

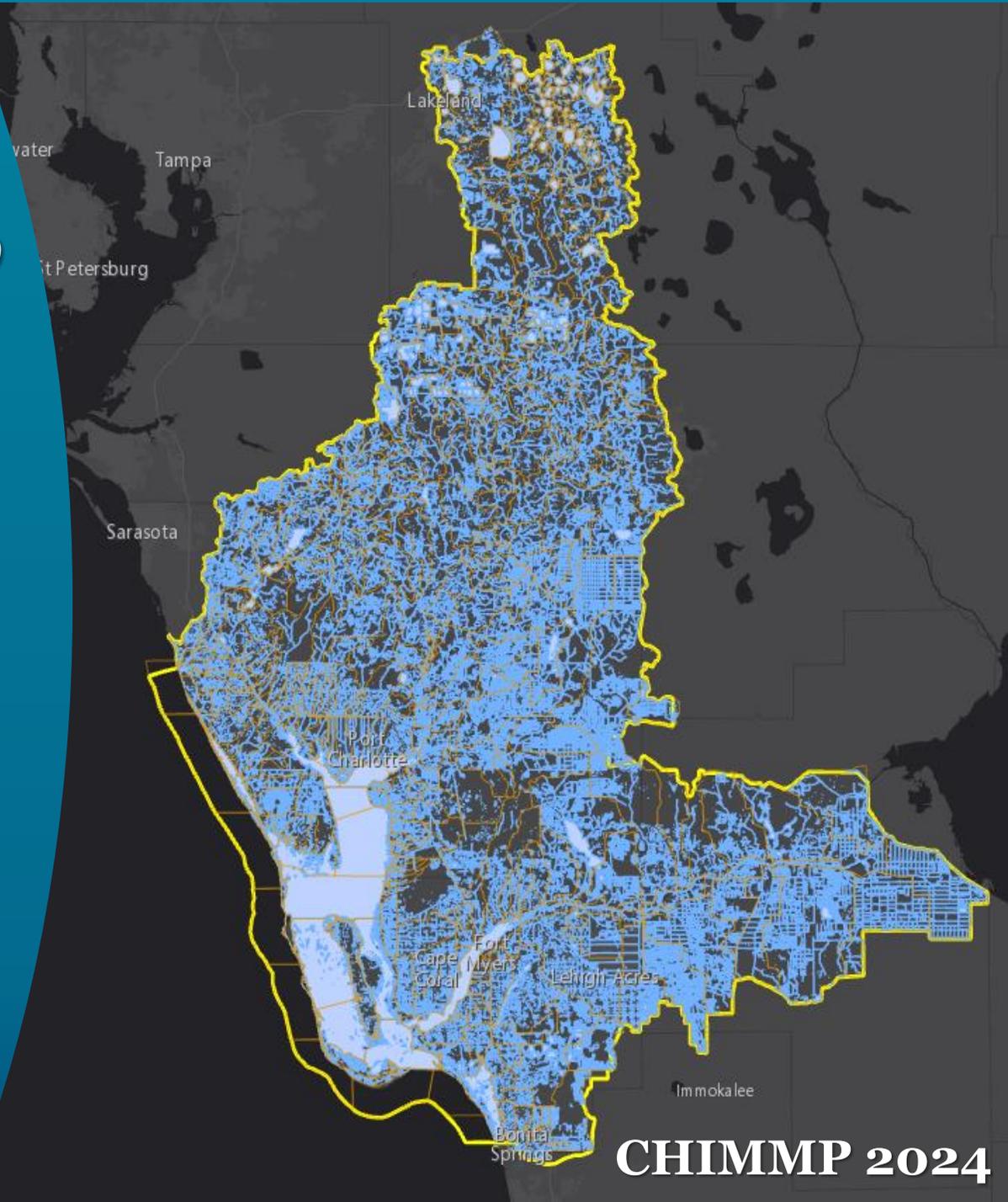
# CHNEP WATER ATLAS: *AN INTERACTIVE HABITAT & ESTUARIES REPORT CARD*



*Nicole Iadevaia<sup>1</sup>, Sarina Weiss<sup>1</sup>, Jennifer Hecker<sup>1</sup>, Shawn Landry<sup>2</sup>, Jan Allyn<sup>2</sup>*

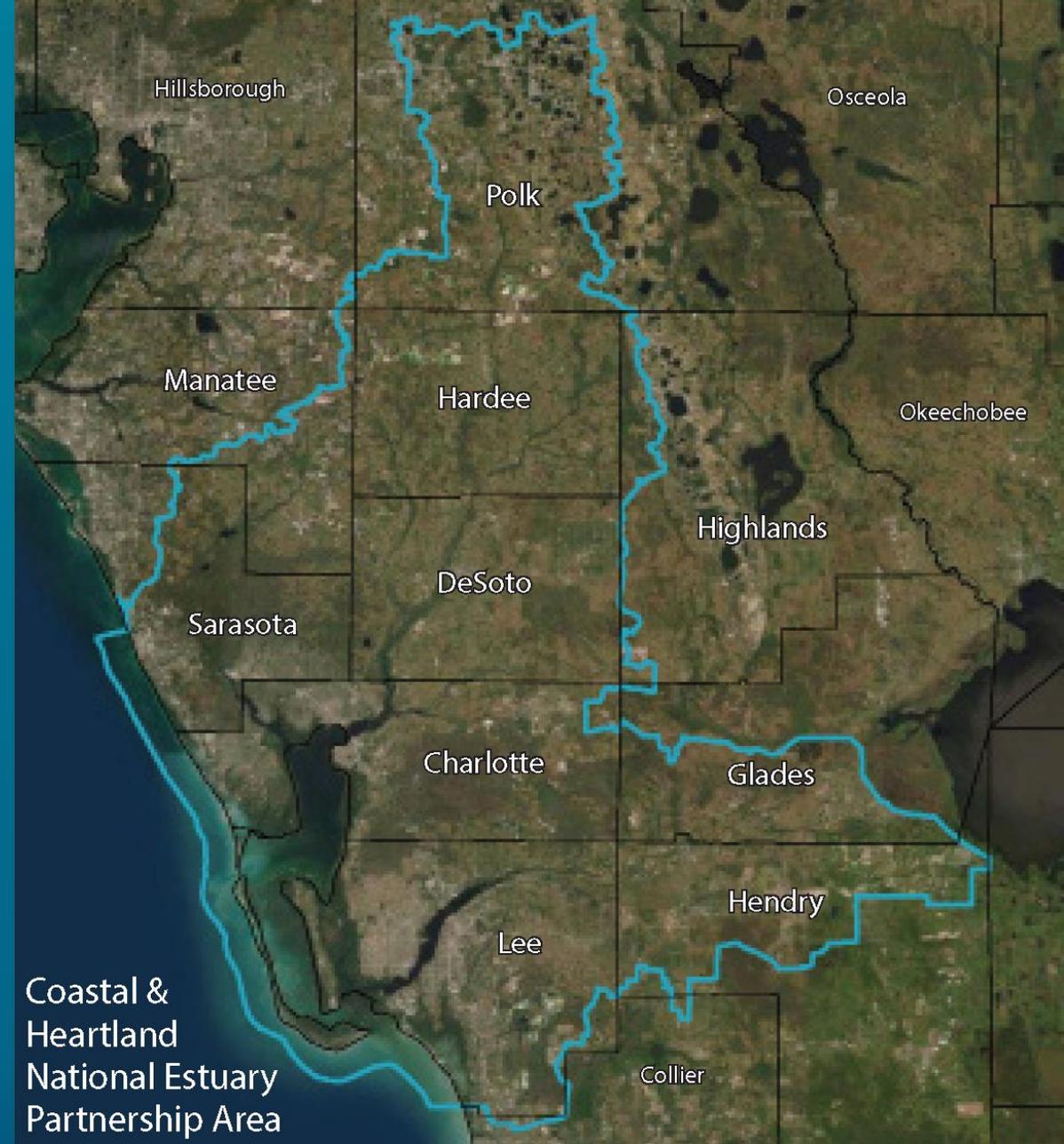
<sup>1</sup>Coastal & Heartland National Estuary Partnership

<sup>2</sup>University of South Florida Water Institute



# WHERE WE WORK

- CHNEP area encompasses 5,416 sq. miles (8 basins)
- Part of the US EPA's National Estuary Program
- Comprised of Local, state and federal govt. as well as NGOs from 10-county area of Central and Southwest Florida
- Inland and coastal Communities incl. 10 counties and 25 cities



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# WHAT WE DO

CHNEP is:

- Public-private partnership
- Consensus-based science
- Non-regulatory
- Regional Collaboration and Planning
- Citizen-supported



The 5-year Strategic Plan for the Partnership region:

Water Quality Improvement



Hydrological Restoration



Fish, Wildlife & Habitat Protection



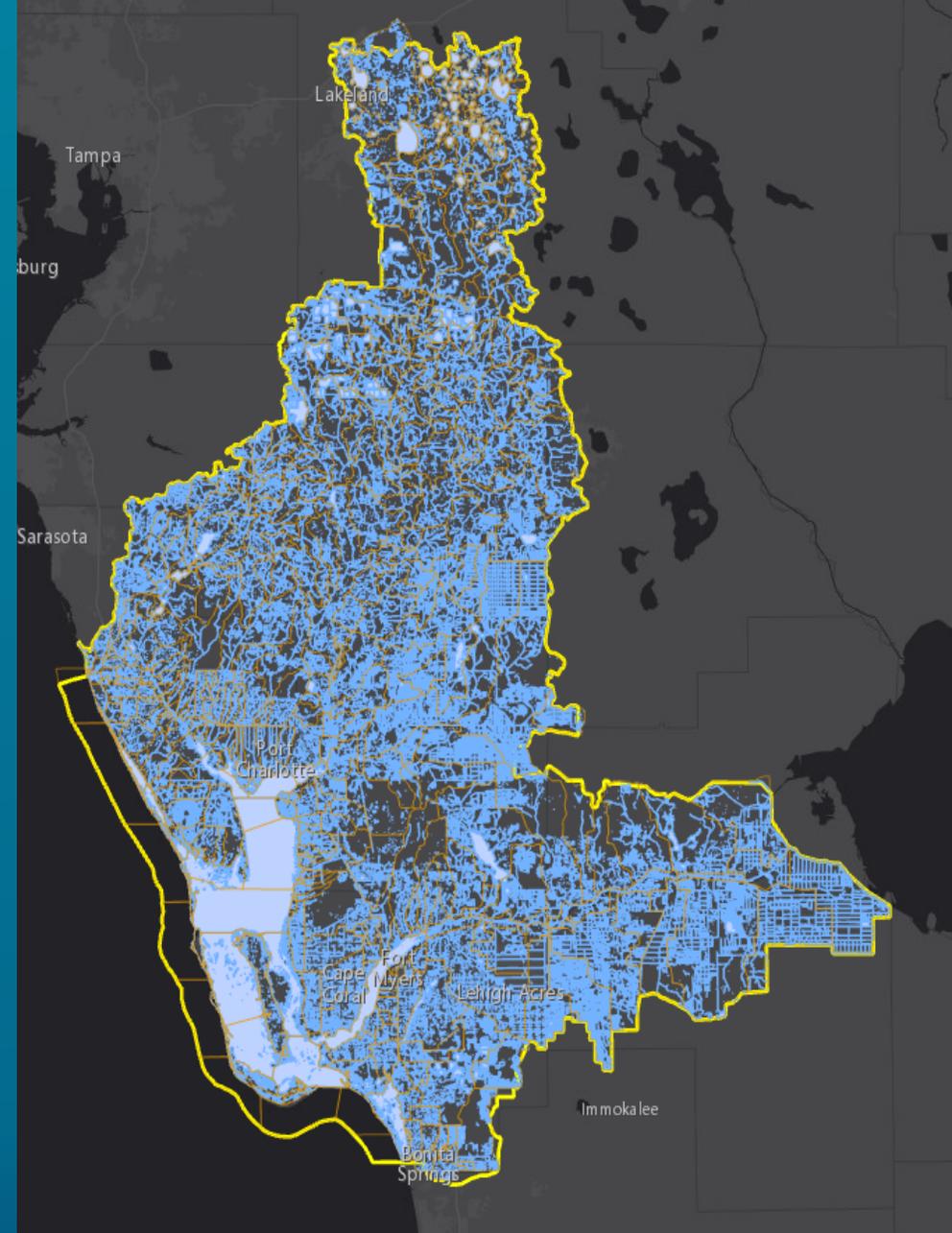
Public Engagement



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# MEETING GOALS

- **VISION:** An informed, engaged public making choices and taking actions that increase protection and restoration of estuaries and watersheds.
- **OBJECTIVE:** Translate water quality data collected by local programs into actions aimed at protection and restoration.
- **STRATEGY:** The CHNEP Water Atlas is a publicly accessible online tool providing regional water and habitat resources and information about the historical and current conditions of our watersheds and ecosystems.



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# CHNEP WATER ATLAS

Web-based resource center for:

- Scientists;
- Local resource managers;
- State agencies;
- Interested community members;
- Decision makers.

User-friendly, one-stop shop for water quality, flow, and habitat data featuring interactive maps, graphs and charts, and easy-to-understand explanations of environmental science.



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site search

HOME DISCOVER MAPS / DATA LEARN PARTICIPATE

## CHNEP Water Atlas

A collection of data, information and educational materials dedicated to the natural resources found within the study area of the Coastal & Heartland National Estuary Partnership.

### WELCOME TO THE CHNEP WATER ATLAS

*The Coastal & Heartland National Estuary Partnership: Uniting Central and Southwest Florida to Protect Water and Wildlife*

Serving Dona and Roberts Bays, Lemon Bay, Charlotte Harbor, Pine Island Sound, Estero Bay, as well as the Peace, Myakka, and Caloosahatchee River Basins.

[View the CHNEP Comprehensive Conservation and Management Plan \(CCMP\)](#)

#### Find a Waterbody

Type the name of a water resource in the box below.

Water Resource Name

Popular Resources Near Me

- Cape Coral (Tidal Segment)
- Lower Tidal Caloosahatchee River
- Punta Gorda Isles
- Caloosahatchee River
- Charlotte Harbor

Find Nearby Waterbodies

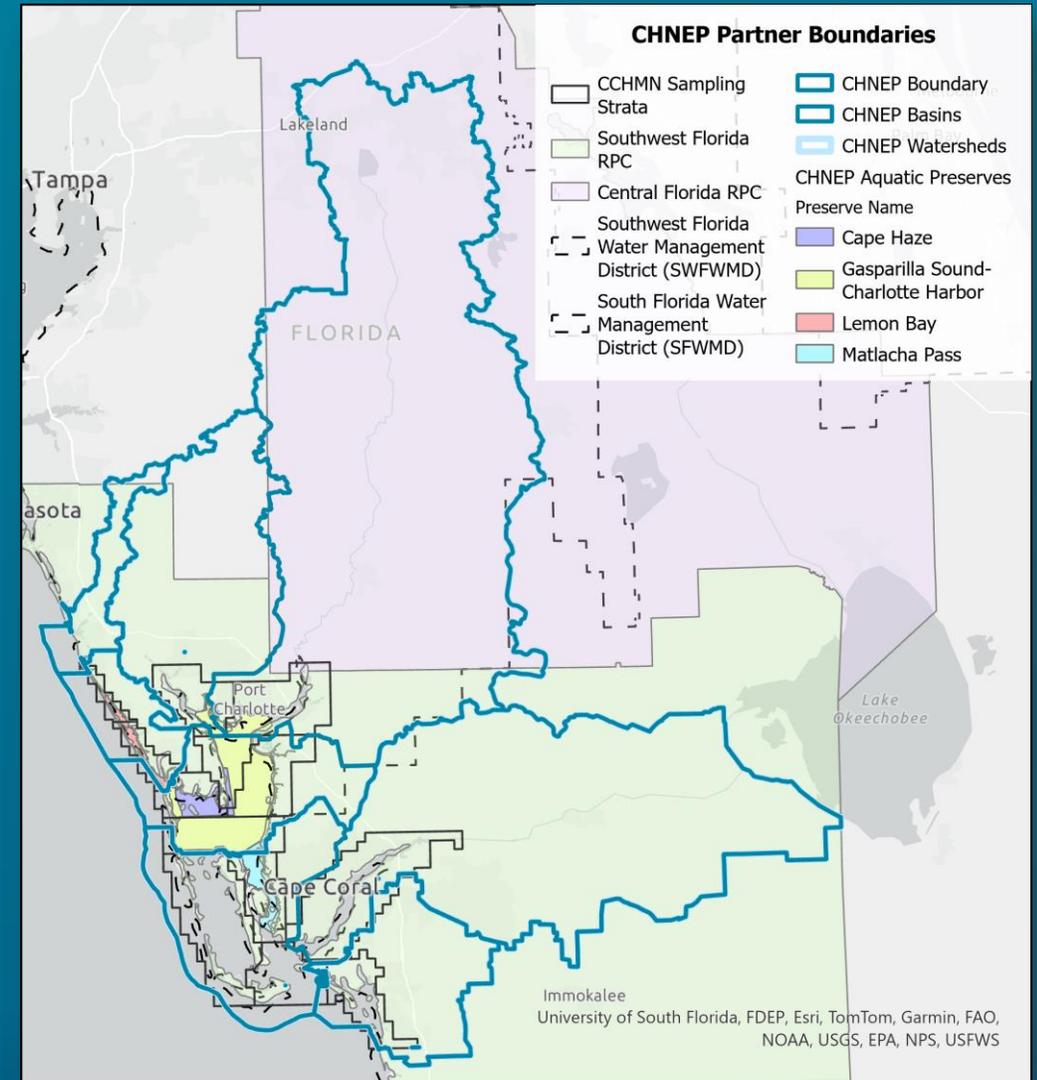
# BREAKING OUT OF SILOS

- The Partnership covers several different management and research boundaries, including:

- 10 counties
- 2 Water Management Districts
- 2 Regional Plannings Councils
- 4 aquatic preserves

- CHNEP Water Atlas tools and data were operating in isolation on individual webpages

- Water Quality Dashboard
- Seagrass pages
- Habitat Restoration Needs
- Clam and Oyster Habitat Suitability



# BREAKING OUT OF SILOS

## WATER QUALITY DASHBOARD

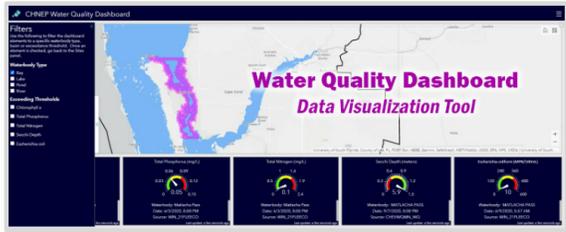
Current water quality conditions for inland and coastal waterbodies

This dashboard measures the most current water quality data against water quality standards for Chlorophyll a, Phosphorus, Nitrogen, *E. coli* bacteria, and Secchi Depth water clarity (separated by fresh and marine water quality standards outlined in [Florida Administrative Code 62-302](#)). It provides a snapshot of how a waterbody is doing, with the colors on the dials representing the current state of the water quality based on the last data point reported with green meaning good condition, yellow meaning fair as water quality is approaching unsafe threshold, and red meaning poor as the water is above the safety threshold. For additional water quality data and more detailed analysis of a specific lake, river or bay [visit the home page of the Water Atlas](#).

The results displayed on the Dashboard are for information only and have no regulatory authority. They are not an assessment of waterbody impairment, which is done solely by the Florida Department of Environmental Protection, which continually collects and assesses water quality and biological data statewide to determine water quality and ecosystem impairment (<https://floridaden.gov/dear/watershed-assessment-section>).

Usage notes: Zoom in completely on the desired waterbody before selecting to ensure the correct waterbody is selected. If you have trouble viewing dials or latest values, refresh the page and re-select the desired waterbody.

[Open the CHNEP Water Quality Dashboard](#)



### Legend

- **Good** Good condition as water quality is in safe range
- **Poor** Poor condition as water quality is above safety threshold

### Tips

- Zoom in completely on the desired waterbody before selecting to ensure the correct waterbody is selected.
- If you have trouble viewing dials or latest values, refresh the page and re-select the desired waterbody.



