Oyster Integrated Mapping and Monitoring Program (OIMMP)

First OIMMP Workshop

23-24 February 2017

Guana Tolomato Matanzas

National Estuarine Research Reserve
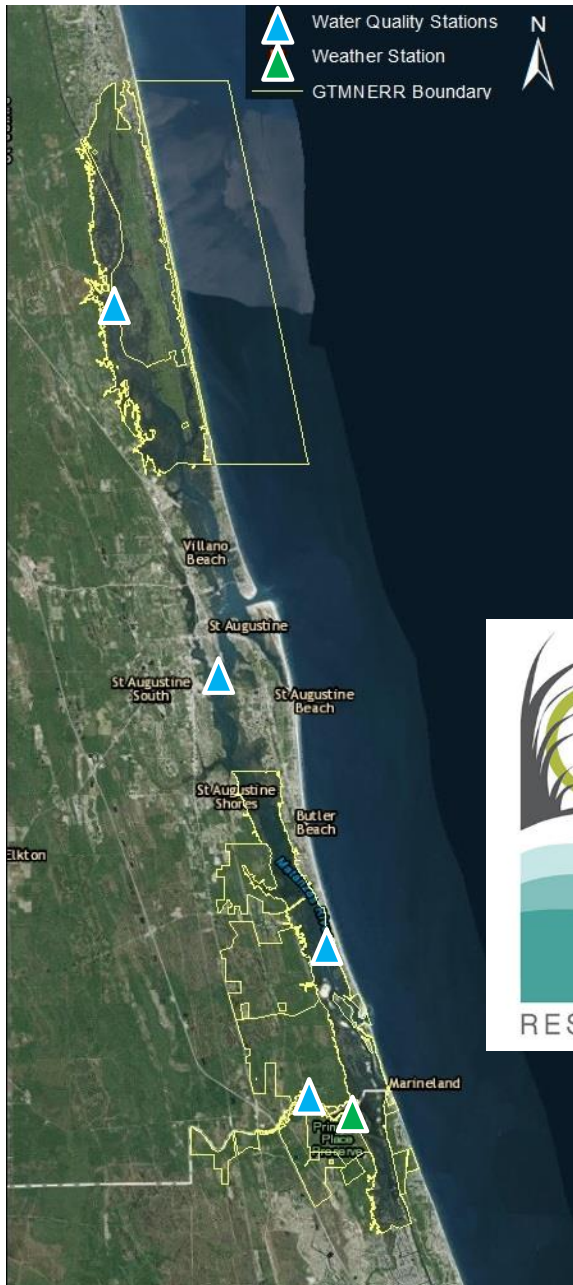
Ryan Moyer, Kara Radabaugh, Steve Geiger

Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute

100 8th Ave SE St. Petersburg, FL 33701

Welcome to the GTMNERR

Workshop Agenda

- **Day 1: Thursday, 23 February 2017**
  - Introduction to OIMMP and existing data
  - Attendee presentations
  - Social hour at Frida's

- **Day 2: Friday, 24 February 2017**
  - Continuation of attendee presentations
  - Breakout groups with focus on regional approach and oyster mapping and monitoring gaps and needs

Funding and Purpose

OIMMP is funded by the US Fish and Wildlife Service's Florida State Wildlife Grants (SWG) Program administered by FWC. SWG supports the study of high priority habitats and species of greatest conservation need, as identified in the State Wildlife Action Plan

Meet the 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 data support)

Project Partners: Nikki Dix (GTMNERR), Ron Brockmeyer (SJRWMD), Anne Birch (TNC), Kris Kaufman (NOAA)

OIMMP Origins

Modeled after the Seagrass Integrated Mapping and Monitoring (SIMM) program and the Coastal Habitats Integrated Mapping and Monitoring Program (CHIMMP) led by FWC/FWRI

SIMM report:
myfwc.com/research/habitat/ seagrasses/projects/active/simm/

CHIMMP website:
ocean.floridamarine.org/CHIMMP/

ISSN 1930-1448

FISH AND WILDLIFE RESEARCH INSTITUTE
TECHNICAL REPORTS

Seagrass Integrated Mapping and Monitoring Program
Mapping and Monitoring Report No. 1

Laura A. Yarbro and Paul R. Carlson, Jr.
Editors

Florida Fish and Wildlife
Conservation Commission

FWRI Technical Report TR-17   2013

Objectives in Year 1

- **Inventory existing (or defunct) oyster mapping and monitoring programs in FL (& SE region)**

- **Bring together representatives and stakeholders for oyster mapping and monitoring programs around the State**

  - Enhance communication and facilitate collaboration
  - Compare current mapping and monitoring methods
  - Identify data gaps, needs, and priorities for future efforts

- **Work with partners to initiate pilot-scale oyster mapping and monitoring studies**

Future Goals and Direction

- **Funding pending for OIMMP years 2 & 3**
  - ◦ Applied to SWG program and proposal recommended for funding pending final approval from USFWS advisory board.

- **Statewide OIMMP report**
  - ◦ Summary of oyster mapping and monitoring data, status of reefs
  - ◦ Modeled after SIMM and CHIMMP reports
  - ◦ Relies on contributions from local experts

- **Second OIMMP workshop**
  - ◦ Partner updates and new-attendee presentations
  - ◦ Breakout focus on methods & strategies to fill data gaps

- **Continuation and expansion of pilot mapping and monitoring efforts**

OIMMP Website

OIMMP website will go live following this workshop (ocean.floridamarine.org/OIMMP/)

Summary of existing oyster data

- Oyster reef classification schemes
- Existing large-scale mapping data
- Monitoring references

