

A sunset over a body of water with three wooden posts in the foreground. The sky is filled with large, dark clouds illuminated from below by the setting sun, creating a dramatic orange and yellow glow. The water reflects the colors of the sky. In the foreground, three dark wooden posts stand vertically in the water.

Lemon Bay – It's Complicated: Ideas for Restoring & Safe-Guarding Our Special Estuary

LBC Annual Meeting – Feb 24, 2022

Ms. Judy Ott, Estuary Scientist & Educator

Dr. Coty Keller, Local Ecologist

What are We Talking About?

Purposes:

- Learn – About Lemon Bay
- Value – Lemon Bay
- Act – to Restore & Protect LB

Topics:

- Lemon Bay is Special
- Who's Monitoring Lemon Bay
- Why Lemon Bay is Threatened
- What the Causes & Solutions Are
- How We Can Each Help
- Take Home Messages



Photo: FCF Flats

Why is Lemon Bay Special?

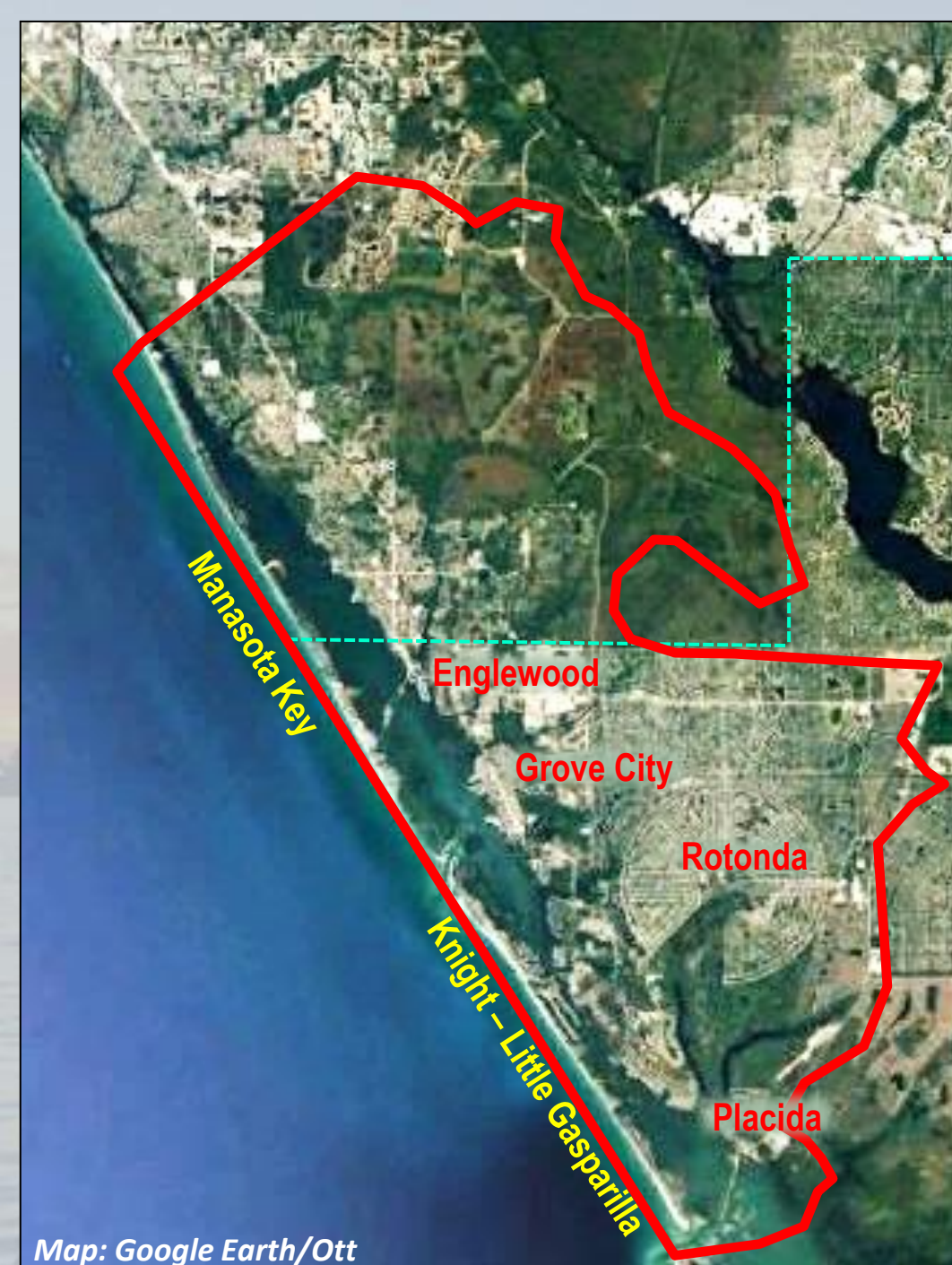
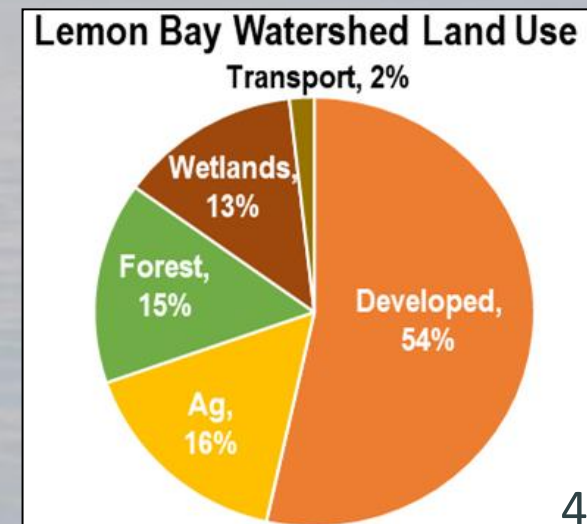
It's an Estuary:

- Where Salt & Fresh Water Meet
- 2 Gulf Passes & 8 Creeks
- Venice Inlet to Gasparilla Sound
- ± 13 mi X $3/4$ mi = ± 12 mi sq
- <4 feet Deep (Except Dredged Areas)
- Flushing Time ± 2 Weeks
- Salt & Fresh Water Mixing Drives Everything



Its Watershed is Small-ish:

- Land that Sheds Rainwater Down Stream – to Rivers, Lakes & Estuaries
- ±15 mi X 5 mi = ±130 mi sq
- 2 Barrier Islands
- Sarasota & Charlotte Counties
- Englewood & Smaller Communities
- >50% Developed
- Watershed:Estuary Ratio = ±10:1



Map: Google Earth/Ott

Red Mangroves

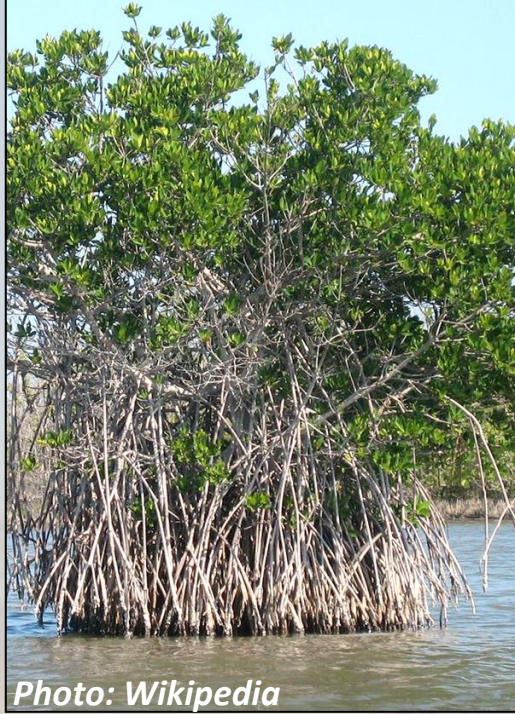


Photo: Wikipedia

Black Mangroves



Photo: Ianaré Sévi

Its Biology is Complex, Dynamic & Fragile:

- Everything has its Own Niche
- Everything has its Optimal & Tolerable Conditions
- Timing is Everything
- Biodiversity is Driven by Tides – Day, Month, Season, Year & Climate

