



# A LANDSCAPE SCALE APPROACH TO RESTORE & MANAGE ESTUARIES

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**Nicole Iadevaia**

**CHNEP Director of Research & Restoration**

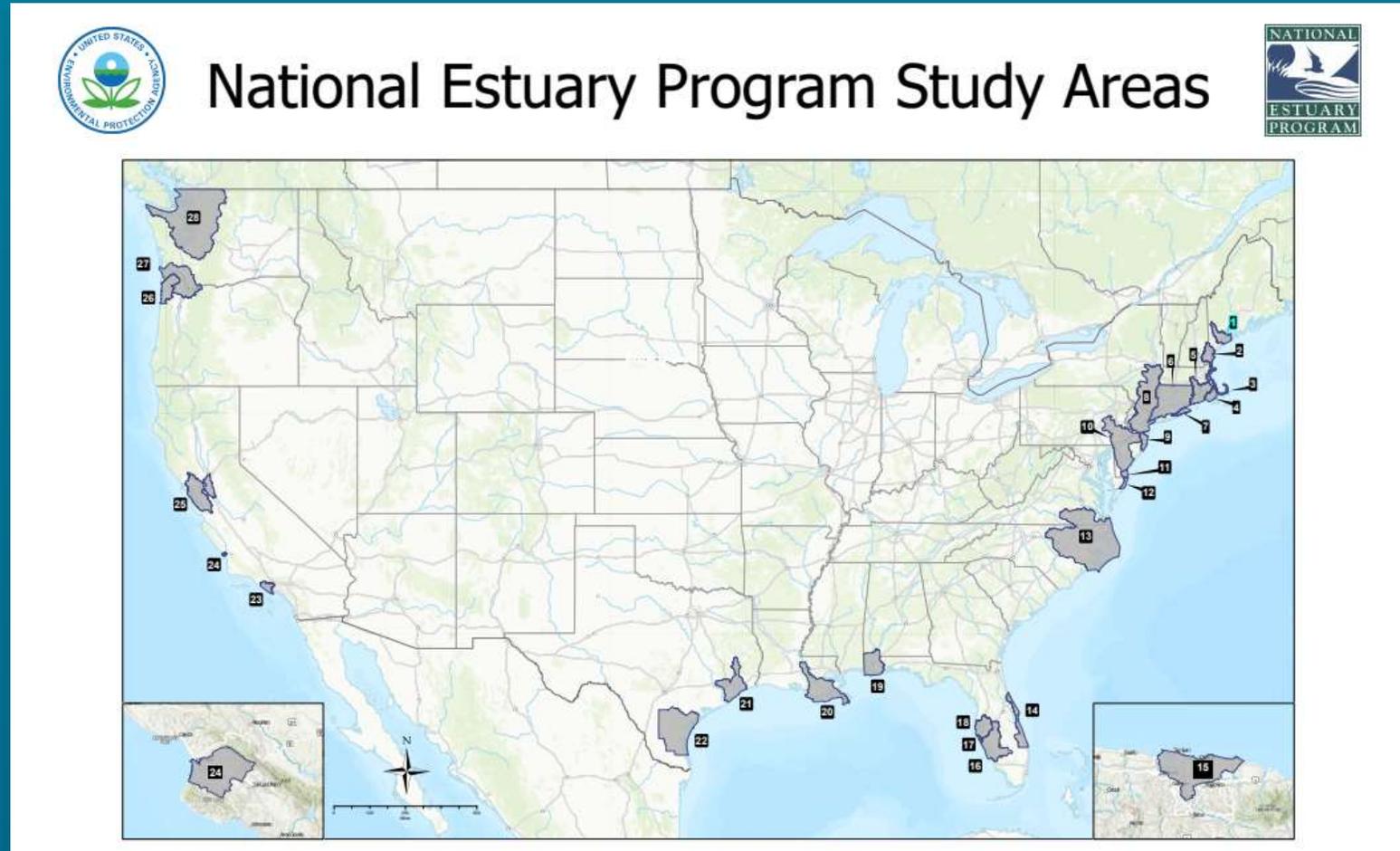
**January 2025**



*Photo courtesy: Steve Russell*

# ABOUT US

- Member of US EPA's 'National Estuary Program'
- Established by Congress under section 320 of the Clean Water Act (CWA) in 1995
- Congressional Appropriation through Clean Water Act to protect and restore 'Estuaries of National Significance'
- 4 NEPs in Florida, 3 on the West Coast



EPA



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# WHERE WE WORK

- 'Place-based' Management
  - Protecting estuaries & their watersheds
- Leverage federal funds with local
- Planning for natural resources & communities
- 8 basins in Central and Southwest FL (5,416 sq. miles)
- Inland and coastal Communities
  - ✓ 10 counties and 25 cities
- Public-Private Partnership (PPP) model
  - ✓ NEP = staff + agency/local govt. reps, research scientists, universities, NGOs, private sector scientists, community environmental groups.



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# WHAT WE DO

A Regional Strategic Plan for the Partners:

- Convening & Facilitating
- Community Driven
- Consensus-based science
- Climate resiliency
- Non-regulatory
- Regional Collaboration
- Research and Planning
- Distribute Roles & Amplify Individual Efforts
- Connecting to Policy Decisions



Water Quality  
Improvement



Hydrologic  
Restoration



Fish, Wildlife &  
Habitat Protection



Public  
Engagement

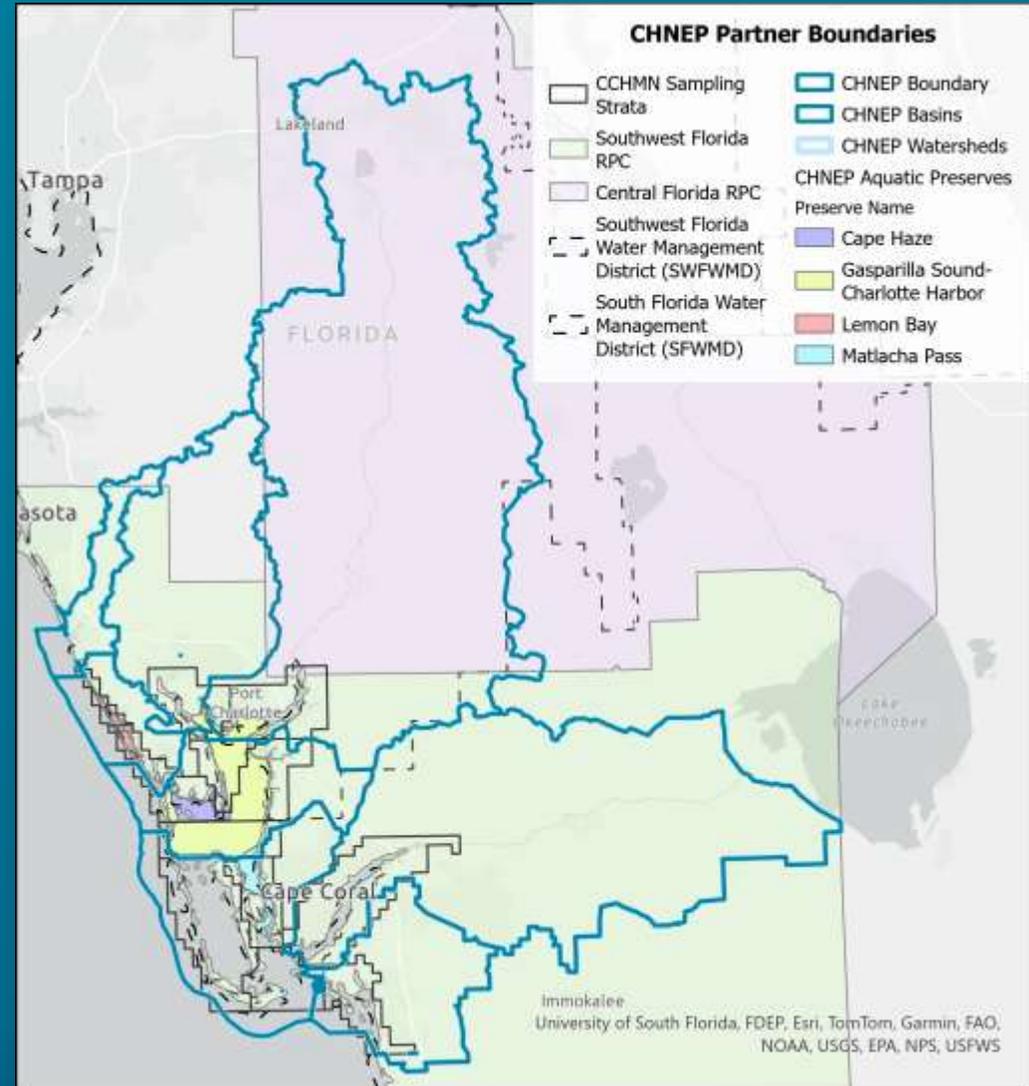


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# BREAKING OUT OF SILOS

Holding regular meetings, create time and space for cross-jurisdictional coordination between agencies that manage water flows, permitting & capital projects with research scientists, local governments and natural resource managers.

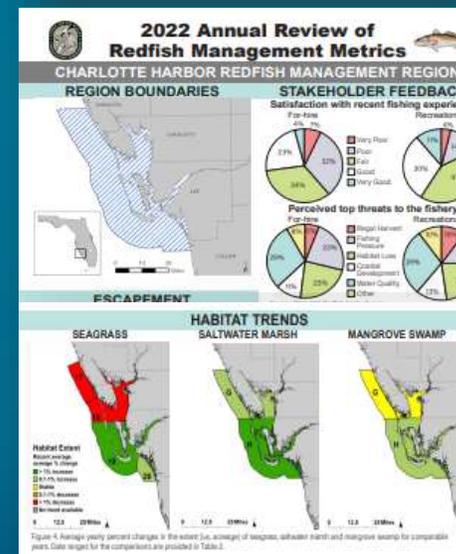
- 10 counties/25 Cities
- 2 Water Management Districts
- 2 State/2 Federal Resource Agencies
- 2 Regional Plannings Councils
- 5 Watershed Initiatives
- Multiple permitting entities



# HOW WE MANAGE

## HOLISTIC MANGEMENT APPROACH

- What are metrics used by stakeholders to measure estuary and habitat health? (research scientists, agencies, local govts., NGOs)
- Create space for partners to share resources, discuss problems, identify gaps and to collaborate on funding for building solutions.
- How to weave hydrologic restoration 'Watershed Planning' initiatives with downstream estuary and fisheries management?



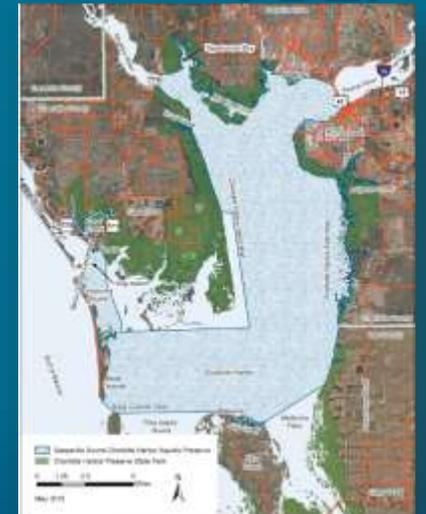
SWFWMD

SFWMD



FWC

FDEP



# MEETING COMMUNITY NEEDS

*MANGEMENT FOR WATERWAY, HABITAT AND SPECIES HEALTH NEEDS TO ALSO BALANCE HUMAN COMMUNITY NEEDS*

- Need to meet community demands for public health, drainage, drinking water, navigation, and recreation while preserving the ecological health of natural systems across jurisdictional boundaries.
- Solutions also need to work in the built environment.



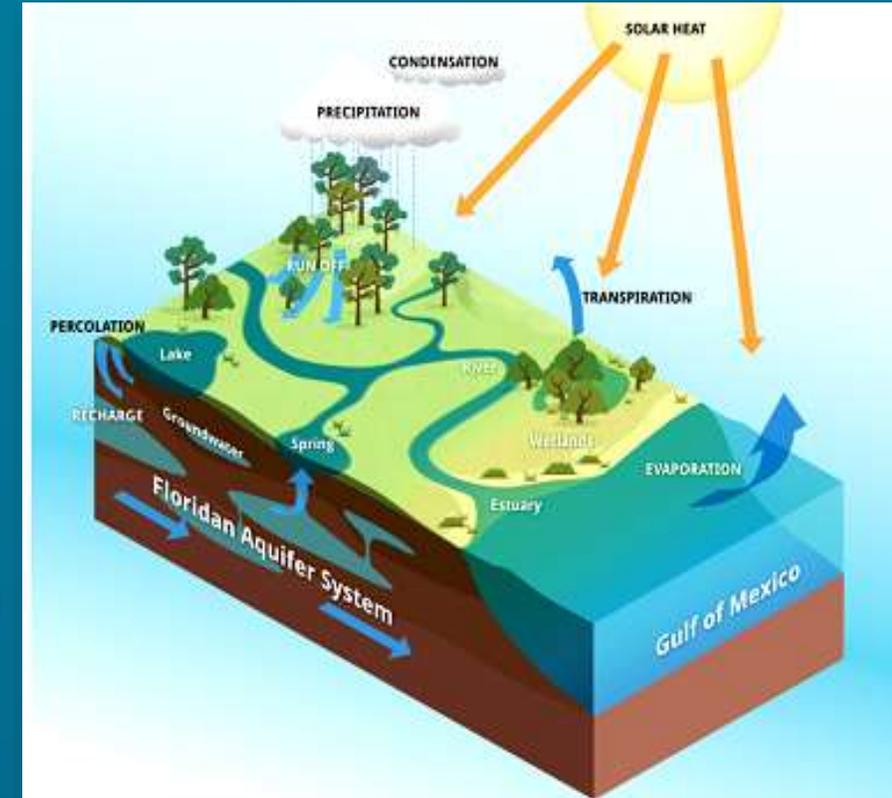
*LARGE-SCALE PLANNING IS COMPLEX, COSTLY & HAS POLICY IMPLICATIONS*

- Planning and Management of these important ecosystems needs a multi-partner, phased approach- NEP, Watershed Initiative, RPC, NGO or University to lead.
- Focus on a landscape-level strategy- research & restoration projects in natural areas can be targeted. Work with planners in the built environment and policy makers for buy in.



# PROBLEMS IN THE WATERSHED

- Unique challenges in the watershed include patchwork of development and travel corridors that are major flow path impediments.
- Wetland habitats at micro-elevation and hydroperiod-scale.
- Period of rapid growth, development in remaining natural areas.
- Meeting the needs of both inland and coastal communities, and economies dependent on clean water and healthy ecosystems.
- Also need to account for compounding climate factors and resilience planning to address vulnerable areas



*Courtesy of USF*

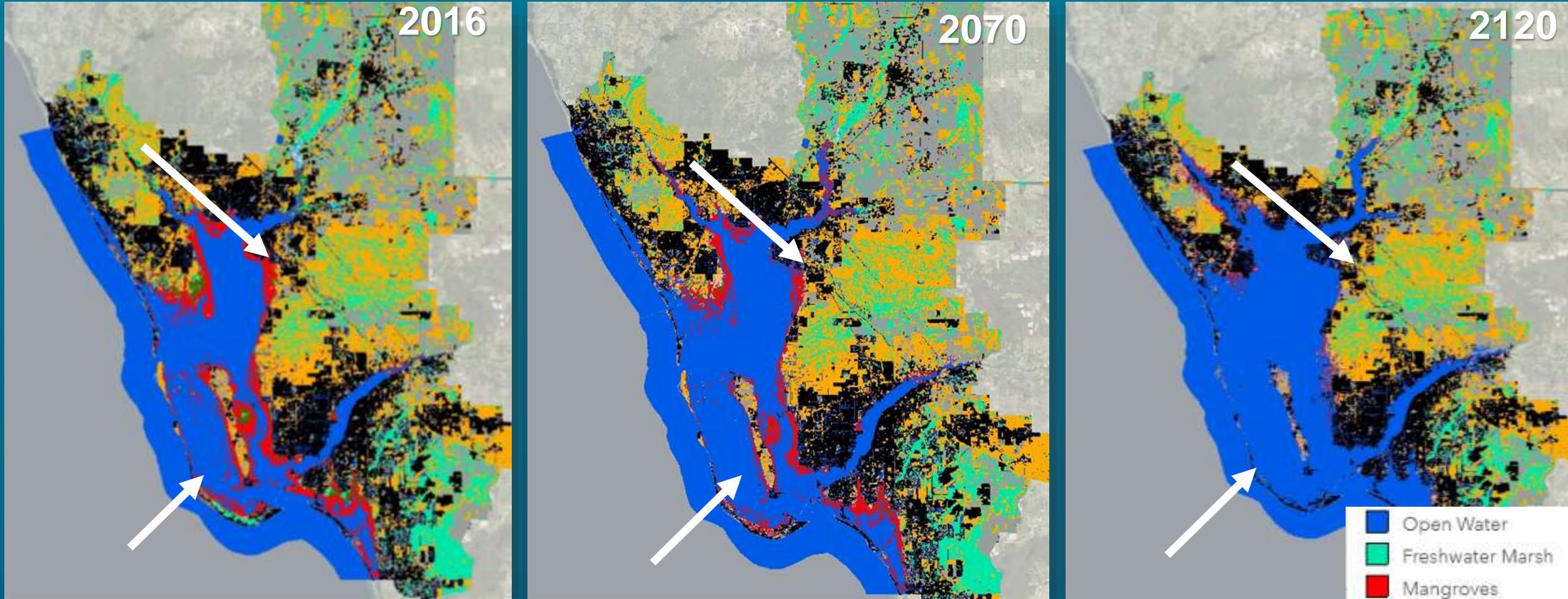


# REDUCED FRESHWATER FLOWS

- Existing hydrologic degradation includes ditching and draining of wetlands and re-directing flow for development and increased consumptive use.
- Climate change will alter rainfall patterns to compound existing problems. (ex: Increased flooding during more intense rainfall events or less freshwater flow in creeks during dry season.)



# INCREASED SALINITY: ACCELERATED SEA LEVEL RISE/ AQUIFER INTRUSION



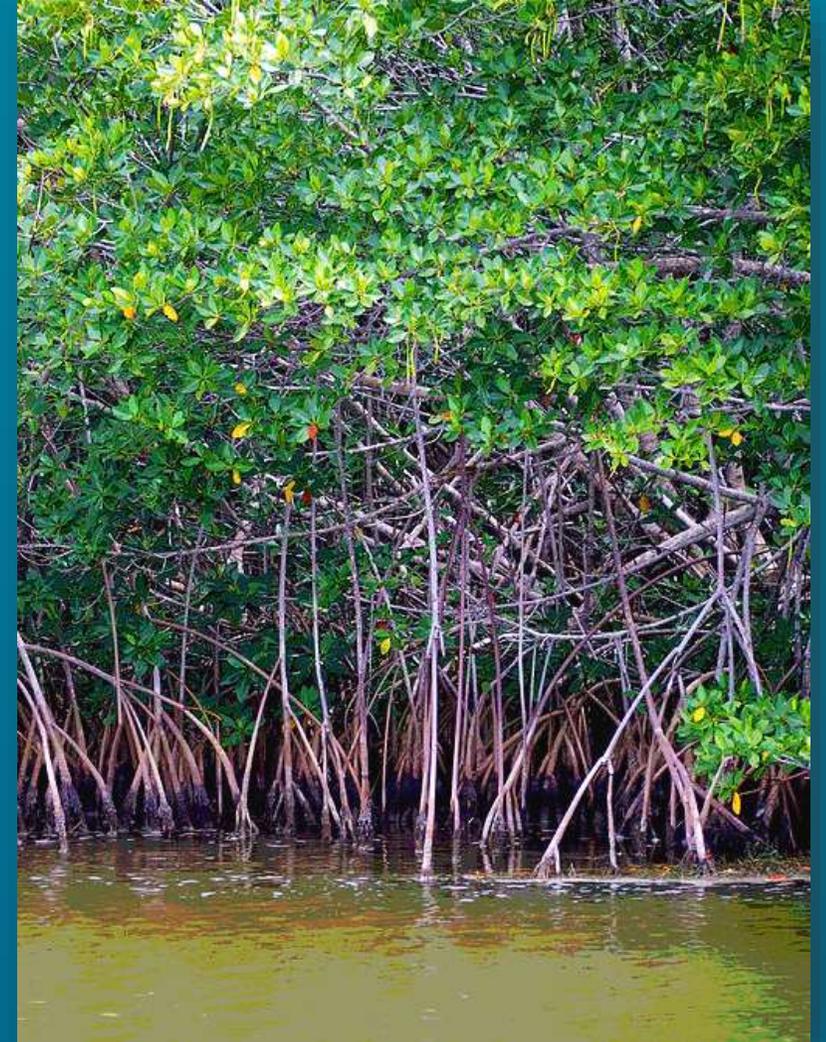
(CHNEP HEM 2019) 2017 NOAA Int-High SLR, Low Accretion.



