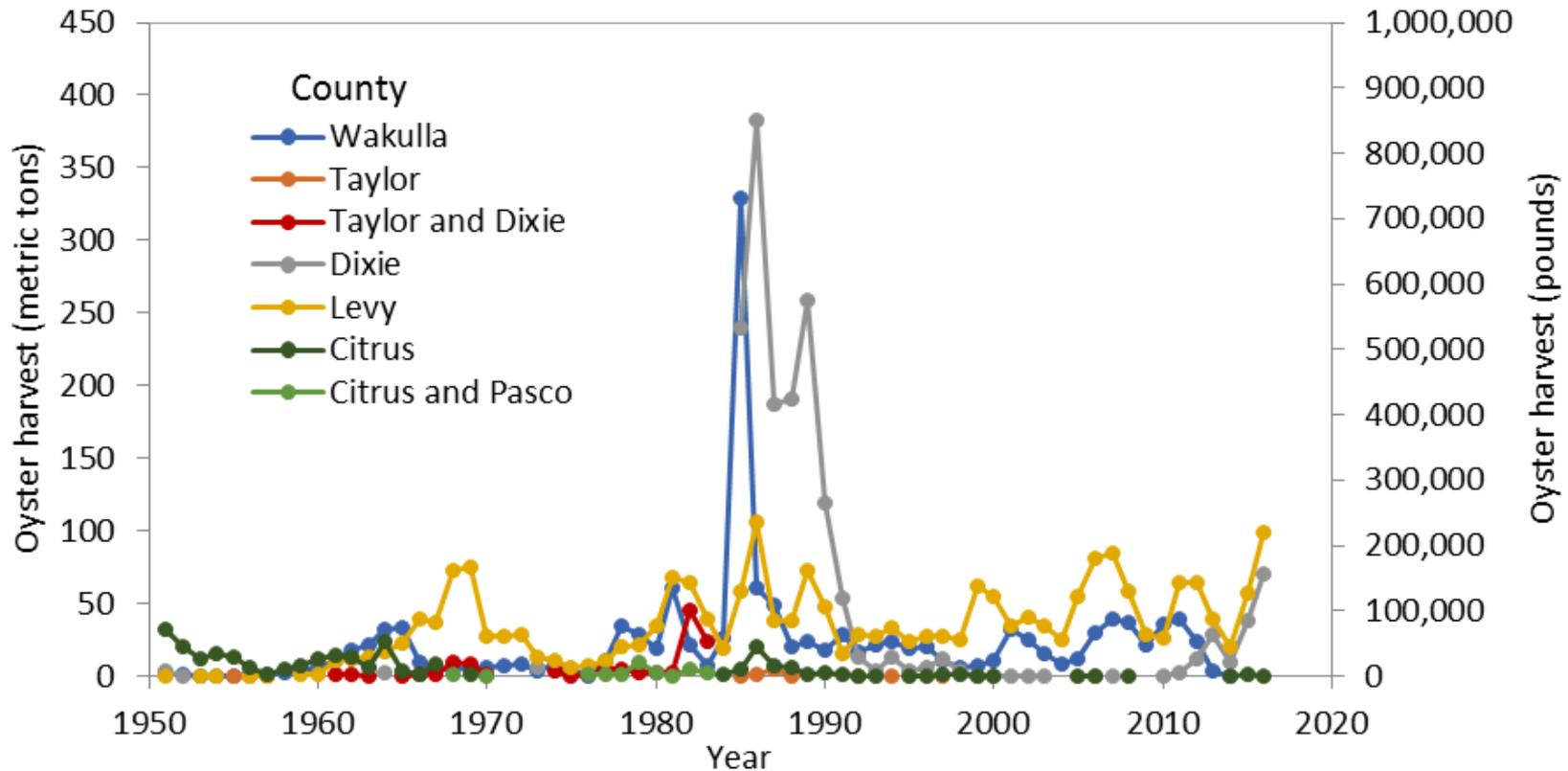
1951-2017 Commercial FL Oyster Harvest



Increased fishing pressure in Apalachee Bay (Wakulla County) and Big Bend

Increased fishing pressure in Big Bend (Levy and Dixie Counties)