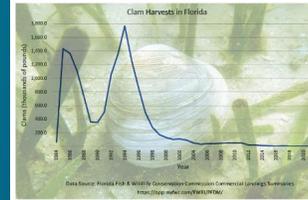
The southern hard clam (*Meretricaria campechensis*) and the northern hard clam (*M. mercenaria*) are both found in the Gulf of Mexico. The southern species is native while the northern species is likely a product of aquaculture introduction. When abundant, hard clams have an important role in estuaries 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, seagrass provides 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

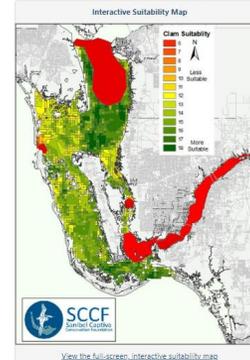
The hard clam has been harvested by man from the Charlotte Harbor Estuary since at least 300 – 500 AD. Since the mid-twentieth century, over-harvesting, water quality changes, habitat loss and ecosystem disturbance has drastically reduced the abundance of hard clams in Southwest Florida. In fact, the Charlotte Harbor Estuary is a 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 instances, the farmed clams are still viable 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.



## WATER QUALITY TRENDS

Explore short- and long-term trends for those water quality parameters that are most useful in evaluating the extent of nutrient pollution.

Use the map to choose a water quality parameter, time period, and geographic area. The map will show a summary of the results of a [Seasonal Kendall Tau statistical analysis for 10000+](#) Each icon displayed on one monitoring station, it shows whether the data collected there for the selected water quality measure shows a statistically significant trend, and if so, whether it was increasing or decreasing, weak (<10% change/year) or strong (>10%/year). Clicking on an icon will open a popup with a trend graph. Click on the "View full details" link in the popup to see a full page of information about the station, data, and trend, and to download a printer-friendly version.

Data is presented and analyzed here in two ways:

- Stratum:** 60 randomized samples are collected each month to capture representative water quality conditions across 10 waterbodies throughout the CHNEP area over multiple years, these waterbodies are the "stratum". This data is collected by partners in the Coastal Charlotte Harbor Monitoring Network (CCHMN).
- Fixed Station:** Individual stations where samples have been collected in the same location over multiple years and are representative of water quality conditions at that station. CHNEP's county and municipal partners and established volunteer programs listed below collect this data.

[Learn more](#)

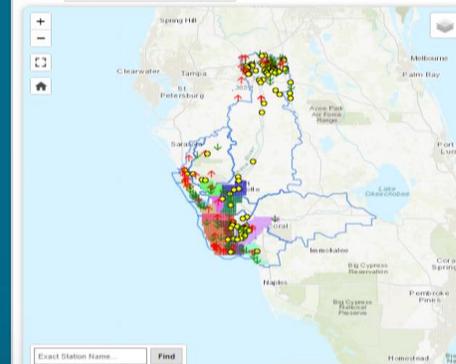
### Total Nitrogen - Period of Record (All Available Data)

The map below shows the trend being experienced at the long-term monitoring stations spread throughout the CHNEP area.

[View Data Details](#)

Water Quality Parameter:  Time Period:

Zoom To:



Note: Trends were prepared on October 9, 2023 using the latest available data. Results presented replace all previous editions.

### Trend Analysis Process Overview

This page displays the results of a statistical ten-year trend analysis developed to use selected water quality parameters from the Water Atlas. In addition to a summary visualization of the trend results, it also provides a compiled data set, and explanatory digital documents that will be valuable to natural resource managers as they attempt to characterize and react to water quality conditions and trends. The statistical analytical techniques employed by this tool were modified from the approach used by Janicki Environmental, Inc. in the 2013 Water Quality Data Analysis Report for the Coastal & Heartland National Estuary Partnership.

The Seasonal Kendall Tau test for trend available in the EnvStats R package is used as the statistical approach<sup>[1]</sup>. The model employs techniques to account for seasonality, autocorrelation and duplicate sampling. In an effort to detect statistically significant trends in the data, analysis was performed on a suite of water quality measures for each of approximately 900 monitoring sites. For each site/water quality measure, the analysis determined whether a statistically significant trend was detected, and if so, whether it was increasing or decreasing, weak (<10% change/year) or strong (>10%/year).

The amount of nutrients entering a water body has important effects on water quality. Plants and animals that live in lakes, rivers, and estuaries use these nutrients, especially nitrogen and phosphorus, to grow and survive. However, when excessive amounts of nutrients enter the water, negative impacts can occur, such as algal blooms that block sunlight for submerged plants and bigger events that deplete the oxygen in the water and result in fish kills. The indicators shown here are those most valuable in assessing the health of our waterways relative to nutrient pollution.

1 Millard SP (2013). *EnvStats: An R Package for Environmental Statistics*. Springer, New York. ISBN 978-1-4614-8455-4. <https://www.springer.com>

### Download Trend Analysis Output

You can download raw data for your own analysis by clicking on the link below. The data is formatted as a ZIP file containing raw and calculated data, methods documentation, and an R script.

[Download](#) [View archived analyses](#)

Note: Trends were prepared on October 9, 2023 using the latest available data. Results presented replace all previous editions.

### Map Legend

- ↑ Increasing Trend, Larger Rate [Declining](#)
- ↑ Increasing Trend, Smaller Rate [Declining](#)
- No Trend
- ↓ Decreasing Trend, Smaller Rate [Improving](#)
- ↓ Decreasing Trend, Larger Rate [Improving](#)
- CHNEP Basin Boundary
- CHNEP Sampling Strata

### Contacts

For more information, please contact the Coastal & Heartland National Estuary Partnership:

- Jennifer Hecker, CHNEP, [jennifer@chnep.org](mailto:jennifer@chnep.org), (941) 833-6583
- Nicole Iadavala, CHNEP, [niadavala@chnep.org](mailto:niadavala@chnep.org), (941) 833-6582
- Sarina Weiss, CHNEP, [swiss@chnep.org](mailto:swiss@chnep.org), (941) 833-6585

### Documents

- For more information, please see the documents below:
- [Water Quality Data Analysis Report for the Coastal & Heartland National Estuary Partnership \(2013\)](#)
  - [Techniques of Trend Analysis for Monthly Water Quality Data \(1982\)](#)
  - [Statistical Methods for the Analysis of Lake Water Quality Trends \(1993\)](#)
  - [Seasonal Trend Analysis of Monthly Water Quality Data](#)
  - [Statistical Analysis for Monotonic Trends](#)
  - [EnvStats: Package for Environmental Statistics, Including US EPA Guidance](#)
  - [Millard SP \(2013\). EnvStats: An R Package for Environmental Statistics. Springer, New York. ISBN 978-1-4614-8455-4](#)
  - [CCHMN 2019 Standard Operating Procedures \(Includes Strata Information\)](#)



## 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 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
<a href="#">Dona &amp; Roberts Bay Basin</a>
<a href="#">Lemon Bay Basin</a>
<a href="#">Myakka River Basin</a>
<a href="#">Peace River Basin</a>
<a href="#">Gasparilla Sound-Cape Haze Basin</a>
<a href="#">Charlotte Harbor Basin</a>
<a href="#">Pine Island Sound-Matiacha Pass</a>
<a href="#">San Carlos Bay Basin</a>
<a href="#">Tidal Caloosahatchee River Basin</a>
<a href="#">Estero Bay Basin</a>
<a href="#">CHNEP Area Interactive Map</a>



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# TOOLS FOR MANAGEMENT PARTNERS

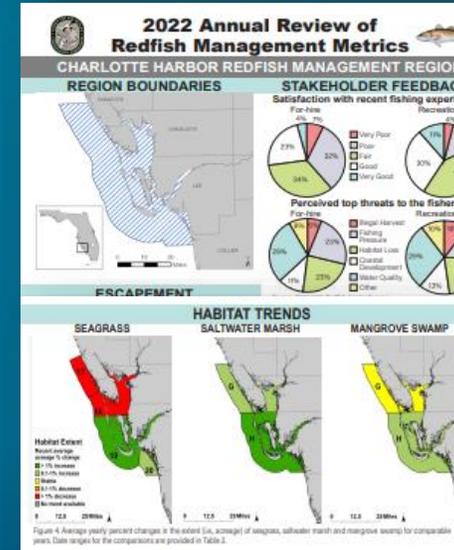
- CHIMMP report: “Cooperation is necessary among federal, state, and local governmental agencies and nonprofit groups to coordinate connectivity.”
- What are metrics used by stakeholders to measure water quality and habitat health? (research scientists, agencies, local govts., NGOs)
- Data needed to be organized in a way used by management agencies. WMDs, FDEP, FWC etc.



Figure 1 – Basin boundaries for the Charlotte Harbor Estuary including Dona & Roberts Bay and Lemon Bay Watersheds. Source: SWFWMD Mapping and GIS Section.