White Mangroves

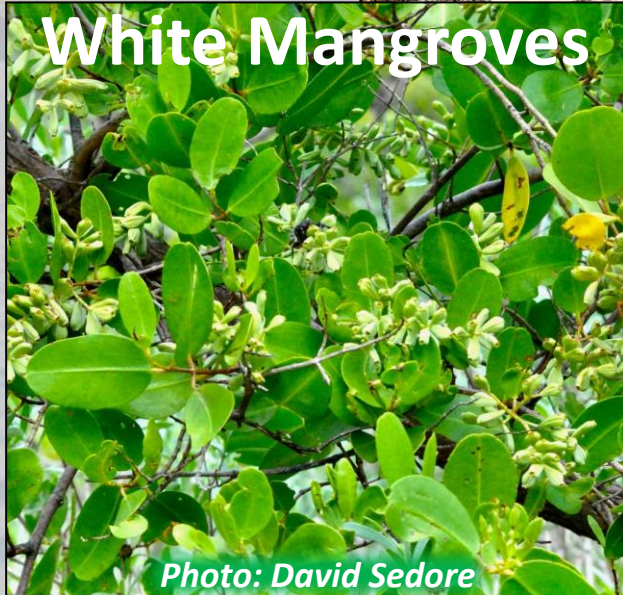


Photo: David Sedore

Needle Rush



Photo: Ann Murray/UF

Cord Grass

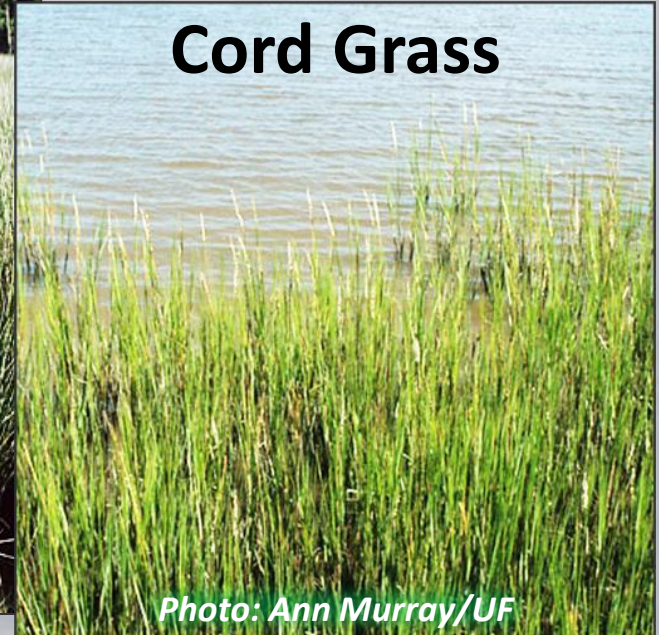


Photo: Ann Murray/UF

Turtle Grass

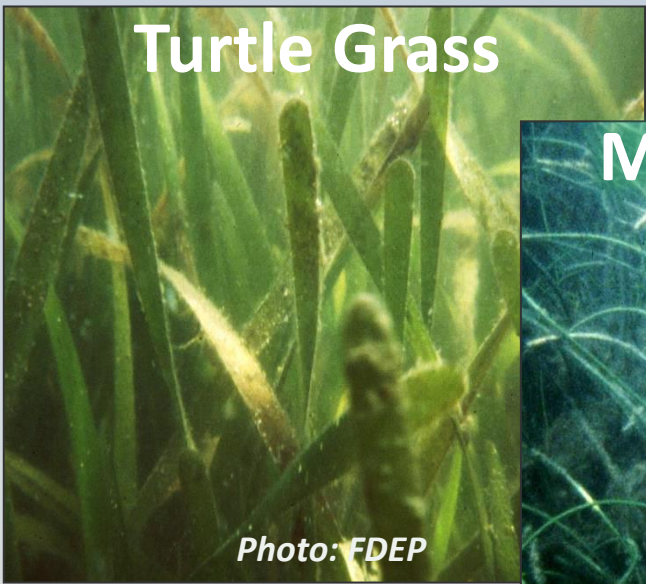


Photo: FDEP

Manatee Grass

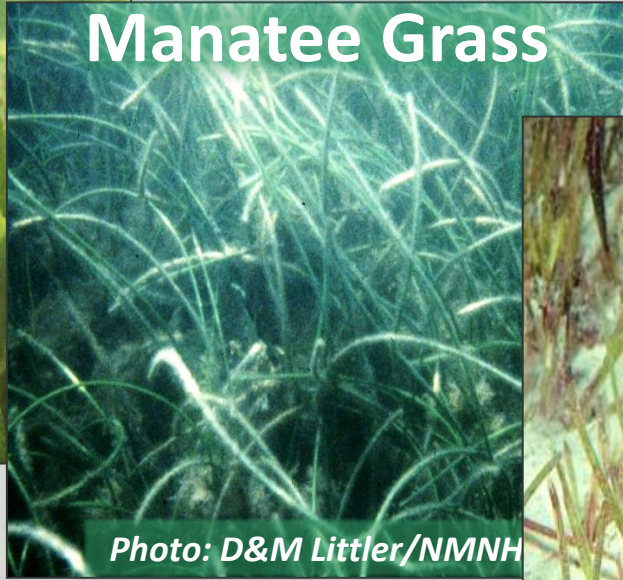


Photo: D&M Littler/NMNH

Shoal Grass



Photo: FDEP

- **Sea Grasses are the Base**
- **Invertebrates Need Places to Hide**

Comb Jelly



Photo: Amos/Shefton

Tunicates

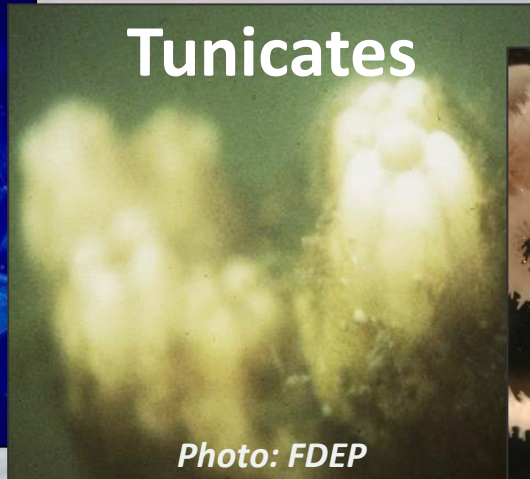


Photo: FDEP

Brittle Star



Photo: Mote Marine Lab

Sea Star



Photo: FDEP

Sand Dollar



Photo: FDEP

Sea Hare



Photo: FDEP

Horse Conch



Photo: Joe Tomoleoni

- **Mollusks & Crustaceans Clean Up Turbidity & Detritus**

Oysters



Photo: TNC

Scallop



Photo: FDEP

Pen Shell



Photo: V Frazio III

Amphipods



Photo: Mote Marine Lab

Barnacles



Photo: FDEP

Mangrove Crabs



Photo: Kris Hart

Pink Shrimp



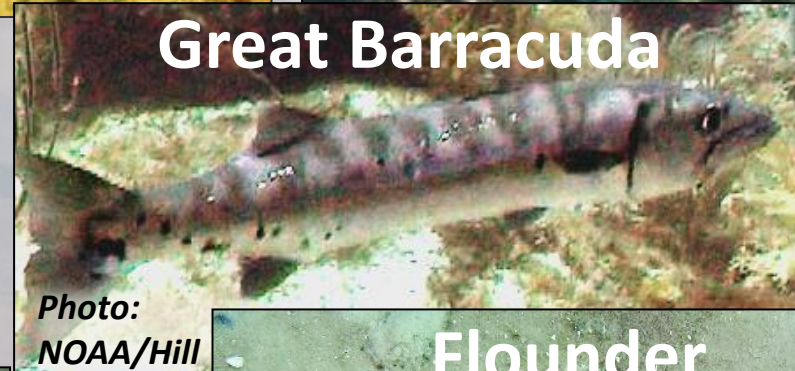
Photo: Inaturalist/MatBio

Fiddler Crabs



Photo: Greg Kahn/NDN

• Fishery Populations are Inter-Dependent



- **Sharks are Fish, Too!**



- **But Dolphins & Manatees are Mammals**



- And Otters & Raccoons are Mammals, too



- But Reptiles are Cold Blooded



• And Our Fine Feathered Friends Fill Many Niches

Ospreys



Photo: Orlando Weekly

Black Skimmer



Photo: FDEP

Reddish Egret



Photo: Audubon Everglades

Roseate Spoonbill



Photo: Bill Dunson

Oyster Catcher

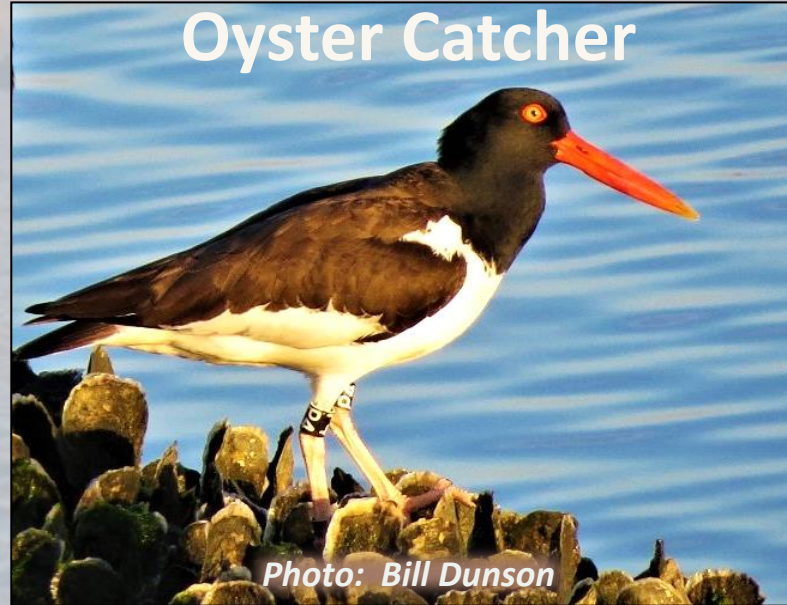


Photo: Bill Dunson

Snowy Egret



Photo: John Sutton/All About Birds

It Provides Refuge for Protected Species:

- >20 State & Federal Listed Species



Aesthetics = \$??

It's the Basis of Our Aesthetics & Economy:

- Aesthetic Enjoyment
- Recreation & Tourism
- Diverse Wildlife
- Fish Nurseries, Juveniles & Adults
- Boating & Fishing
- Property Values

Some Values of Natural Resource to the Economy of the Lemon Bay Watershed*

*from 2020 CHNEP Economic Valuation Report

Activity	Goods & Services Value	Labor Value	Jobs
Recreation	\$490,046,000	\$166,175,000	
Agriculture	\$5,510,000	\$3,644,000	
Commercial Fishing	\$1,161,000	\$180,000	
TOTAL	\$496,820,000	\$170,860,000	5,581

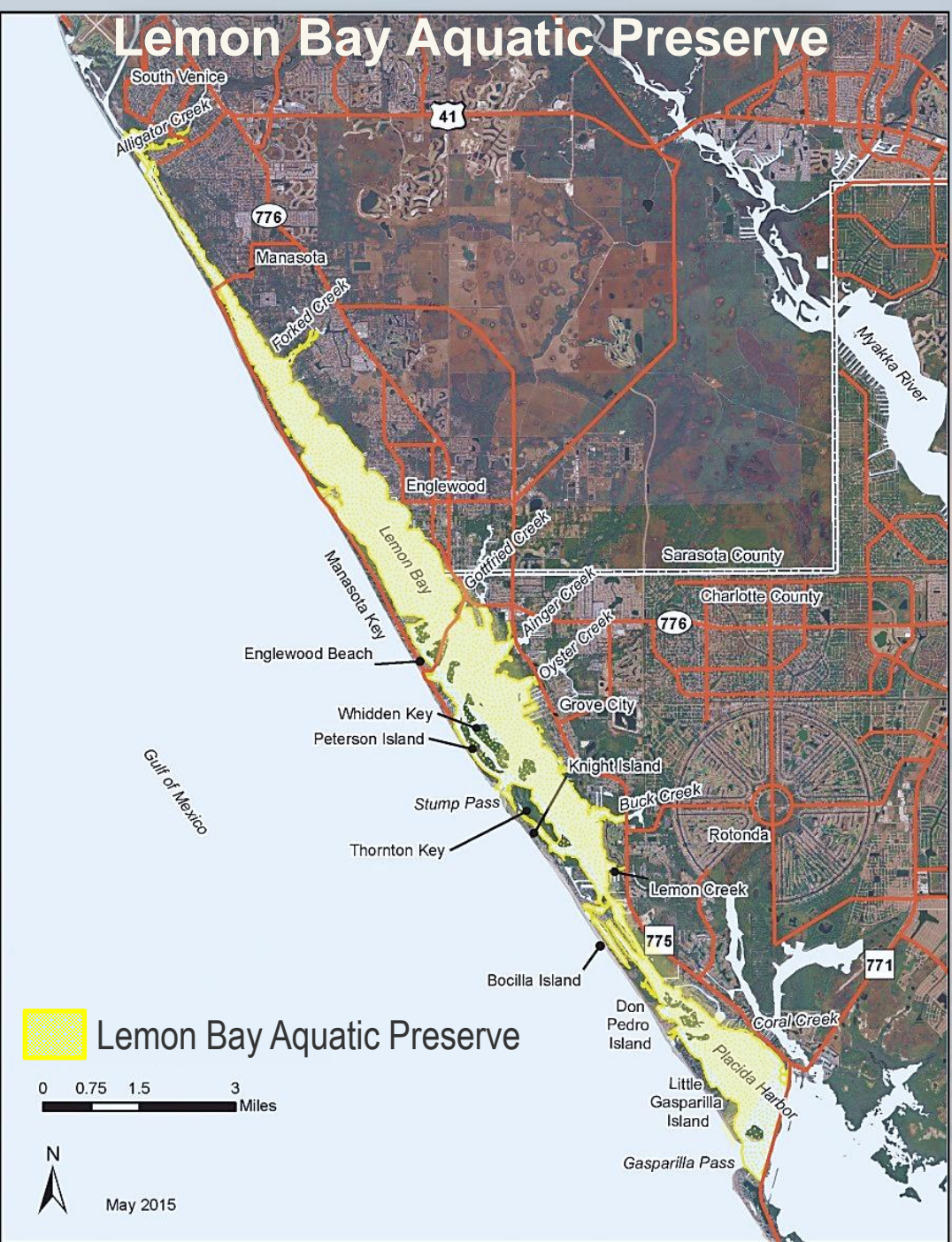
**2020 Punta Gorda/Englewood VCB
Economic Report:**