1951-2017 Commercial FL Oyster Harvest



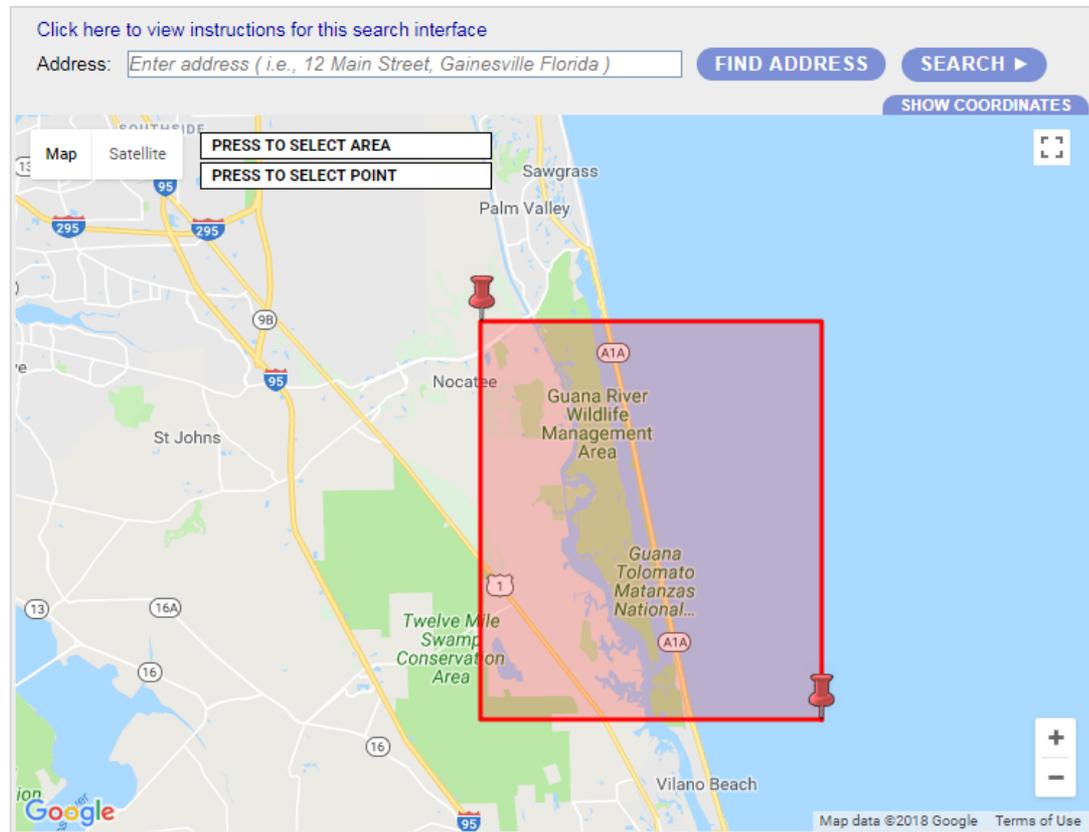
↑
1985 Hurricane
Elena

↑
2012-2013 Apalachicola
Collapse

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 St. Johns County - Flight 4C (1942)