Basic Classification Schemes

Name	Affiliation	Region	Classification Scheme	Reference
Florida Land Use and Cover Classification System (FLUCCS)	Florida Department of Transportation	Florida	Wetlands ○ Non-vegetated • Oyster bars	FDOT 1999
System for Classification of Habitats in Estuarine and Marine Environments (SCHEME)	Florida Fish and Wildlife Conservation Commission	Florida	Reef/Hardbottom ○ Mollusk reef • Bivalve reefs	Madley et al. 2002
Guide to the Natural Communities of Florida	Florida Natural Areas Inventory	Florida	Marine and estuarine ○ Mollusk reef	FNAI 2010
Florida Land Cover Classification System	Florida Fish and Wildlife Conservation Commission	Florida	Estuarine ○ Intertidal • Oyster bar	Kawula 2009, 2014
Coastal Change Analysis Program (C-CAP) Classification System	National Oceanic and Atmospheric Administration	National	Marine/Estuarine reef ○ Mollusk reef	Klemas et al. 1993, Dobson et al. 1995

Detailed Classification Schemes

Name	Affiliation	Region	Classification Scheme	Reference

Classification of Wetlands and Deepwater Habitats of the United States	U.S. Fish and Wildlife Service	National	○ Estuarine, Subtidal
			    • Reef
			        ▪ Mollusk
			○ Estuarine, Intertidal
			    • Reef
			        ▪ Mollusk
			            • Regularly flooded
			            • Irregularly flooded
				Cowardin et al. 1979, FGDC 2013

Coastal and Marine Ecological Classification Standard (CMECS)	Federal Geographic Data Committee	National	Geoform origin: Biogenic
			○ Geoform: Mollusk reef
			    • Fringing mollusk reef
			    • Linear mollusk reef
			    • Patch mollusk reef
			    • Washed shell mound, etc
				FGDC 2012

Sarasota County Water Quality Planning Methods Manual for Field Mapping of Oysters	Sarasota County	Sarasota and Tampa Bays	○ Shell ○ Scattered shell ○ Oyster clumps ○ Scattered oyster clumps ○ Oyster reef, etc.	Meaux 2011

Sarasota County Oyster Habitats

Legend
- Clumps
- Dead Shell
- Mangrove Apron
- Mangrove Root
- Piling
- Reef
- Rip Rap
- Seawall

100 m
500 ft

http://maps.wateratlas.usf.edu/SarasotaOysters/

Mapping Challenges

- Peripheral oysters on mangrove roots, pilings, seawalls
- Subtidal oysters in turbid water
- Temporal variability

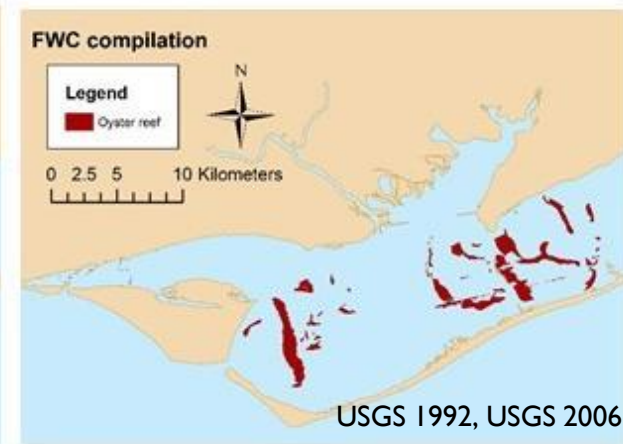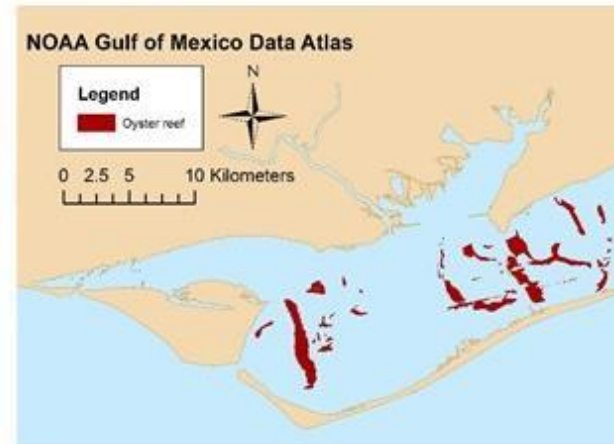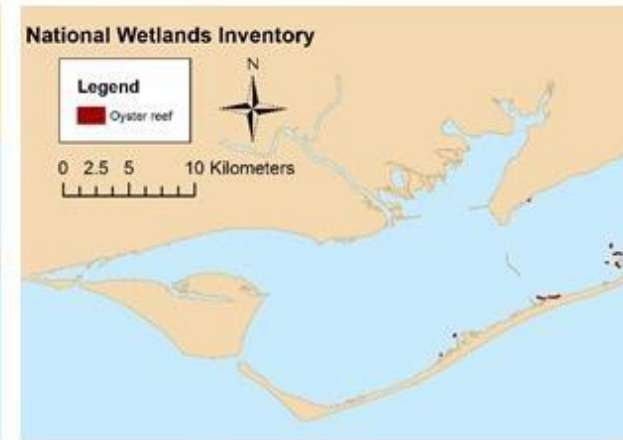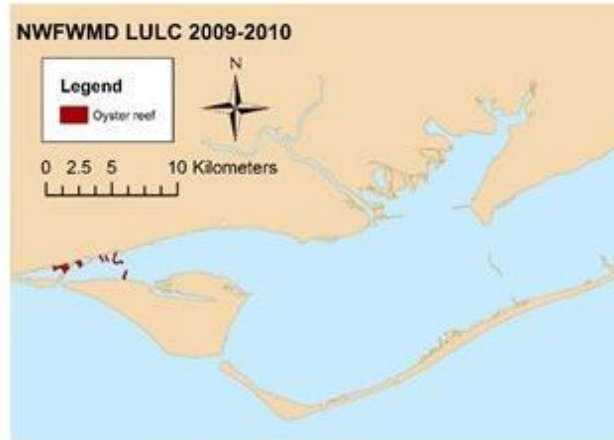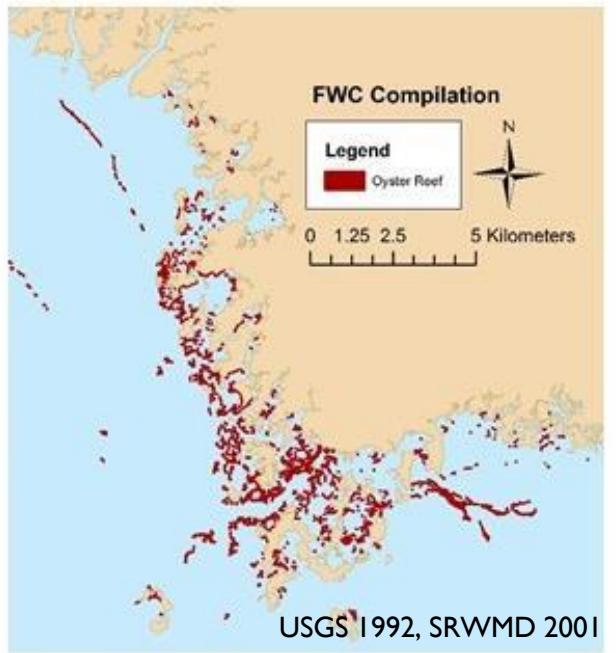# Florida land cover data sets