Visitors Save Households >\$700 Taxes/Yr

**2015 FL Relators Study
in Lee Co:**

↑ **Water Clarity 1 ft =**

↑ **Property Value 15%**



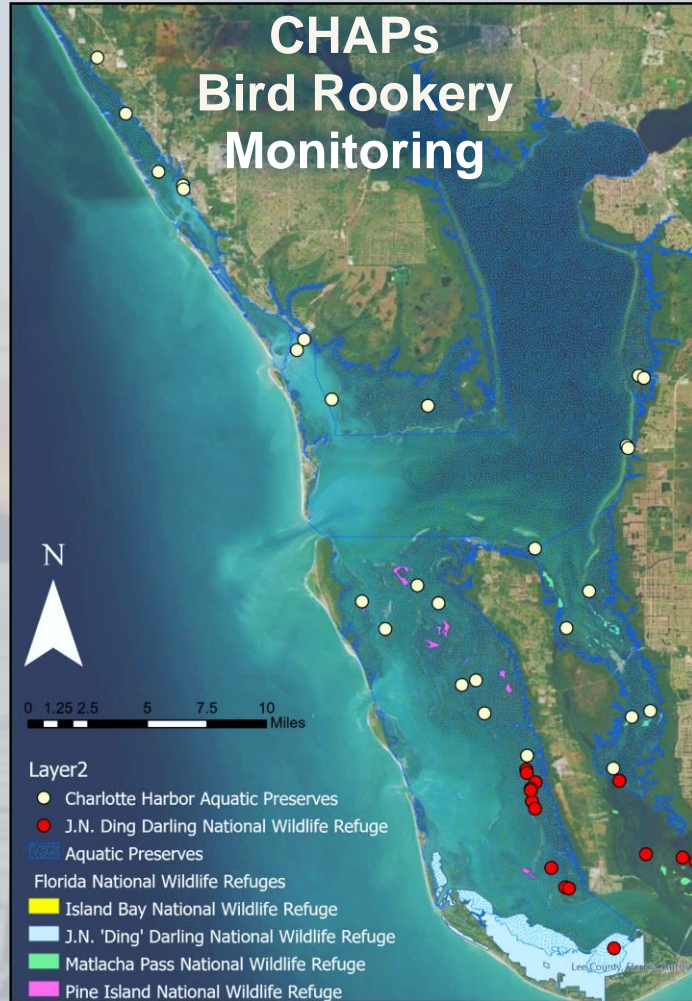
It's Cared for by Many:

- 1931 – Bass Marine Biological Lab
- 1971 – Lemon Bay Conservancy
- 1971 – Stump Pass Beach State Park
- 197? – Manasota Key Turtle Patrol
- 1985 – Don Pedro State Park
- *1986 – Lemon Bay Aquatic Preserve**
- 1993 – SWFWMD Priority Waterbody
- 1995 – Charlotte Harbor NEP
- 1997 – Coastal Wildlife Club
- 2003 – Sarasota Co. NEST Program
- 2004 – Lemon Bay League
- 2010 – Sarasota Co. LB Mgmt Plan

Who's Monitoring Lemon Bay?

Birds:

- FDEP Charlotte Harbor Aquatic Preserves
- Wading & Diving Bird Nesting
- Since 2008
- Monthly
- 6 Fixed Sites
- Nests, Chicks, Humans



Sea Turtles:

- Coastal Wildlife Club
- Sea Turtle Nesting
- Since 1997
- Daily, April - Oct
- 14 miles
- Nests, Hatchlings

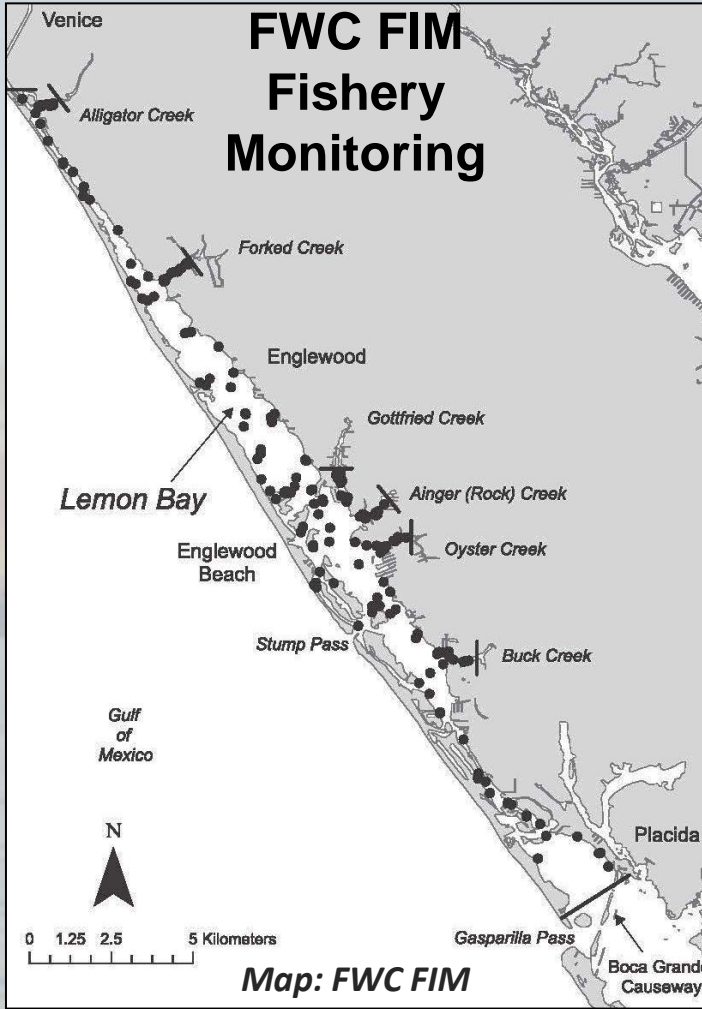
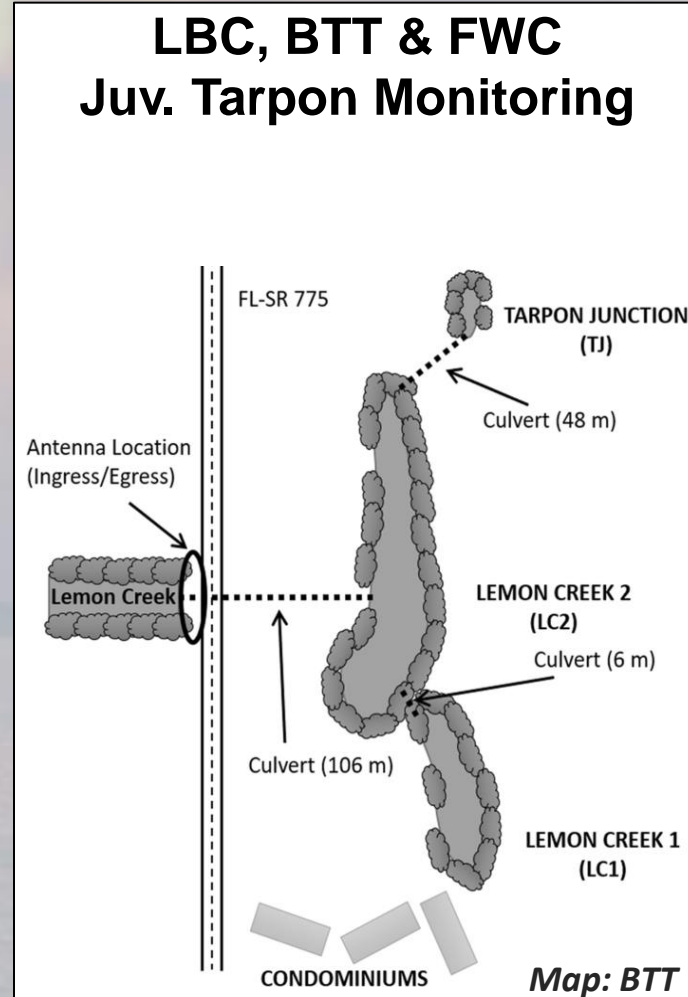


Fish:

- FWC FIM Charlotte Harbor Lab
- Fishery Community
- 2009-2010
- Bimonthly
- 180 Random Sites
- Species, Size, Numbers