DESCRIPTION ▾

ALL VOLUMES

SEARCH RESULTS

THUMBNAILS

PAGE IMAGES ▾

DOWNLOADS

PRINT

SEND

+ADD

SHARE

Go To: Tile 22 ▾

NEXT ▶

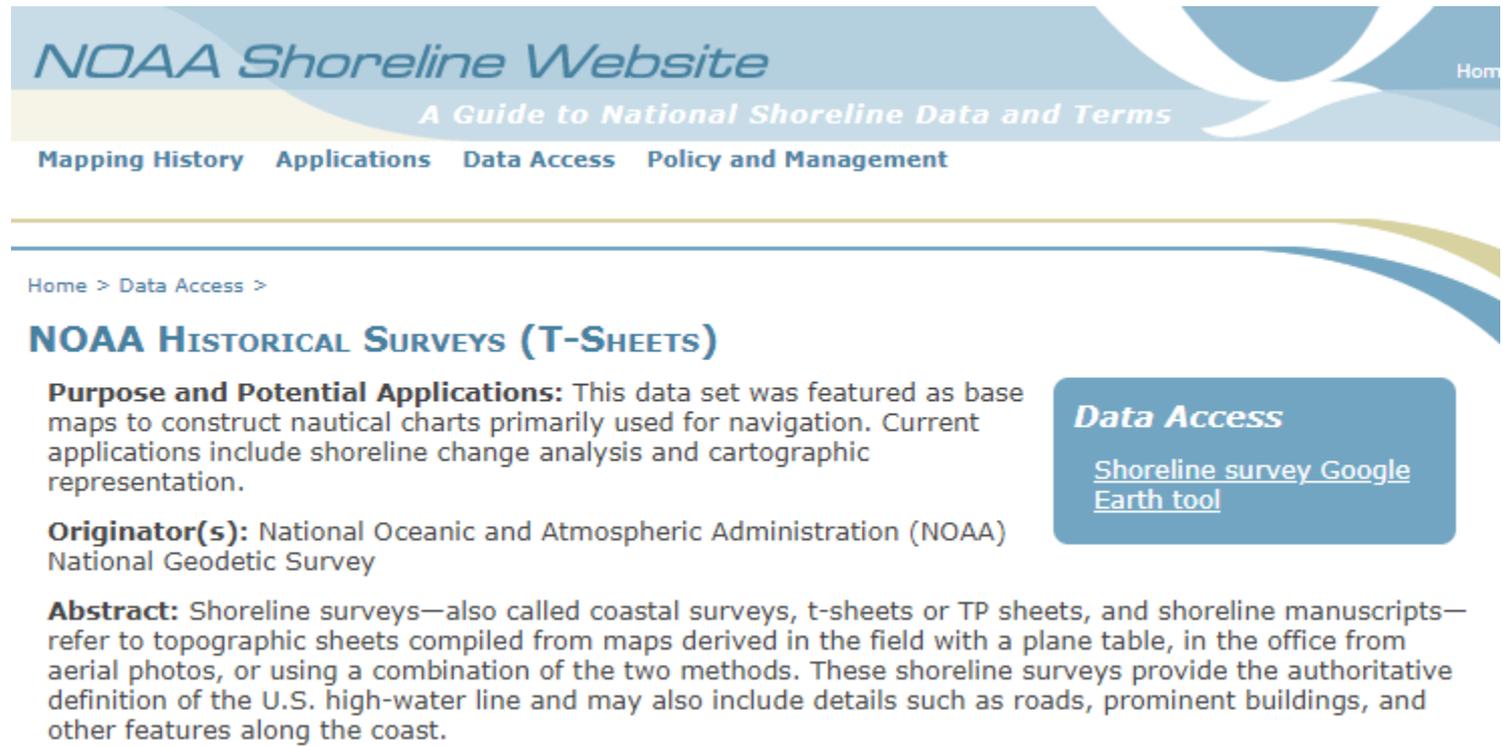
LAST ▶|

Click on image below to switch to zoomable version



Online Resources

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



The image is a screenshot of the NOAA Shoreline Website. At the top, there is a blue header with the text "NOAA Shoreline Website" and "A Guide to National Shoreline Data and Terms". Below this is a navigation menu with links for "Mapping History", "Applications", "Data Access", and "Policy and Management". The main content area has a breadcrumb trail "Home > Data Access >" and a section titled "NOAA HISTORICAL SURVEYS (T-SHEETS)". The text describes the purpose and potential applications of this data set, which was used for nautical charts. It also identifies the originator as the National Oceanic and Atmospheric Administration (NOAA) National Geodetic Survey. An abstract explains that these surveys are 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. A blue button labeled "Data Access" contains a link to "Shoreline survey Google Earth tool".

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.