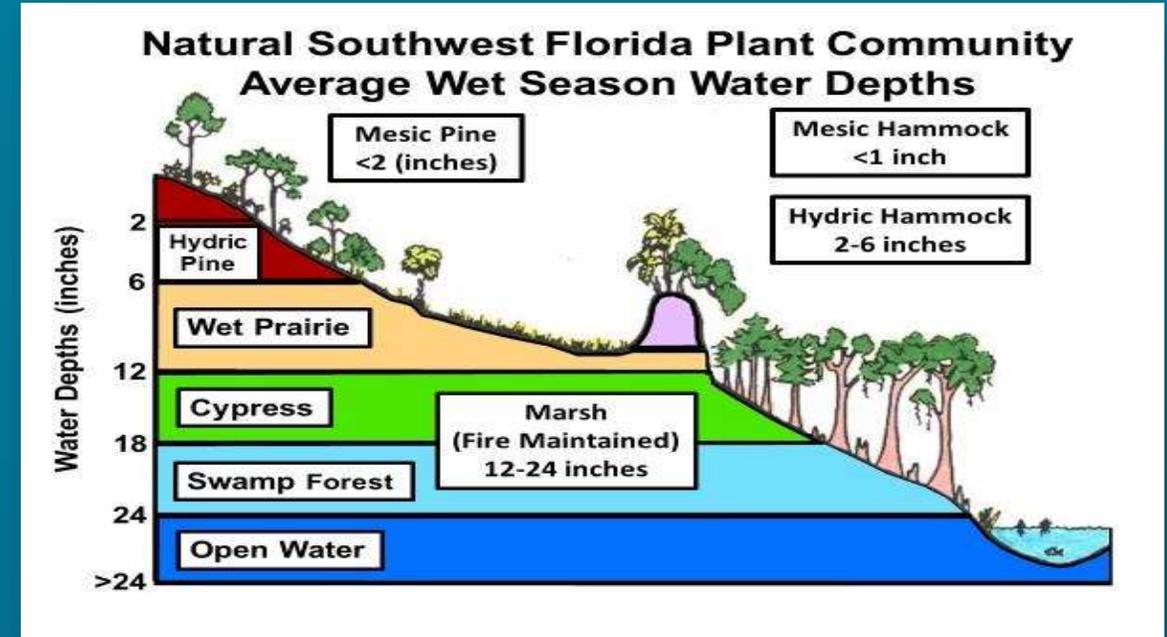
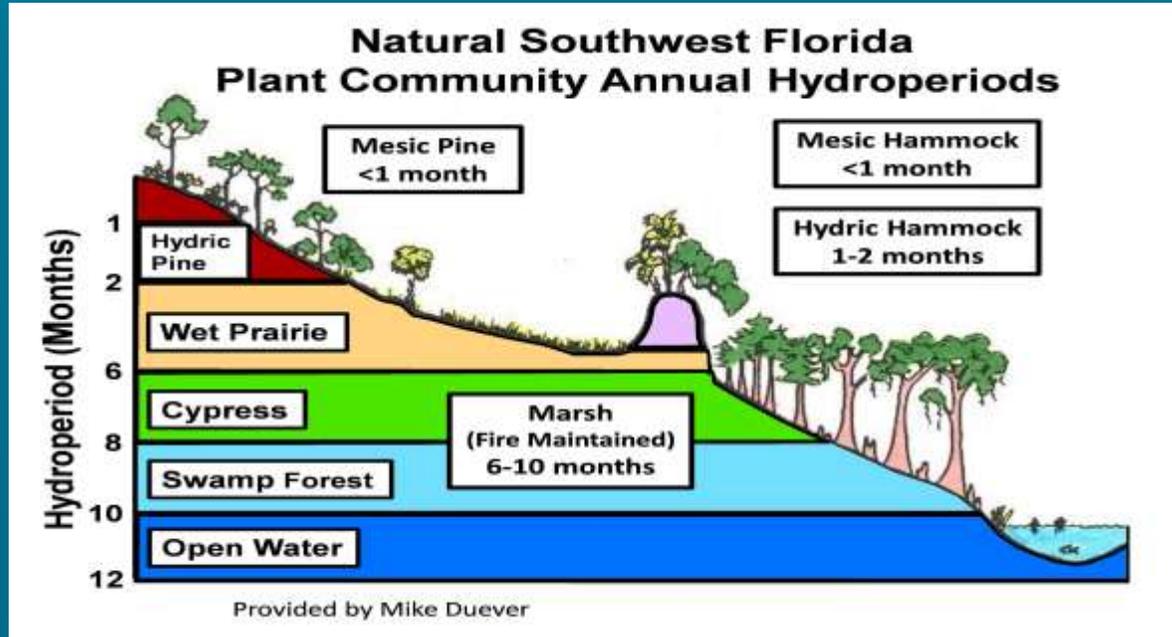
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# COASTAL HABITATS IN NEED: 'SQUEEZED OUT'

- Tidal wetlands will expand landward where suitable slopes and substrates exist
- Mangroves will encroach into and eventually replace existing salt marshes
- Salt marshes will be relegated to the tidal rivers and will need suitable salinity gradients and riparian slopes to sustain their presence in the CHNEP estuarine system
- The expansion of mangrove habitats will be short-lived as they too are pushed out between open water and hardened shorelines



# WETLANDS IN NEED: CHANGES IN HYDROPERIODS & WATER DEPTHS



Optimum Wetland Hydroperiods and Average Wet Season Water Depths for South Florida Wetland Communities, Courtesy of Duever & Roberts (2013)

Coniferous wetlands (cypress swamps), non-forested wetlands (marshes), wet prairies, upland forests and rangeland habitat areas are at high risk to transition (>30%) due to a combined climate factors (ex: temp., EVT, rainfall) (CHNEP HRN 2022)



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# CHANGES IN THE ESTUARY

- Seagrass habitat loss & Increased macroalgae
- Impacts from reduced flows to tidal creeks/increased salinity pushing upstream
- Changes in Water Quality/Chemistry
- Loss of shellfish species

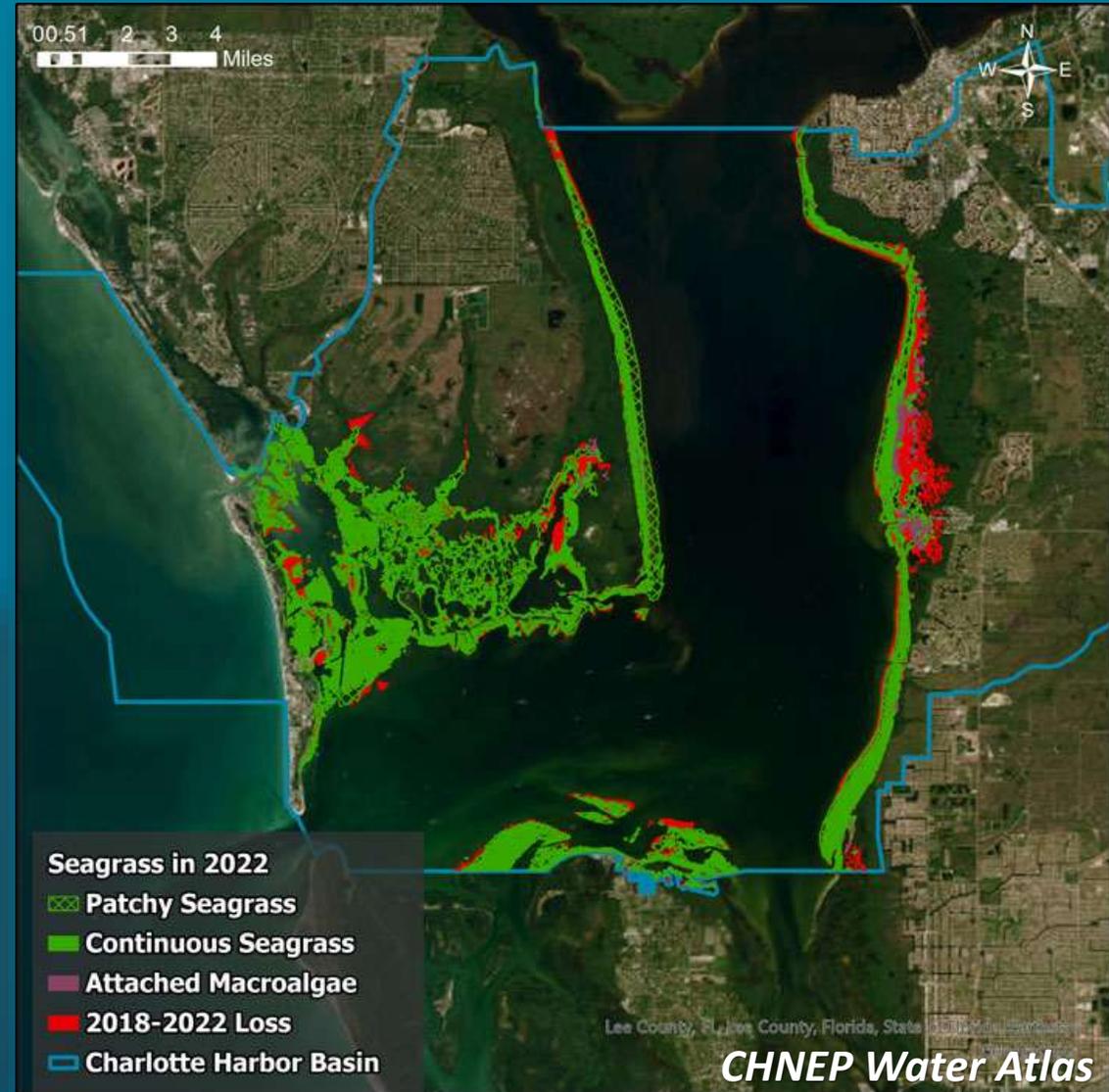
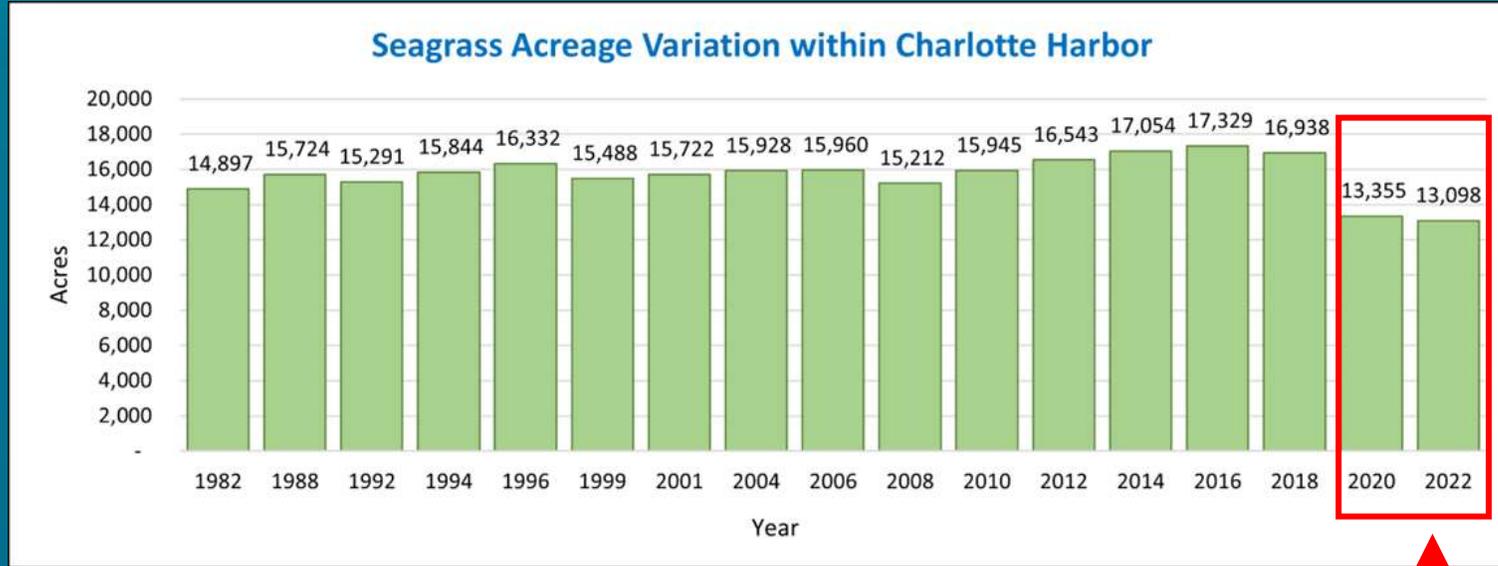


Table 11. Seagrass coverage by sampling area in the Charlotte Harbor region in 2014, 2018 and 2021/2022 compared to seagrass management targets | CHNEP.

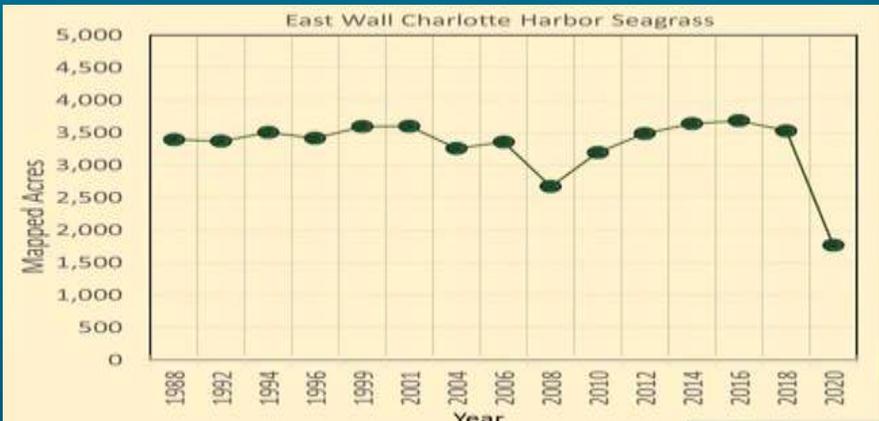
Sampling Area	2014 (acres)	2018 (acres)	2021/2022 (acres)	Target (acres)
Dona and Roberts Bays	103	120	34	112
Lemon Bay	4,203	3,763	3,108	3,891
Tidal Myakka River	399	378	171	456
Tidal Peace River	652	654	278	975
Gasparilla Sound-Cape Haze	6,953	7,105	5,993	6,998
Charlotte Harbor	10,101	9,833	7,105	9,346
Pine Island Sound-Matlacha Pass	37,282	no data	35,088	36,152



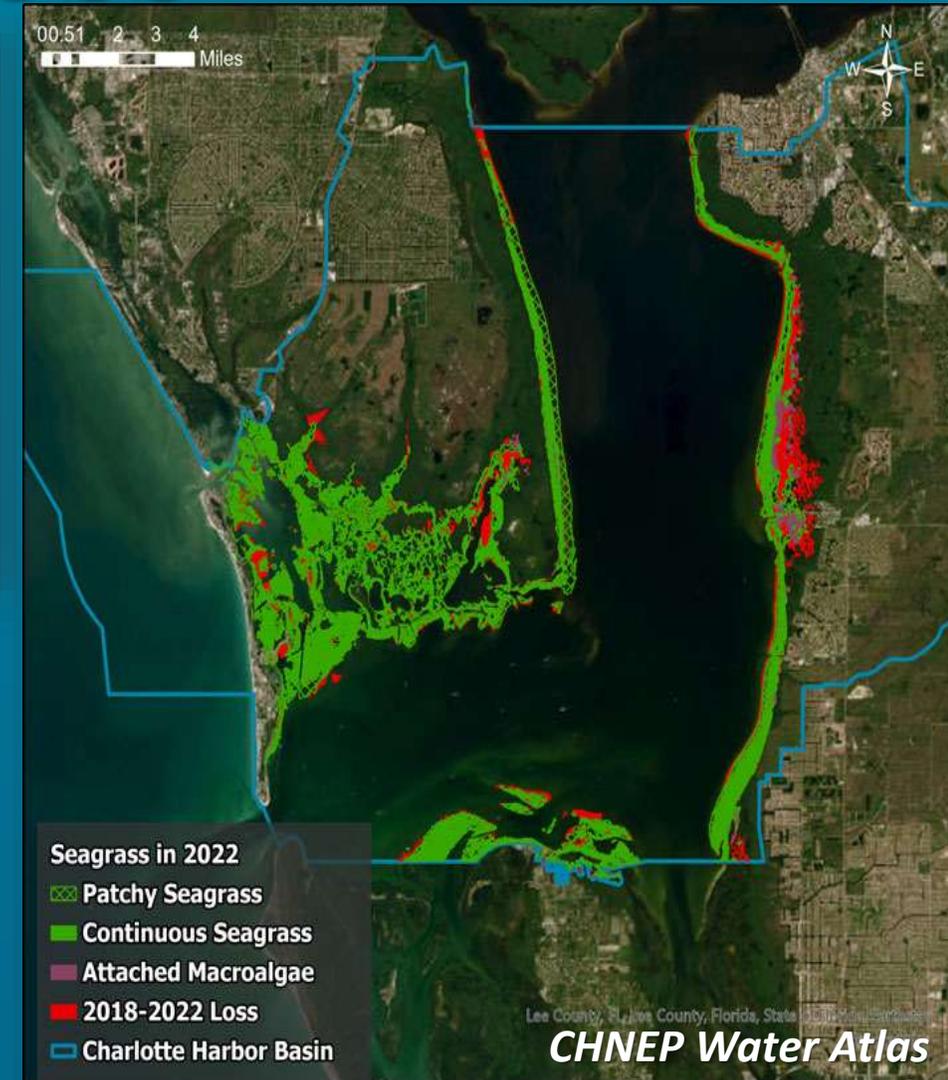
# SEAGRASS LOSS



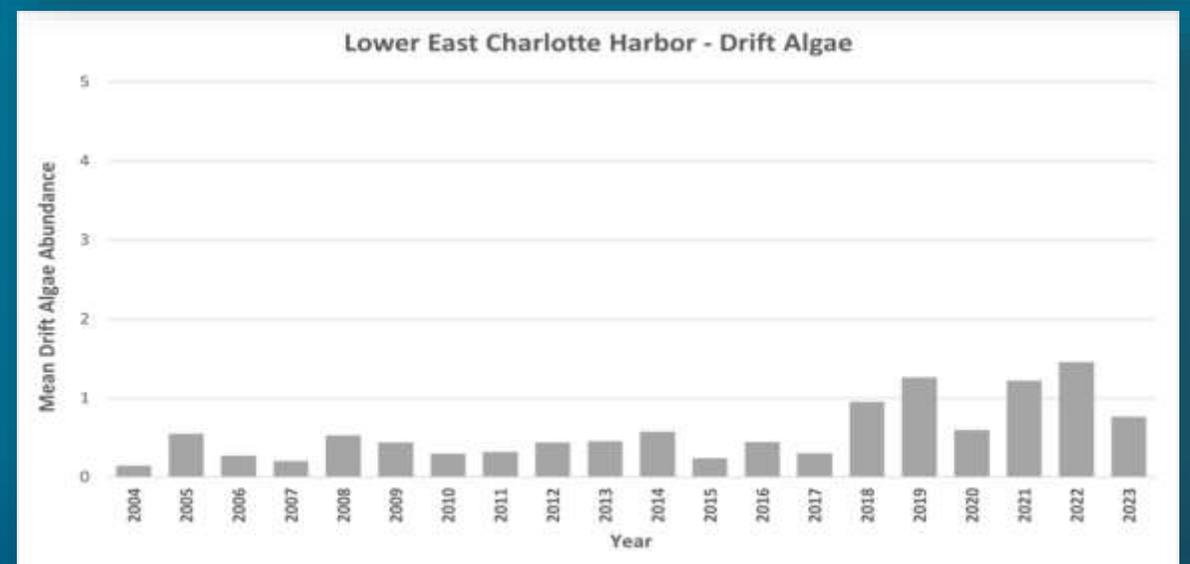
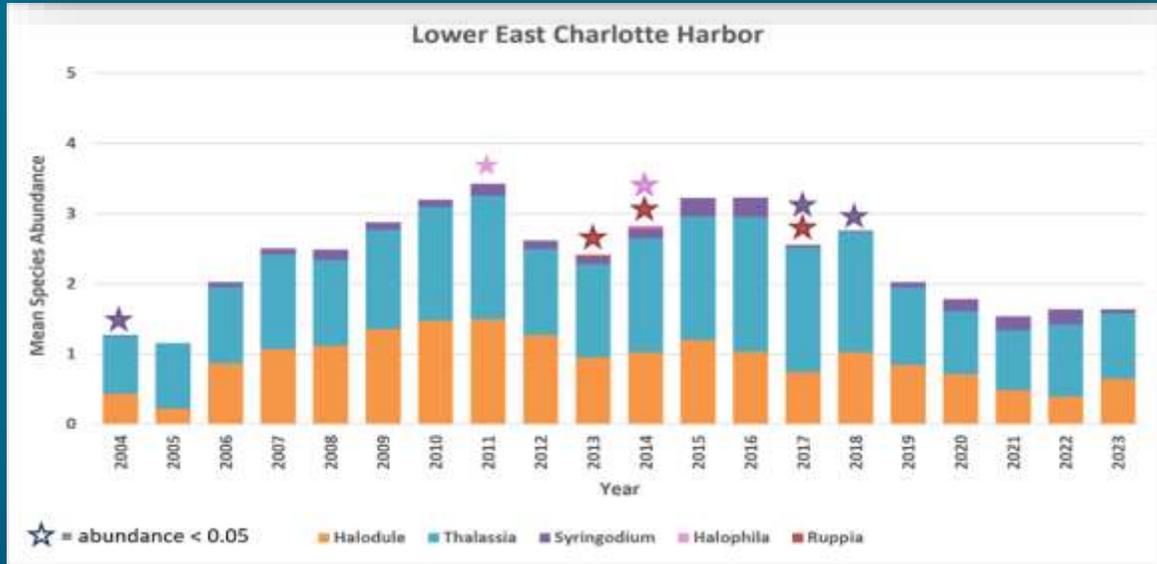
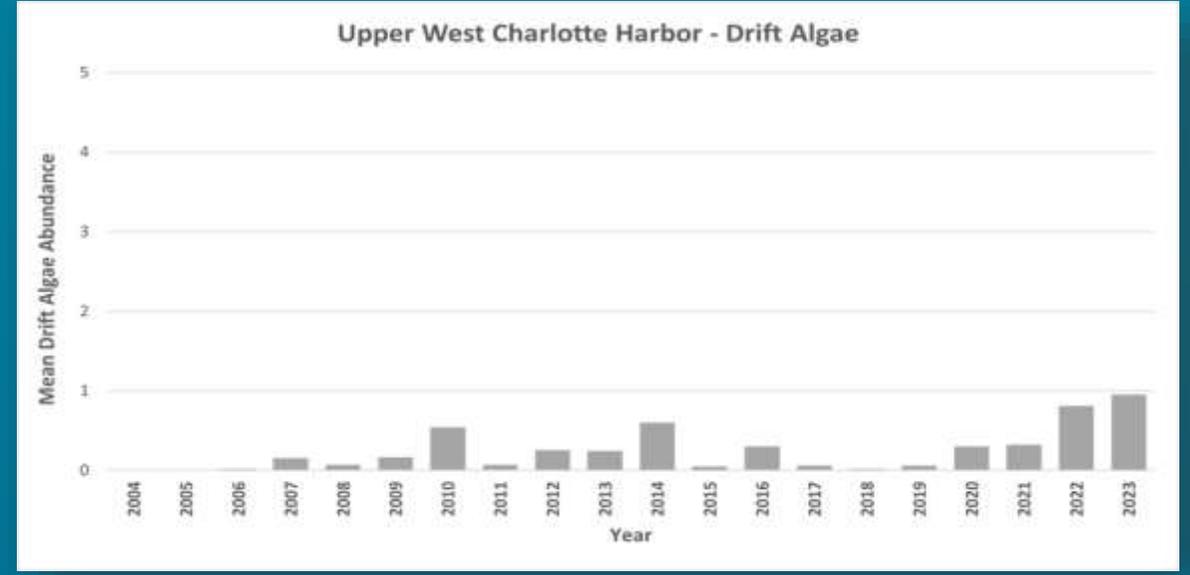
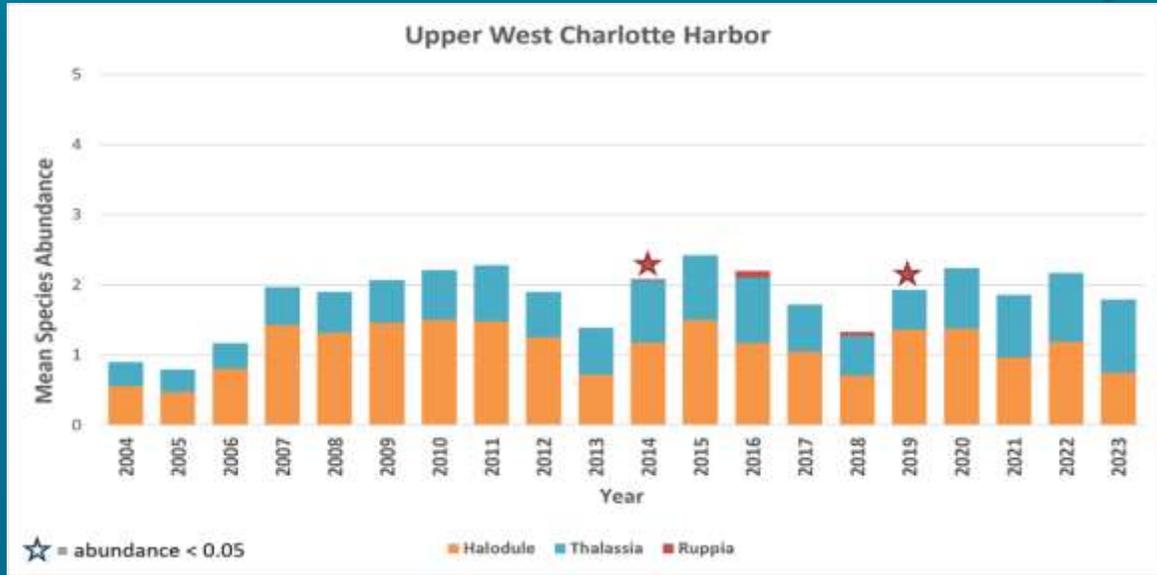
50% seagrass loss along the eastern shoreline of Charlotte Harbor (aka East Wall) from 2018 to 2020