SWFWMD

SFWMD



FWC

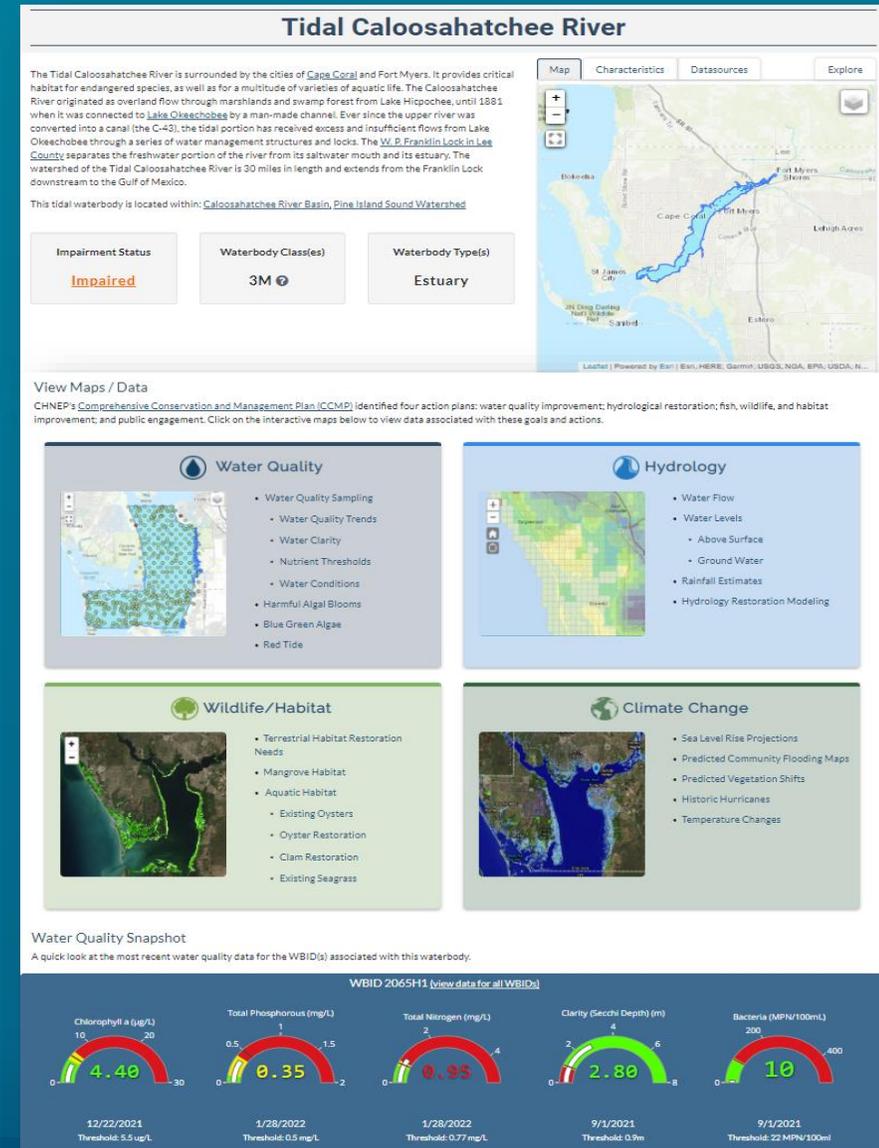
FDEP



# INTERACTIVE ESTUARIES & HABITAT REPORT CARD

- Bringing all data collected by partners in one place to give holistic management picture

- Water Quality
- Hydrology
- Wildlife/Habitat
- Climate Stressors



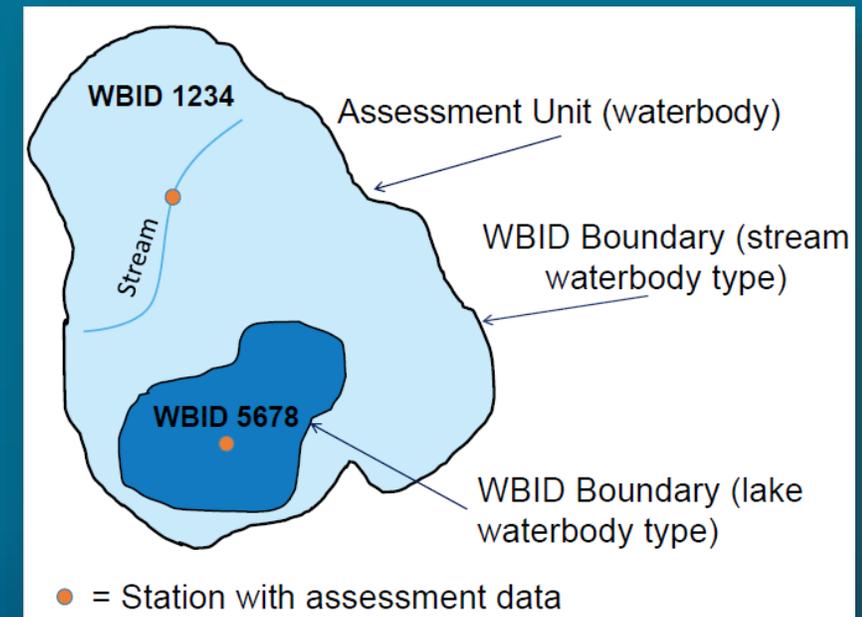
# WATER QUALITY ASSESSMENT



The FL Dept. of Environmental Protection (FDEP) Water Quality Assessment Program establishes water quality standards and impairments on behalf of EPA.

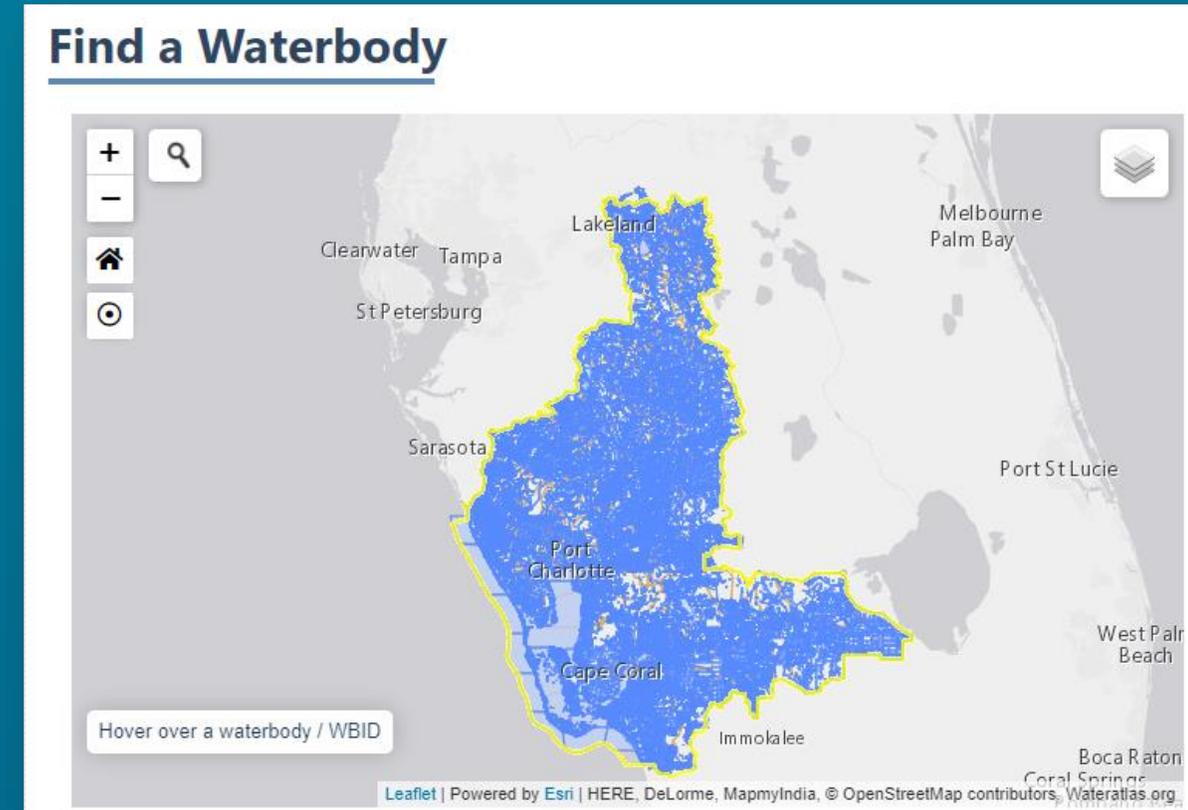
*Water quality status and trends are essential to identify sources of pollutants, examine pollutant load limits, and evaluate effectiveness of management practices.*

- FDEP's Water Body Identification Number (aka WBID) is an assessment unit. Each WBID is 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.



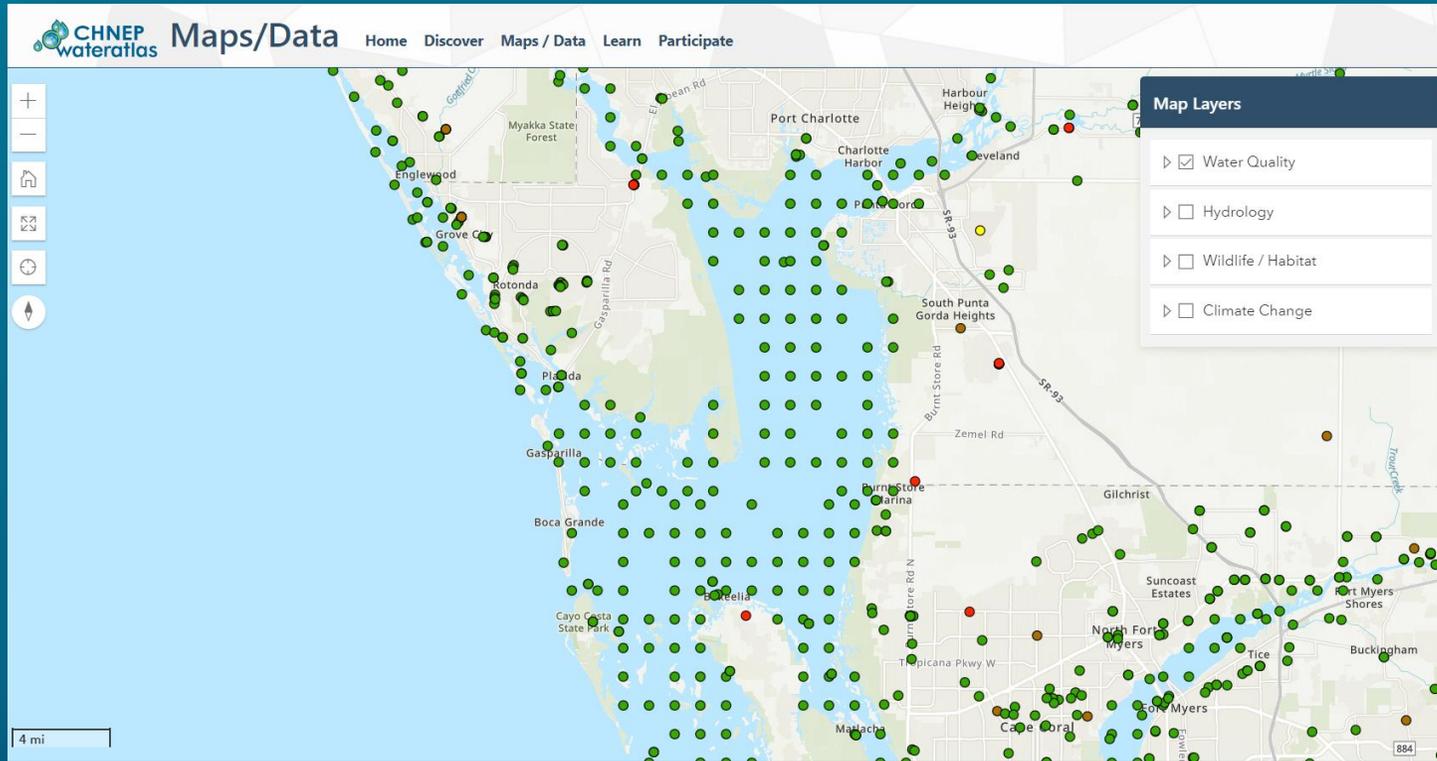
# ORGANIZING DATA TO GUIDE MANAGEMENT

- 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.