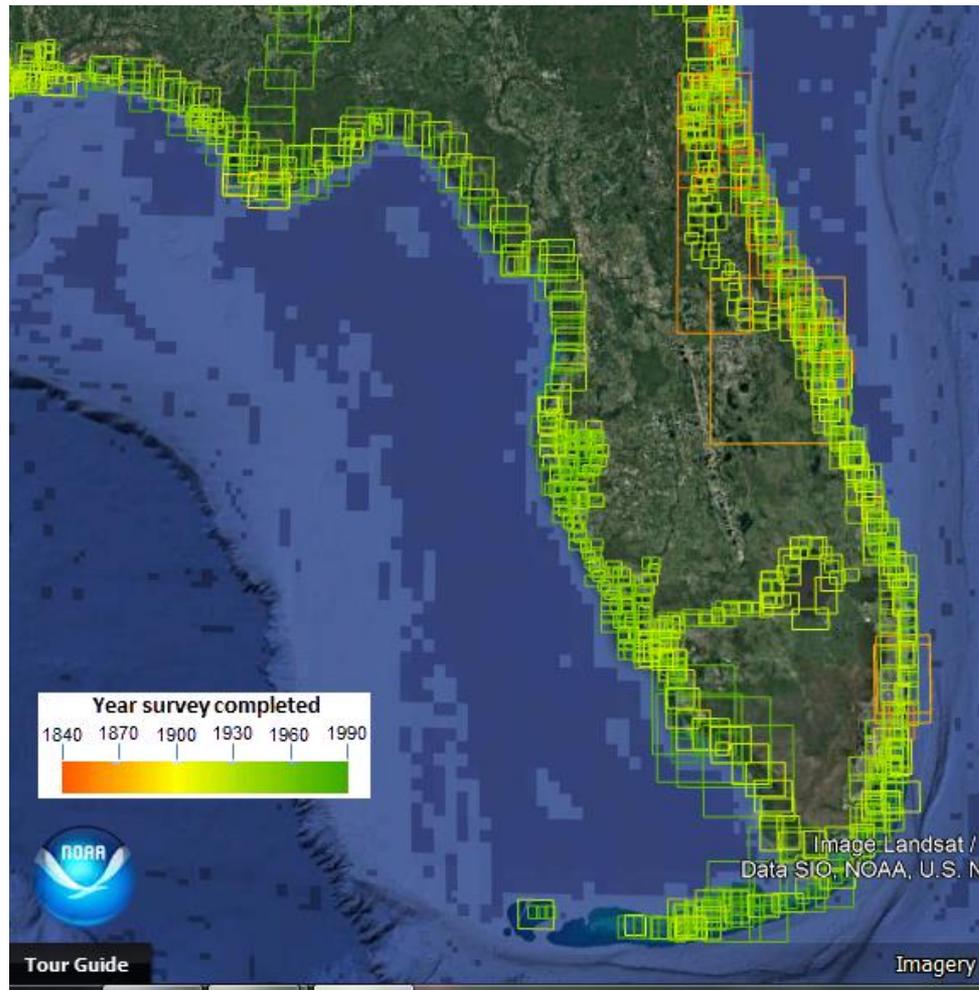
Originator(s): National Oceanic and Atmospheric Administration (NOAA)
National Geodetic Survey

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](#)