LBC, BTT & FWC Juv. Tarpon Monitoring

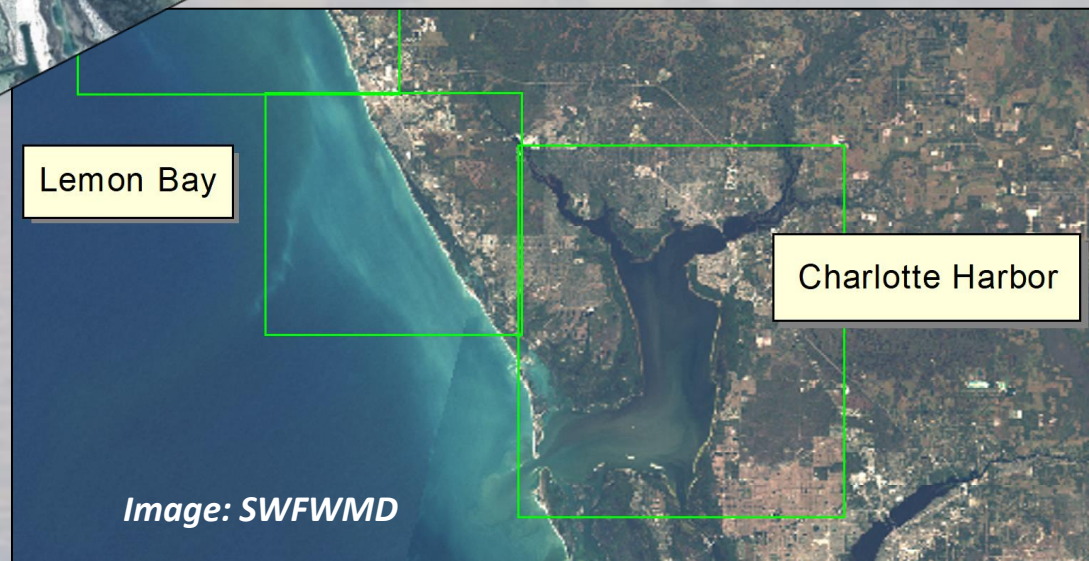
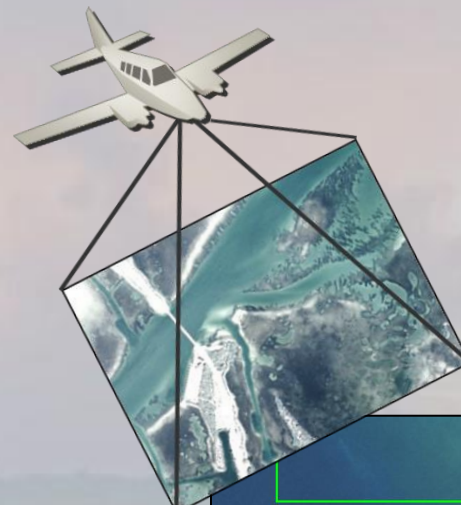
- LBC, BTT & FWC
- Juvenile Tarpon
- Since 2012
- Monthly
- Wildflower Preserve
- Size, Numbers, Tagging



Seagrass:

- FDEP Charlotte Harbor Aquatic Preserves
- Seagrass Monitoring
- Since 1999
- Annually
- 6 Fixed Sites
- Species, Abundance, Length, Deep & Shallow Edge

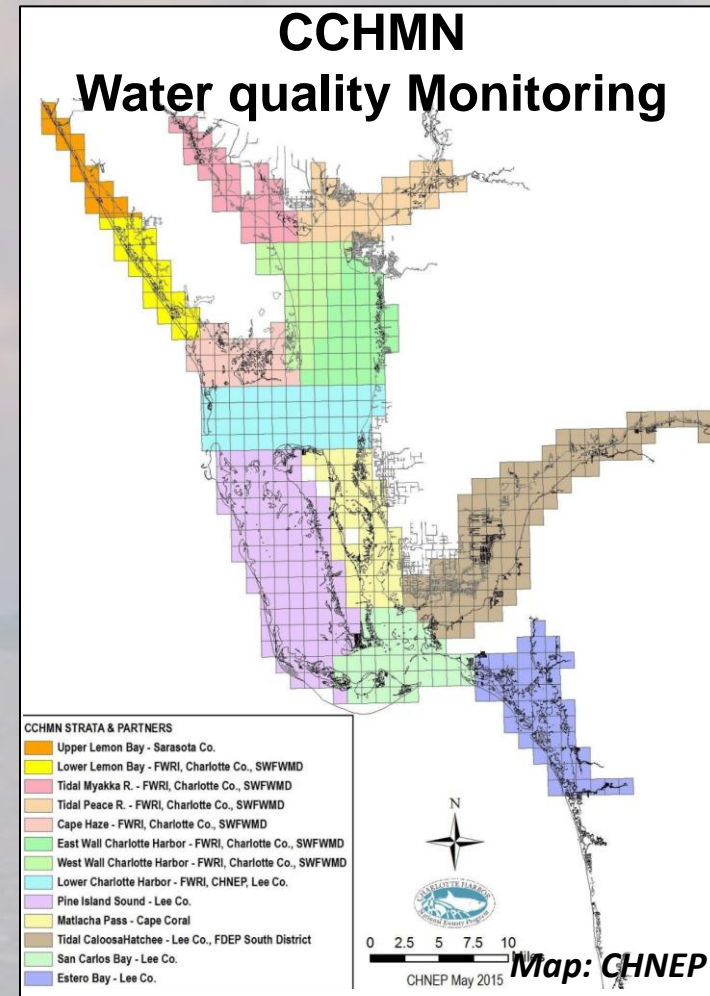
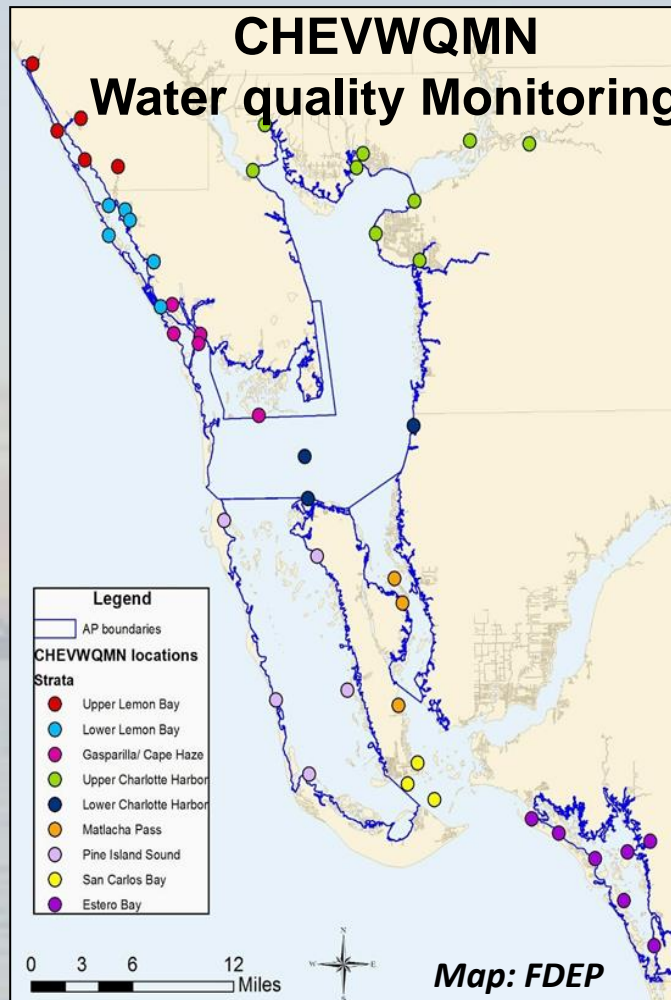
- SWFWMD
- Seagrass Aerial Mapping
- Since 1988
- Biannually
- Continuous
- Presence, Acres, Cover



Water Quality:

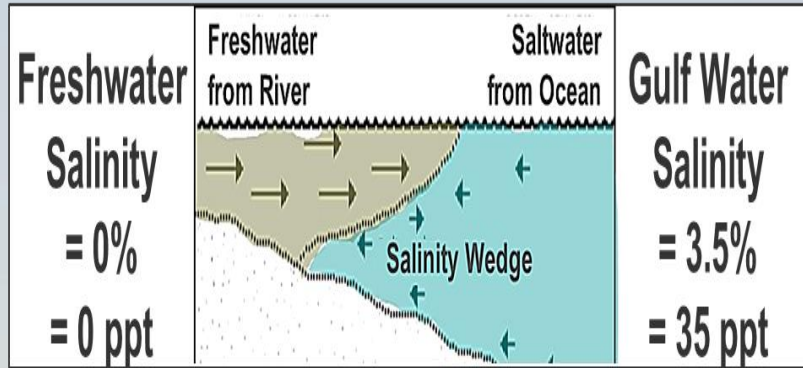
- FDEP Charlotte Harbor Aquatic Preserves
- CHEVWQMN Water Quality Monitoring
- Since 1998
- Monthly
- 7 Fixed Sites
- 19 Factors

- Multi-Agency
- CCHMN Water Quality Monitoring
- Since 2004
- Monthly
- 5 Random Sites
- 21 Factors



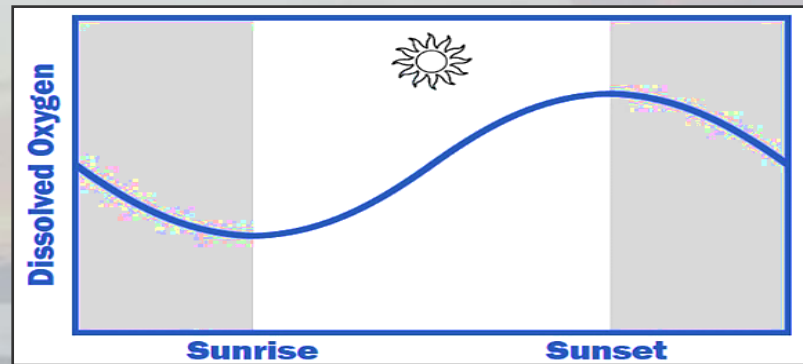
Water Quality:

Essential Factors to Monitor Estuary Health:

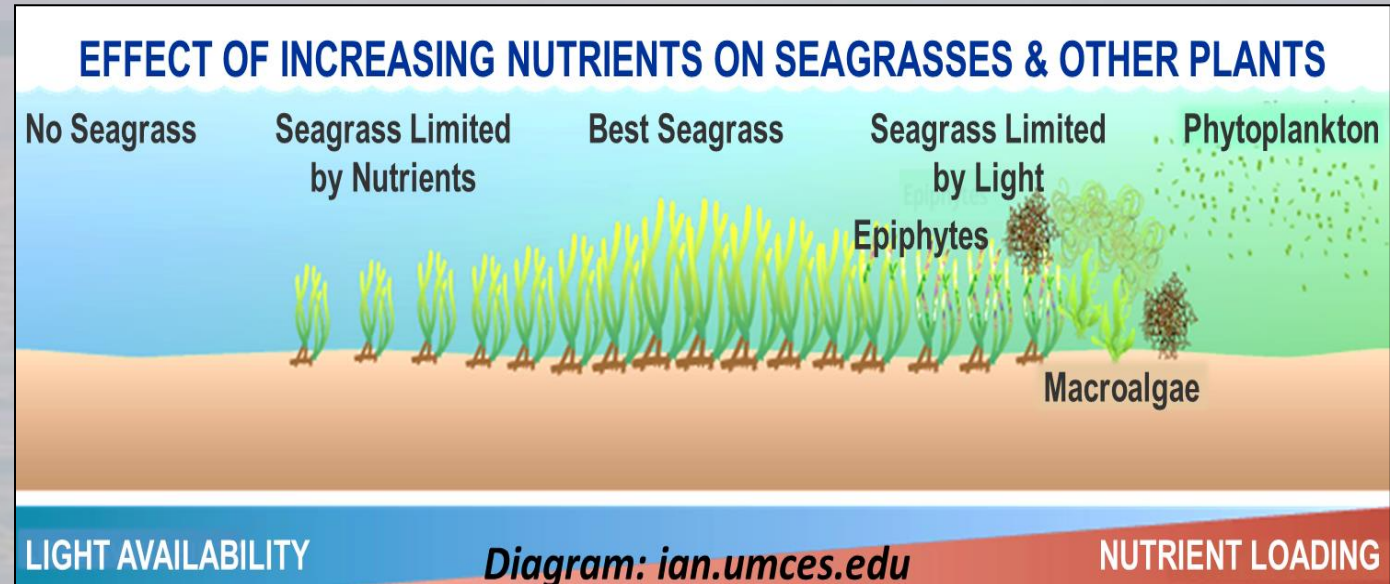
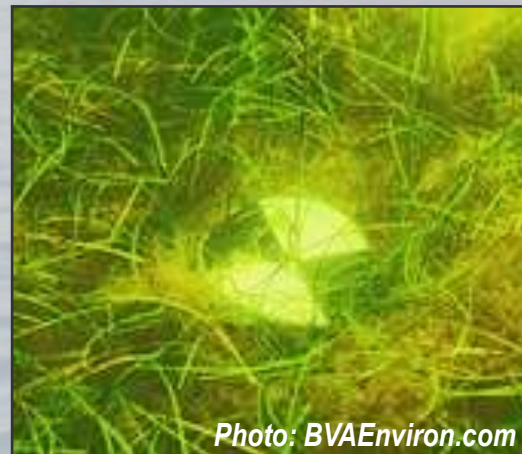