# WATERBODY PAGES

- Waterbody Pages presented with associated FDEP WBIDs and appropriate impairment criteria and explanation, WQ Dashboard dials, and all associated data in 4 interactive maps



### Tidal Caloosahatchee River

The Tidal Caloosahatchee River is surrounded by the cities of [Cape Coral](#) and Fort Myers. It provides critical habitat for endangered species, as well as for a multitude of varieties of aquatic life. The Caloosahatchee River originated as overland flow through marshlands and swamp forest from Lake Hippochee, until 1881 when it was connected to [Lake Okeechobee](#) by a man-made channel. Ever since the upper river was converted into a canal (the C-43), the tidal portion has received excess and insufficient flows from Lake Okeechobee through a series of water management structures and locks: The [W.D. Franklin Lock](#) in [Lee County](#) separates the freshwater portion of the river from its saltwater mouth and its estuary. The watershed of the Tidal Caloosahatchee River is 30 miles in length and extends from the Franklin Lock downstream to the Gulf of Mexico.

This tidal waterbody is located within: [Caloosahatchee River Basin, Pine Island Sound Watershed](#)

Impairment Status: **Impaired**

Waterbody Class(es): **3M**

Waterbody Type(s): **Estuary**

View Maps / Data

CHNEP's [Comprehensive 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
- Nutrient Thresholds
- Water Conditions
- Harmful Algal Blooms
- Blue Green Algae
- Red Tide

#### Hydrology

- Water Flow
- Water Levels
- Above Surface
- Ground Water
- Rainfall Estimates
- Hydrology Restoration Modeling

#### Wildlife/Habitat

- Terrestrial Habitat Restoration Needs
- Mangrove Habitat
- Aquatic Habitat
- Existing Oysters
- Oyster Restoration
- Clam Restoration
- Existing Seagrass

#### Climate Change

- Sea Level Rise Projections
- Predicted Community Flooding Maps
- Predicted Vegetation Shifts
- Historic Hurricanes
- Temperature Changes

Water Quality Snapshot

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

WBID 2065H11 [\[view data for all WBIDs\]](#)

Parameter	Value	Threshold	Date
Chlorophyll a (µg/L)	4.40	5.5 µg/L	12/22/2021
Total Phosphorous (mg/L)	0.35	0.5 mg/L	1/28/2022
Total Nitrogen (mg/L)	0.95	0.77 mg/L	1/28/2022
Clarity (Secchi Depth) (m)	2.80	0.9m	9/1/2021
Bacteria (MPN/100ml)	10	22 MPN/100ml	9/1/2021



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# BASIN & WATERSHED PAGES

- Waterbody pages will link to Basin and Watershed pages
- Waterbodies.
- These pages align with how Management Plans from other agencies and partners aggregate data.
- Each Basin and Watershed page is presented with associated data in 4 interactive mappers

**Charlotte Harbor Watershed**

The Charlotte Harbor Watershed is located within CHNEP and spans 350.0 square miles. The watershed contains 13 named lakes/ponds, 21 named rivers/streams/canals and 5 named bays/bayous. The Charlotte Harbor Watershed encompasses 3 major drainage basins, including the Charlotte Harbor Basin, Peace River Basin, and Myakka River Basin. Fresh water from the Peace and Myakka rivers mixes with salt water coming through Boca Grande Pass from the Gulf of Mexico to form the Charlotte Harbor Estuary.

Charlotte Harbor Watershed contains these basins:

- Charlotte Harbor Basin
- Myakka River Basin
- Peace River Basin

[View all water resources in this watershed](#)

**View Maps / Data**

CHNEP's Comprehensive 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**
  - Pond Watch
  - Canalwatch
  - Charlotte Harbor Environmental Volunteer Water Quality Network
  - Water Atlas Sample Sites
  - Impaired Waters
- Hydrology**
  - Recent Rainfall
- Wildlife/Habitats**
  - FNAI Conservation Lands
  - Seagrass Extent
  - Habitat Restoration Needs
- Climate Change**
  - Lee County Coastal High Hazard Area
  - Charlotte County Storm Surge
  - Habitat Resiliency to Climate Change

**Charlotte Harbor Basin**

The Charlotte Harbor Basin is located within CHNEP and spans 350.0 square miles. The basin contains 13 named lakes/ponds, 21 named rivers/streams/canals and 5 named bays/bayous. The basin is located within the larger Charlotte Harbor Watershed, which also includes the Peace River and Myakka River Basins. 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 Gascoilla Sound, 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.

This basin is located within: Charlotte Harbor Watershed

[View all water resources in this basin](#)

**View Maps / Data**

CHNEP's Comprehensive 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.

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**Water Quality Snapshot**

The Water Quality Snapshot compares the most current water quality data to applicable water quality standards for Chlorophyll a, Phosphorus, Nitrogen, Bacteria, and Dissolved Oxygen to provide a snapshot of how a waterbody is doing. Water quality standards are outlined in Florida Administrative Code 62.302 for freshwater waterbodies of different types and uses. A Water Body Identification number (WBID) is an assessment unit that is intended to represent Florida's waterbodies at the watershed or sub-watershed scale. The assessment units are drainage basins, lakes, lake drainage areas, springs, rivers and streams, segments of rivers and streams, coastal, bay and estuarine waters in Florida.

Showing water quality snapshots for 1 out of 5 WBIDs. [View details for all WBIDs.](#)

**2043 - ALLIGATOR CREEK (NORTH FORK)**

- Dissolved Oxygen (mg/l): 3.02
- Total Nitrogen (ug/l): 744.00
- Water Temperature (°F): 87.80

WIN 21ELCHAR 7/10/2023 Threshold: 6.000



# MEETING THE GOALS OF CHIMMP

**From CHIMMP report:**

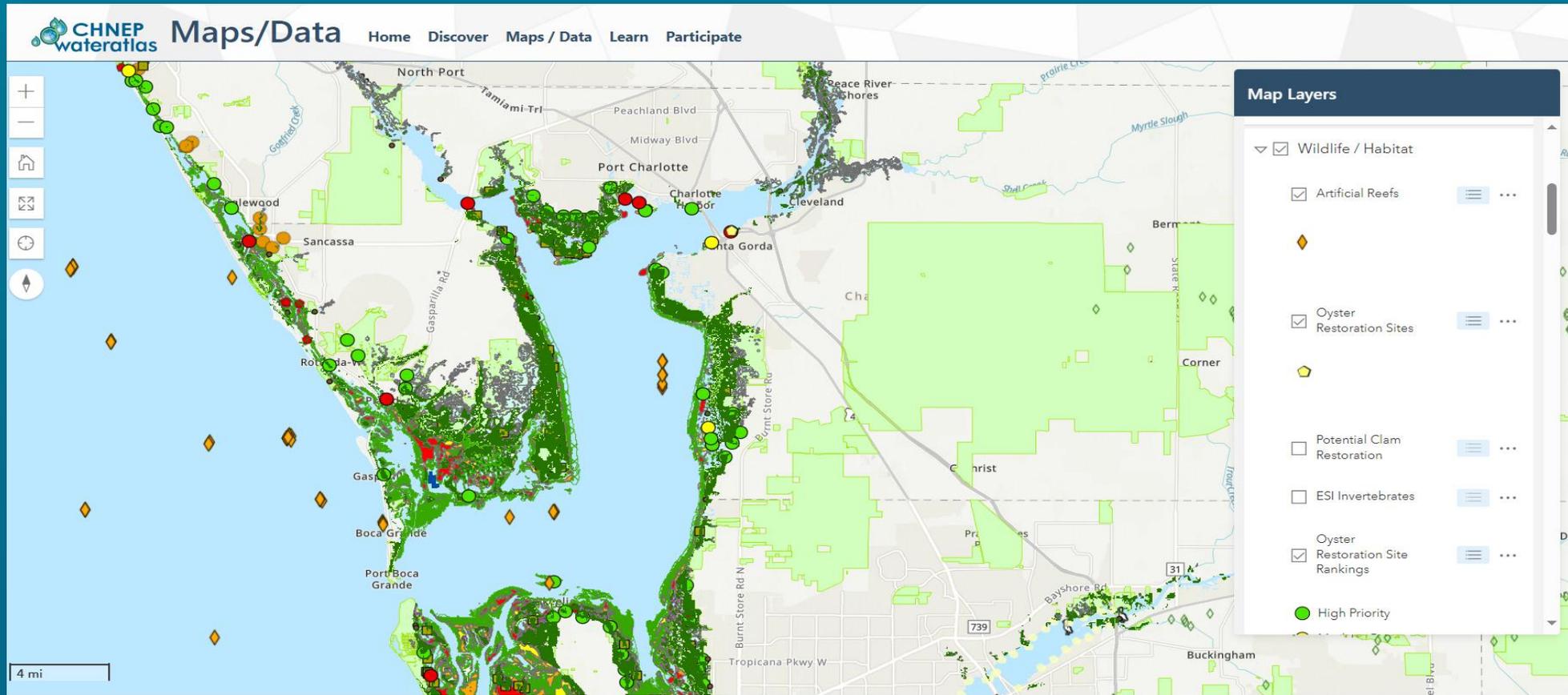
**A coordinated statewide mapping and monitoring program was deemed necessary to better understand and protect Florida's vulnerable coastal habitats and the numerous species that depend upon them.**

**The goals of CHIMMP include bringing together representatives from mapping and monitoring programs across the State to increase communication, minimize duplicate efforts and identify data gaps, needs, and priorities**

**Coastal wetland monitoring programs...vary widely in methodology. Monitoring over long-time scales is increasingly important due to regional uncertainties as to how coastal wetland vegetation and substrate accretion will respond to sea-level rise, altered freshwater hydrology, and other disturbances.**



# INTERACTIVE WILDLIFE & HABITAT MAP



- Additive to existing efforts (ex: CHIMMP Reports): Sought to combine all publicly available mapping data that captures large-scale changes in habitat extent, as well as smaller-scale species shifts gathered by on-the-ground monitoring.