Program	Affiliation	Region of map extent, year	Classification scheme
National Wetlands Inventory (NWI)	U.S. Fish and Wildlife Service	National, 1977-2016	Cowardin et al. 1979
Florida Water Management Districts (WMD) Land Use Land Cover (LULC) maps	NWFWMD	NWFWMD, 2009-2010	FDOT 1999
	SRWMD	SRWMD, 2010-2011	FDOT 1999
Northern Coastal Basin Intercoastal Oysters	SJRWMD, UCF	NE FL, 2009-2016	Custom classification
Oyster Beds in Florida	FWC	Florida, compilation of many sources	FDOT 1999 and others
Cooperative Land Cover (CLC) map	Florida Natural Areas Inventory, FWC	Florida, compilation of many sources	FNAI 1990, FDOT 1999, Kawula 2014, and others
Gulf of Mexico Data Atlas	NOAA, Gulf of Mexico coast	Gulf of Mexico coast, all of Florida, 1984-2006	FNAI 1990, FDOT 1999, and others

Comparison of maps: Apalachicola Bay

USGS 1992, USGS 2006

SRWMD 2001

Legend
Oyster reef

0 1.25 2.5   5 Kilometers

SRWMD LULC 2010-2011

Legend
Oyster reef

0 1.25 2.5   5 Kilometers

Cooperative Land Cover v3.1

Legend
Oyster Reef

0 1.25 2.5   5 Kilometers

NOAA Gulf of Mexico Data Atlas

Legend
Oyster reef

0 1.25 2.5   5 Kilometers

FWC Compilation

Legend
Oyster Reef

0 1.25 2.5   5 Kilometers

USGS 1992, SRWMD 2001
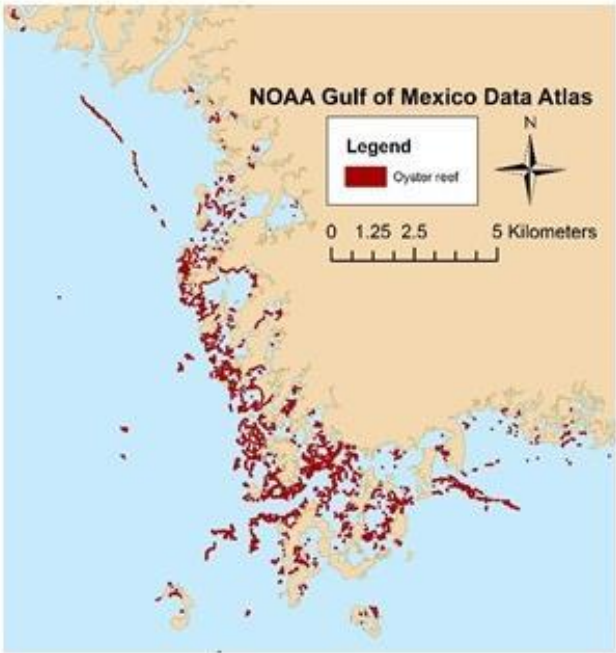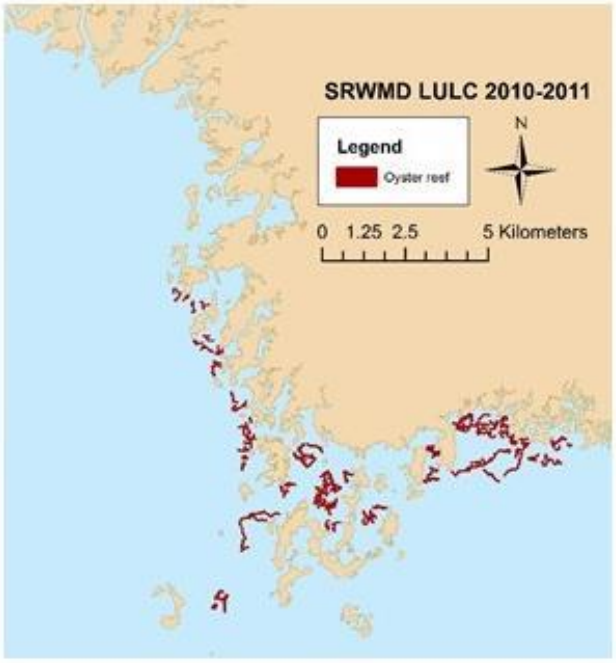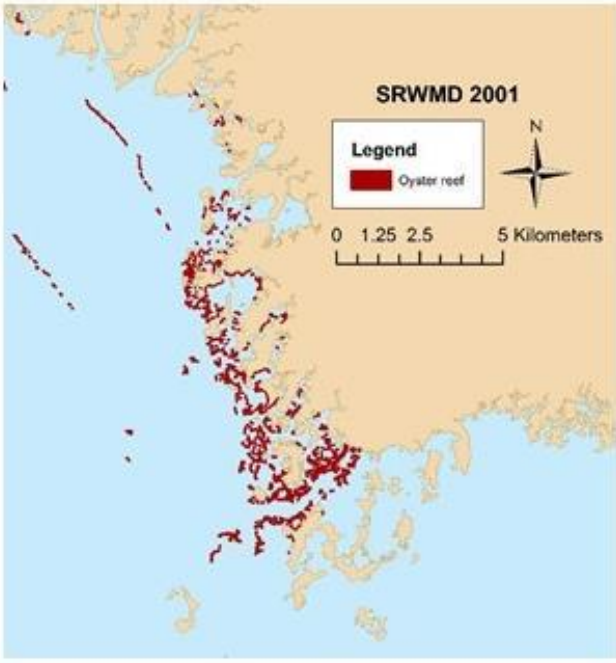
FWC oyster layer