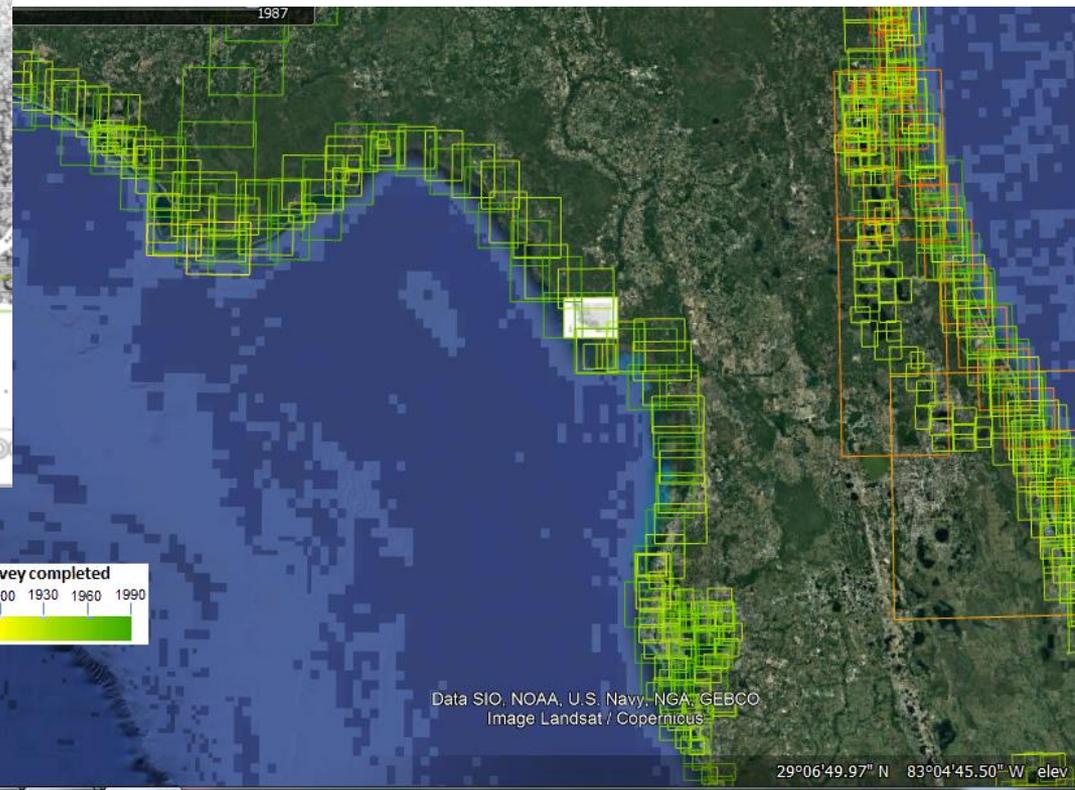
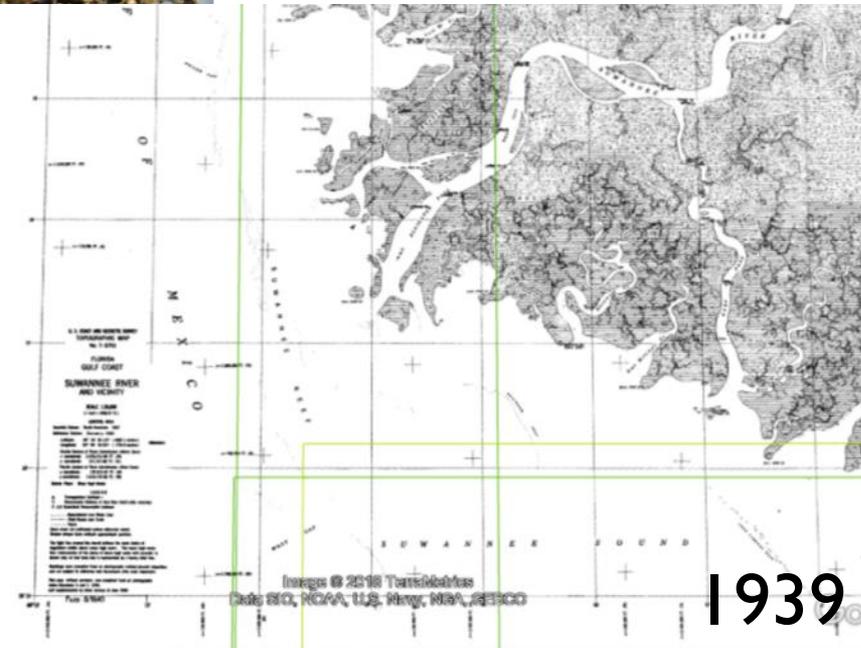
Online Resources

- 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 \(44MB PDF\)](#)