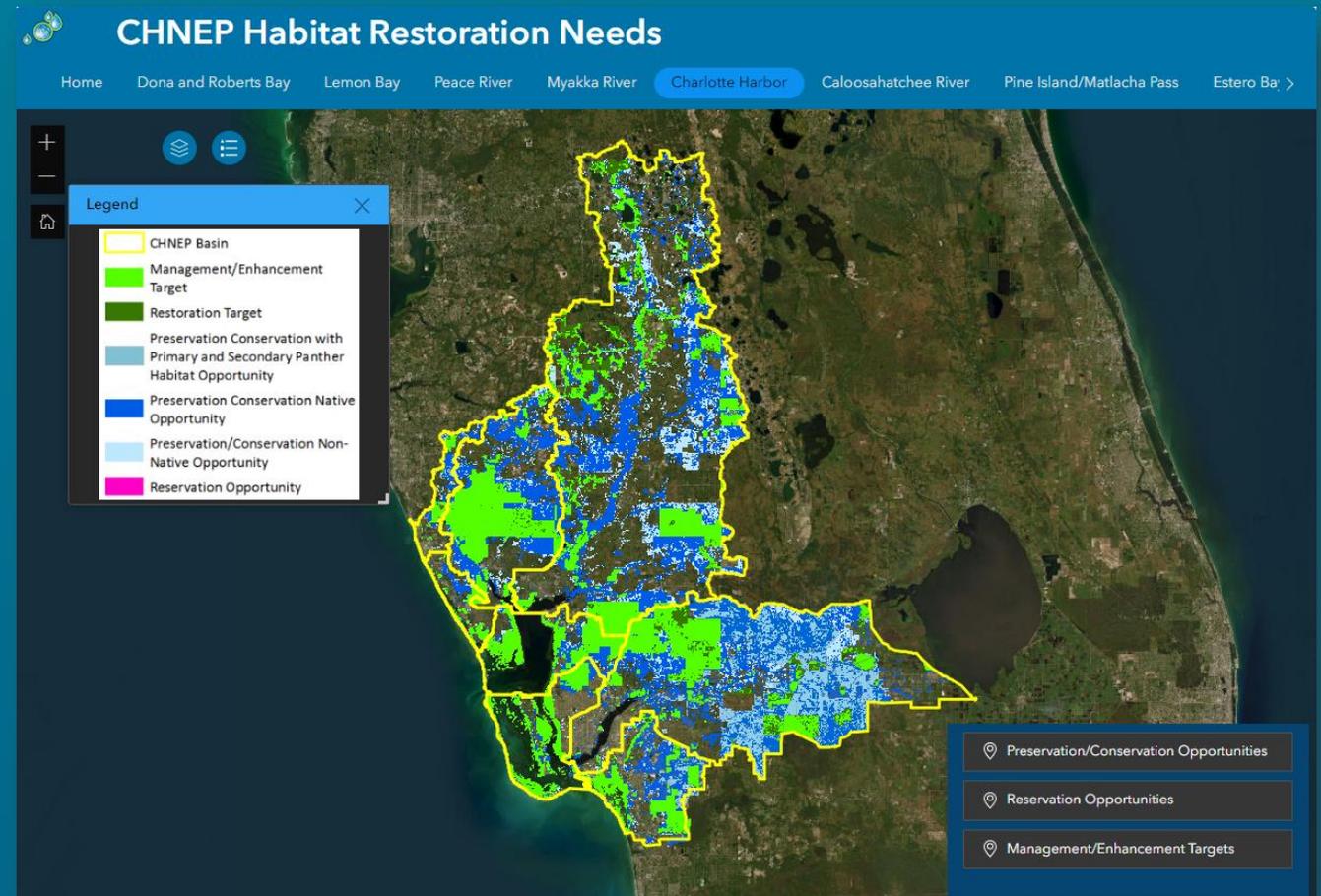


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# HABITAT RESTORATION NEEDS

## Habitat Restoration Needs Report Maps & Landing Page

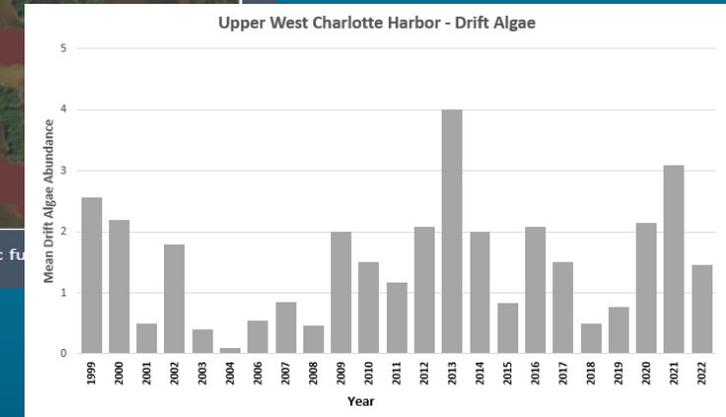
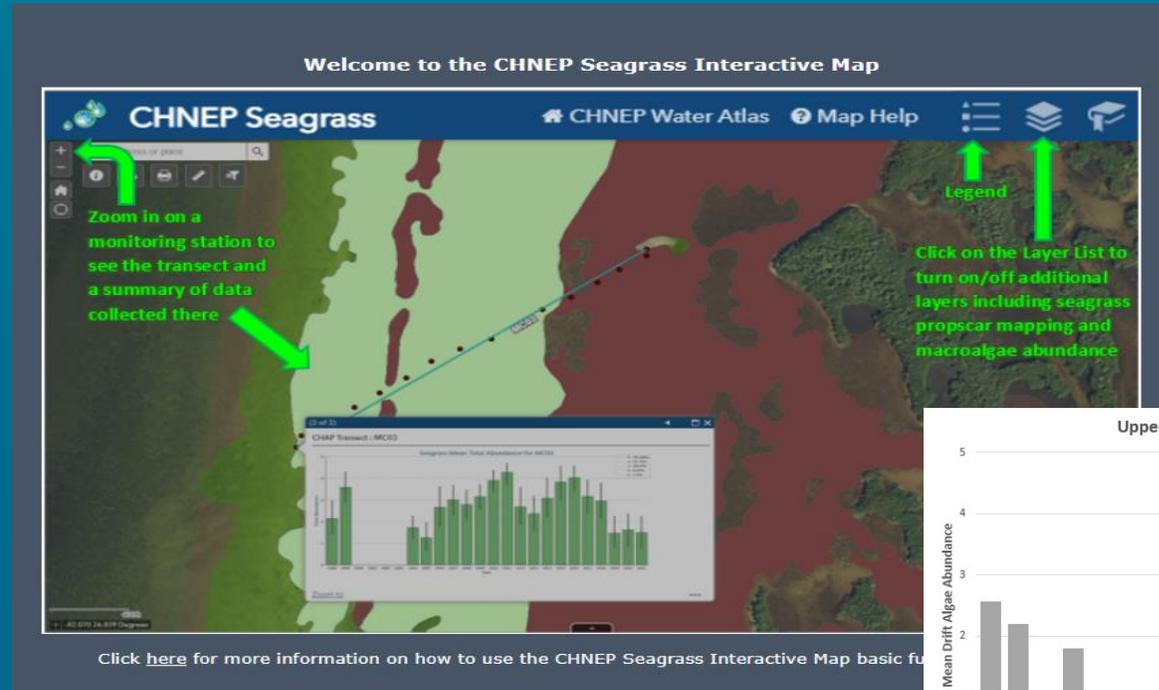
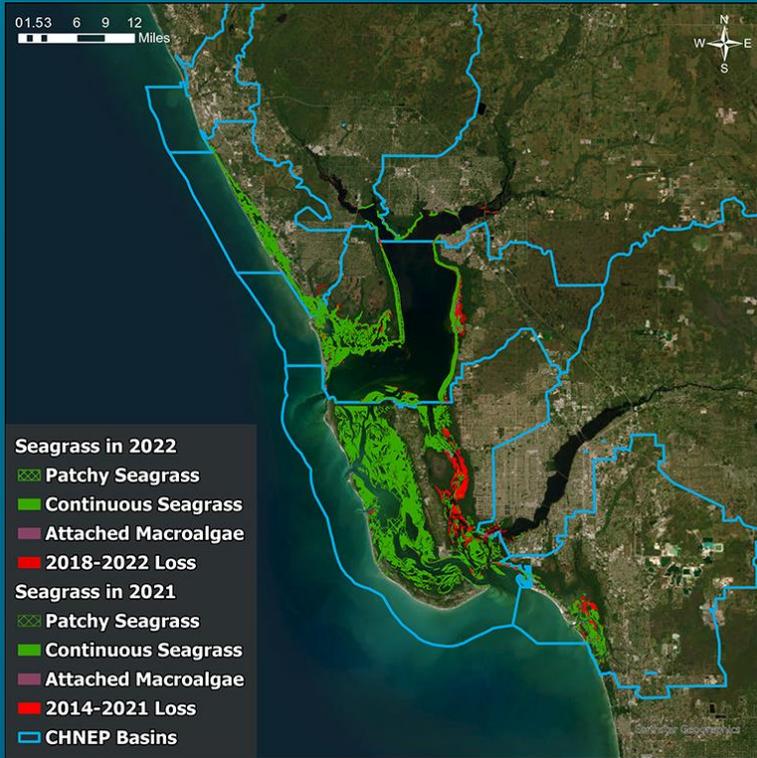
- Map of potential preservation/conservation and reservation opportunities, as well as management/enhancement and restoration targets by basin
- Recommendations for coastal wetlands
- Includes habitat change analysis and habitat migration model results