- Compilation of many sources
  - USGS
  - FWC
  - Water Management Districts
  - US Army Corps of Engineers
  - NERRs
  - Universities
  - Cities/Counties
- Missing data in several bays

Existing FWC oyster layer

Existing FWC Oyster Data

Legend
Oyster

0 25 50   100   150   200
Miles

Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Years of Mapping

FWC Oyster: Years Mapped

2003
1992
2006
2001
2001
2007
2005
2009-2016
2009
2006
2007
2003, 2011
2004, 2011
2004
2011
2007, 2011
1999
2006
2003-2006

Legend
Oyster

0 25 50   100   150   200
Miles

Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Marine Resources GIS Map Service

Marine Resources GIS
http://ocean.floridamarine.org/mrgis
FWC GIS data downloads:
http://geodata.myfwc.com/

Oyster monitoring

- ## Many references and protocols available
  (Brumbaugh et al. 2006, Baggett et al. 2014, Thayer et al. 2003, Thayer et al. 2005, Leonard and Macfarlane 2011, Oyster Metrics Workgroup 2011, Coen and Humphries 2017)

- ## Monitoring metrics
  - Reef area/height/depth,
  - Oyster density, size-frequency distribution
  - Recruitment, growth, survival
  - Condition index, disease
  - Water quality, associated species

1st – what is your question?
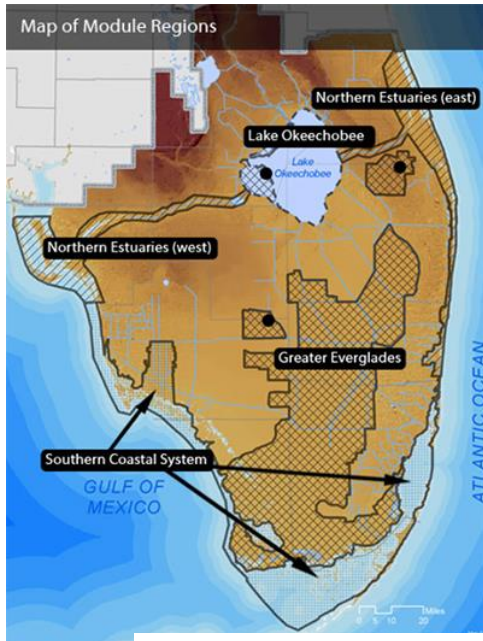
Florida oyster landings
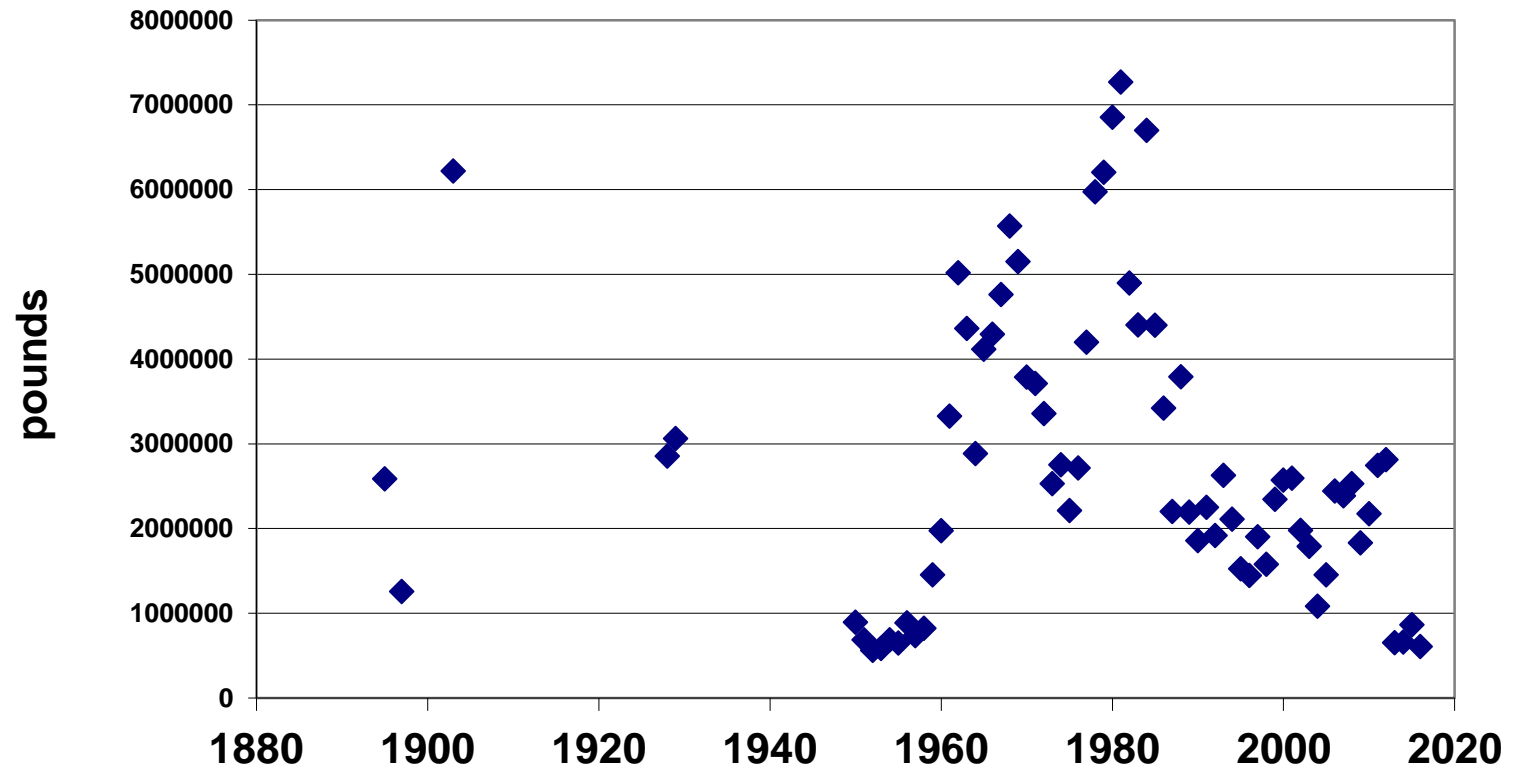
# Oysters (mussels too) as an indicator of environmental health