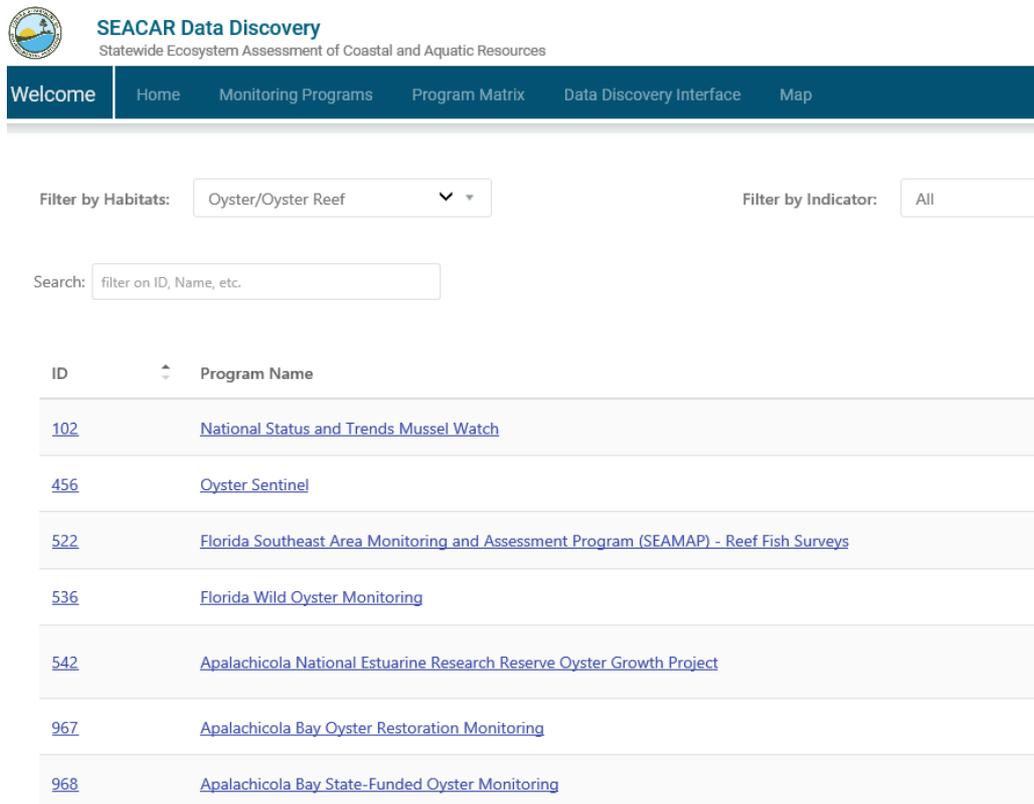
[NOAA Historical Shoreline Survey Viewer](#)

[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

SEACAR monitoring database

- FDEP's Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR)
- Monitoring database now available online:
- <https://dev.seacar.waterinstitute.usf.edu/programs>



The screenshot shows the SEACAR Data Discovery web application. At the top left is the Florida Department of Environmental Protection logo. The title is "SEACAR Data Discovery" with the subtitle "Statewide Ecosystem Assessment of Coastal and Aquatic Resources". A dark blue navigation bar contains the following links: "Welcome", "Home", "Monitoring Programs", "Program Matrix", "Data Discovery Interface", and "Map". Below the navigation bar, there are two filter sections: "Filter by Habitats:" with a dropdown menu set to "Oyster/Oyster Reef", and "Filter by Indicator:" with a dropdown menu set to "All". Below these filters is a search box with the placeholder text "filter on ID, Name, etc.". The main content area displays a table with two columns: "ID" and "Program Name". The table contains the following data:

ID	Program Name
102	National Status and Trends Mussel Watch
456	Oyster Sentinel
522	Florida Southeast Area Monitoring and Assessment Program (SEAMAP) - Reef Fish Surveys
536	Florida Wild Oyster Monitoring
542	Apalachicola National Estuarine Research Reserve Oyster Growth Project
967	Apalachicola Bay Oyster Restoration Monitoring
968	Apalachicola Bay State-Funded Oyster Monitoring

Questions or comments?