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# SEAGRASS & ALGAE

Maps of seagrass presence/loss, propscar studies, macroalgae, and seagrass transects. Also acreage and transect graphs, algae and epiphyte graphs (Sources: SWFWMD, SFWMD, FDEP, SeaGrant)



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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)



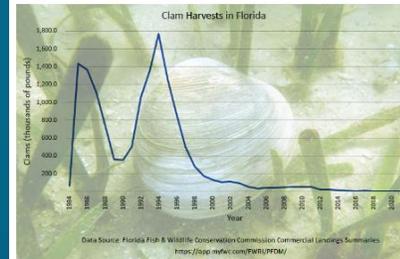
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## Summary

### Clam Restoration in the Charlotte Harbor Estuary

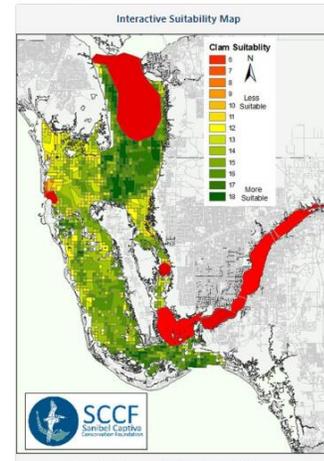
The hard clam has been harvested by man from the Charlotte Harbor Estuary since at least 300 – 500 AD. Since the mid-twentieth century, over-harvesting, water quality changes, habitat loss and ecosystem disturbance has drastically reduced the abundance of hard clams in Southwest Florida. In fact, the Charlotte Harbor Estuary is a home for clam farm leases in Pine Island and Gasparilla Sounds. Farmers are often faced with an inability to market their clams due to red tide, fishery closures and other natural events. During these instances, the farmed clams are still viable 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 Captive 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.



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 (SWF OWG) 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 Nature Conservancy \(TNC\)](#), 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

## Reports, Data, & Tools

### Reports & Tools

- [Trabue Harborwalk Oyster Habitat Restoration project Overview and One-Year Monitoring Results](#)
- [Trabue Harborwalk Oyster Reef Restoration: Two Year Post Installation Results](#)
- [Trabue Harborwalk Oyster Reef Restoration: Three Year Post Installation Results](#)
- [Invertebrate Density in Trabue Harborwalk Reef and Control Areas](#)
- [Oyster Beds in Florida \(Geospatial Data Set\)](#)
- [CHNEP Oyster Habitat Separation Plan](#)
- [Oyster Habitat Restoration: Monitoring and Assessment Handbook](#)
- [Oyster Intergrated Mapping and Monitoring Program \(QIMMP\) Tech. Report No. 22, Version 2 \(2022\)](#)
- [CHNEP Volunteer Oyster Habitat Monitoring Program – Volunteer Manual, SOPs](#)
- [Oyster Calculator Tool – For determining restoration objectives](#)
- [Index of Oyster Mang in Florida](#)

### Southwest Florida Oyster Working Group and Subcommittee

- [December 16, 2016 \(Agenda\)](#)
- [Nov. 17, 2016 Regional Oyster Restoration Regulatory Discussion \(Meeting Notes\)](#)
- [January 8, 2016 \(Agenda, Meeting Notes\)](#)
- [April 13, 2015 \(Agenda, Summary of Ranking Process, Map of Ranked Sites\)](#)
- [February 19, 2015 \(Agenda\)](#)
- [January 14, 2015 \(Agenda, Map of Ranked Sites\)](#)
- [October 30, 2014 \(Agenda, List of Field Visit Sites\)](#)
- [May 8, 2014 \(Agenda, Meeting Notes\)](#)
- [September 7, 2012 \(Agenda, Meeting Notes\)](#)
- [June 19, 2012 \(Agenda, Meeting Notes\)](#)
- [May 25, 2012 \(Agenda, Meeting Notes\)](#)
- [May 9, 2012 \(Agenda, Meeting Notes\)](#)
- [April 24, 2012 \(Agenda, Meeting Notes\)](#)

### Monitoring Data

## Oyster Dataset Map

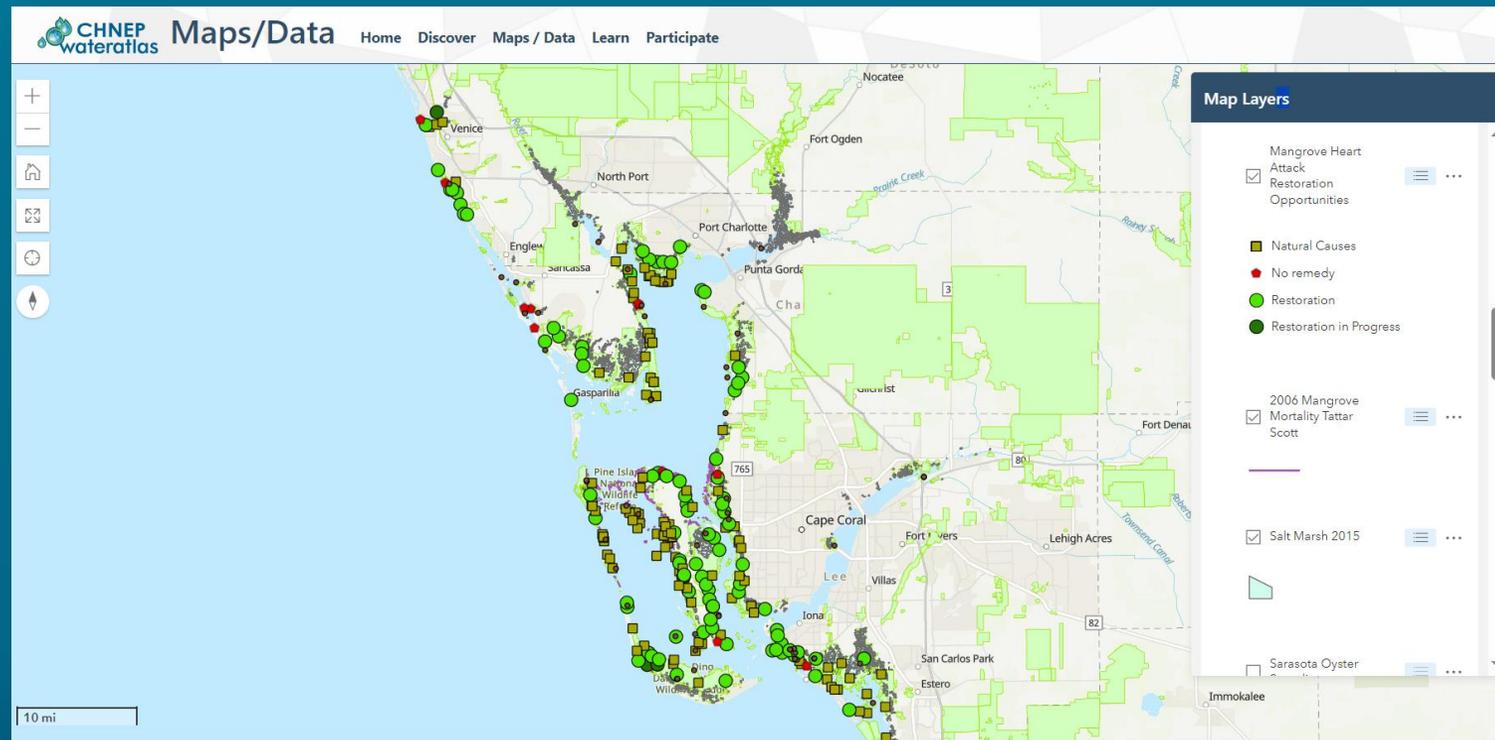
View the full list of datasets by clicking on the Layer List button:



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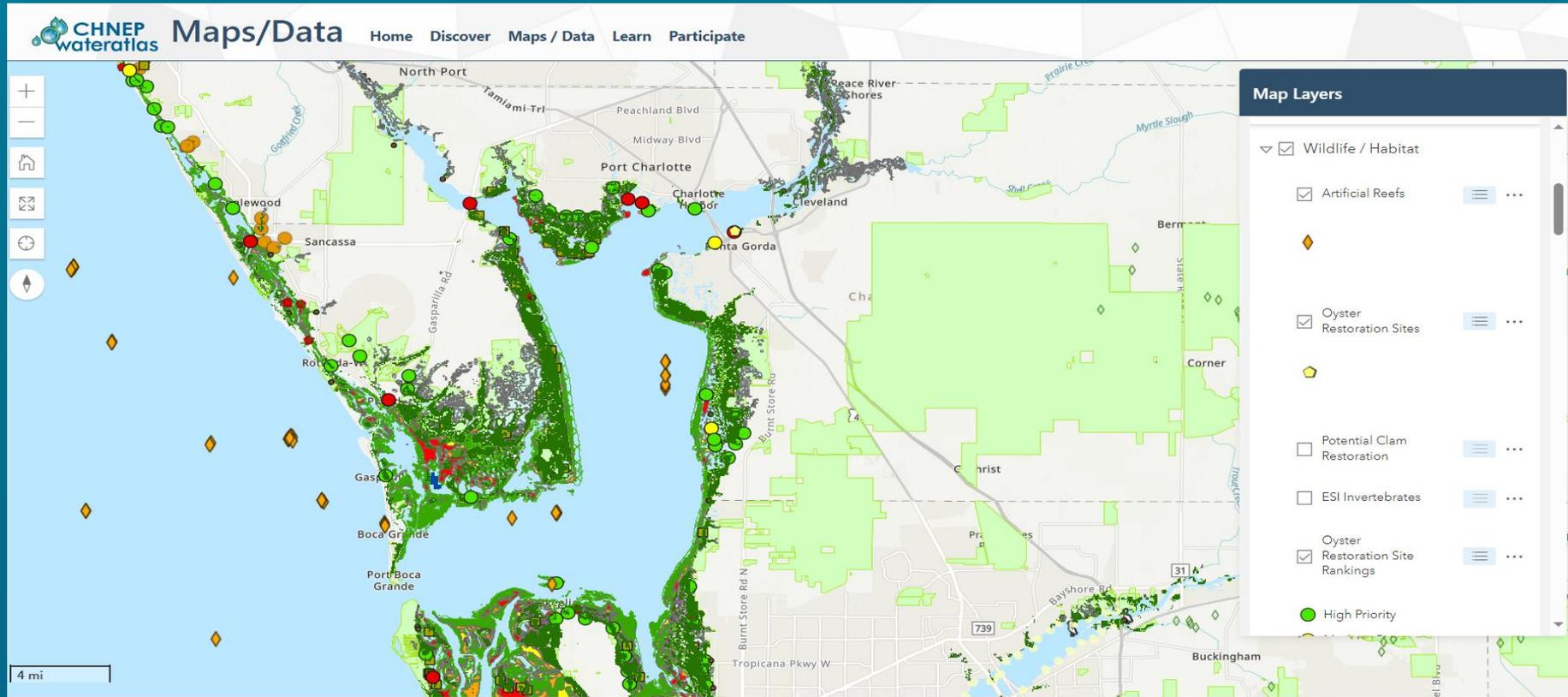
# FUTURE WORK: MANGROVES & SALT MARSH

- Based on partner resource needs: Landing page for mangrove restoration prioritization and salt marsh studies and data. Available data already on full habitat mapper (Sources: Mangrove Heart Attack, FWC, FDEP, SCCF, others???)