NOAA's Mussel Watch records data to the 1960s, but most sites began in 1986. The target, PAHs, PCB's, Pesticides, Butyltins, Metals, bacteria

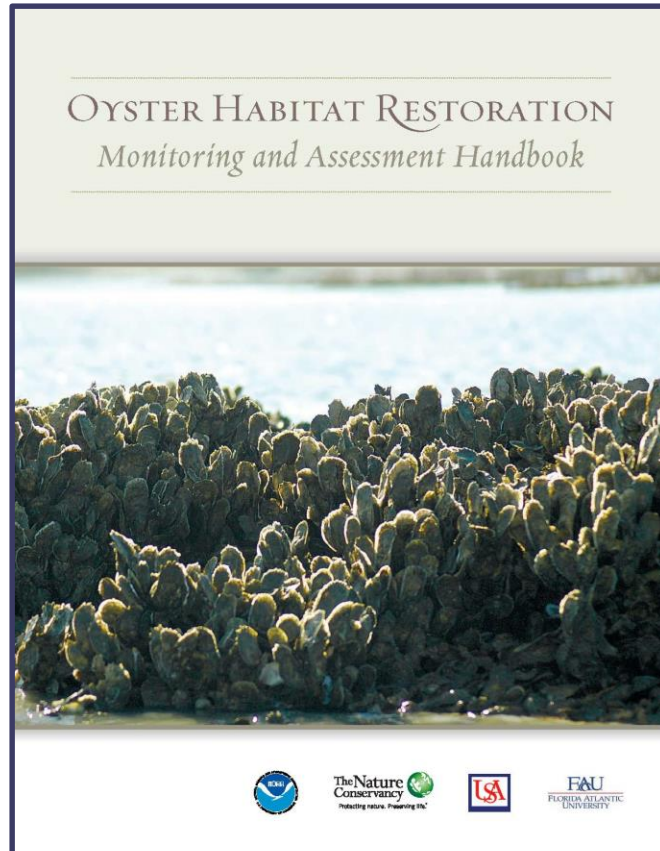# Another place oysters are serving as an indicator? CERP

Detailed metrics combined with observations of water quality will help to interpret decadal to semi-decadal changes in spatial extent.
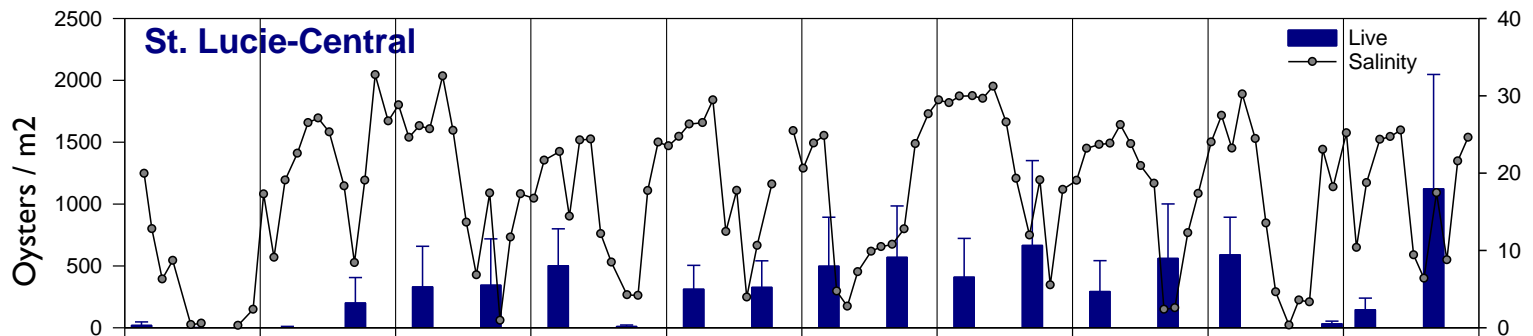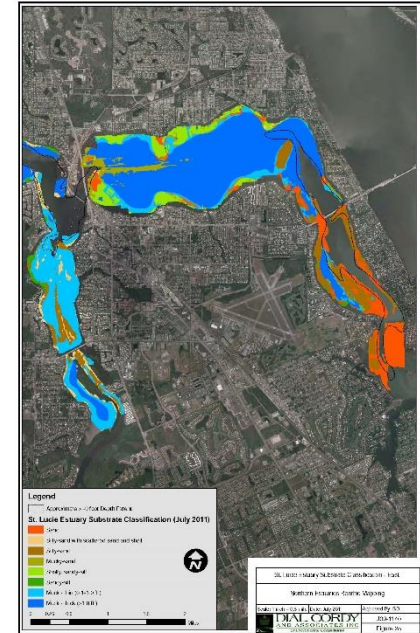
M.L. Parker, 2015. Oyster monitoring in the northern estuaries on the southeast coast of Florida. Final Report 2005 - 2014