Animal	Min DO Needs (mg/L)
Seatrout	6
Red Drum	5
Blue Crab	4
Ladyfish	3
Pinfish	2
Scallop	2

Diagram: SCCF



- Salinity & Temp – Drive Everything
- Oxygen – for Fish
- Depth & Clarity – for Seagrass
- Chlorophyll (chl) – for Clarity
- Nitrogen & Phosphorus – for Chl
- Bacteria – for Human Use



How Do We Know Lemon Bay is Threatened?

There's a "*Boom in Blooms*" – of Algae:

- Block Sunlight for Seagrass
- "Blue Greens" in Fresh Water
- Red Tide in Salt Water
- Indicate High Nutrients

Macro Algae

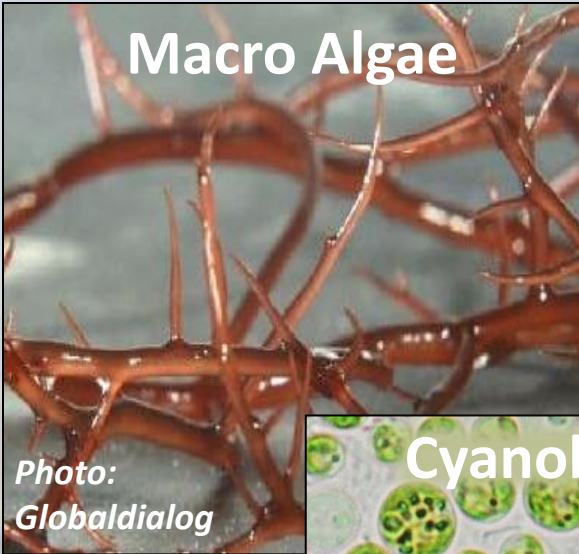


Photo:
Globaldialog

Cyanobacteria

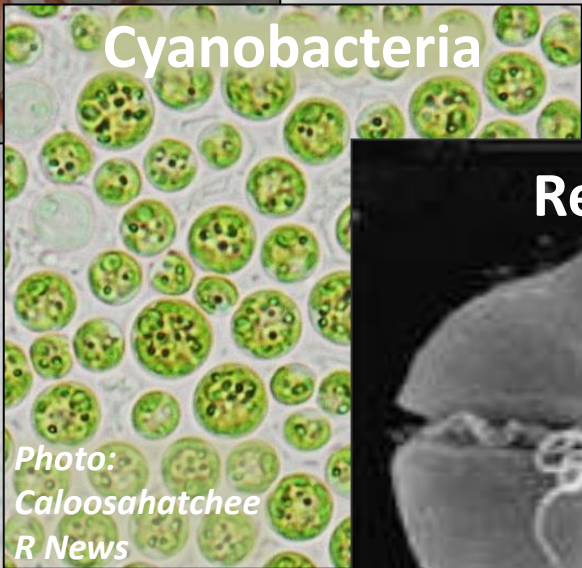


Photo:
Caloosahatchee
R News

Red Tide

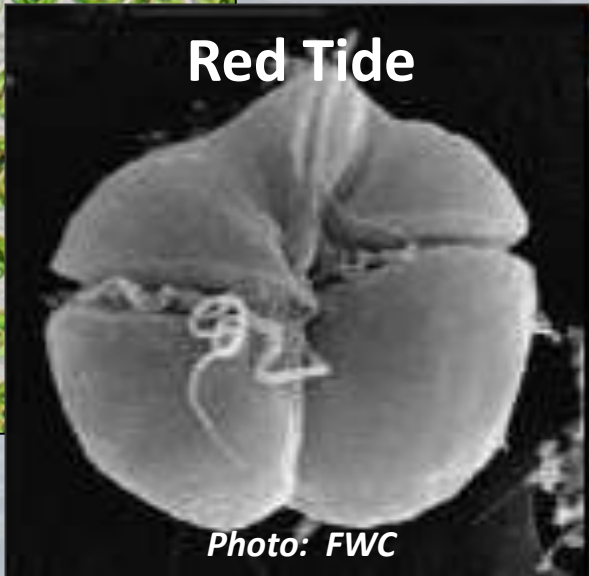


Photo: FWC

Coral Cr

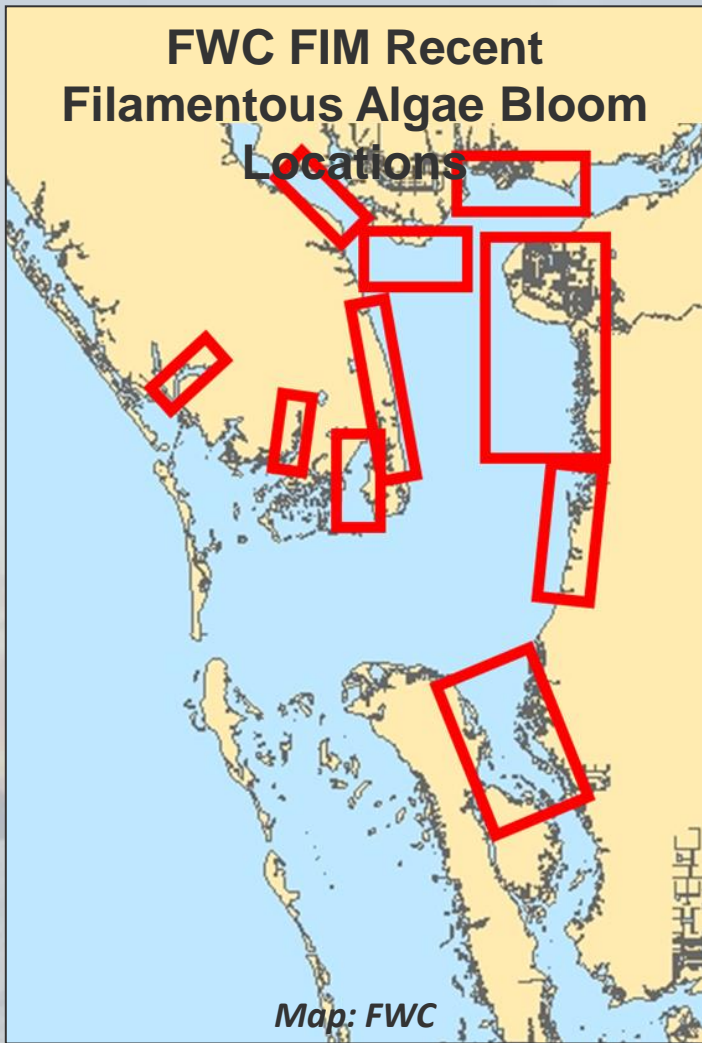


Photo: FWC

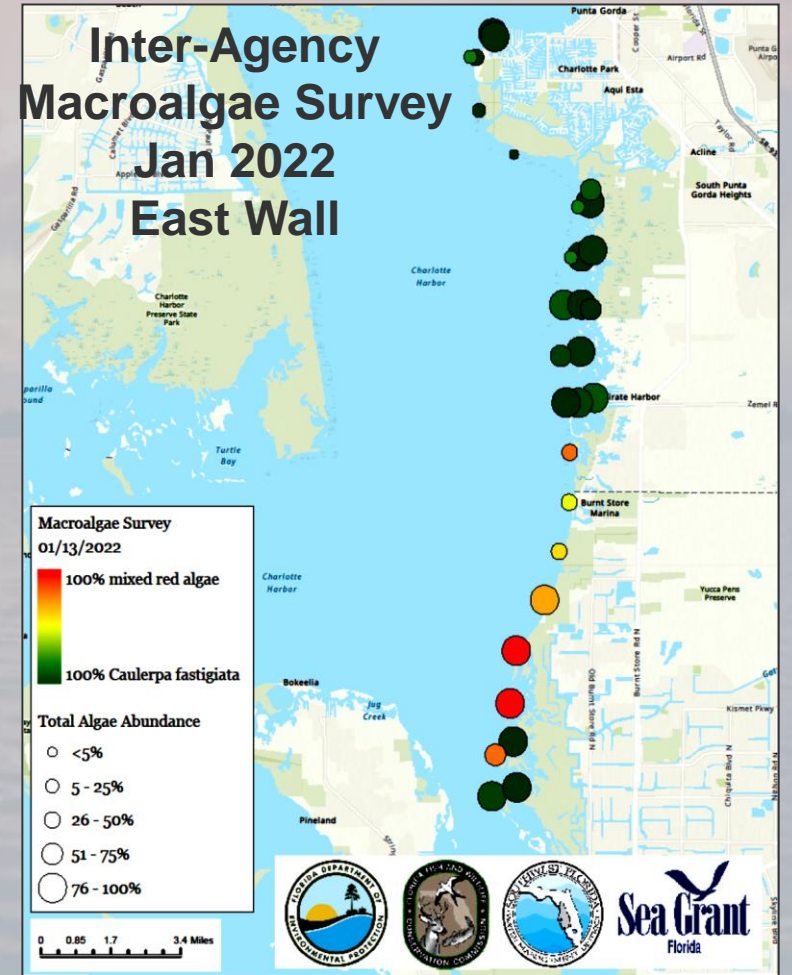
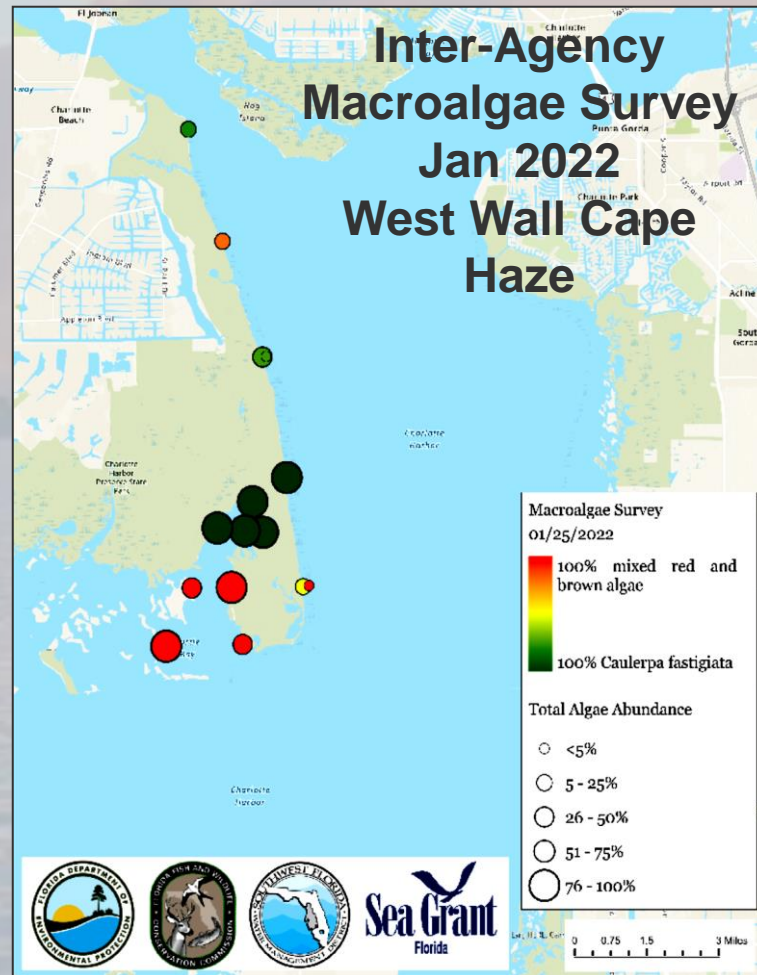
Hog Island