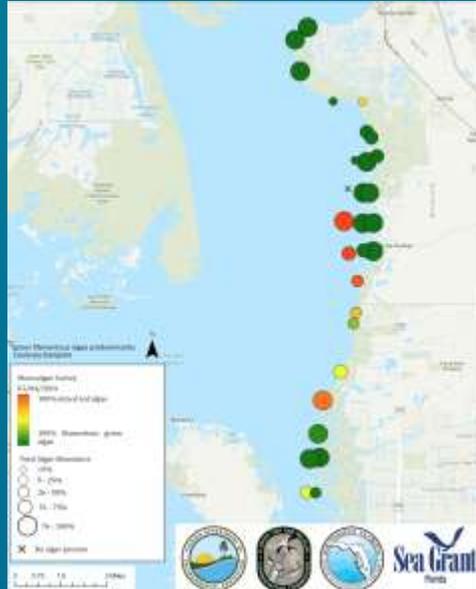
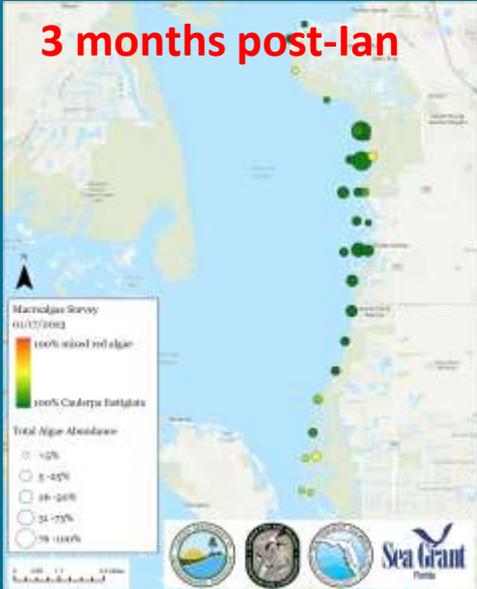
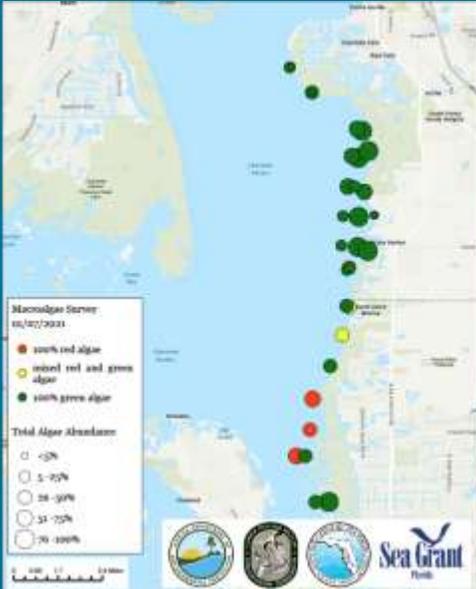
Anastasiou, C. (2022 presentation). The hangover effect: seagrass loss and macroalgal growth in Charlotte Harbor. Southwest Florida Water Management District



# SEAGRASS/ALGAE TRENDS

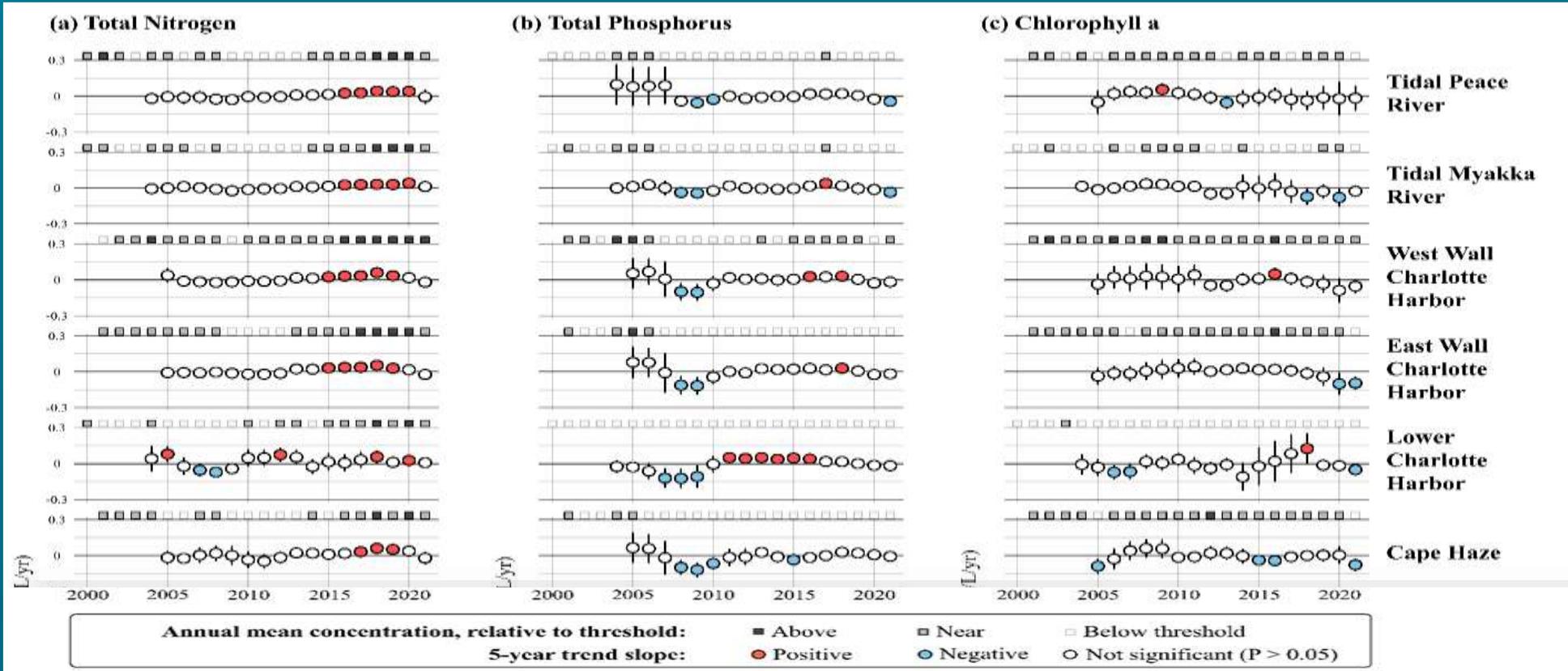


# ALGAE SURVEYS



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# WATER CHEMISTRY



Several strata qualified as nitrogen hot spots during the 2017–2021 period i.e., where Total Nitrogen was consistently elevated

During the 2010-decade, annual mean Total Nitrogen was generally elevated relative to specified thresholds and exhibited upward trends

‘Water quality trends and eutrophication indicators in a large subtropical estuary: A case study of the Greater Charlotte Harbor system in southwest Florida’

Soon to be published: Medina et al. *Estuaries and Coasts*



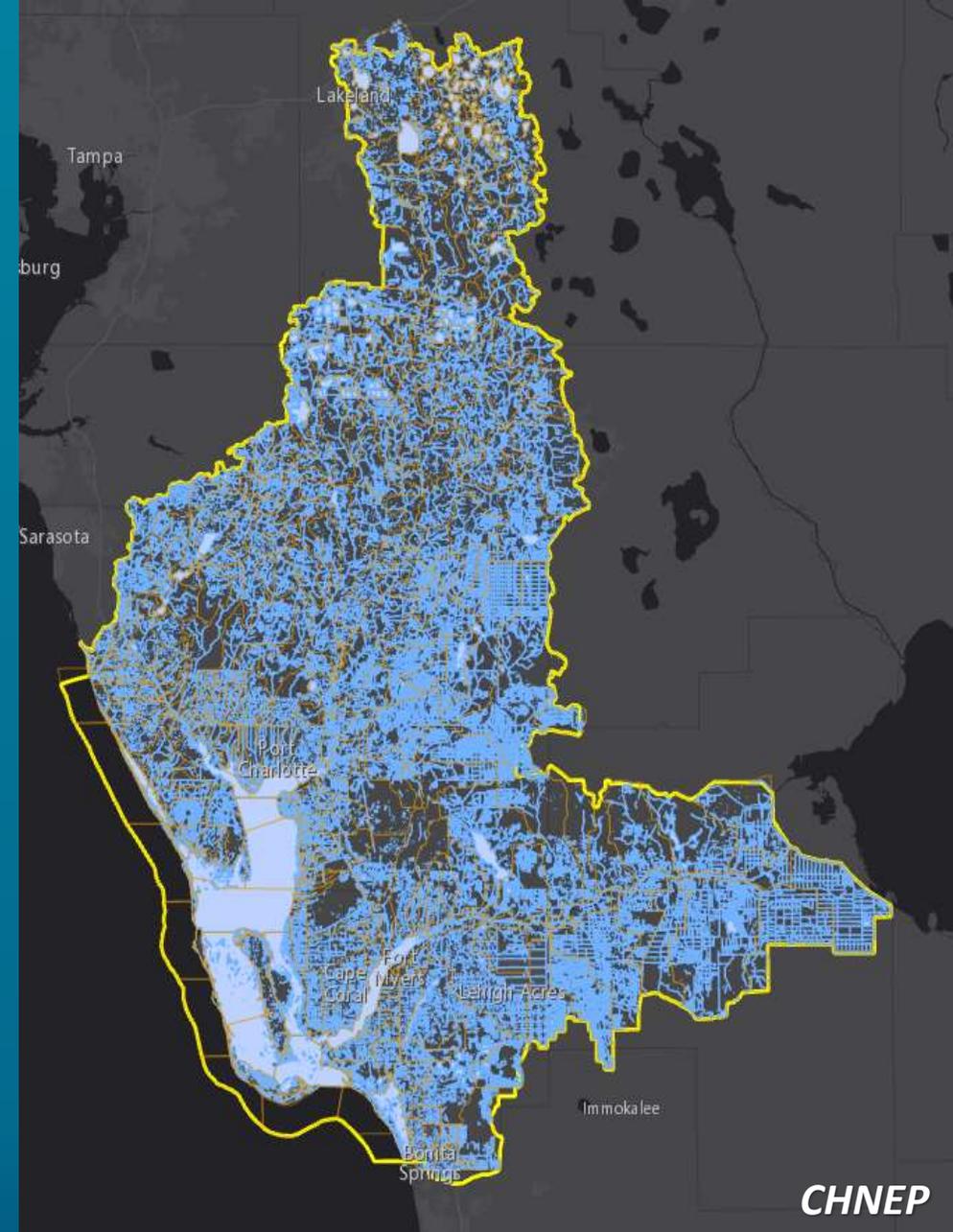
# MEETING GOALS

## *VISION FOR WATER QUALITY IMPROVEMENT*

Waters that meet their designated human uses for drinking, shellfish harvesting, or swimming and fishing, while supporting appropriate and healthy aquatic life.

**OBJECTIVE** Meet or exceed water quality standards for designated uses of natural waterbodies and waterways with no degradation of Outstanding Florida Waters.

**STRATEGY** Support comprehensive and coordinated water quality monitoring programs, and projects and programs that reduce pollutants entering waterways.



CHNEP



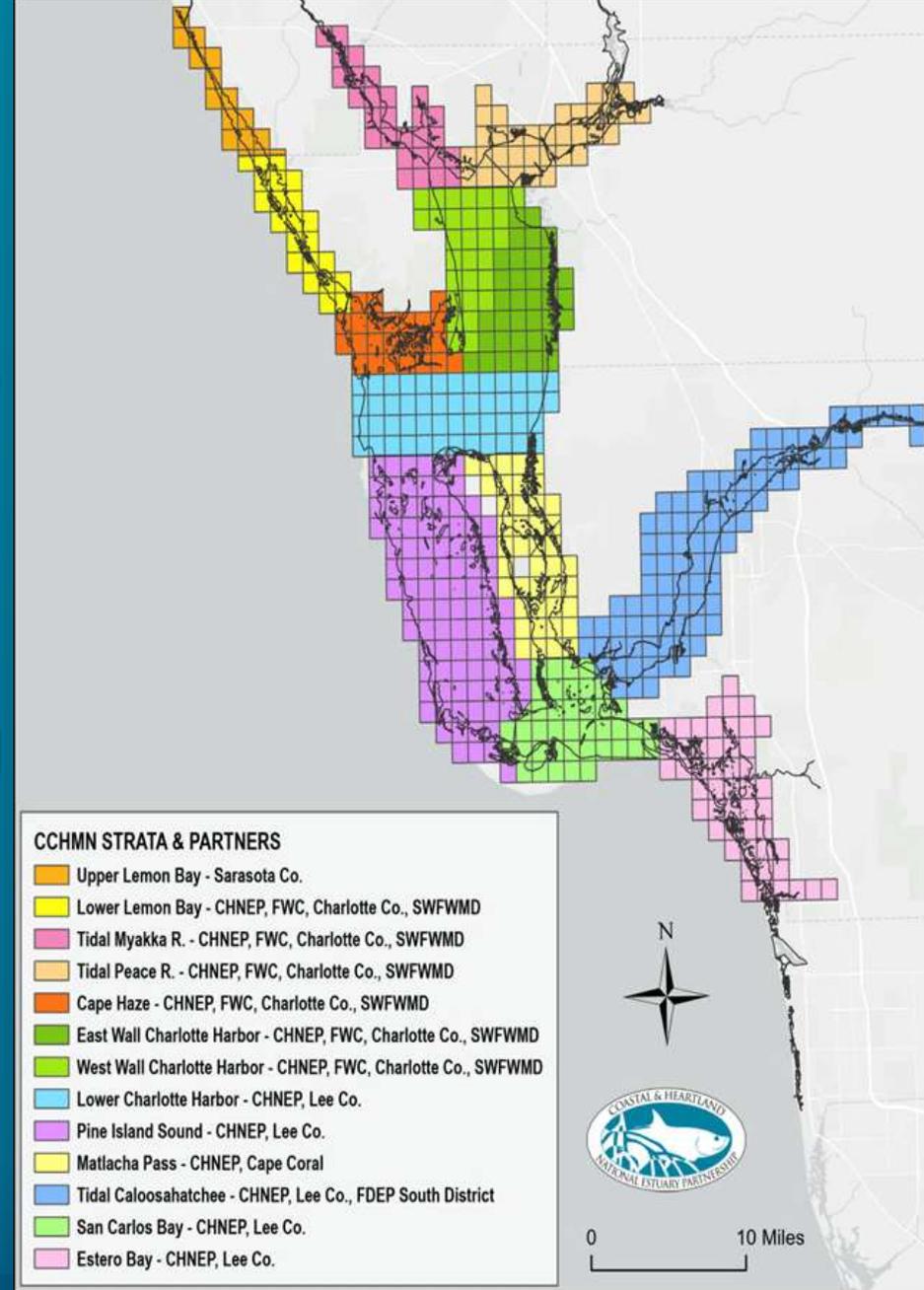
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# COASTAL CHARLOTTE HARBOR MONITORING NETWORK

- The CCHMN is a regional partnership of agencies, that collects monthly surface water quality data.
- CHNEP funds sampling, coordinates the Network, conducts field sampling audits, and uploads data into CHNEP Water Atlas.
- Initiated in 2001, monthly water samples collected at 60 field sites throughout 10 waterbodies each month in the estuaries using consistent, technically sound methods.
- Supplements ongoing watershed monitoring programs implemented by partners (including fixed station monitoring by counties, cities, agencies, NGOs)

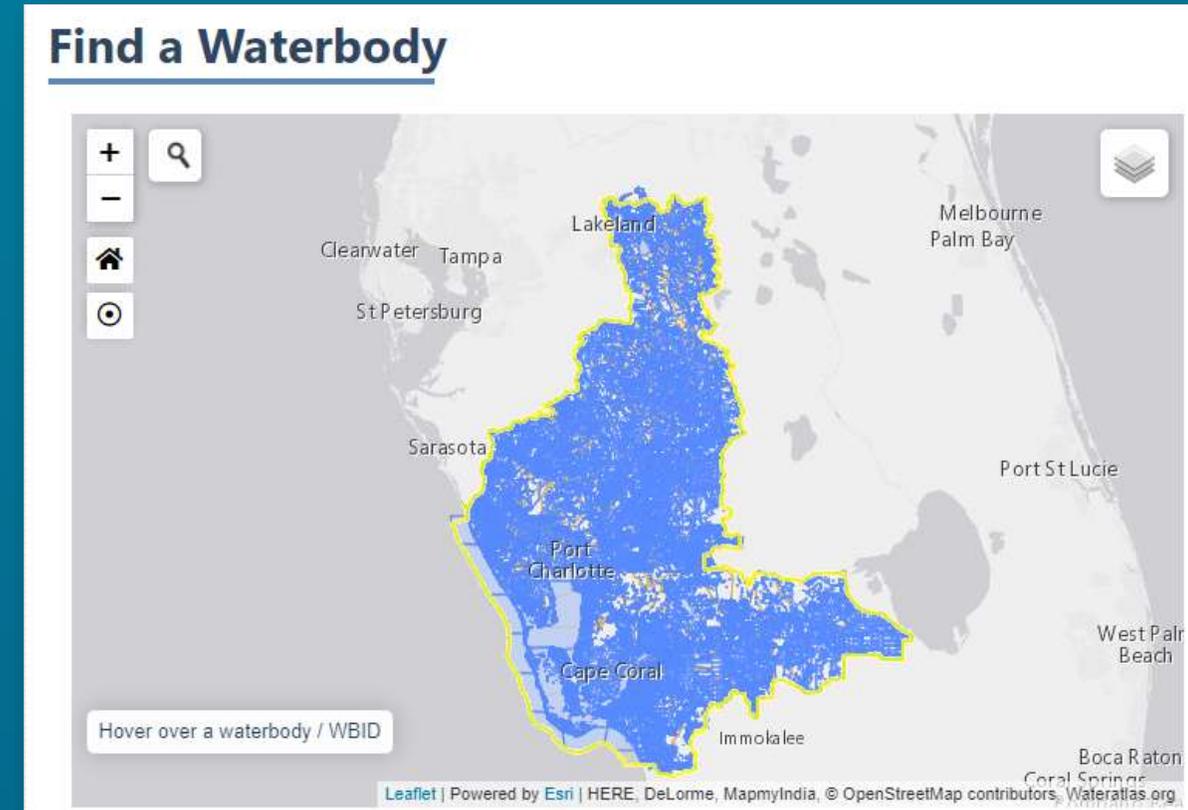


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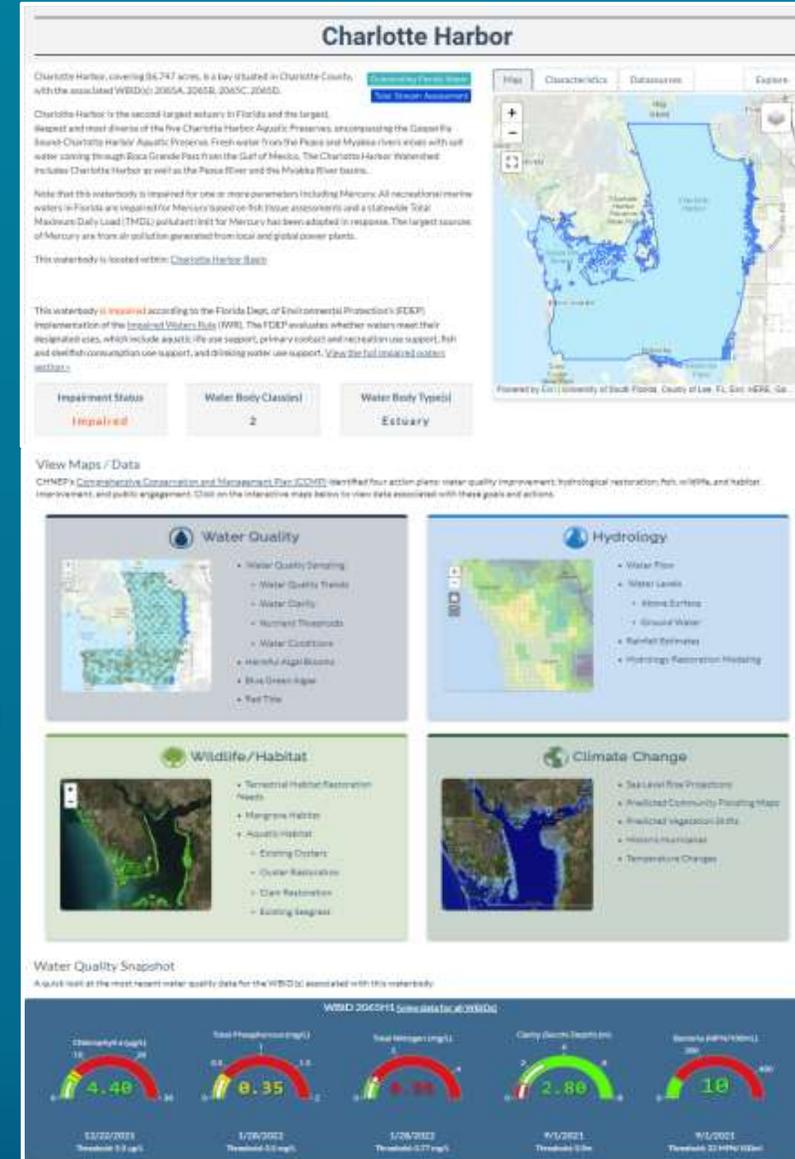
# ORGANIZING DATA TO GUIDE MANAGEMENT

- CHNEP Water Atlas waterbodies were reorganized to align with FDEP WBIDs. Management agency (FDEP) uses this scale to identify sources of pollutants, examine pollutant load limits, and evaluate effectiveness of management practices.
- Users can access pages for individual waterbodies – including lakes, ponds, bays, rivers, and streams to view associated water quality data and impairment status.