For the purposes of OIMMP,

- What is the spatial extent?
- How many?
- Is environment suitable?

and then….

Reef shape (height); Size frequency; Growth rate; Community; Disease; Condition; Measure of reproduction (sex ratio and gonad assessments); shell volume (reef volume); percent cover; neighbors and neighbor demographics; shoreline and surrounding habitat change; associated plant communities (marsh, seagrass, mangrove); water quality (clarity, light, Chl, phyto composition)

- What is the spatial extent?
- How many?
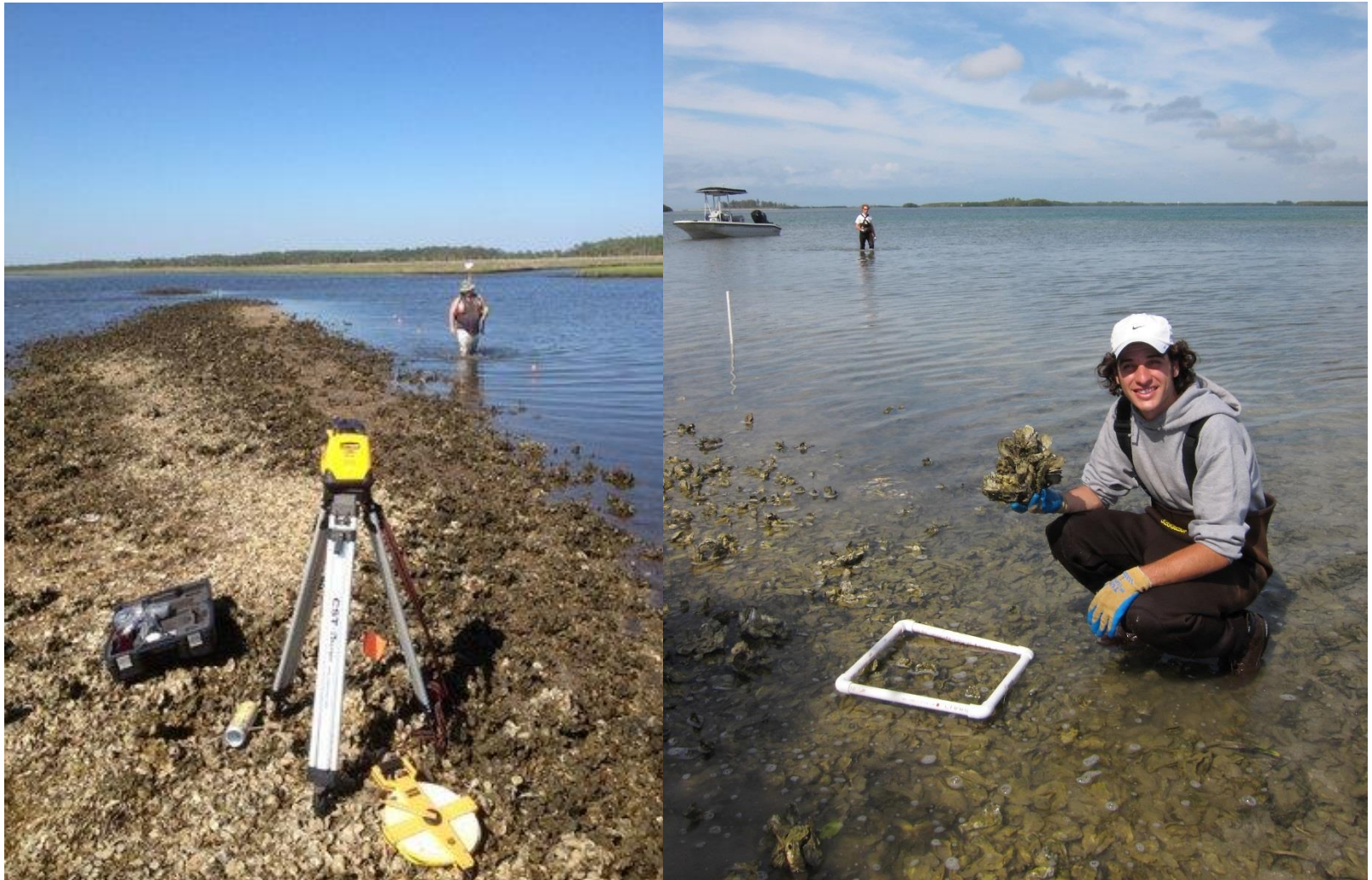
Size frequency