Photo: FWC



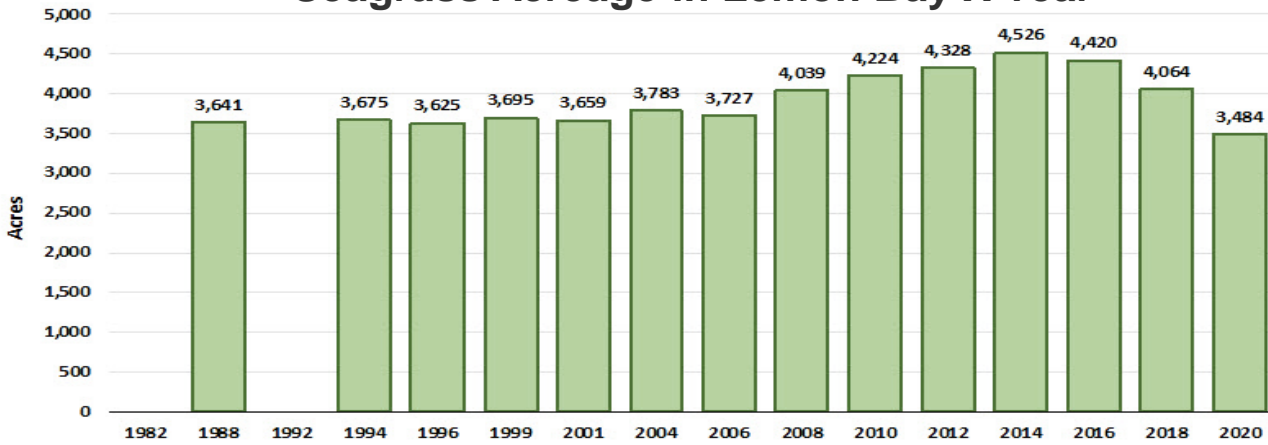
- Historically, Macroalgae Blooms Not Observed
- Recently, Macroalgae Observed by CHAPS & FIM
- Started in 2012 at Hog Island & Increasing
- Started Monitoring in 2018 & 2021



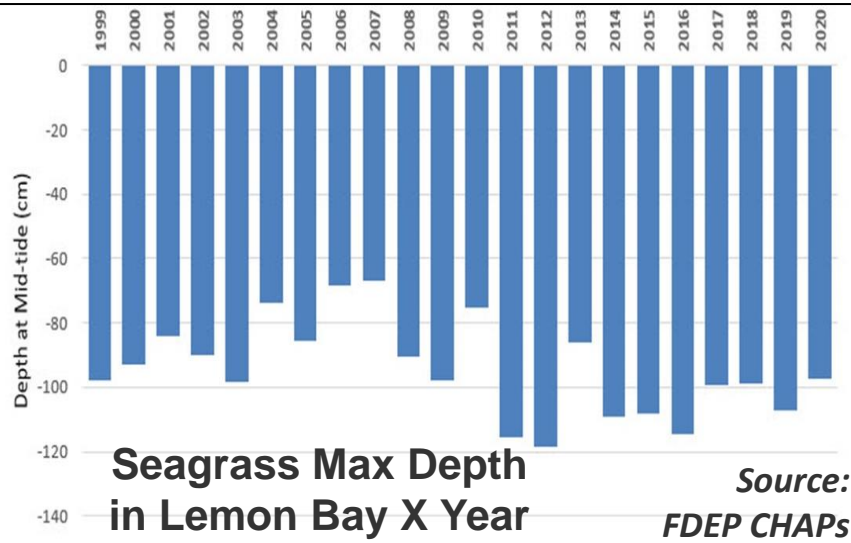
Seagrasses are Declining:

- +1,040 Acres (23%) Less in 6 Years
- +8 Inches (18%) Shallower in 8 Years

Seagrass Acreage in Lemon Bay X Year



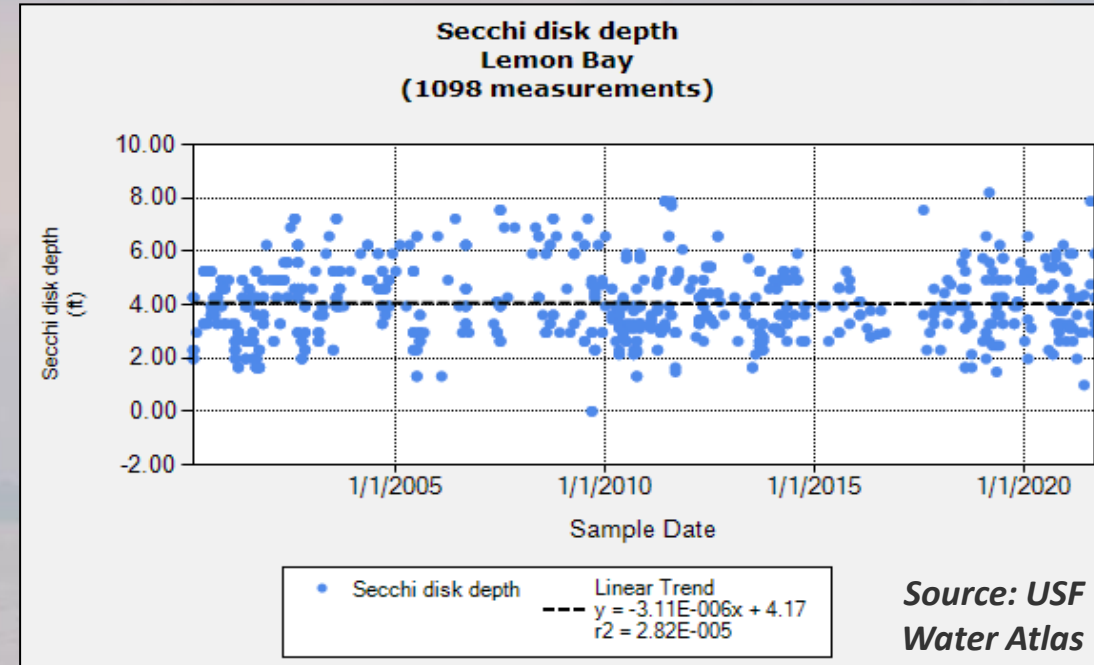
Source: SWFWMD



Seagrass Max Depth in Lemon Bay X Year

Source: FDEP CHAPS

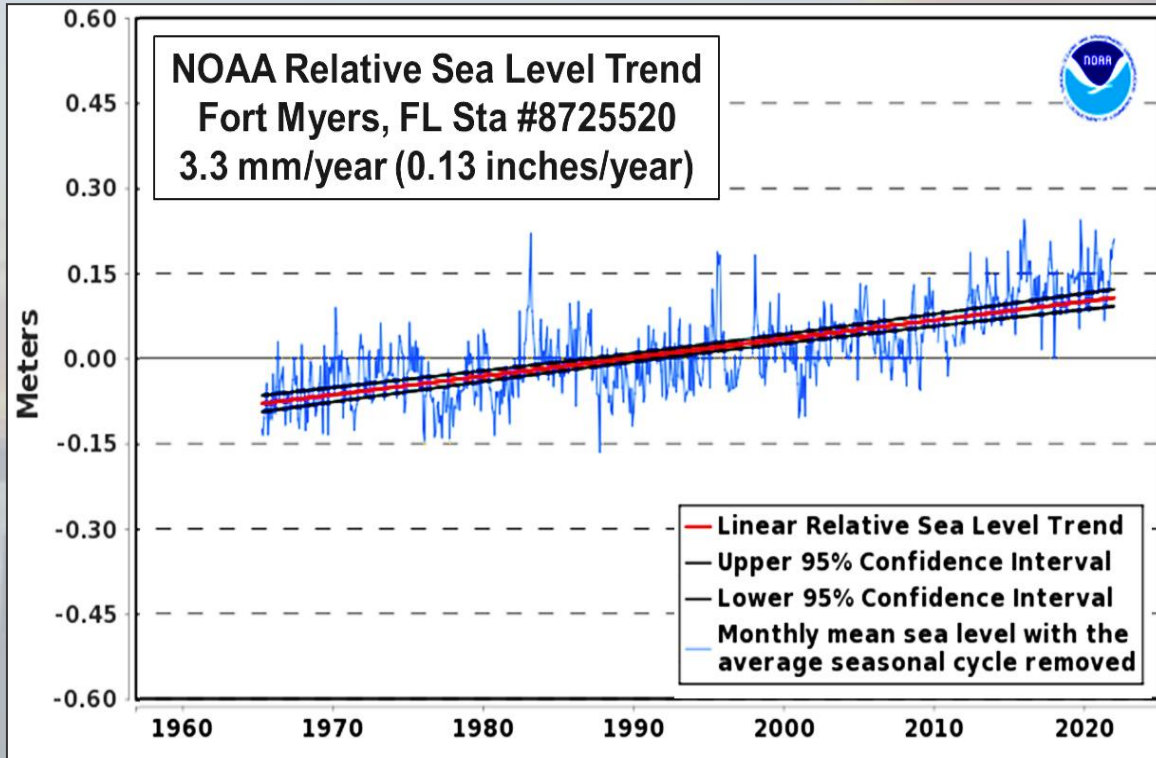
Interestingly, Water Clarity Appears Stable:



Source: USF Water Atlas

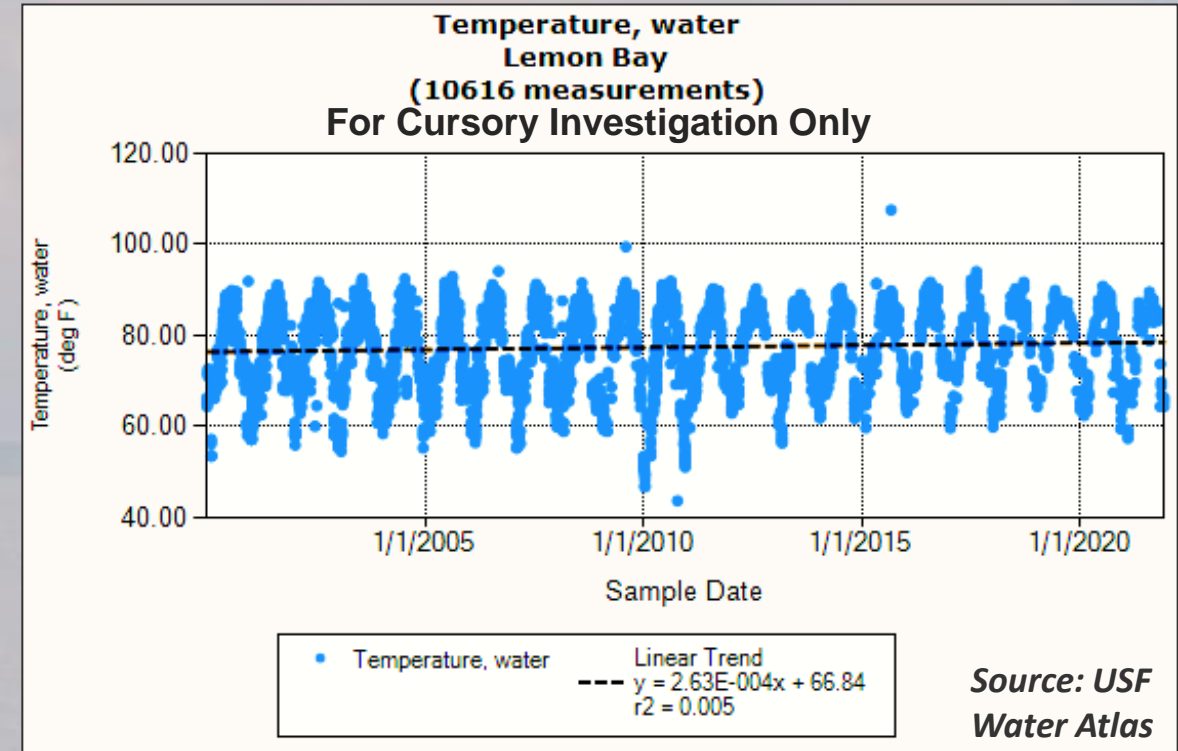
Water Level is Rising:

- +5 Inches in 40 Years Locally



Water Temperature is Rising:

- +5 Deg F in 20 Years Locally



Runoff Speed is Increasing:

- Storms Intensity is Increasing
- Impervious Surfaces are Increasing
- Runoff Potentially Getting Flashier
- Faster Runoff Carries More Sediment & Pollutants



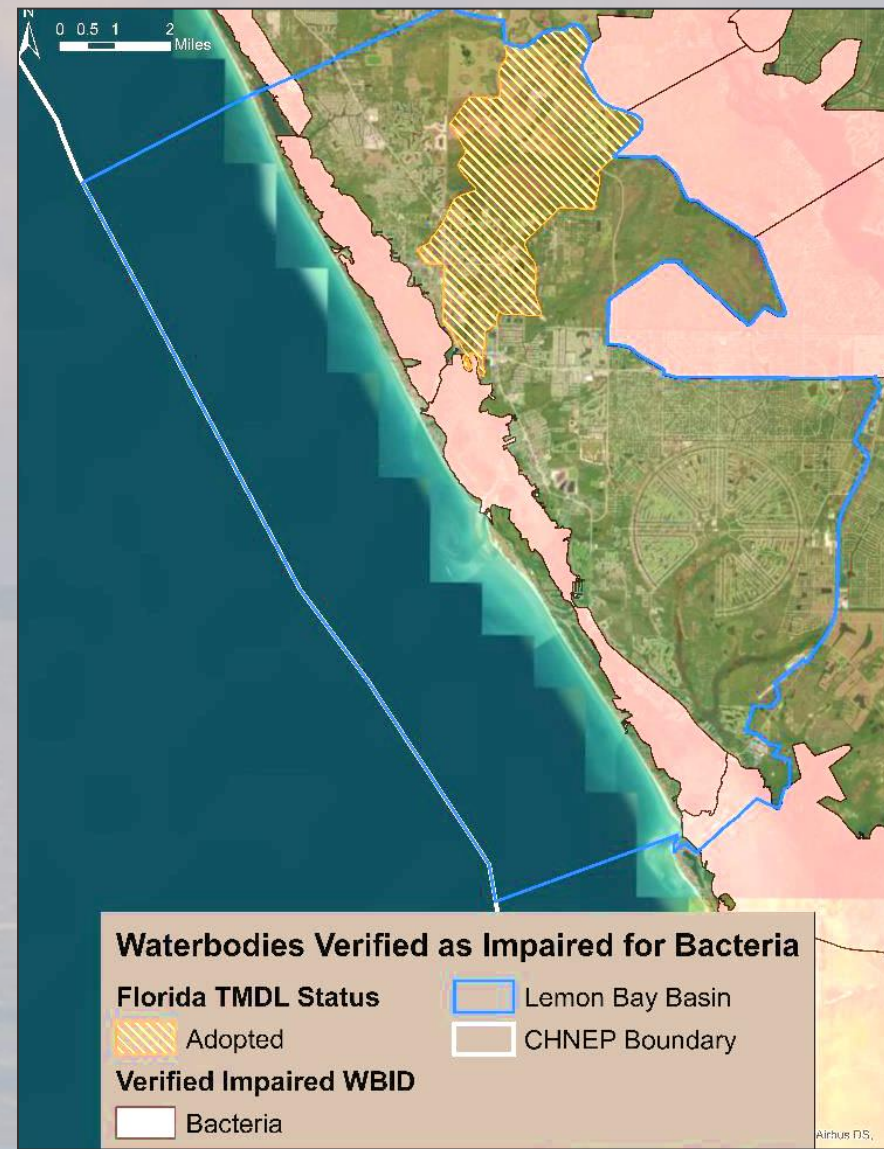
Nutrients are Higher than Required by State Standards:

- Water Quality Standards – How Waterbodies Meet Desired Use.
- Purpose – Identify Waterbodies that Need Restoring & Protecting.
- Defined – in State Regulations (62.302 FAC), with Federal Authority.
- Set Limits of Pollutant Discharges – from Public & Private Facilities.
- Different – for Fresh vs Salt Waters.
- Nutrient Standards for Estuaries – Adopted by FL in 2012.
- Waterbodies Worse than Standards – are “Impaired” & Must Implement Restoration Actions in Watershed.

Water Quality Standards for Lemon Bay Estuarine Waters (62-302 FAC)				
Basin	Chl (ug/L)	TP (mg/L)	TN (mg/L)	Bactria
Upper Lemon Bay	8.9	0.26	0.56	See FAC
Lower Lemon Bay	6.1	0.17	0.62	See FAC

Lemon Bay is “Impaired” for Nutrients & Bacteria:

- See CHNEP Lemon Bay Surface Water Quality Status Report 2019



What are the Causes of these Threats?

We Know the Basic Causes:

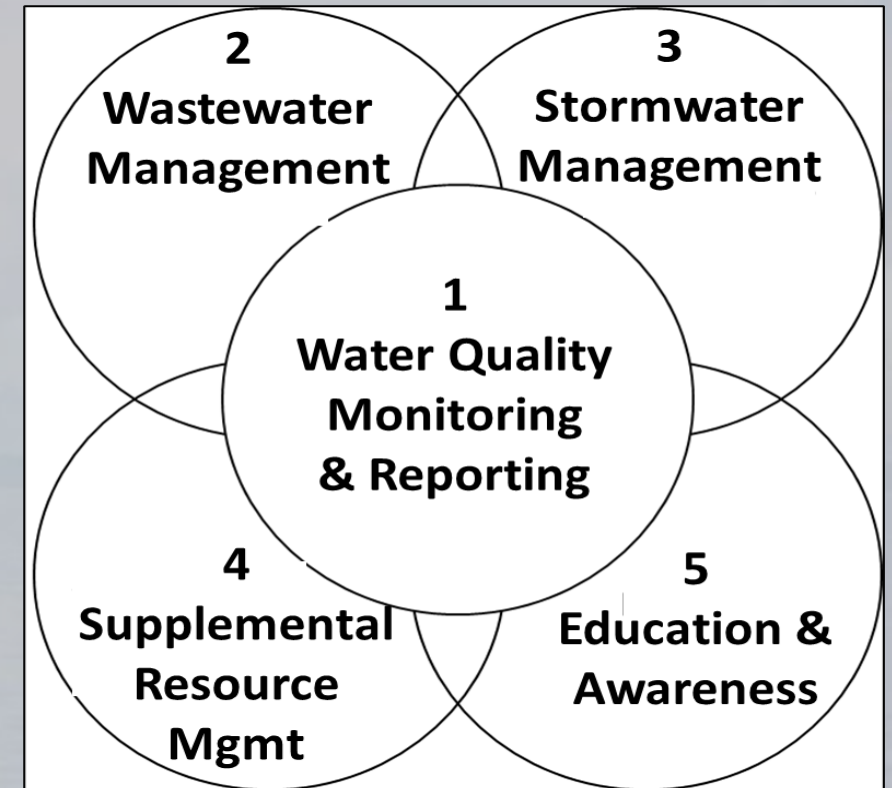
- Too Many Nutrients from Human Activities – Worsened by Climate Change
- Wastewater & Stormwater Runoff – Contribute Almost All Excess Nutrients
- Site Specific “Hot Spots” – of Locations & Parameters & Land Uses & Ages
- Rapidly Changing Conditions – Development, Storms, Sea Levels & Temperatures



What are the Solutions to these Threats?