# INTERACTIVE REPORT CARD

- What are metrics used by stakeholders to measure estuary and habitat health?
- Status and Trends of all data collected by various partners in one place to give holistic management picture:
  - **WATER QUALITY** Assessments based on water chemistry, Water quality trends at sample stations
  - **HYDROLOGY** Volume of water flows/levels, rainfall
  - **HABITAT & WILDLIFE** Habitat migration/loss or shifts in 'bioindicator' species in response to ecosystem changes- seagrass, shellfish, changes in land cover
  - **CLIMATE** Sea Level Rise projections, predicted community flooding maps, predicted vegetation shifts, historic hurricanes, temperature changes, rainfall, EVT, saltwater intrusion

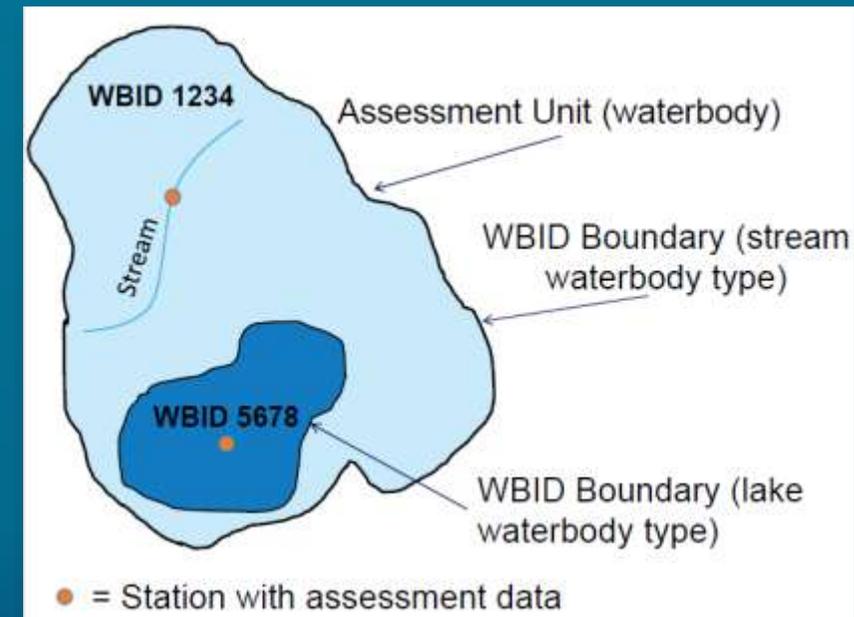


# WATER QUALITY ASSESSMENT



The FL Dept. of Environmental Protection (FDEP) Water Quality Assessment Program establishes water quality standards and impairments on behalf of EPA. **NOTE: Current estuary standards were developed through NEP-funded consensus-based studies in 2012 and adopted by the State in 2015.**

- *Water quality status and trends are essential to identify sources of pollutants, examine pollutant load limits, and evaluate effectiveness of management practices.*
- FDEP's Water Body Identification Number (aka WBID) is an assessment unit, intended to represent a waterbody or an area of homogenous water quality.
- Annual impaired waters assessments are done at the WBID level and needed management actions will be determined based on these assessment results.



# WATERBODY PAGES

- Waterbody Pages presented with associated FDEP WBIDs and appropriate impairment status and explanation, a Water Quality Snapshot, associated data, and 4 interactive mappers

This waterbody **is impaired** according to the Florida Dept. of Environmental Protection's (FDEP) implementation of the [Impaired Waters Rule \(IWR\)](#). The FDEP evaluates whether waters meet their designated uses, which include aquatic life use support, primary contact and recreation use support, fish and shellfish consumption use support, and drinking water use support. [View the full impaired waters section >](#)

Impairment Status	Water Body Class(es)	Water Body Type(s)
<b>Impaired</b>	2	Estuary



**Charlotte Harbor**

Charlotte Harbor, covering 86,747 acres, is a bay situated in Charlotte County, with the associated WBID(s): 2045A, 2045B, 2045C, 2045D.

Charlotte Harbor is the second largest estuary in Florida and the largest, deepest and most diverse of the five Charlotte Harbor Aquatic Preserves encompassing the Greater Ft. Pierce-Charlotte Harbor Aquatic Preserves. Fresh water from the Peace and Myakka rivers mixes with salt water coming through Boca Grande Pass from the Gulf of Mexico. The Charlotte Harbor Watershed includes Charlotte Harbor as well as the Peace River and the Myakka River basins.

Note that this waterbody is impaired for one or more parameters including Mercury. All recreational marine waters in Florida are impaired for Mercury based on fish tissue assessments and a statewide Total Maximum Daily Load (TMDL) pollutant load for Mercury has been adopted in response. The largest sources of Mercury are from air pollution generated from local and global power plants.

This waterbody is located within: [Charlotte Harbor Basin](#)

This waterbody is **impaired** according to the Florida Dept. of Environmental Protection's (FDEP) implementation of the [Impaired Waters Rule \(IWR\)](#). The FDEP evaluates whether waters meet their designated uses, which include aquatic life use support, primary contact and recreation use support, fish and shellfish consumption use support, and drinking water use support. [View the full impaired waters section >](#)

Impairment Status: **Impaired** | Water Body Class(es): 2 | Water Body Type(s): Estuary

View Maps / Data

CHMFP's [Cooperative Conservation and Management Plan \(CCMP\)](#) identified four action plans: water quality improvement, hydrological restoration, fish, wildlife, and habitat improvement, and public engagement. Click on the interactive maps below to view data associated with these goals and actions.

- Water Quality**
  - Water Quality Sampling
  - Water Quality Trends
  - Water Clarity
  - Wetland Thresholds
  - Water Conditions
  - Harmful Algal Blooms
  - Blue Green Algae
  - Red Tide
- Hydrology**
  - Water Flow
  - Water Levels
  - Wetland Elevation
  - Ground Water
  - Rainfall Estimates
  - Hydrology Regression Modeling
- Wildlife/Habitat**
  - Terrestrial Habitat Restoration Needs
  - Mangrove Habitat
  - Aquatic Habitat
  - Coastal Ditches
  - Oyster Restoration
  - Clam Restoration
  - Coastal Seagrass
- Climate Change**
  - Sea Level Rise Projections
  - Projected Community Flooding Maps
  - Projected Vegetation Shifts
  - Historic Mortalities
  - Temperature Changes

**Water Quality Snapshot**

A quick look at the most recent water quality data for the WBID(s) associated with this waterbody.

WBID	Parameter	Value	Threshold	Date
2045A/2045B	Total Phosphorus (mg/L)	4.48	0.0 mg/L	8/22/2023
2045C	Total Phosphorus (mg/L)	0.35	0.0 mg/L	1/16/2023
2045D	Total Phosphorus (mg/L)	0.70	0.0 mg/L	1/26/2023
2045E	Clarity (Secchi Depth) (m)	2.80	5.0 m	8/1/2021
2045F	Bacteria (CFU/100mL)	10	20 CFU/100mL	9/1/2021



# WATERBODY PAGES

- Waterbody Pages presented with associated water quality and habitat data as well as recreation opportunities and related information.

View Detailed Data About the Following Topics:

## + WATER QUALITY

(Red Tide, Nutrient Chemistry, Water Clarity, Salinity, Bacteria, Dissolved Oxygen, Other Indicators, Impaired Waters)

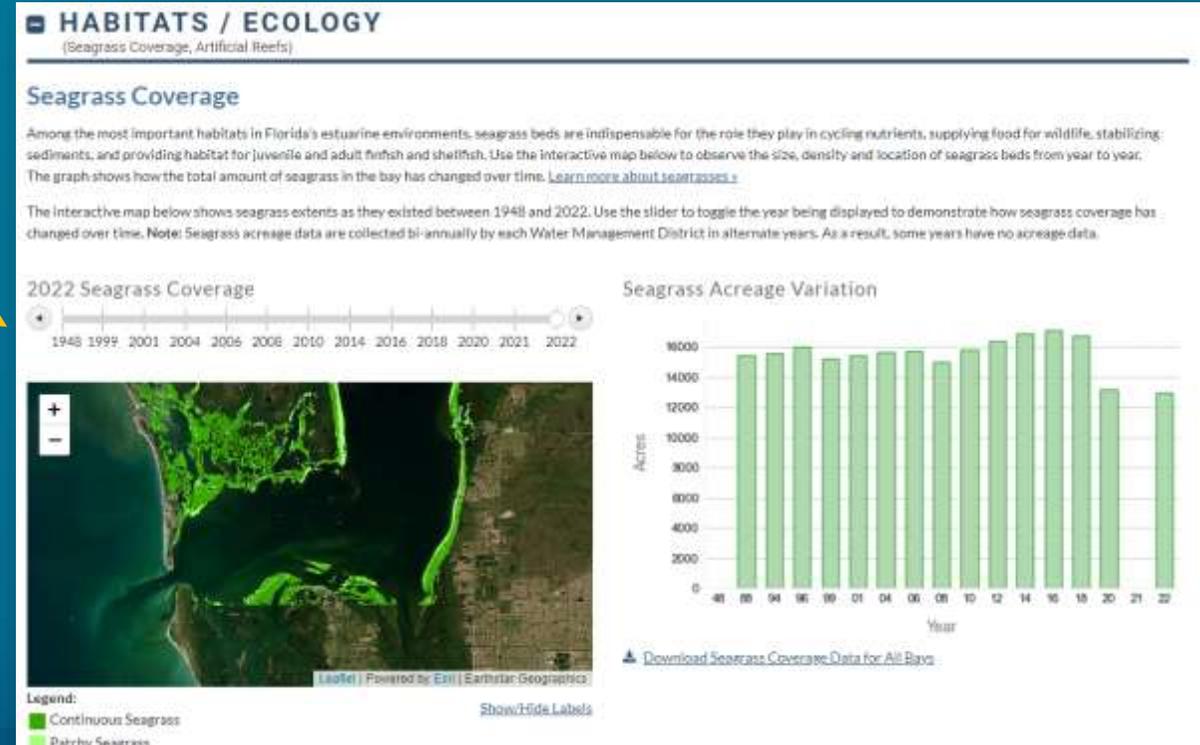
## + HABITATS / ECOLOGY

(Seagrass Coverage, Artificial Reefs)

## + RECREATION

## + PHOTOS

## - RELATED INFORMATION



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# INTERACTIVE MAPS

<https://chnep.wateratlas.usf.edu/maps/maps-and-data/>

INTERACTIVE MAPS



### Water Quality



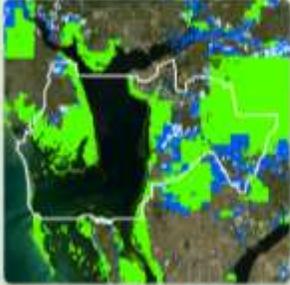
- Charlotte Harbor Environmental Volunteer Water Quality Network
- Water Atlas Sample Sites
- Impaired Waters
- CCHMN Grid Strata
- CCHMN Partners
- Florida Algal Bloom Site Visits
- FWC Red Tide Abundance
- WQ Trends

### Hydrology



- Recent Rainfall
- Live Stream Gauges (ESRI)
- Adopted Lake MFLs external
- Statewide Adopted Minimum Flows and Levels (MFLs) external

### Wildlife/Habitats



- FNAI Conservation Lands
- Seagrass Extent
- Habitat Restoration Needs
- Mangroves 2005
- Oyster Beds In Florida
- Salt Marsh 2015

### Climate Change



- Lee County Coastal High Hazard Area
- Habitat Resiliency to Climate Change

## Map Layers

▶  Water Quality

▶  Hydrology

▶  Aquatic Habitat

▶  Terrestrial Habitat

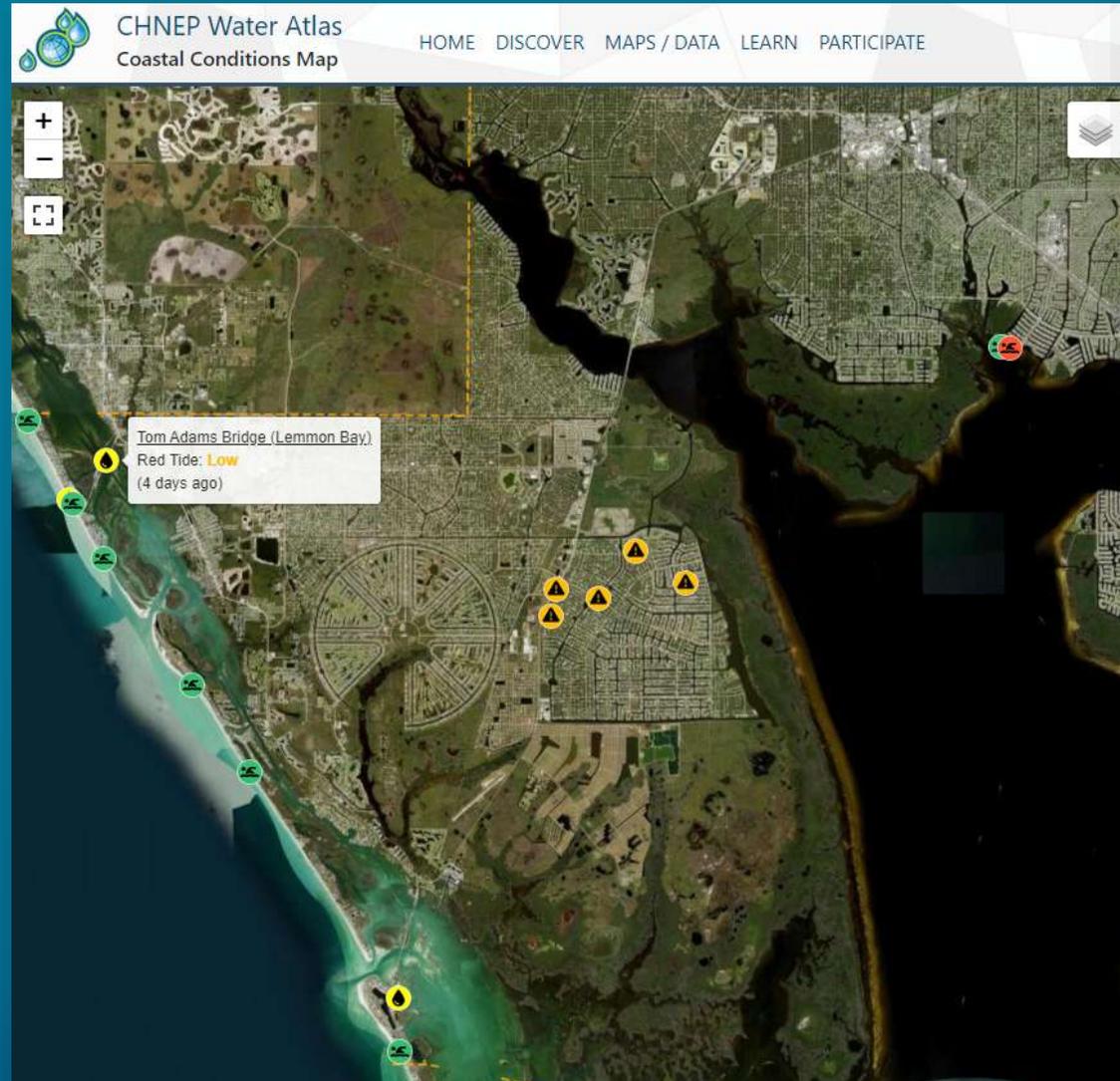
▶  Climate Change



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# COASTAL CONDITIONS MAP

- Maps of water quality information related to red tide, blue-green algae, fecal bacteria, and wastewater spills.
- Layers also available on waterbody pages interactive maps.
- CHNEP is working with USF and Mote to pull in Mote Beach Conditions (BCRS) data in future



**Display Filters**

Use the checkboxes below to show/hide monitoring locations on the interactive map.

**Red Tide Monitoring**

- FWC Red Tide Monitoring
- 
- Algal Bloom Sampling Status
- 

**Bacteria Monitoring**

- Enterococcus
- 

**Pollution Reports**

- Public Notice of Pollution
- 



# MEETING GOALS

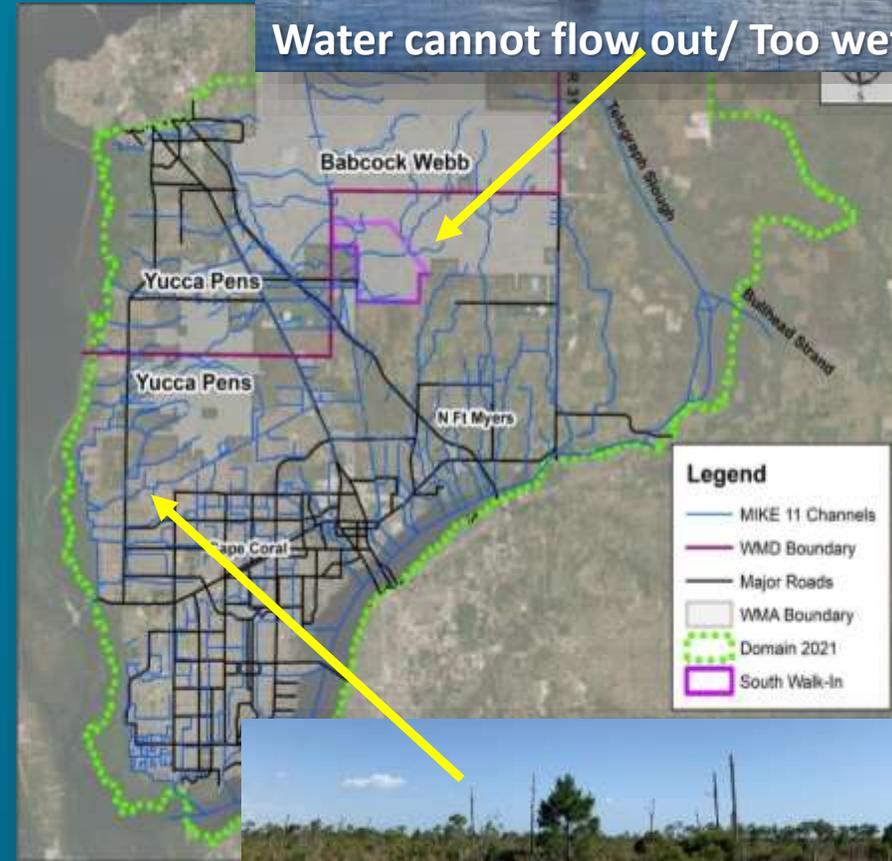


- **VISION FOR HYDROLOGIC RESTORATION**  
Appropriate freshwater flow across the landscape to sustain healthy wetlands, rivers, and estuaries.
- **OBJECTIVE** Support watershed planning and hydrologic restoration projects to restore natural flow regimes and provide sufficient fresh surface water and groundwater to natural systems.
- **STRATEGY** Data collection and modeling to simulate how much, and where water on the landscape can be stored and moved to protect ecosystems, downstream estuaries and species as well as communities. Prioritize recommendations for the resulting ‘watershed plans.’



# GOING WITH THE FLOW

- **Watershed Restoration Models** based on real-world data to understand where and how much water is needed to be moved to restore natural areas and waterways, Ex:
  - ✓ South Charlotte/North Lee County Charlotte Harbor watershed
  - ✓ South Lee County/Estero Bay watershed.
- **Implement Flow Restoration Projects** to remove barriers and enhance flow to natural areas (while maintaining existing flood protection) based on modeling recommendations.
- **Support Land Conservation**, incl. local programs, Florida Forever, Florida Wildlife Corridor, and federal Everglades to Gulf Conservation Area



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# MEETING GOALS



- **VISION FOR HABITAT PROTECTION** A diverse environment of interconnected, healthy habitats that support natural processes and viable, resilient native plant and animal communities.
- **OBJECTIVE** Permanently acquire, connect, protect, monitor, restore, and manage natural terrestrial and aquatic habitats.
- **STRATEGY** Promote and facilitate permanent acquisition and effective protection and management of critical natural habitats including wildlife dispersal areas, movement and habitat migration corridors, wetlands, flowways, and environmentally sensitive lands and estuarine habitats.

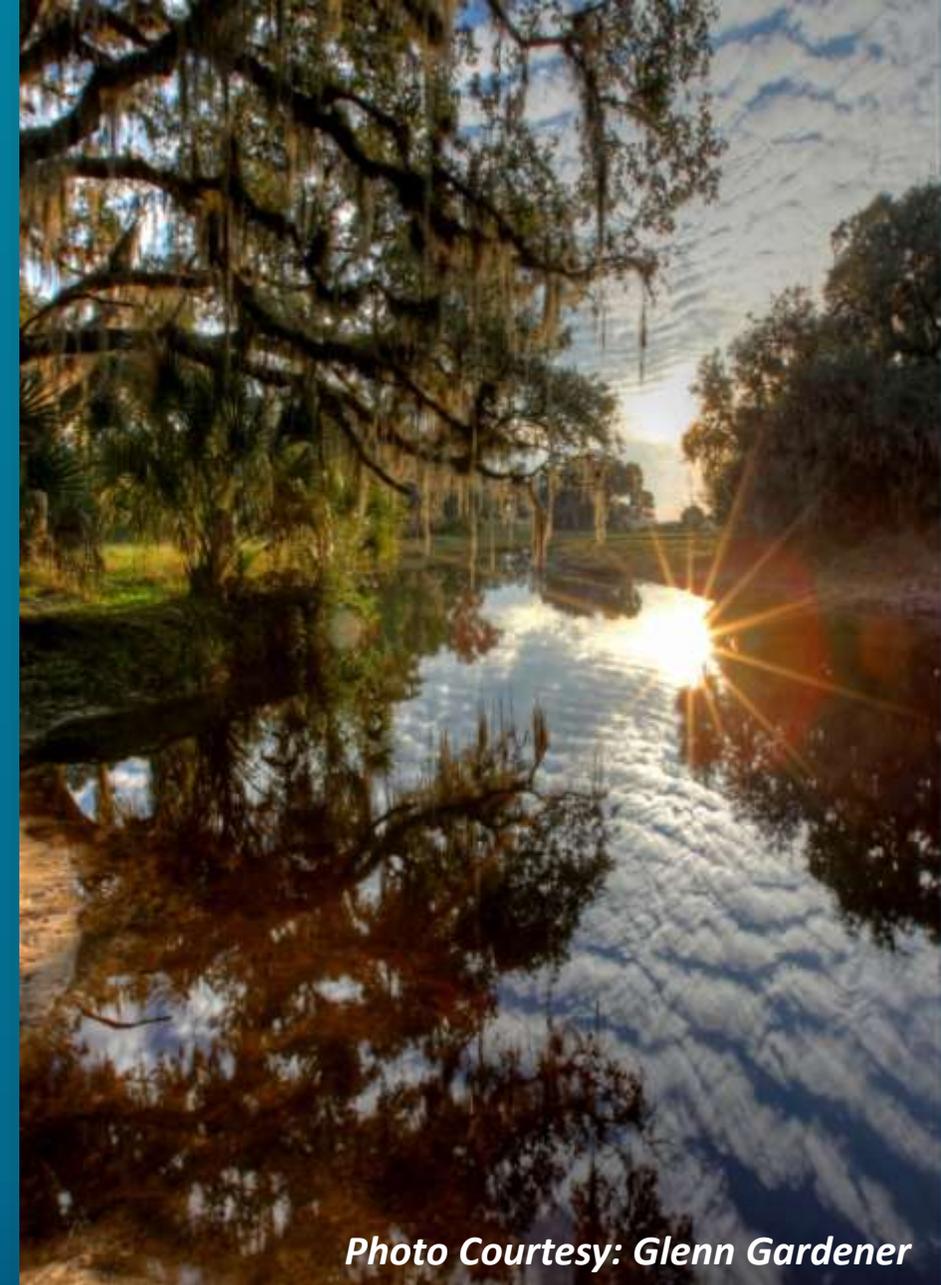
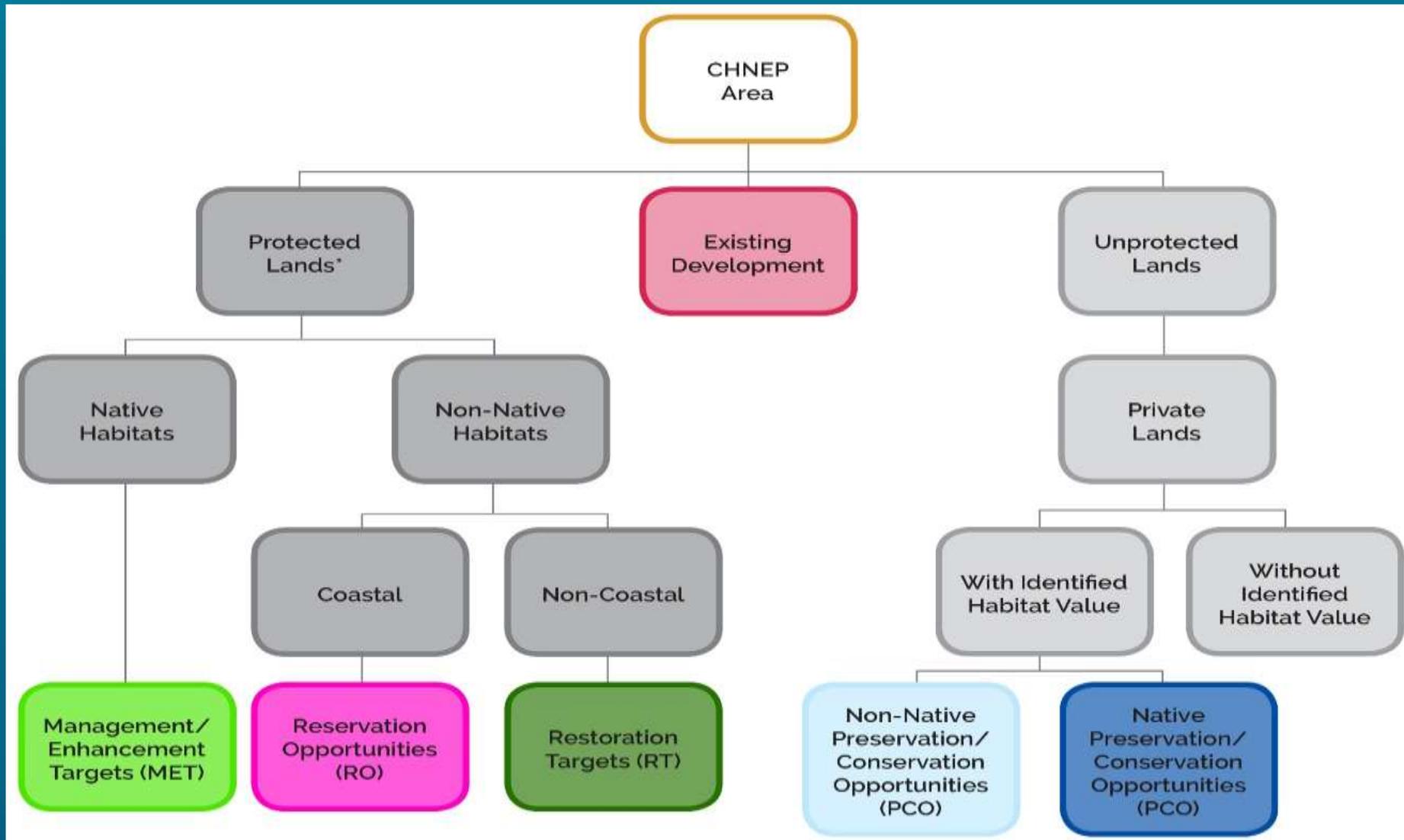