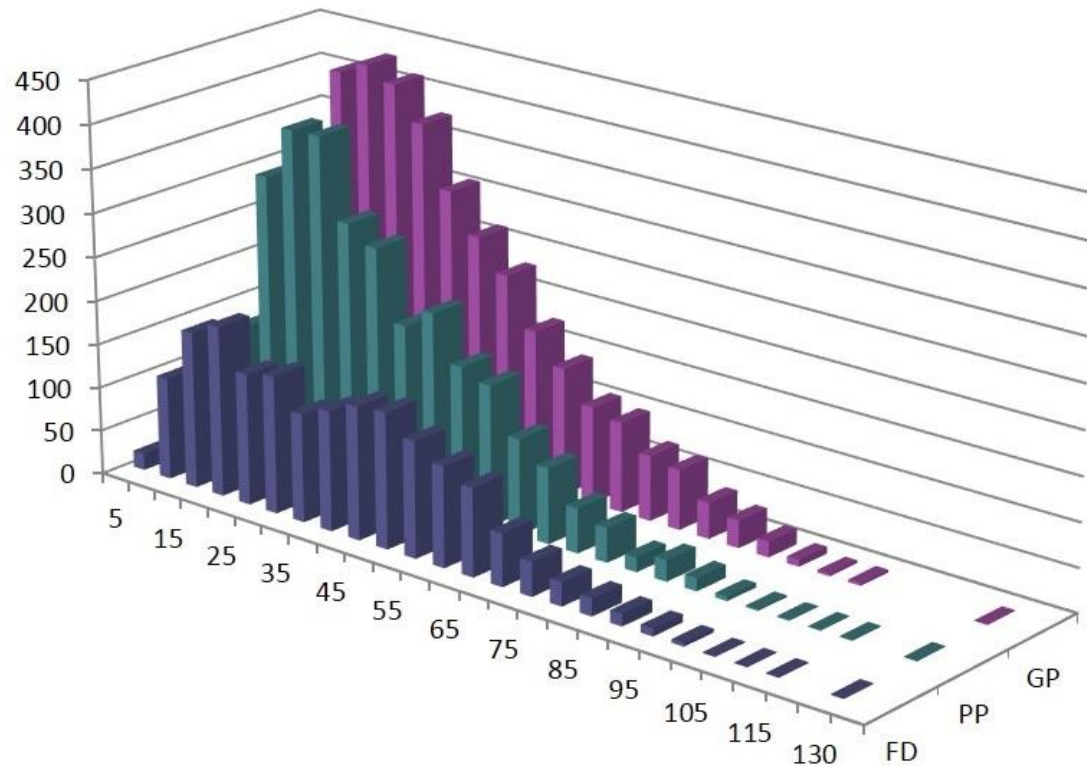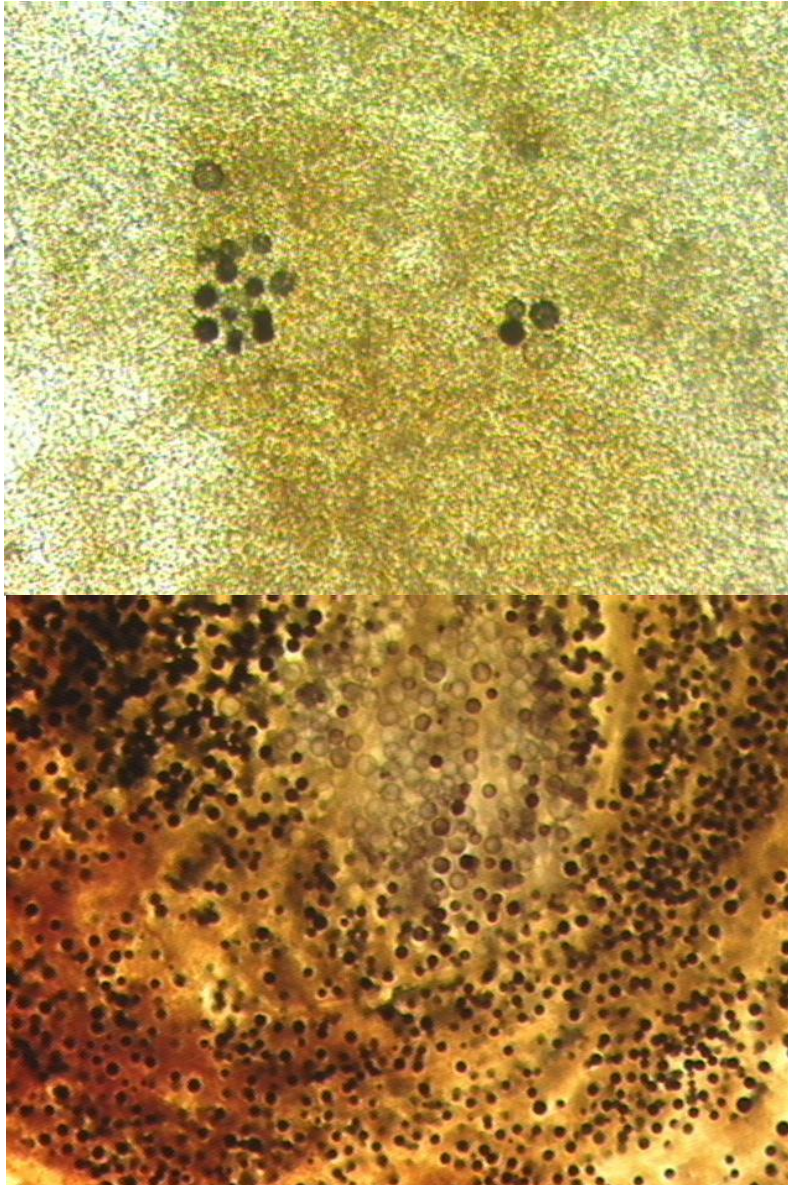The presence of small oysters indicates successful reproduction and survival of larvae.
The absence of large oysters – those over 70 mm (common in Florida) - indicates either harvest, disease, or both.