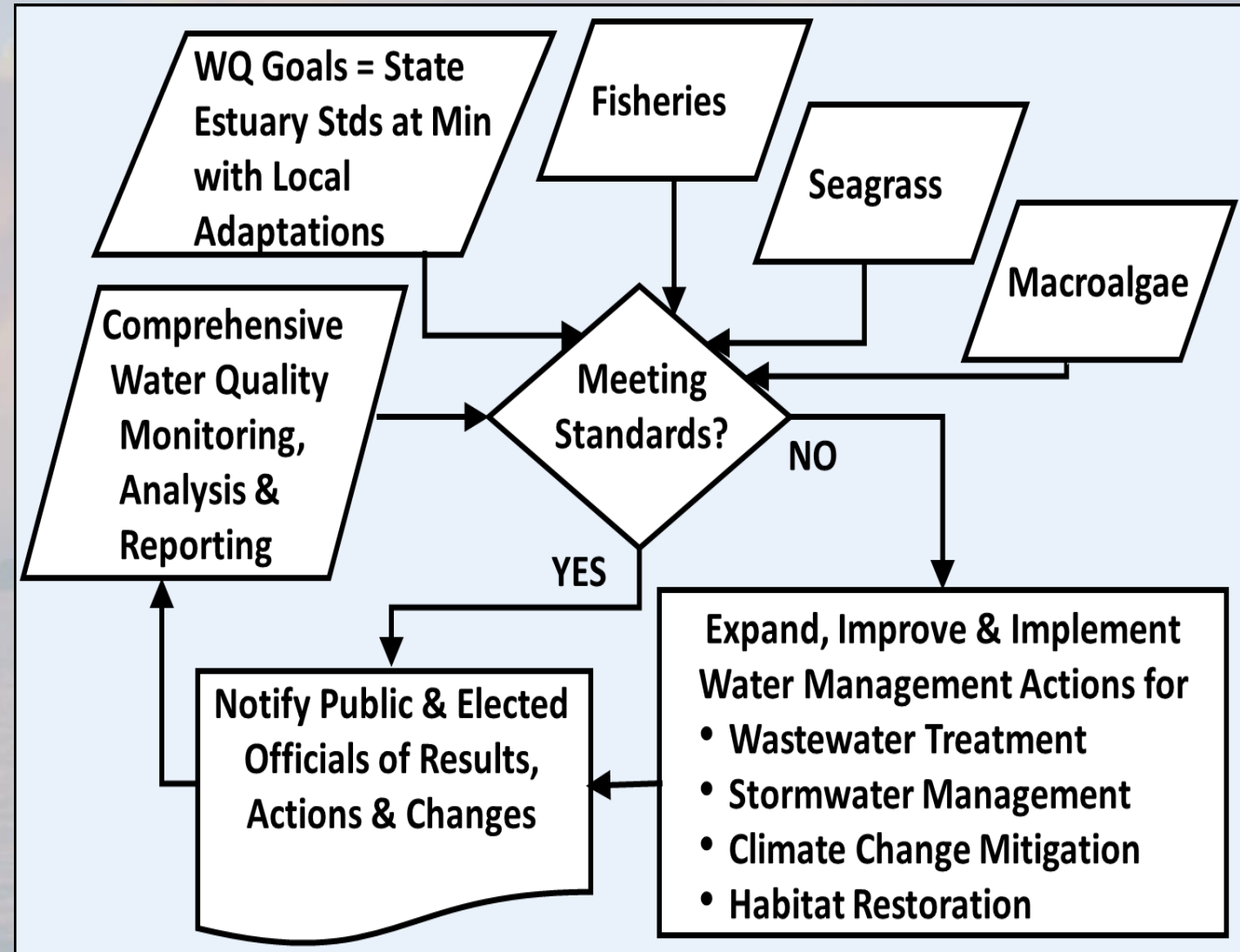
Essential Actions Include:

- Create a Comprehensive Water Resource Management Approach
- Declare a Water Resource Vision
- Monitor & Report Water Quality – Regularly in All Waterways
- Identify “Hot Spots” – Based on Monitoring
- Reduce Nutrients to Prescribed Levels – Focus on “Hot Spots”
- Improve Wastewater & Stormwater Mgmt – Fund & Schedule
- Support Supplemental Programs – For Climate & Water Quality



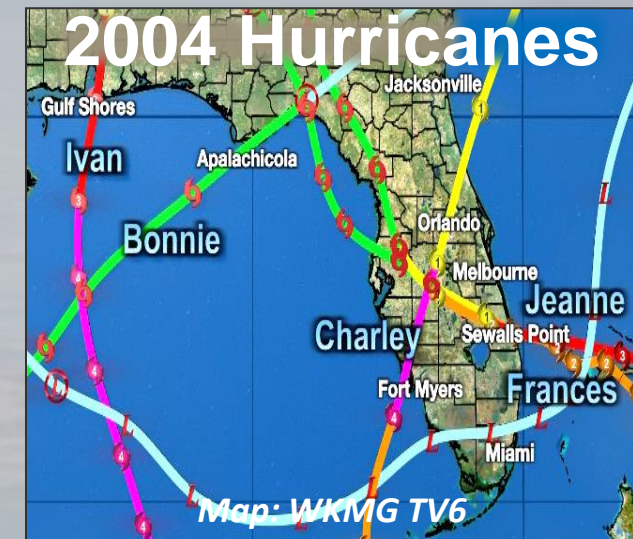
Use Science-Based Decision Process:

- **Work Together – for Sustainable Estuaries.**
- **Use State Standards – as Basis for Our WQ Goals.**
- **Adapt State Standards to Local Waters – Be Stricter Where Needed.**



Strong County Role in Changes & Solutions is Imperative:

- Local Responsibilities Hold Key Solutions – Knowledge, Zoning, Infrastructure, Education & Funding.
- Can Lead Coordination – Between Counties, Departments, Staff, Citizens & Elected Officials.
- Can Provide Healthy Waterways Vision.
- Responsible for Wastewater & Storm Water Management – Location, Design, Funding, Scheduling.
- Closest to Impacts & Solutions – Water & Climate Adaptation & Mitigation
- Citizens Can Participate in Local Decisions.



“K to Gray” Education & Awareness Campaign Ideas:

Audiences:

- School Kids
- College Students
- Adults
- New Residents
- Elected Officials
- Staff

Example Materials Needed:

- Estuaries & You
- Water Pollution Basics
- Human Impacts & Estuaries – History & Future
- Water Quality Monitoring & Reporting
- Managing Water to Meet State Standards
- Wastewater & Stormwater Explained
- Florida Friendly Landscaping
- Reducing Our Climate Impact

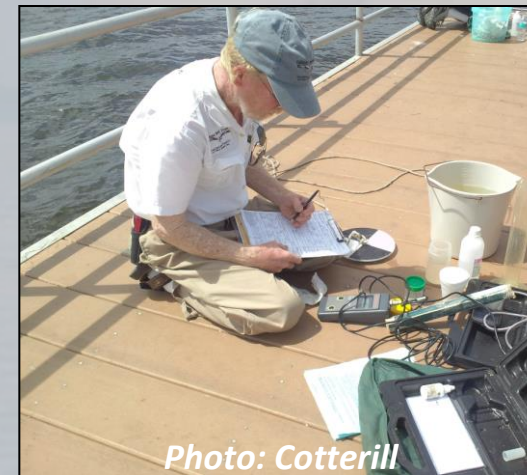


Photo: Independent School Parent

How Can We Help Restore & Protect Lemon Bay?

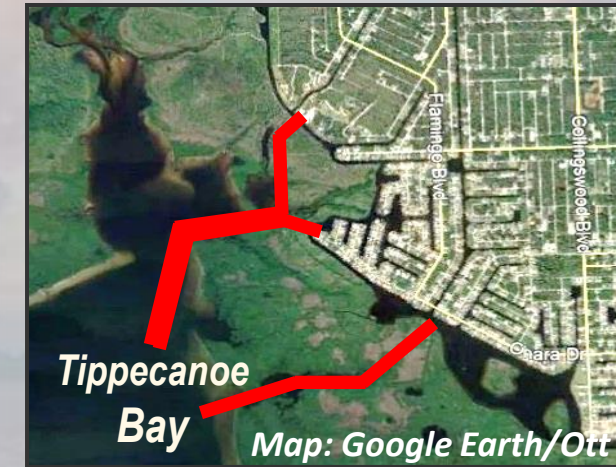
Basics:

- Keep Informed & Keep Learning – about Nature, Water & Climate.
- Vote – for Elected Officials & Good Choices.
- Act – As Citizen Scientist & Neighborhood Steward.
- Advocate – for Comprehensive Water Quality Management Approach & Vision.
- Reduce – You Water Quality & Climate Footprint.

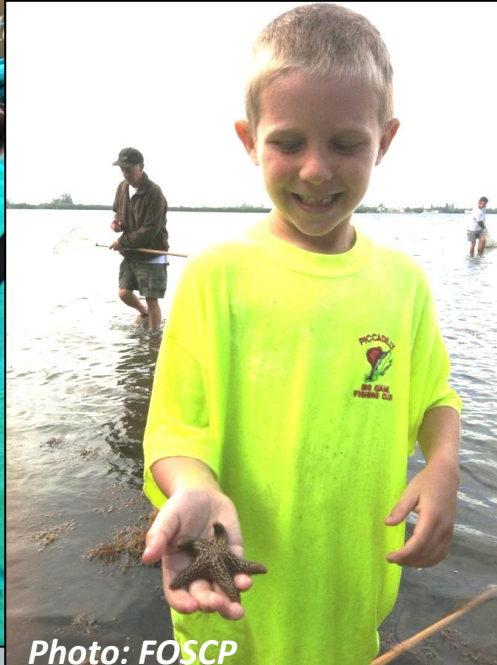


Specifically:

- Attend Charlotte Co Water Summit – March 7!
- Pump Your Septic System & Support Sewers!
- Be Careful with Reuse Water as Irrigation!
- Plant Natives (Many) – at Home & Neighborhood!
- Discourage Tippecanoe Dredging!
- Take a Class or Seminar –
CHEC, IFAS, LBC, Water Atlas, CHEP, Ecopapak
- Become a Scientist – CHEVWQMN, Eyes on
Seagrass, Scallop Search, Wildflower Tarpon
- Become a Steward – NEST, Oyster Gardening
- Take 1 Step in Reducing Your Carbon Footprint
- Join New Peace Myakka Water Keepers



What are the Take Home Messages?



- Lemon Bay is Special
- Healthy Bay Necessary for Economy & Lifestyle
- Managing Bay's Water Quality is Key to Healthy Estuary
- We Know Many Solutions
- We Can Help with Solutions
- Pick 1 Action & Start – Now

Where Can We Find More Information?

Presentations, Reports & Current Science Links:

<https://ecopapak.org>

Water Quality & Other Data:

<https://chnep.wateratlas.usf.edu>

One Charlotte, One Water:

<https://www.charlottecountyfl.gov/one-charlotte-one-water/>

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