Photo Courtesy: Glenn Gardener



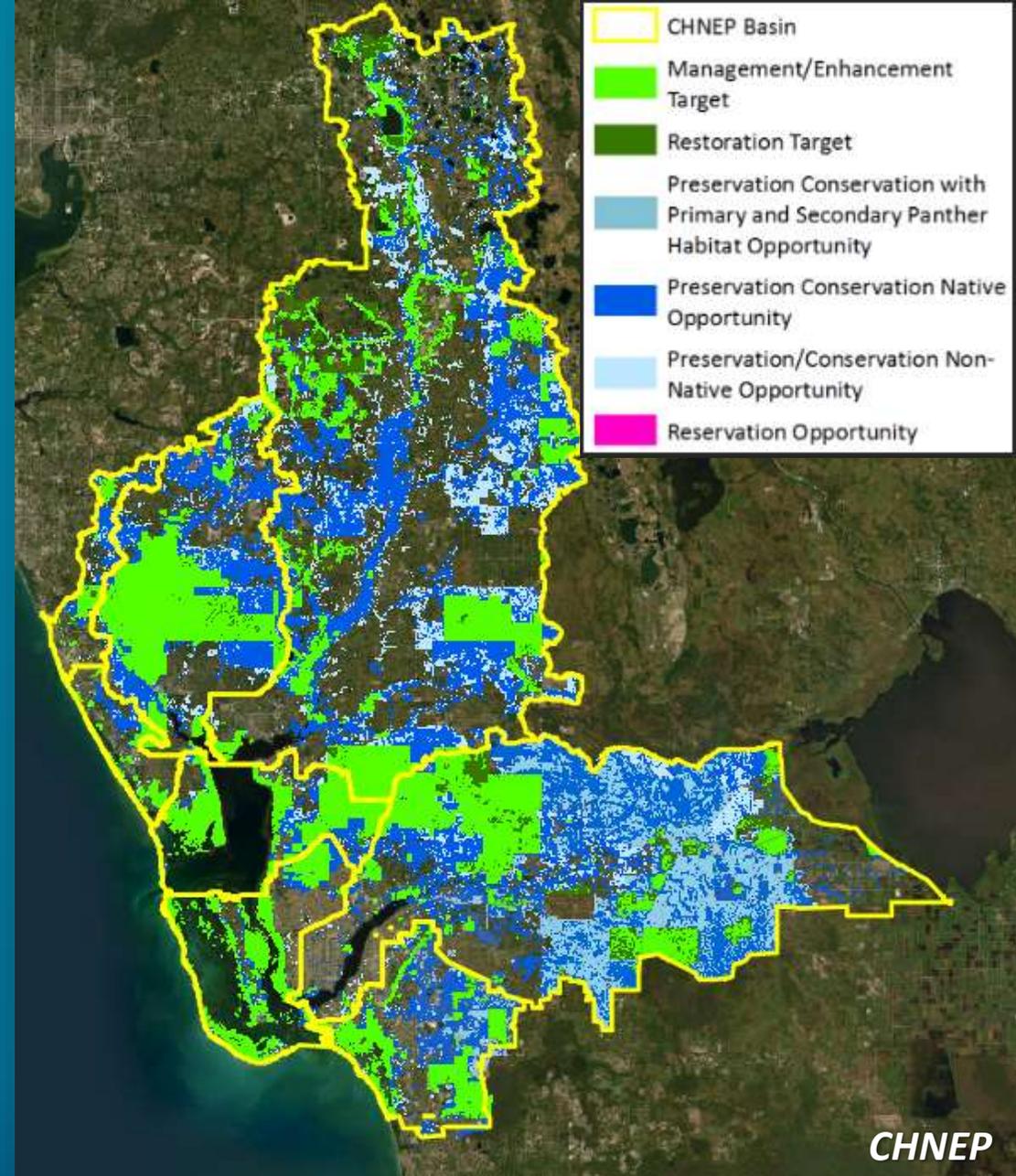
# STRATEGIC PLANNING



# LANDSCAPE-LEVEL PROTECTION

## CHNEP Habitat Restoration Needs Plan:

- Combined maps show private habitat areas (blue) that fit together with public habitat areas (green)
- Full implementation offers landscape-level habitat corridors and contiguous habitat areas.
- A diverse environment of interconnected, healthy and climate-ready habitats.
- Habitat Restoration Needs plan seeks to balance the reality of economic growth with maintaining quality of land, water, and life in local communities.



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# HABITAT MAPS & RESTORATION PLANS

## CHNEP CLAM HABITAT SUITABILITY AND POTENTIAL RESTORATION SITE SELECTION

The southern hard clam (*Meretrix meretricus*) and the northern hard clam (*M. marisineri*) are both found in the Gulf of Mexico. The southern species is native while the northern species is likely a product of aquaculture introduction. When abundant, hard clams have an important role in estuaries as filter feeders transferring energy through the food web. The feeding activity of hard clams reduces phytoplankton and turbidity, which benefits seagrass by increasing water clarity ultimately providing habitat and a food source for marine life. Hard clams are becoming less abundant in most areas of the Gulf of Mexico and resource managers are investigating techniques to effectively restore natural populations along the Florida coast.

**Summary**

### Clam Restoration in the Charlotte Harbor Estuary

The hard clam has been harvested by man from the Charlotte Harbor Estuary since at least 300 - 500 AD. Since the mid-twentieth century, over-harvesting, water quality changes, habitat loss and ecosystem disturbances has drastically reduced the abundance of hard clams in Southwest Florida. In fact, the Charlotte Harbor Estuary is home for clam farm leases in Pine Island and Gasparilla Sound. Farmers are often faced with an inability to market their clams due to red tide, fishery closures and other natural events. During these closures, the farmed clams are still valuable and could be used to help regional restoration efforts by relocating them to suitable areas for their long-term survival and natural propagation.

A Charlotte Harbor Estuary clam restoration study group was formed to address the potential of using unmarketable hard clams for restoration efforts. The study group consists of clam farmers and scientists from Florida Department of Environmental Protection (FDEP), Florida Fish and Wildlife Commission (FWC), and Sanibel-Captiva Conservation Foundation (SCCF). The goal of the project was to identify and rank 10 potential clam restoration sites within the Charlotte Harbor Estuary which provide optimum habitat suitability with minimal logistical challenges.

**Suitability Map**

This interactive map shows combined suitability factors with aggregated suitability scores for each pixel. The dark green areas indicate predicted most suitable habitat while the red areas predict unsuitable habitat. This map will be used to survey potential clam restoration sites located within habitat predicted to be suitable.

**Clam Harvests in Florida**

[View the full-screen interactive suitability map](#)

Maps of restoration projects as well as restoration suitability and ranked priority sites

Sources: CHNEP SWFL Oyster Working Group (OWG), SCCF, FWC, FDEP Aquatic Preserves etc.

**CHNEP wateratlas**

HOME DISCOVER MAPS / DATA LEARN PARTICIPATE

## OYSTER HABITAT RESTORATION PROGRAM

With the understanding that an estimated 90% of historic oyster habitat has been lost, the CHNEP and its partners began a concerted effort to restore oyster habitat throughout the estuaries within the CHNEP region in 2012. The Southwest Florida Oyster Working Group (SWFOWG) was convened to guide the development of the CHNEP Oyster Habitat Restoration Plan. The Plan was produced through a partnership between the CHNEP and [The Florida Conservation Trust \(FTC\)](#), with contributions from numerous partners. The purpose of the Plan is to provide a technically sound, consensus-based approach for identifying oyster habitat restoration goals, methods and partnerships for the estuaries within the CHNEP region.

The long-term CHNEP goal is to enhance and restore self-sustaining oyster habitat and related ecosystem services throughout the estuaries and tidal rivers and creeks. The following short-term goals were developed to drive progress towards the long-term goal:

- Map oyster habitats by type within the CHNEP
- Design, implement and monitor the success of pilot oyster restoration projects in a variety of habitats in 50% of the estuary segments within the CHNEP region
- Increase public awareness of the ecosystem value of native oyster habitats by including community stewardship components in each oyster restoration project
- Assist partners in seeking state, federal, and organizational funding opportunities to support oyster habitat restoration projects

## SEAGRASS

**Summary**

Florida seagrass beds are an extremely valuable natural resource. Seagrasses are flowering plants that grow underwater in shallow coastal and brackish waters. They provide food, habitat and nursery grounds for several marine species, including many economically important fish and shellfish species. Additionally, seagrasses play a role in carbon sequestration, nutrient cycles, stabilizing sediments, and maintaining coastal biodiversity.

Seagrass is recognized by state, federal, and local agencies as a critical habitat. Estuary specific restoration and water quality goals have been established to support seagrass recovery. Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. *Given the value of seagrass beds, many agencies in Florida now monitor and track the health and status of seagrasses regularly.*

Use the navigation bar on the left to view seagrass data and analyses in selected basins or visit the interactive mapper to view historical seagrass acreage and recent seagrass loss throughout the entire CHNEP area.

- Seagrass Home
- Dorr & Roberts Bay Basin
- Lamm Bay Basin
- Myakka River Basin
- Peace River Basin
- Gasparilla Sound-Cape Haze Basin
- Charlotte Harbor Basin
- Pine Island Sound-Mattachee Pass
- San Carlos Bay Basin
- Tidal Calumet/Matchee River Basin
- Estero Bay Basin
- CHNEP Area Interactive Map



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# CLAM HABITAT SUITABILITY



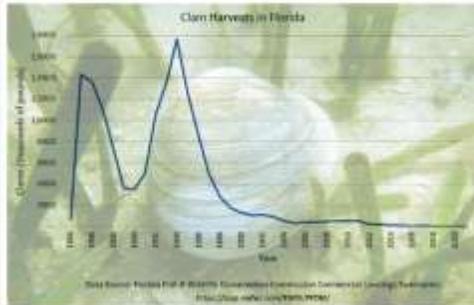
The southern hard clam (*Meretrix campechanus*) and the northern hard clam (*M. mercenaria*) are both found in the Gulf of Mexico. The southern species is native while the northern species is likely a product of aquaculture introduction. When abundant, hard clams have an important role in estuaries as filter feeders transferring energy throughout the food web. The feeding activity of hard clams reduces phytoplankton and turbidity, which benefits seagrass by increasing water clarity ultimately providing habitat and a food source for marine life. Hard clams are becoming less abundant in most areas of the Gulf of Mexico and resource managers are investigating techniques to effectively restore natural populations along the Florida coast.

## Summary

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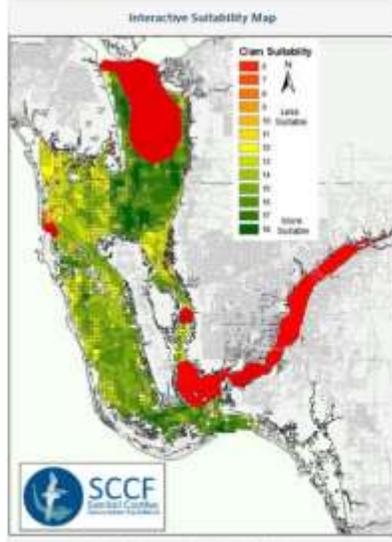
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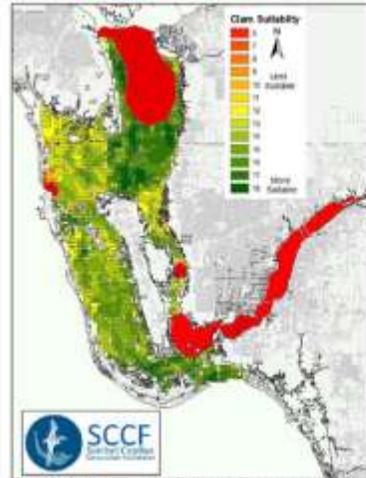


Figure 1A. Layer showing combined suitability factors with aggregated suitability scores for each pixel. The dark green areas indicate predicted most suitable habitat while the red areas predict unsuitable habitat. This map will be used to survey potential clam restoration sites located within habitat predicted to be suitable.



Figure 1B. Locations of sites recommended for hard clam restoration projects through the work of this project. Dark green are preferred sites, light green are good least preferred and light green are lower ranked of the sites selected for field. The site shown with red is not suitable due to macroalgal outbreaks.

Table 3. Recommended Restoration Sites

Site ID	Site Description	Latitude	Longitude	Rank	Waterbody
CR11	Pine Island Sound West McKeever Keys	26.51422985870	-82.12506125710	1	Pine Island Sound
CR19	Grouper Hole off Boca Grande	26.79385540200	-82.26451181090	2	Gasparilla Sound
CR17	North Sandfly Key	26.78959671370	-82.24588205720	3	Gasparilla Sound
CR15	CH at Southern Mouth Turtle Bay	26.77915158590	-82.16569241180	4	Charlotte Harbor
CR14	Pine Island Sound West Demere Key Near Clam Leases	26.59334017870	-82.15758863240	5	Pine Island Sound
CR12	CH N of Bokvelia S of Jug Creek Point Shoal	26.70623211270	-82.13270706030	6	Charlotte Harbor
CR18	South of Placida	26.81429562470	-82.25313409460	7	Gasparilla Sound
CR13	Pine Island Sound North Chino Island West McKeever	26.51465703390	-82.13393090260	8	Pine Island Sound
CR16	Pine Island Sound NE Buck Key Near Bar	26.52673100600	-82.16817702250	9	Pine Island Sound
CR16	Pine Island Sound SW of York Island	26.48399951960	-82.10842993270	10	Pine Island Sound

Now, SCCF is in the process of collaborating with local conservation groups to share our research and develop a statewide plan guiding restoration practices and projects.



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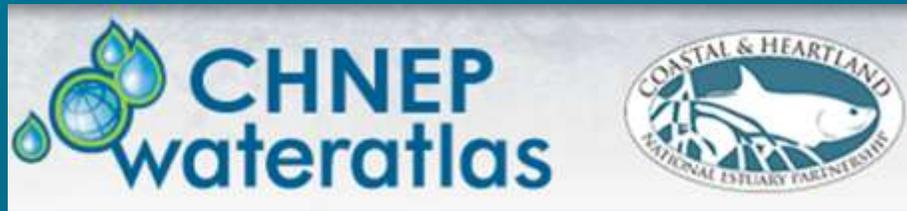
# MEETING GOALS

- **VISION FOR PUBLIC ENGAGEMENT** An informed, engaged public making choices and taking actions that increase protection and restoration of estuaries and watersheds.
- **OBJECTIVE** Increase the proportion of the population that supports and participates in actions to protect and restore estuaries and watersheds
- **STRATEGY** Promote environmental awareness, understanding, and stewardship to the general public, new target audiences, and policymakers; and strengthen partner collaboration in education and engagement programs.



# ENHANCING UNDERSTANDING AND ENGAGEMENT

- Organize and host annual Climate Summit to bring public, scientists and elected leaders together to exchange information on how to advance regional resiliency.



- Provide centralized data sharing online with CHNEP Water Atlas - with maps & analysis tools to learn more about each waterbody and watershed.



- Provide recovery resources and storm event data on CHNEP website. Share partner events and resources in monthly email newsletter. Provide environmental education resources and present to public and at technical conferences. Convene partner meetings.



# RESILIENCE TOOLS

***ENHANCE CLIMATE DATA & ENGAGEMENT*** More scientific work to identify potential climate impacts and adaptation/mitigation actions, consensus building to engage policymakers and stakeholders, and more public education to engage citizens. Account for community resiliency needs in projects.

- Prior engineering and restoration work has been based on historical data. Climate change is creating conditions never recorded. Modeling involves assumptions that must be constantly recalibrated based on emerging real-world data.

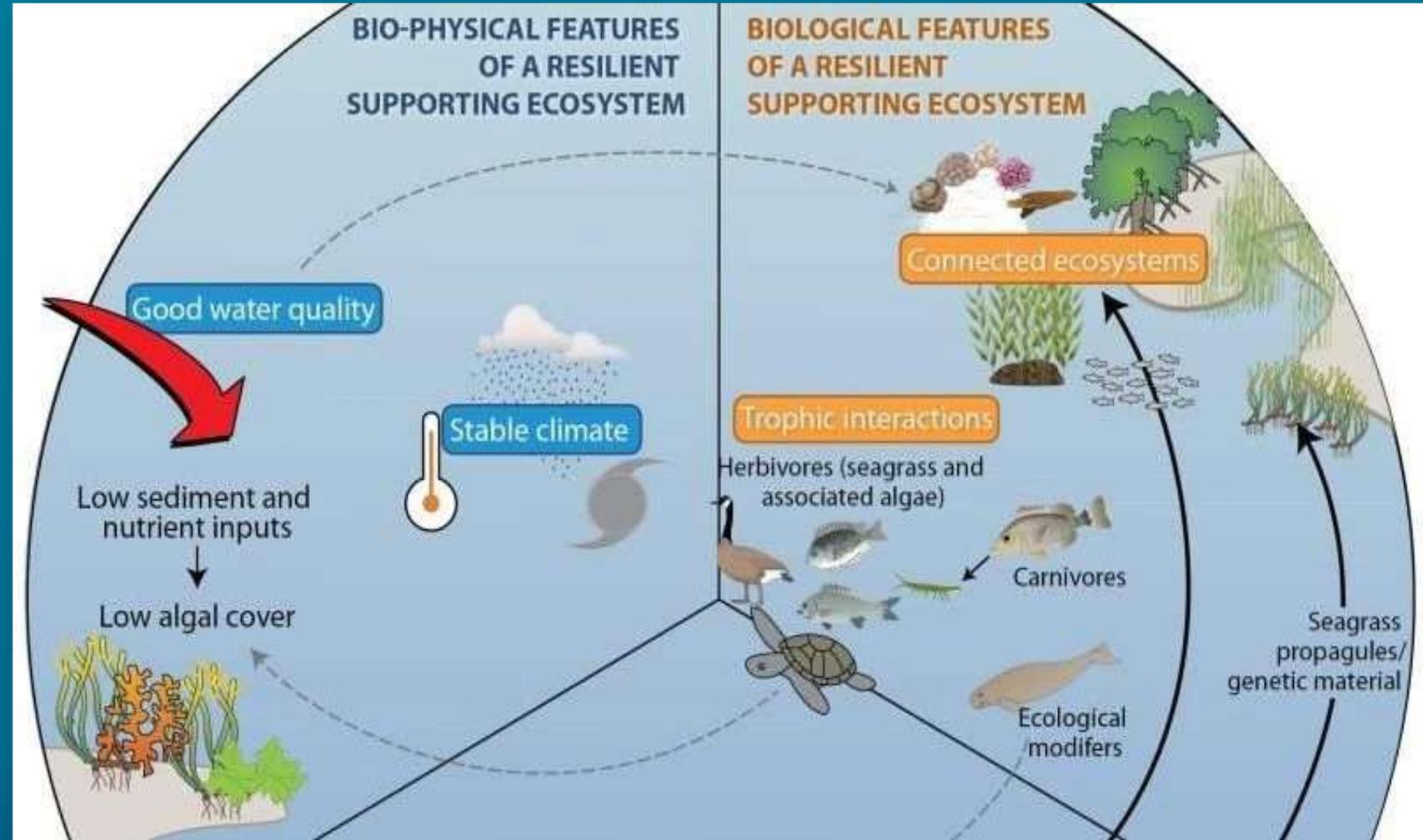
***GOING WITH THE FLOW*** Plan projects for the future, we are not returning to historic climate or landscape conditions so how can hydrologic restoration help with reducing flooding, rehydrating wetlands and provide needed cleaner freshwater.

***PATHWAYS FOR ECOSYSTEM SHIFTS*** Project planning for climate induced vegetative community shifts, helping them to better cope with climate stressors and buy them time to adapt.