Disease (basically in Florida, Dermo)

- **Logistically more challenging for small groups**
- **Appears to be good indicator of salinity regime**
- **If there is no dermo, the salinities are likely spending too much time below optimal**
- **When oysters are near "normal", dermo will be frequent, but low intensity**
- **When dermo intensity climbs over ~1.5 or 2, average salinities are probably too high.**

Are neighboring habitats and water clarity improving?
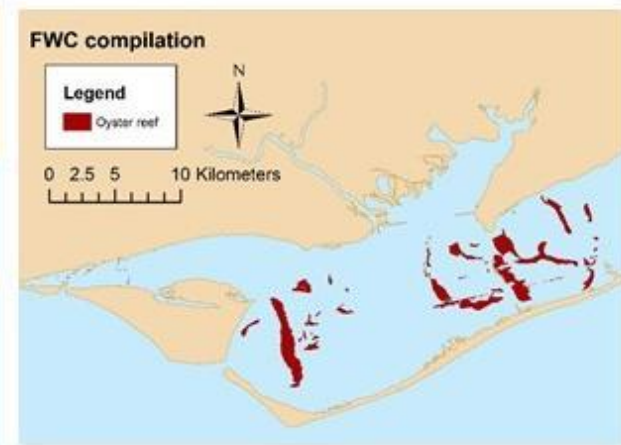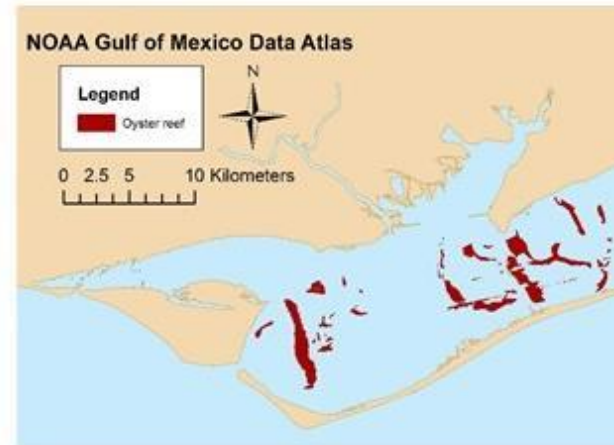
Are normal communities developing?

Questions and Feedback

Breakout #1 Introduction

Comparison of maps: Apalachicola Bay
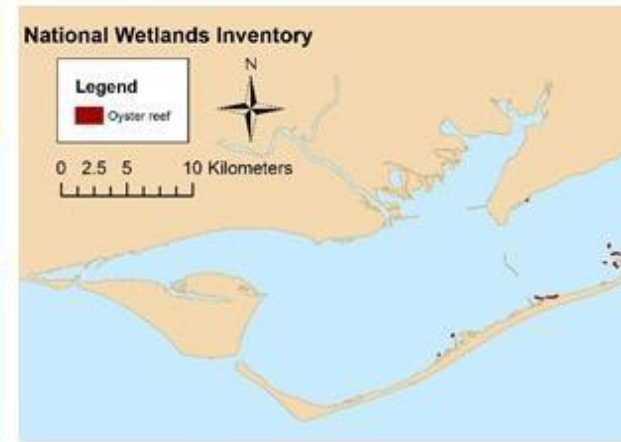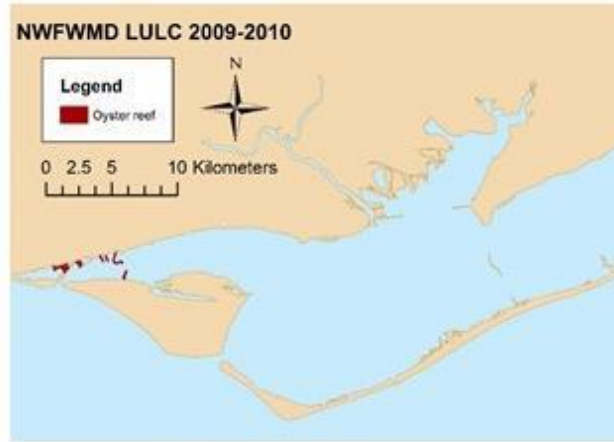
Breakout #1

- Within each region:
  - Critique existing maps
  - Identify oyster mapping and monitoring programs
  - Identify gaps

Breakout #2 Introduction

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
- Regional chapters
  - Regional introduction and maps
  - Summary of local mapping and monitoring programs
  - Status, threats and recommendations
  - Report card?

OIMMP report overview

- **Chapter drafts**
  - Compiled by OIMMP team

- **Editing, additions, local expertise**
  - Contributed by local experts

Northwest Florida

Apalachicola Bay

Big Bend

Northeast Florida

Indian River Lagoon

Tampa and Sarasota Bays

Charlotte Harbor and Estero Bay

Southeast Florida

Southwest Florida

SIMM Report card example

Seagrass Status Indicators	Status	Trend	Assessment, Causes
Seagrass cover	🟥	Declining	Losses, hypoxia
Seagrass meadow texture	🟨	Poor growth	Mortality, stunted, sparse
Seagrass species composition	🟨	Little change	Salinity changes, high sulfide levels
Overall seagrass trends	🟥	Declining	Salinity changes, high sulfide levels
Seagrass Stressors	**Intensity**	**Impact**	**Explanation**
Water clarity	🟨	Some improvement	Poor in some areas
Nutrients	🟩	Good	Low levels, little runoff
Phytoplankton	🟩	Good	Low levels

🟩 **Green**—Healthy, improving, stable conditions

🟨 **Yellow**—Declining, some stress present, some threats to ecosystem health

🟧 **Orange**—Measureable declines, moderate stressors or declines in seagrass cover

🟥 **Red**—Large negative changes in seagrass health and stressors, either acutely over a short period of time, or chronically over a period of years.

OIMMP report card ideas

- **Possible OIMMP report card criteria:**
  - Abundance
  - Live vs. dead
  - Evidence of recruitment

- **Report card criteria must be documented, not anecdotal**

Breakout #2

- Are these appropriate regional boundaries?

- Thoughts on report card?

- Individual surveys
  - Regions of expertise
  - Interest in contributing to OIMMP report