# HEALTHY ECOSYSTEMS ARE RESILIENT ECOSYSTEMS

- Just as humans with stronger immunity and health are better able to cope with infections or other illnesses, healthier ecosystems can better cope with climate stressors.
- Most important resiliency measure is to get our ecosystems as healthy as possible.



# FINAL THOUGHTS ON PLANNING

- **Watershed- scale issues need to be addressed through a multi-partner and diversified funding approach**
- **Create TIME and setting aside additional FUNDING for planning**
- **Stakeholder driven is of utmost importance, when working toward collectively agreed upon outcomes**
- **Priorities shift, land gets developed, new problems arise- strategic planning and adaptive management to be opportunistic is vital to implementation**
- **These plans provide justification/sound science needed to support partner efforts when they do not always have \$\$ for planning**
- **Healthy Ecosystems are Resilient Ecosystems healthier ecosystems can better cope with climate stressors.**



# FUTURE MANAGEMENT

- Please visit the CHNEP Water Atlas for data and mapping relevant to your work.
- CHNEP produces and updates Water Quality & Seagrass Fact Sheets by basin as additional communication tool for partners and the public. (Contributors: FDEP, SWFWMD, SFWMD, Counties for their use)

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

### Dona & Roberts Bays Basin Water Quality Status Report

**Summary**

Dona and Roberts Bays are surrounded by beaches, barrier islands, and mangroves. The basin spans 145.6 square miles. The barrier islands separate the intracoastal waterway running from Venice Inlet through Lemon Bay from the open waters of the Gulf of Mexico and Charlotte Harbor. This part of the CHNEP area has some important resource management challenges including:

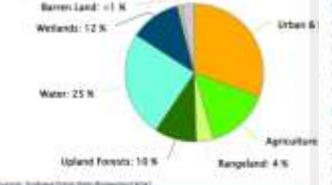
- Alteration of historic basin boundaries and resulting freshwater flows to estuaries.
- Effect of boat traffic and dredging on the Intracoastal Waterway and other channels.
- Loss of mangrove areas and seagrass.
- Large areas of undeveloped platted lots.
- Water quality effects of septic systems and stormwater runoff from development.
- Nuisance exotic vegetation.

### WATER QUALITY IMPROVEMENT



The Coastal & Heartland National Estuary Partnership (CHNEP) and its partners conduct water quality monitoring in this area, which is available on the CHNEP Water Atlas ([www.chnep.wateratlas.usf.edu/](http://www.chnep.wateratlas.usf.edu/)). This report describes waterbodies that are not currently meeting Waters Rule (19R 62-303 F.A.C.).

### Land Use / Land Cover Categories as a Percentage of Dona & Roberts Bay Basin



**COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP**

### Seagrass in Charlotte Harbor

**Summary**

Charlotte Harbor is the largest of the estuaries in this region. In the Harbor, fresh water from the Peace and Myakka Rivers and numerous small tidal creeks mixes with salt water coming through Boca Grande Pass from the Gulf of Mexico. Southern areas closer to the Pass receive substantial tidal flushing. Further north, near the mouths of the rivers, the Harbor is significantly affected by the seasonal changes in river discharges.

**Seagrass Measures Water Quality & Improves Estuary Health**

Seagrass beds provide many benefits. It is nursery habitat for fish and shellfish and it contributes to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Seagrass requires clean water and ample sunlight to grow, and therefore it is used by agencies and local governments as a way to measure water quality. This is documented in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, areas and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (depth edges). This monitoring works to characterize the density, complexity, and stability of these seagrass meadows.

### Fish, Wildlife, & Habitat Protection



### Seagrass Acreage

The graph below depicts results from seagrass mapping, done once every two years, in Charlotte Harbor from 1982-2022. Seagrass in this area has remained relatively stable over time since monitoring began, but acreage declined significantly in Charlotte Harbor between 2018 and 2020 when the region lost 1,848 acres of seagrass, representing a 21% loss overall. The reason for recent declines is complex and likely involves several factors, including storm events such as Hurricane Irma, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to better understand causes and investigate solutions. Minimal losses were seen in 2022 and numbers remained relatively stable with some seagrass beds even showing modest recovery. This demonstrates that the system has the potential to move toward recovery naturally given time and continued work to improve water quality conditions and flows. Note this data was collected in early 2022 and does not include any potential changes that may have occurred following hurricane Ian. Learn more about what the Partnership is doing protect and improve water quality in Charlotte Harbor [CHNEP.org/](http://CHNEP.org/).



**COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP**



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# THE POWER OF PARTNERSHIP

Thank you to our partners!

CHNEP Management Conference Members from the Technical Advisory Committee, CHNEP Program staff, the U.S. Environmental Protection Agency, and the University of South Florida Water Institute

CHNEP WATER ATLAS



CHHARLOTTE HARBOR  
BASIN PAGE



*Photo courtesy: Megan Drumheller*

# INTERACTIVE MAPS

<https://chnep.wateratlas.usf.edu/maps/maps-and-data/>

INTERACTIVE MAPS



### Water Quality



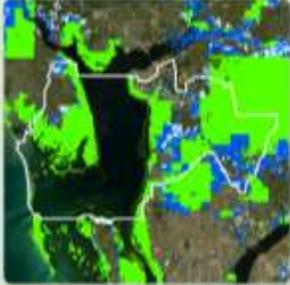
- Charlotte Harbor Environmental Volunteer Water Quality Network
- Water Atlas Sample Sites
- Impaired Waters
- CCHMN Grid Strata
- CCHMN Partners
- Florida Algal Bloom Site Visits
- FWC Red Tide Abundance
- WQ Trends

### Hydrology



- Recent Rainfall
- Live Stream Gauges (ESRI)
- Adopted Lake MFLs external
- Statewide Adopted Minimum Flows and Levels (MFLs) external

### Wildlife/Habitats



- FNAI Conservation Lands
- Seagrass Extent
- Habitat Restoration Needs
- Mangroves 2005
- Oyster Beds in Florida
- Salt Marsh 2015

### Climate Change



- Lee County Coastal High Hazard Area
- Habitat Resiliency to Climate Change

## Map Layers

▶  Water Quality

▶  Hydrology

▶  Aquatic Habitat

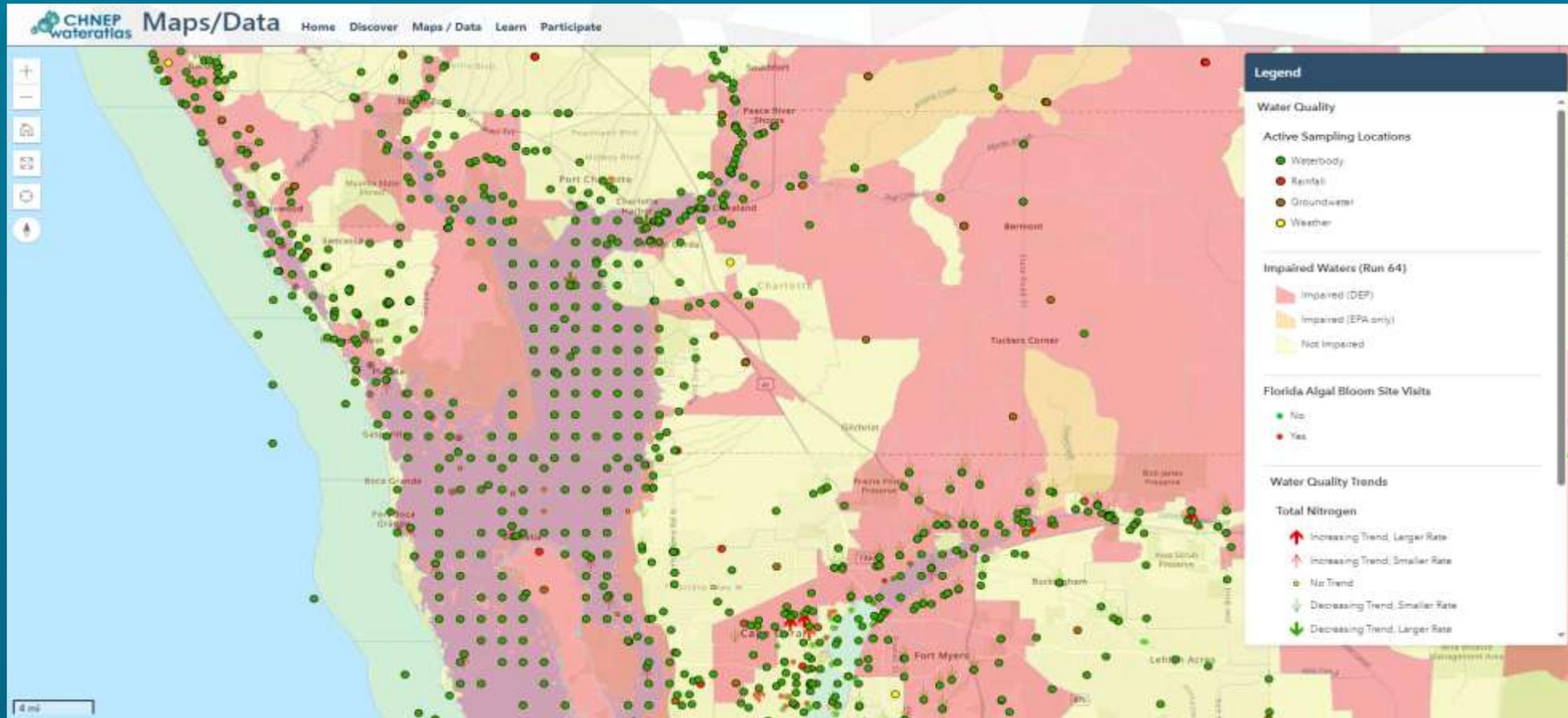
▶  Terrestrial Habitat

▶  Climate Change



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# INTERACTIVE WATER QUALITY MAP

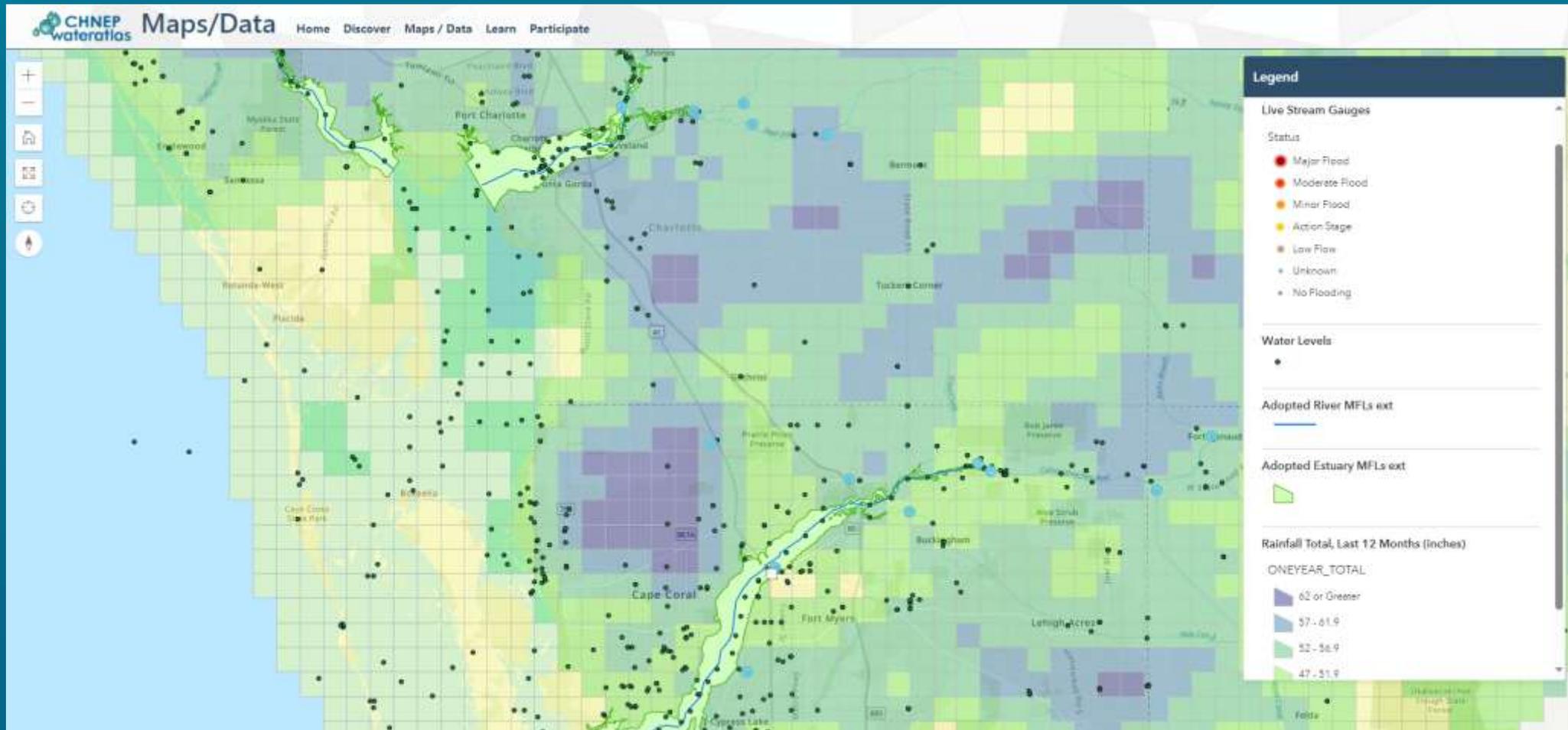


Combine all publicly available mapping data that captures the current status of water quality as well as long-term trends in water quality



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# INTERACTIVE HYDROLOGY MAP

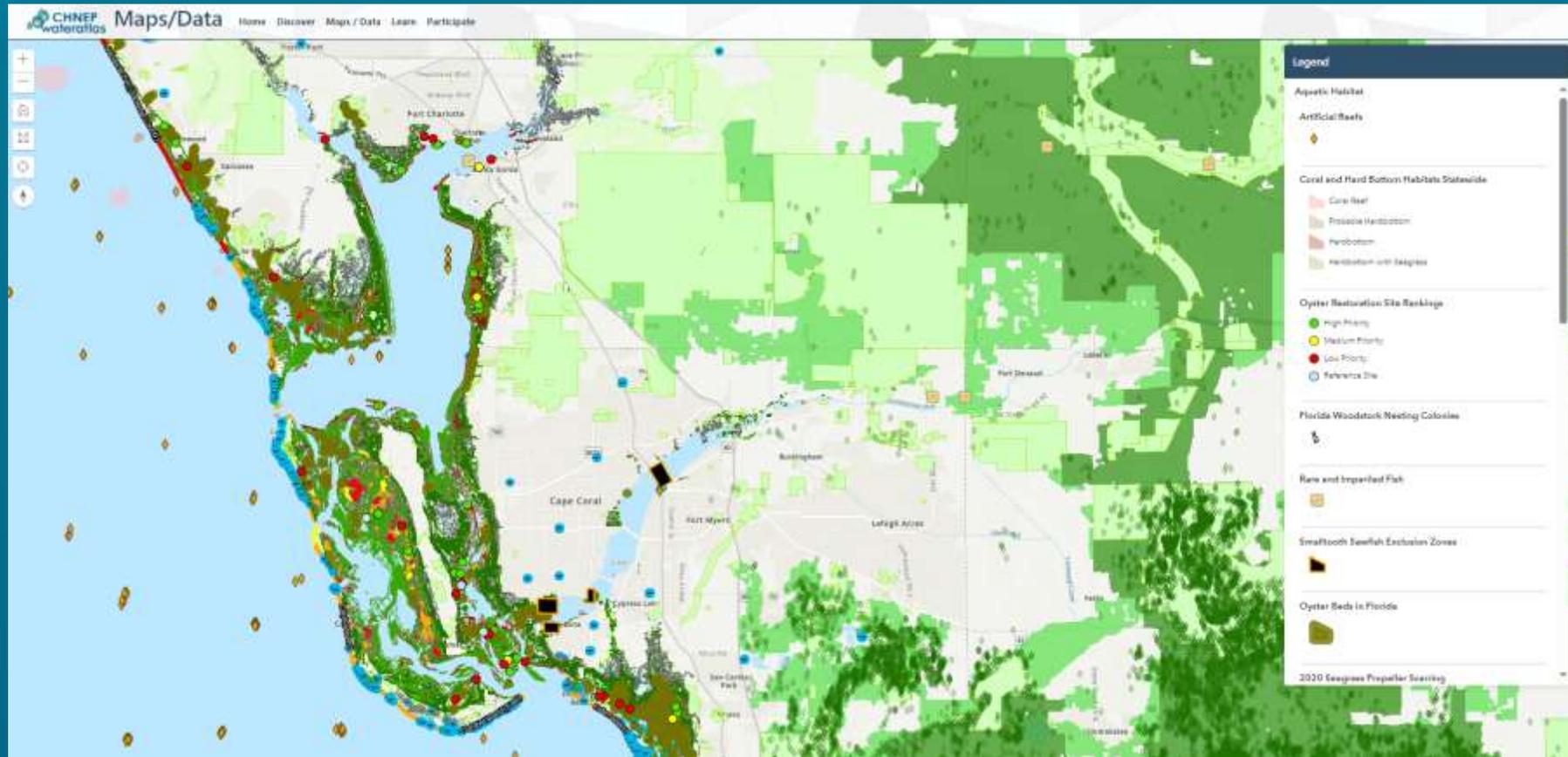


Combine all publicly available spatial data that captures the current hydrology



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# INTERACTIVE WILDLIFE/HABITAT MAP

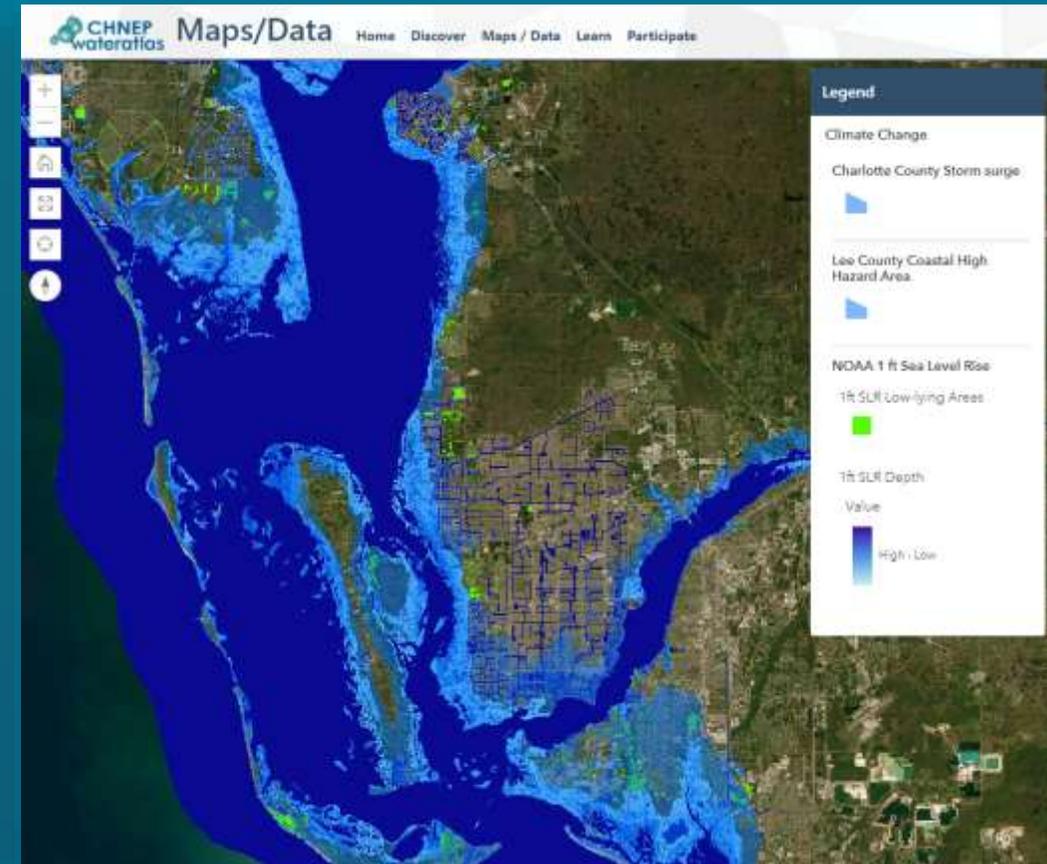
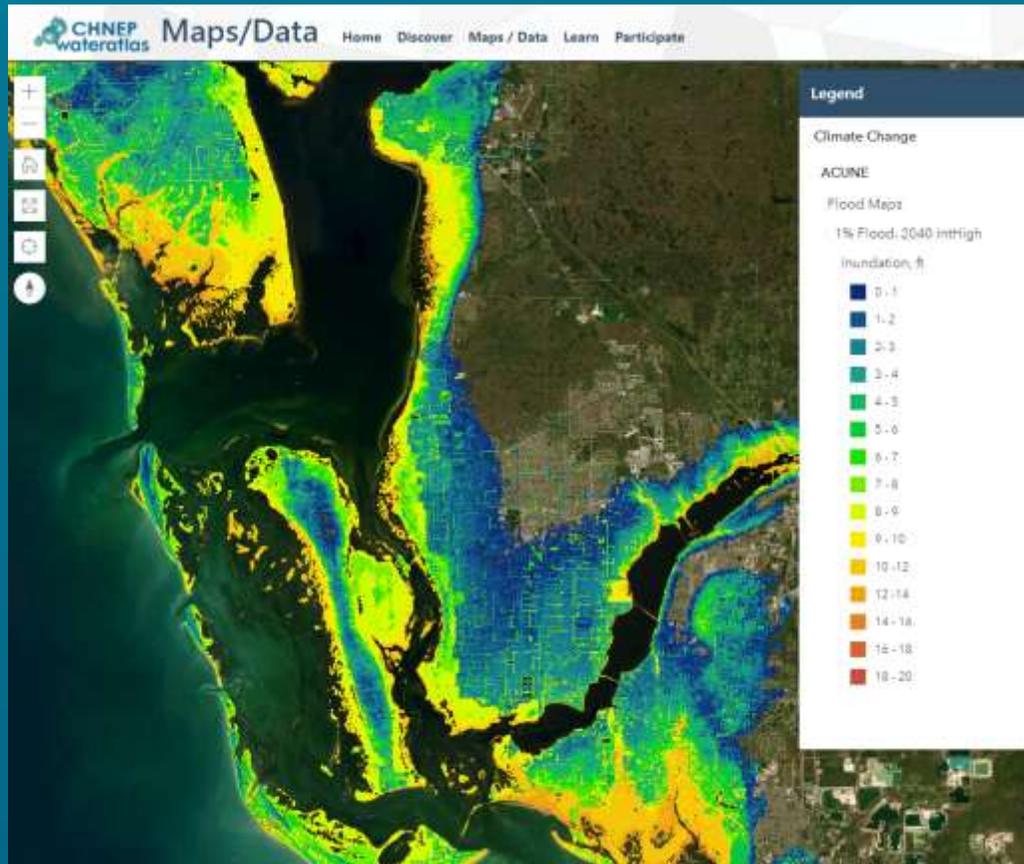


**Combine all publicly available data that captures large-scale changes in habitat extent, as well as smaller-scale species shifts gathered by on-the-ground monitoring.**



*Uniting Central and Southwest Florida to Protect Water and Wildlife*

# INTERACTIVE CLIMATE DATA MAP



**Combines all publicly available climate data: Sea Level Rise Projections, Predicted Community Flooding Maps, Predicted Vegetation Shifts, Historic Hurricanes, Temperature Changes, Rainfall, EVT, Saltwater Intrusion**



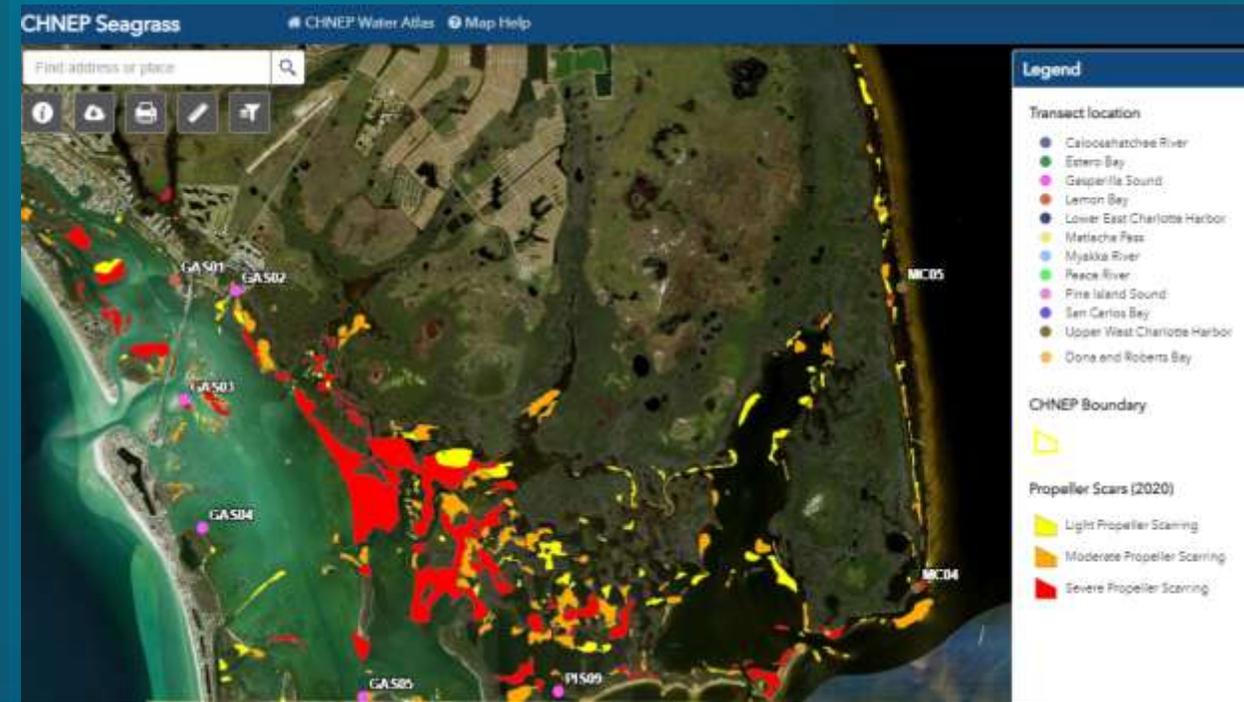
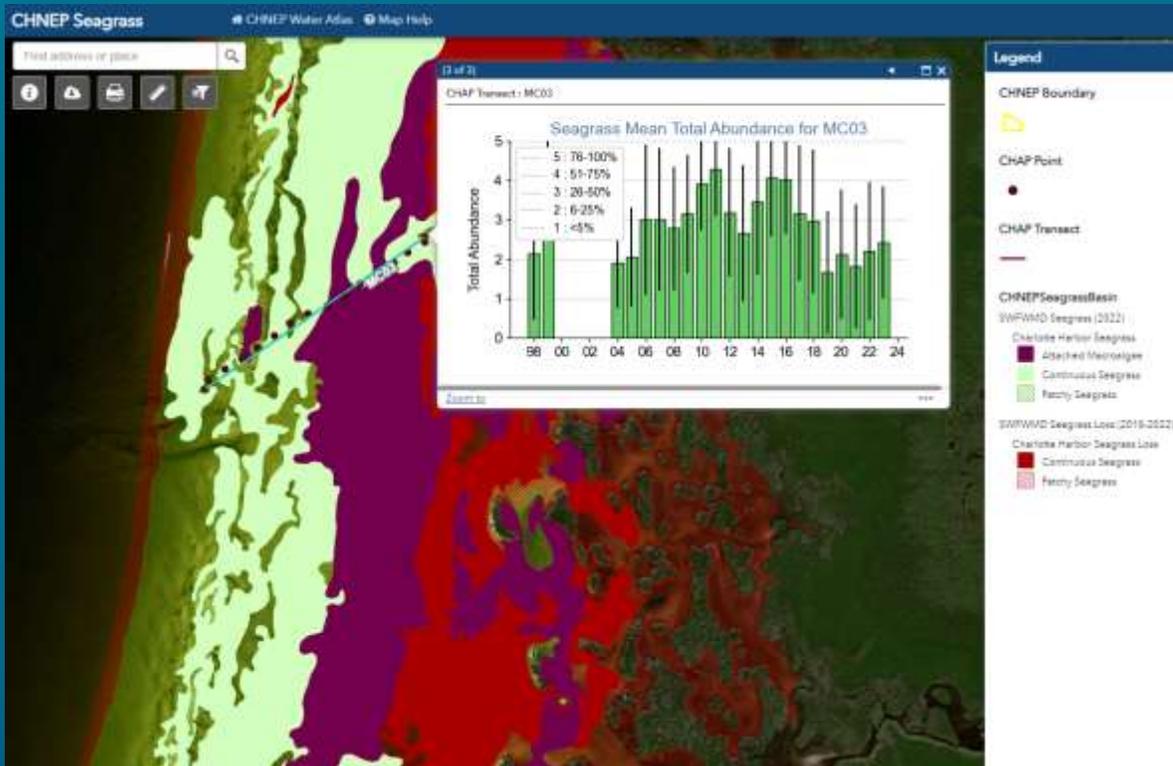
*Uniting Central and Southwest Florida to Protect Water and Wildlife*

# SEAGRASS & ALGAE

Maps of seagrass presence/loss, propeller scar studies, macroalgae, and seagrass transects.

(Sources: SWFWMD, SFWMD, FDEP, SeaGrant)

SEAGRASS PAGES



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# SEAGRASS & ALGAE

Graphs for seagrass acreage, species composition and abundance, deep edge, algae and epiphyte density

(Sources: SWFWMD, SFWMD, FDEP, SeaGrant)

HOME DISCOVER MAPS / DATA LEARN PARTICIPATE

Seagrass Home

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CHNEP Area Interactive Map

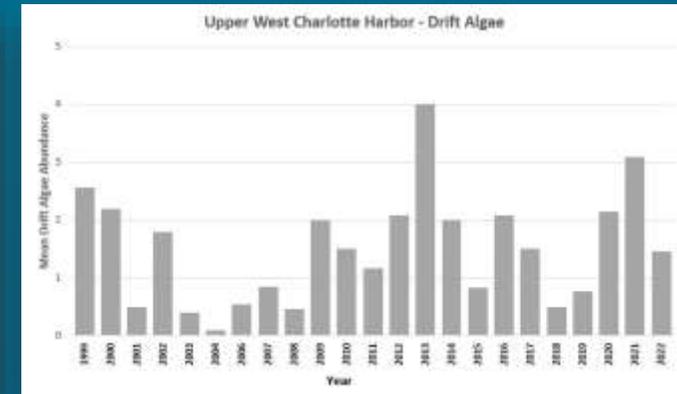
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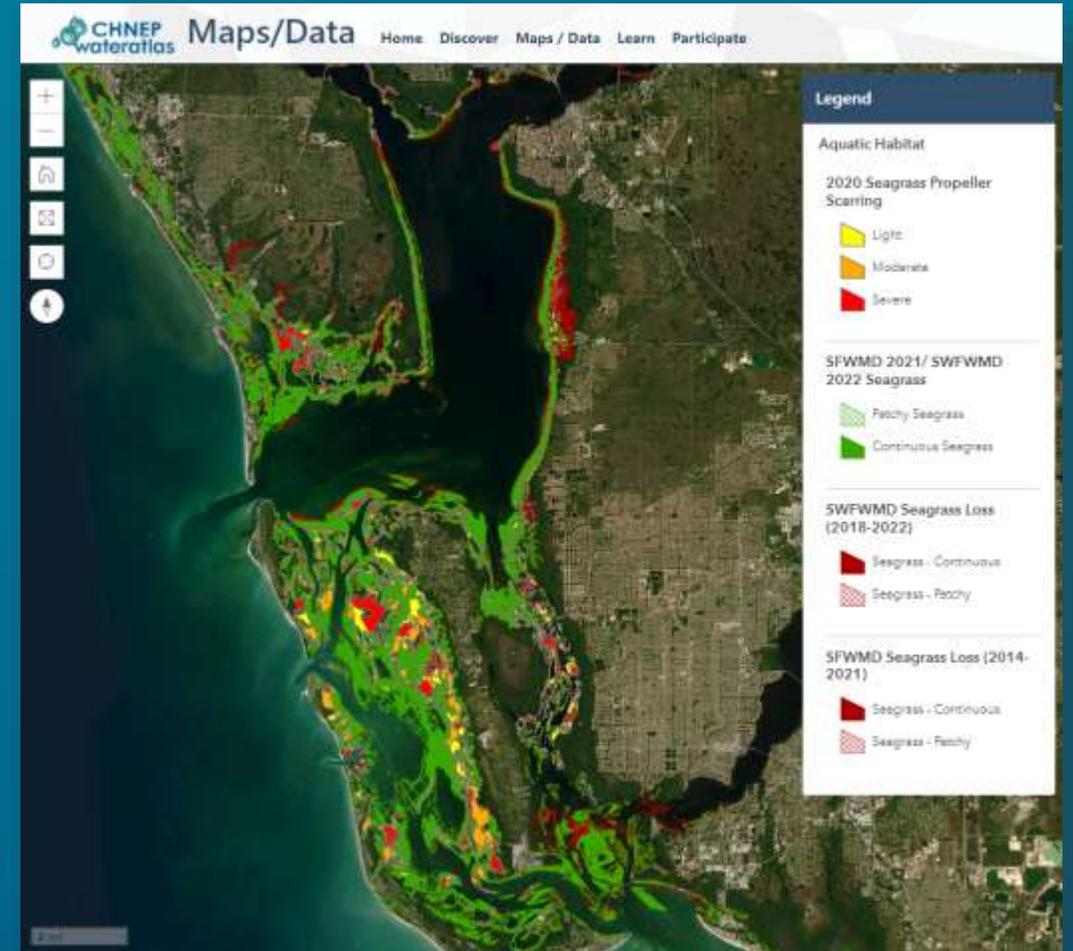
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# SEAGRASS & ALGAE

Also available on waterbody pages and interactive maps



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# OYSTERS & CLAMS

Maps of restoration projects as well as restoration suitability and ranked priority sites (Sources: CHNEP SWFL Oyster Working Group (OWG), SCCF, FWC, FDEP Aquatic Preserves)

## CHNEP CLAM HABITAT SUITABILITY AND POTENTIAL RESTORATION SITE SELECTION

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### CLAM HABITAT SUITABILITY

### OYSTER HABITAT RESTORATION

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### Reports, Data, & Tools

#### Reports & Tools

- [Native Hardshell Oyster Habitat Restoration Objectives Overview and One-Year Monitoring Report](#)
- [Native Hardshell Oyster Reef Restoration Two-Year Post-Implementation Report](#)
- [Native Hardshell Oyster Reef Restoration Three-Year Post-Implementation Report](#)
- [Charitable Deduction in Taxation: Implications for Reef and Coastal Areas](#)
- [Oyster Stock in Florida: Generalized Data Set](#)
- [CHNEP Oyster Habitat Restoration Plan](#)
- [Oyster Habitat Restoration Monitoring and Assessment Handbook](#)
- [Oyster Associated Invasive and Nonindigenous Species \(OAHIS\) Tech. Report No. 20, Version 2.0 \(2021\)](#)
- [CHNEP Southern Oyster Habitat Monitoring Program – Volunteer Manual, SOPs](#)
- [Oyster Classification Tool – For determining restoration objectives](#)
- [Index of Oyster Sites in Florida](#)

#### Southwest Florida Oyster Working Group and Subcommittee

- December 16, 2014 (Special)
- Nov. 11, 2016 (Special) Oyster Restoration Regulatory Discussion (Meeting Notes)
- January 8, 2016 (Special, Meeting Notes)
- April 13, 2016 (Special, Summary of Working Process, Sites of Interest Sites)
- February 15, 2013 (Special)
- January 14, 2013 (Special, Sites of Interest Sites)
- October 20, 2014 (Special, List of Focus Area Sites)
- May 8, 2014 (Special, Meeting Notes)
- September 11, 2013 (Special, Meeting Notes)
- June 16, 2013 (Special, Meeting Notes)
- May 20, 2013 (Special, Meeting Notes)
- May 9, 2013 (Special, Meeting Notes)
- April 24, 2013 (Special, Meeting Notes)

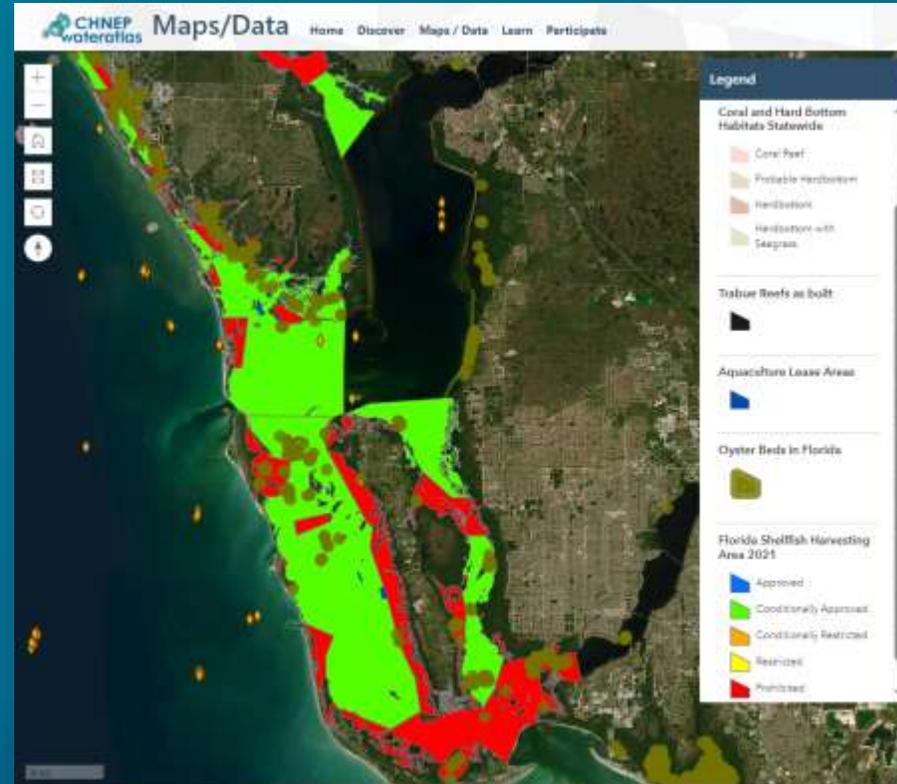
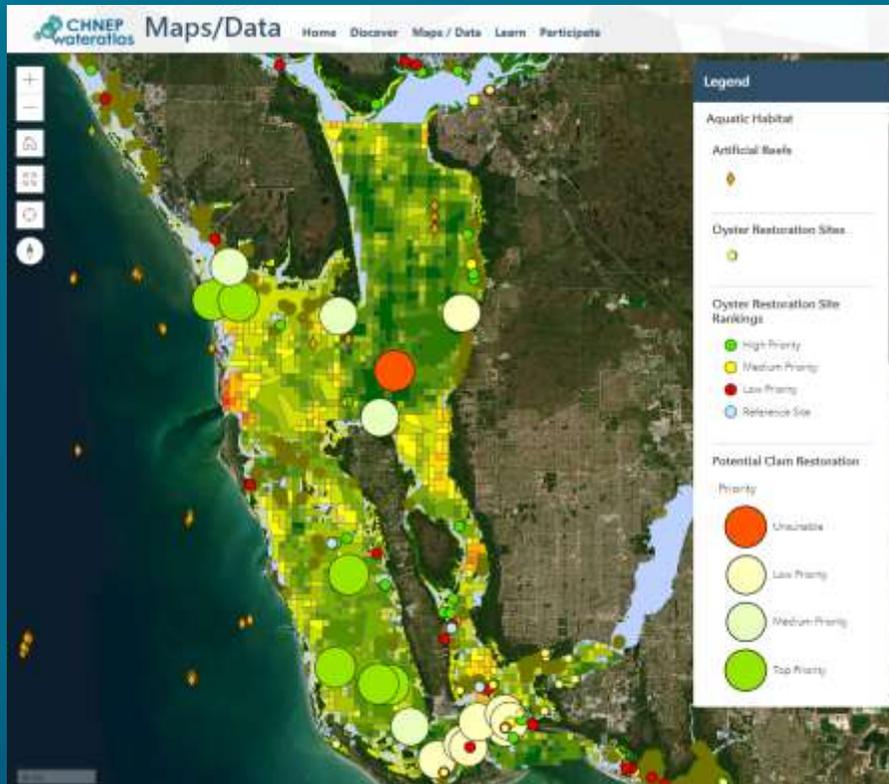
#### Monitoring Data

View the full list of datasets by clicking on the Layer List button.



# OYSTERS & CLAMS

- Oyster and clam restoration projects and suitability also available on interactive maps
- Other shellfish related layers available on interactive maps as well



# NUMERIC NUTRIENT CRITERIA (NNC) CALCULATOR TOOL

- NNC updated to use the most recent thresholds defined in the Florida Administrative Code (FAC).



**CHNEP wateratlas** NNC Calculator Discover Maps / Data Learn Participate

Note that tidal waters do not have established FDEP NNCs. However, non-FDEP NNC values are available on the [TBEP Tidal Creeks Dashboard](#).

**Request #825** by Anonymous on 11/25/2024 @ 9:28 AM  
**Status** Created as of 11/25/2024 9:28:09 AM  
**Date Range** 1/1/2021 - 12/31/2024  
**Summary** 298 WBIDs; 4 Years

[Back to List](#) [Download](#)

**Legend**  
 - No Data ! Above NNC ✓ Below NNC  
 ● Insufficient Data

**No Data** - No sampling data exist  
**Insufficient Data** - It cannot be determined which NNC threshold should apply, or there are not enough data for comparison.

**WBIDs**  
[New](#): Click on a table row to view an interactive chart of the results.

Show 10 entries Search:

WBID	Waterbody Class	Waterbody Type	Color (PCU)	Alkalinity (mg/L CaCO <sub>3</sub> )	2021			2022			2023			2024					
					ChlA	TN	TP	ChlA	TN	TP	ChlA	TN	TP	ChlA	TN	TP			
3237C - LAKE HICPOCHEE	3F	STREAM	Not Available	Not Available	✓	!	!	!	!	!	!	!	!	!	!	!	!	!	!
3237D - FLAGHOLE CANAL	3F	STREAM	Not Available	Not Available	-	!	!	-	✓	!	-	✓	!	-	✓	!	-	✓	!
3237E - C-19 CANAL	3F	STREAM	Not Available	Not Available	!	!	✓	-	!	!	-	✓	✓	-	!	!	!	!	!
3240A - CALOOSAHATCHEE ESTUARY (TIDAL SEGMENT1)	3M	ESTUARY	Not Available	Not Available	!	!	!	TP above NNC Value: 0.117 mg/l Threshold: 0.04 mg/l			!	!	!	!	!	!	!	!	!
3240A1 - CAPE CORAL (TIDAL SEGMENT)	3M	ESTUARY	Not Available	Not Available	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
3240A4 - DEEP LAGOON CANAL	3M	ESTUARY	Not Available	Not Available	✓	!	!	✓	!	!	✓	!	!	✓	!	!	✓	!	!
3240B - CALOOSAHATCHEE ESTUARY (TIDAL SEGMENT2)	3M	ESTUARY	Not Available	Not Available	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!



# REAL-TIME DATA MAP

- Near real-time data for rainfall, surface and groundwater levels, flow, water quality, and weather
- View station details to download all station data and generate interactive graphs
- Sources: USGS, NOAA, SFWMD, SWFWMD, UF IFAS, Sarasota County, and Lee County

CHNEP Water Atlas  
Real-time Data Mapper

HOME DISCOVER MAPS

**COCOPLUM WATERWAY AT NORTH PORT FL**

Station Name: COCOPLUM WATERWAY AT NORTH PORT FL  
Station ID: 02299482  
Last Updated: 2024-11-25T09:15:00 **Active**  
Agency: USGS National Water Information System

**Additional Details**

**Most Recently Reported Data**

Sample Date	Parameter	Value
Nov 25, 2024, 9:15 AM	Elevation, water surface (NAVD88)	4.25 ft
Nov 25, 2024, 9:15 AM	Flow	50 cfs
Nov 25, 2024, 9:15 AM	Gage height	5.39 ft
Mar 9, 2017, 10:15 AM	Velocity - stream	-0.02 ft/sec
Jul 19, 2016, 12:15 PM	Elevation, water surface	4.28 ft
Jun 14, 2010, 8:00 AM	Streamflow (Tidal)	14 cfs

**Station Details**

**Graphs**

Explore the last two years of data for each parameter by selecting one of the buttons below. Today's date/time will always be on the right side of the x-axis. Zoom in by clicking and dragging in the plot area. Save charts as images or download data via the chart options button in the top-right corner.

**Elevation, water surface (NAVD88) (ft)**

Nov 25, 2024, 4:15:00  
Elevation, water surface (NAVD88) 4.24 ft

**Filter by Status**

- Active
- Inactive
- Decommissioned

**Filter by Last Update**

All Time Periods

**Filter by Data Monitored**

- Rainfall
- Water Flow
- Water Levels
- Water Quality

**REAL-TIME DATA MAP**



# DATA DOWNLOAD

**Water Atlas Data Download (BETA)** Home Help Feedback

By Shape By Value By Spatial Results

The Search Tool lets you create a selection within a single layer (Sampling Locations, WBIDs, or Watersheds).

Layer to Search: [Clear Fields](#)

Sampling Locations

Search On:

All fields (boolean AND logic)

Search multiple fields using boolean AND logic

Data Source is

Station ID is e.g. LB-5

Waterbody monitored contains e.g. Lemon Bay

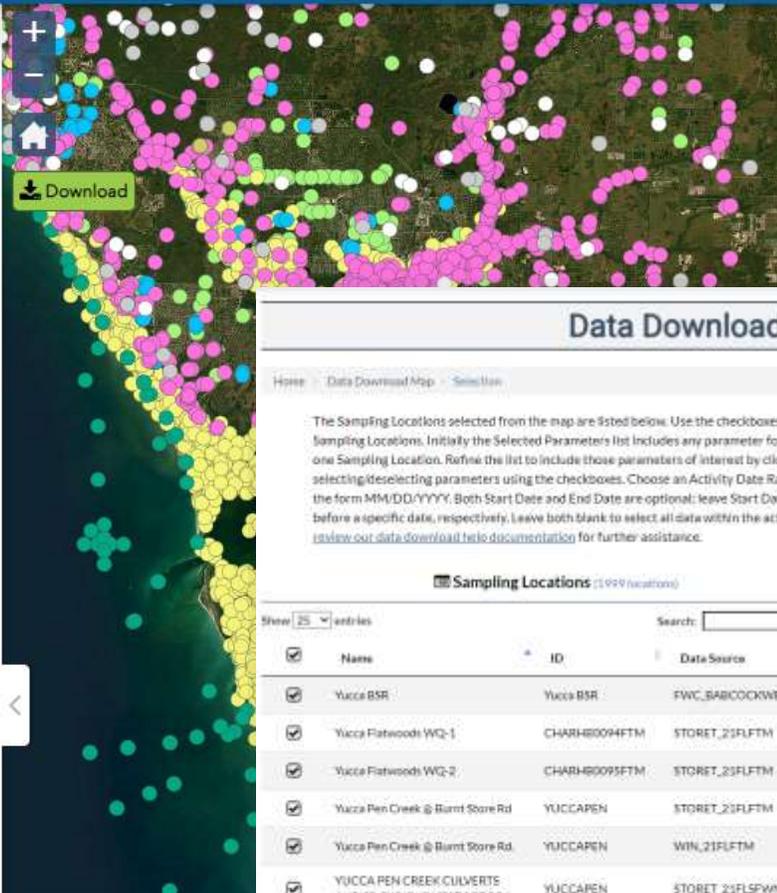
DEP WBID is e.g. 1536C

Monitoring Agency is

County is

Station Type is

Limit search to map extent



**Water Atlas Data Download (BETA)** Home Help Feedback ArcGIS World Geocoding Service

By Shape By Value By Spatial Results

Features selected: 1338

- CHARH0004FTM  
STATIONNAME Whidden Creek - South Point  
SOURCEAGENCY Florida Department of Environmental Protection
- 670136-03  
STATIONNAME Charlotte Harbor CCHMN-117-03  
SOURCEAGENCY Southwest Florida Water Management District
- 670128  
STATIONNAME CHARLOTTE HARBOR CCHMN-108  
SOURCEAGENCY Southwest Florida Water Management District
- 670087-02  
STATIONNAME Charlotte Harbor CCHMN-062-02  
SOURCEAGENCY Southwest Florida Water Management District

Download (1338)

**Data Download (BETA)**

Home Data Download Map Select Use

The Sampling Locations selected from the map are listed below. Use the checkboxes to select/deselect individual Sampling Locations. Initially the Selected Parameters list includes any parameter for which there is data from at least one Sampling Location. Refine the list to include those parameters of interest by clicking the Modify button and selecting/deselecting parameters using the checkboxes. Choose an Activity Date Range by using the date selection boxes or typing in dates in the form MM/DD/YYYY. Both Start Date and End Date are optional: leave Start Date or End Date blank to select data collected after or before a specific date, respectively. Leave both blank to select all data within the activity date range for the chosen Sampling Locations. Please [view our data download help documentation](#) for further assistance.

**Sampling Locations (199 locations)**

Show 25 entries Search:

<input checked="" type="checkbox"/>	Name	ID	Data Source
<input checked="" type="checkbox"/>	Yucca BSR	Yucca BSR	FWC_BABCOCKWEBB_HYDRO
<input checked="" type="checkbox"/>	Yucca Flatwoods WQ-1	CHARH00094FTM	STORET_23FLFTM
<input checked="" type="checkbox"/>	Yucca Flatwoods WQ-2	CHARH00095FTM	STORET_23FLFTM
<input checked="" type="checkbox"/>	Yucca Pen Creek @ Burnt Store Rd	YUCCAPEN	STORET_23FLFTM
<input checked="" type="checkbox"/>	Yucca Pen Creek @ Burnt Store Rd	YUCCAPEN	WIN_21FLFTM
<input checked="" type="checkbox"/>	YUCCA PEN CREEK CULVERTS AND SR 765 (BURNT STORE RD)	YUCCAPEN	STORET_23FLSPWM
<input checked="" type="checkbox"/>	Yucca Pen Marlee @ N of Old Burntstore	Q2SD0015	WIN_21FLFTM
<input checked="" type="checkbox"/>	Yucca Pen Marlee @ N of Old Burntstore	Q2SD0015	STORET_23FLFTM

**Selected Parameters (214)** : 240\_ug/l (ug/l), 9-Hydroxycarbofuran (ug/l), Atrachlor (ug/l), Aldicarb (ug/l), Aldicarb sulfone (ug/l), Aldicarb sulfoxide (ug/l), Atr-In (ug/l), Algal growth potential (mg/l), Alkalinity, Carbonate as CaCO3 (mg/l), Alkalinity, Total (mg/l CaCO3) ... and 204 more.

**Activity Date Range**

Start Date: End Date:

Search Results: Sampling Locations

Options Filter by Map Extent Zoom to Clear Selection Refresh

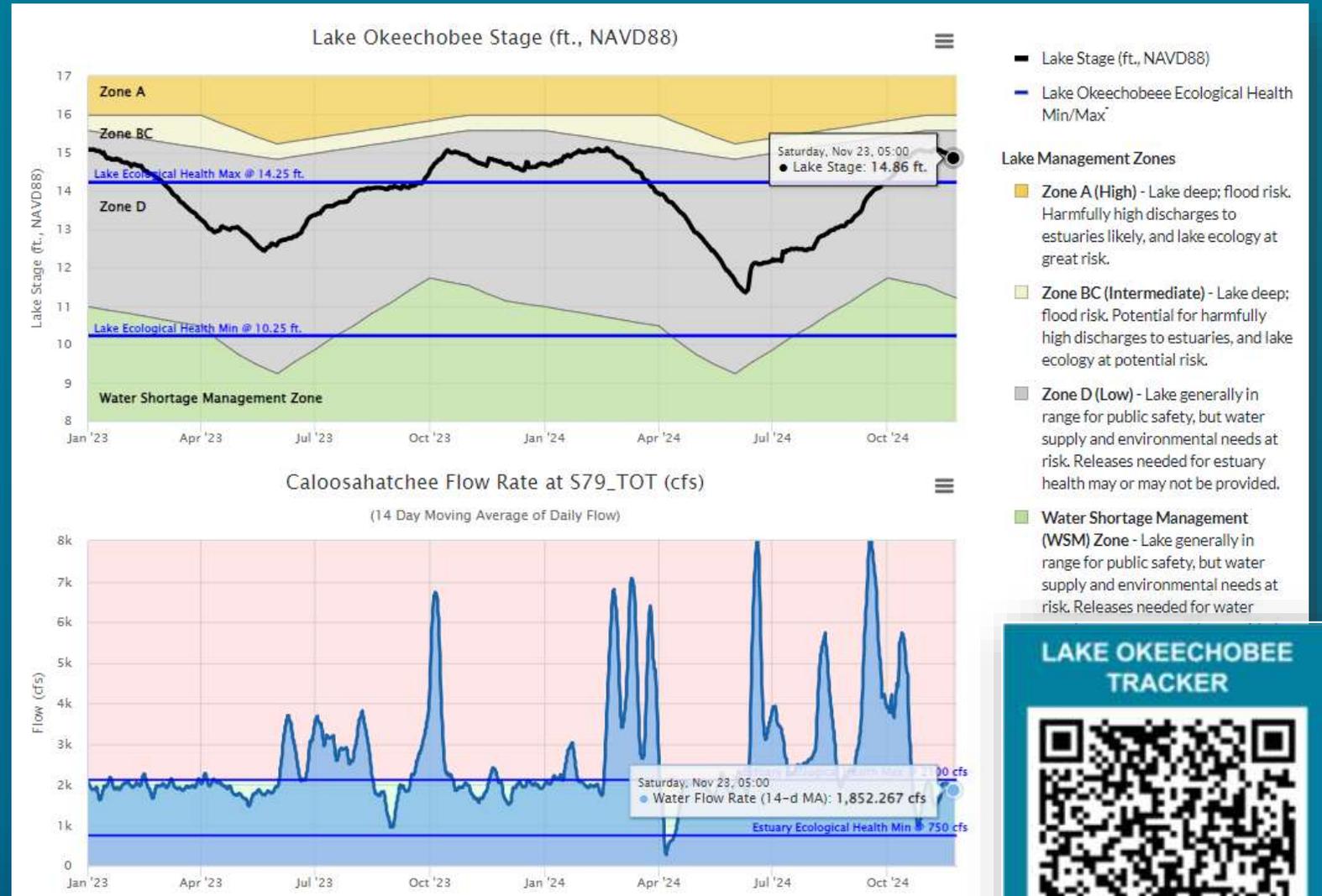
STATIONID	DATASOUR	STATIONNA	WATERBODY	COUNTY	SOURCEAG	DATACOUN	FOR_MIN	FOR_MAX
CHV008	STORET_21F	Alligator C- at Rivers Oyster Bar	Total Alligator Creek (North Fork)	Charlotte	Charlotte County Environment Quality Lab	1092	December 1, 1996	April 30, 2017
CHV009	STORET_21F	Burnt Store Marina	Burnt Store Marina	Lee	Charlotte County	1934	July 5, 1998	April 30, 2017
CHV012	STORET_...							April 30, 2017
CHV007	STORET_...							April 30, 2017



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# LAKE OKEECHOBEE TRACKER

- Interactive graphs of recent Lake Okeechobee elevation levels and corresponding flow into the Caloosahatchee River
- Recently updated with new LOSOM lake management zones and ecological health min/max values



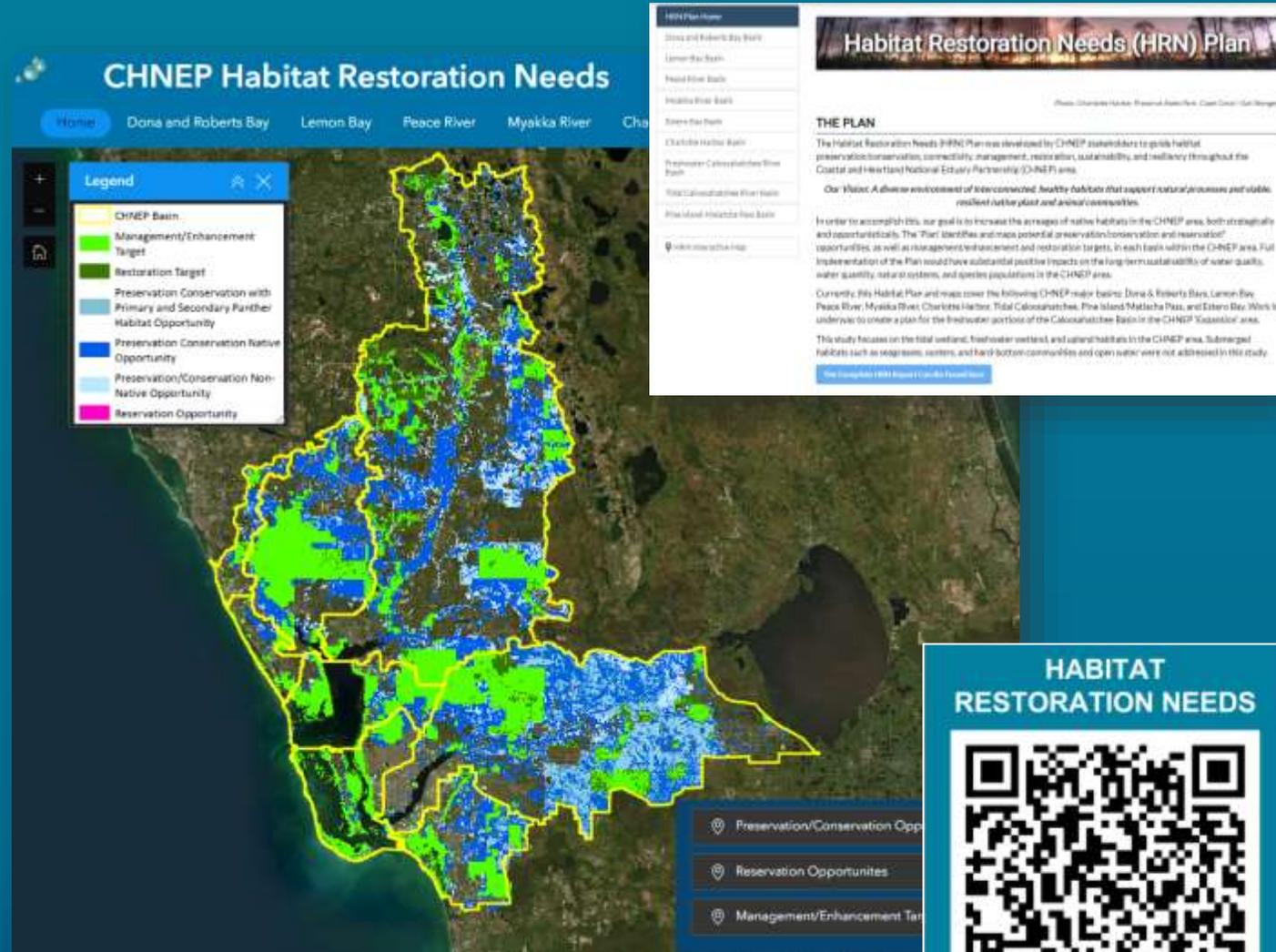
Uniting Central and Southwest Florida to Protect Water and Wildlife



# HABITAT RESTORATION NEEDS (HRN)

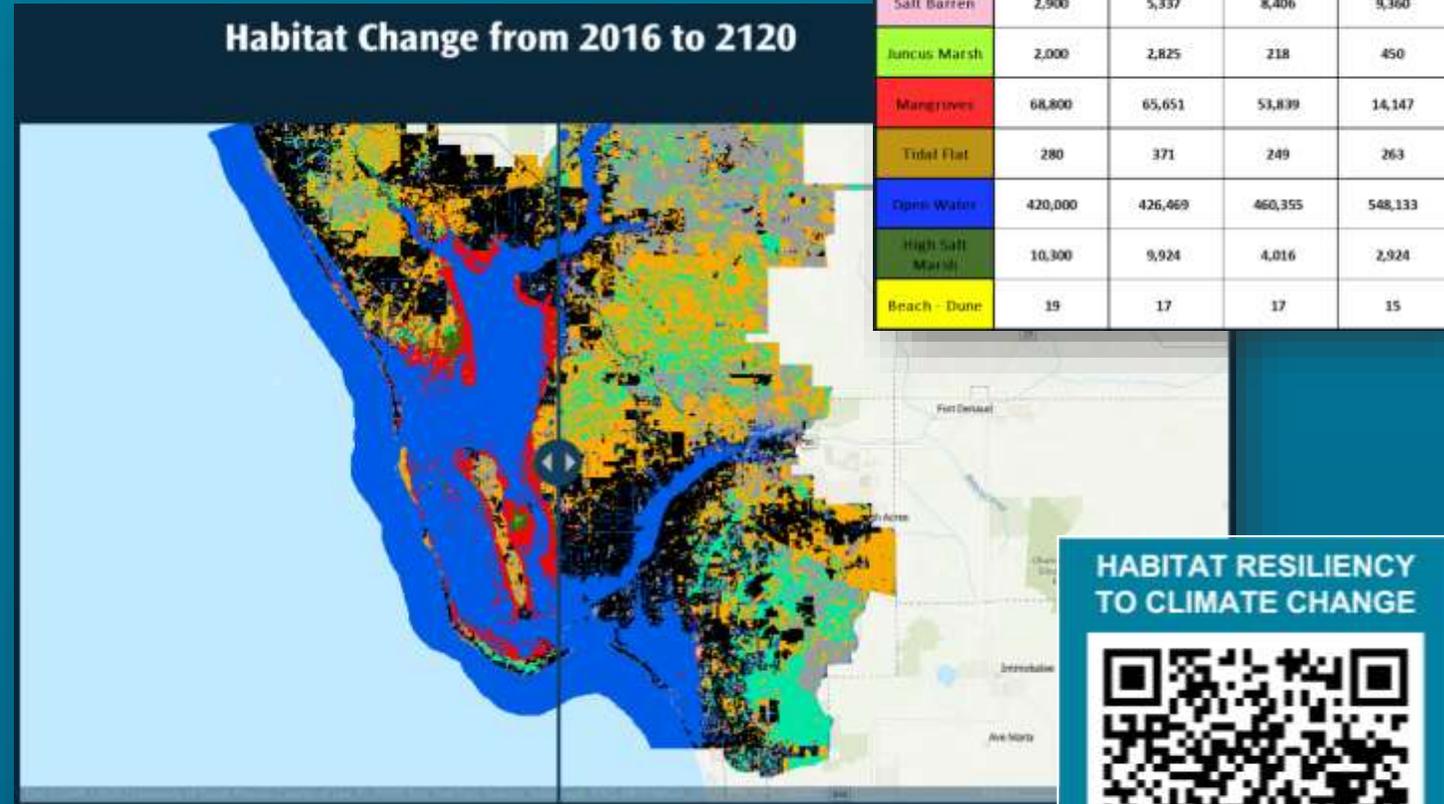
## HRN Report Maps & Landing Page

- Map of potential conservation and reservation opportunities, as well as management and restoration targets by basin
- Recommendations for coastal wetlands
- Includes habitat change analysis and habitat migration model results



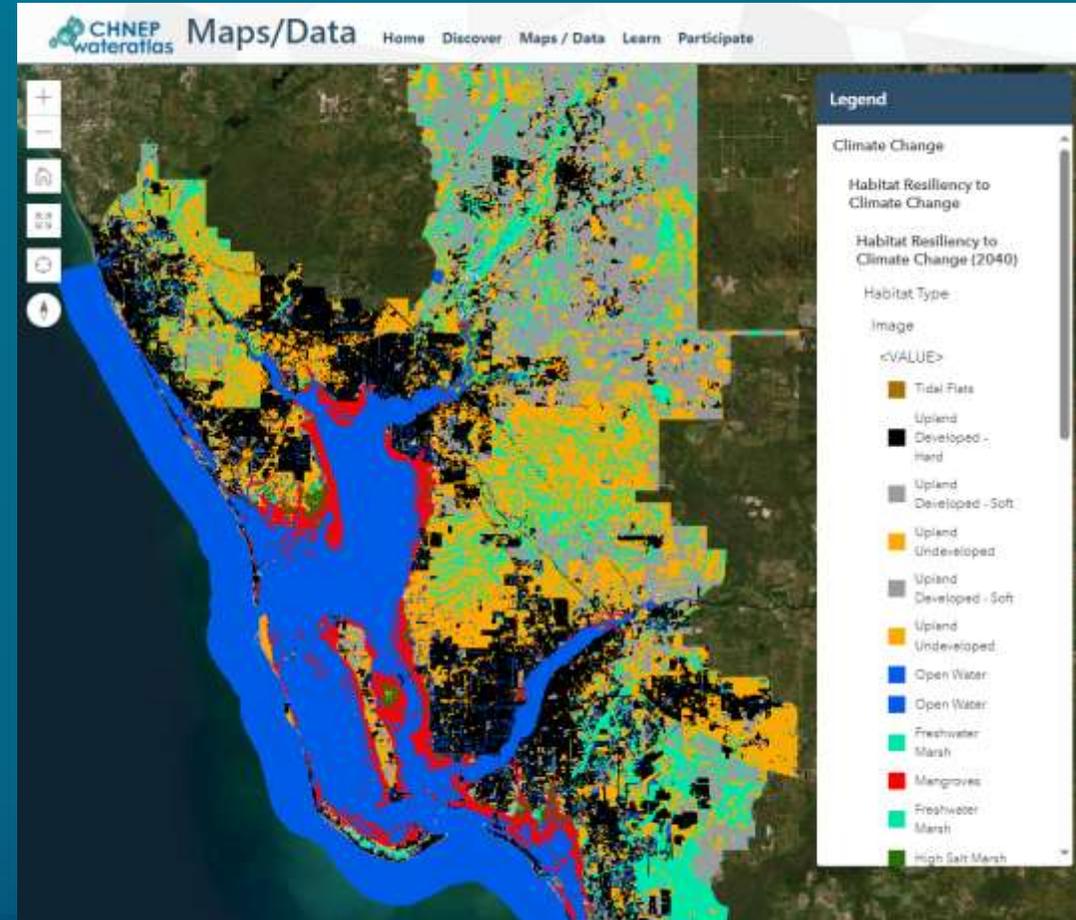
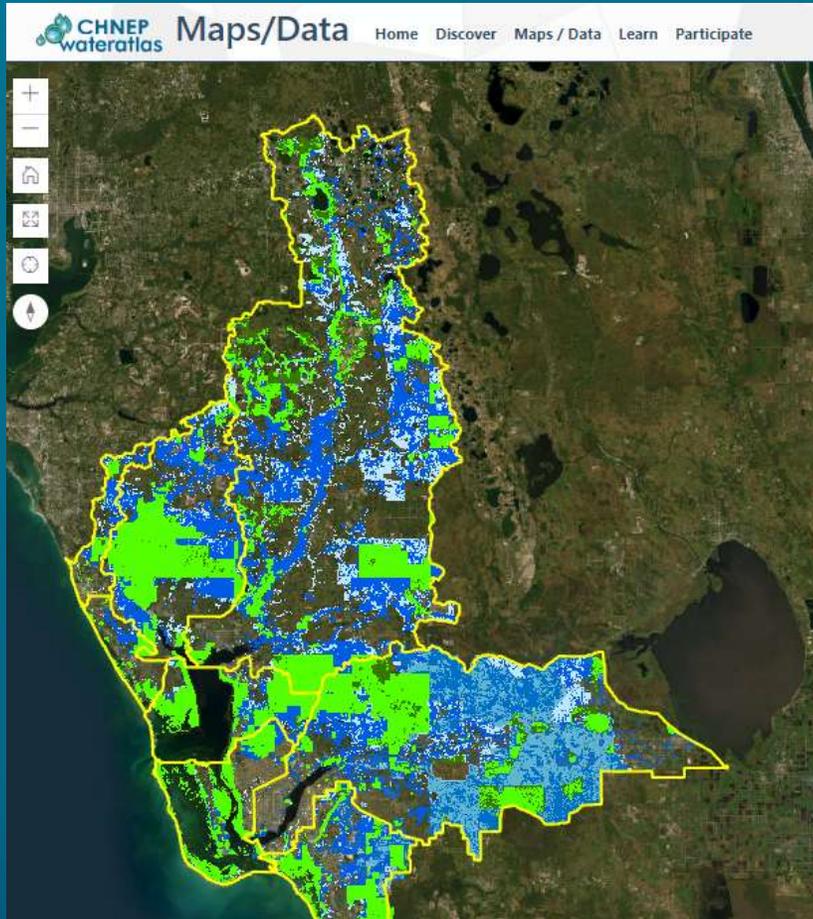
# HABITAT RESILIENCY TO CLIMATE CHANGE (HRCC)

- Habitat Evolution Model (HEM) developed to predict changes in vegetative communities caused by climate change
- Years 2016, 2040, 2070, 2120
- Includes interactive maps and charts with time sliders as well as interpretation of results



# HABITAT RESTORATION NEEDS & RESILIENCY TO CLIMATE CHANGE

Also available on waterbody pages interactive maps



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