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# INTERACTIVE CLIMATE DATA MAP



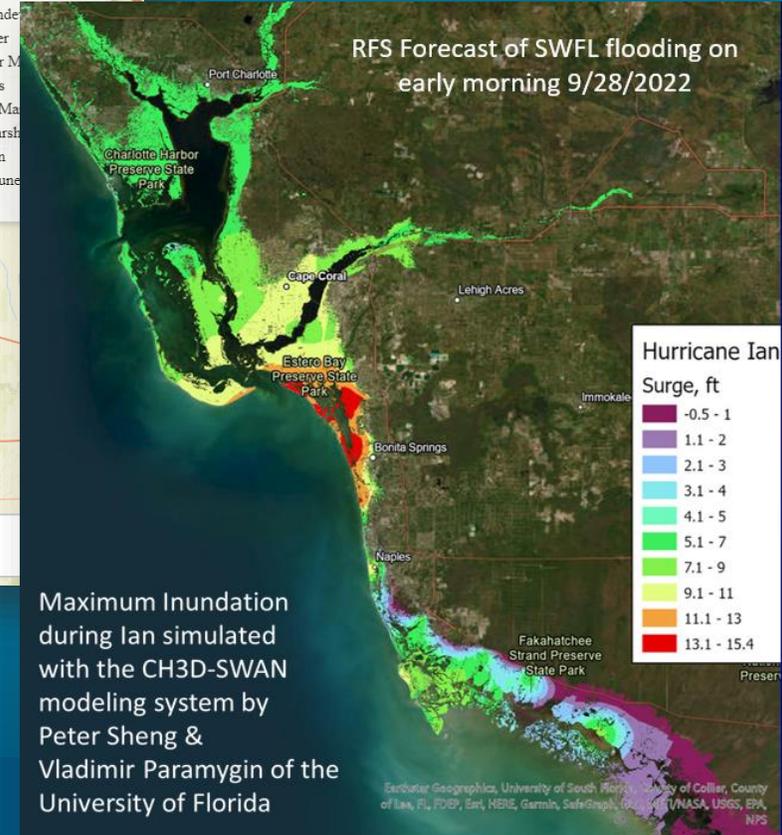
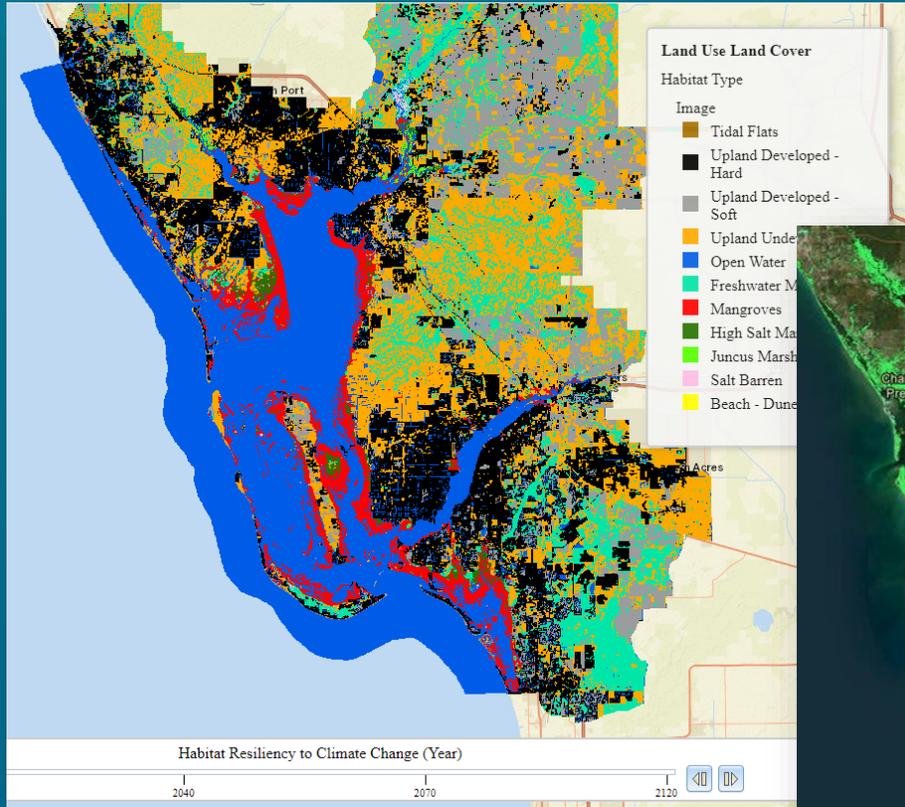
- Additive to existing efforts: Sought to combine all publicly available climate data: Sea Level Rise Projections, Predicted Community Flooding Maps, Predicted Vegetation Shifts, Historic Hurricanes, Temperature Changes, Rainfall, EVT, Saltwater Intrusion



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# HABITAT RESILIENCY TO CLIMATE CHANGE & ACUNE MODELS (ACCELERATED SLR)

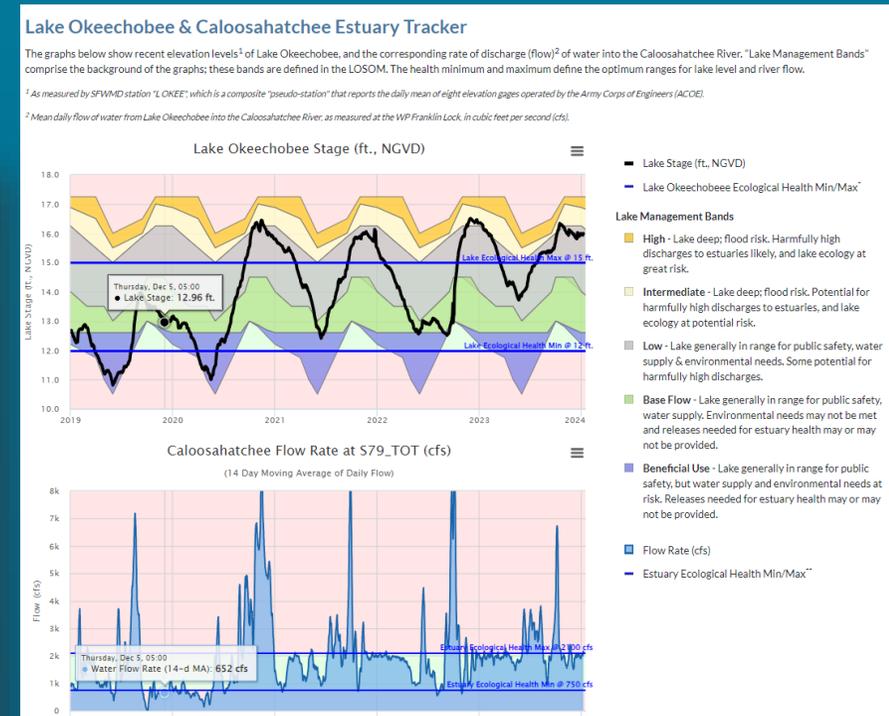
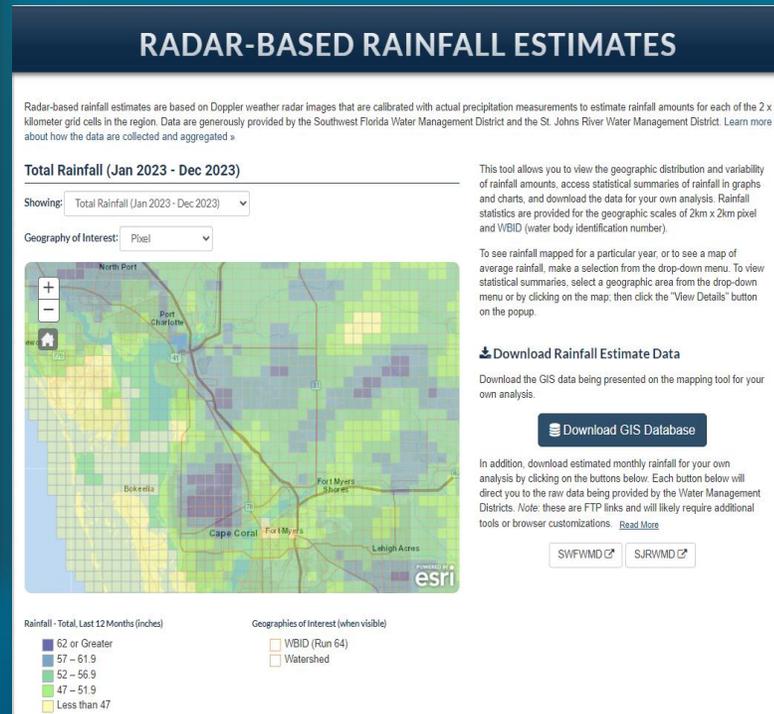
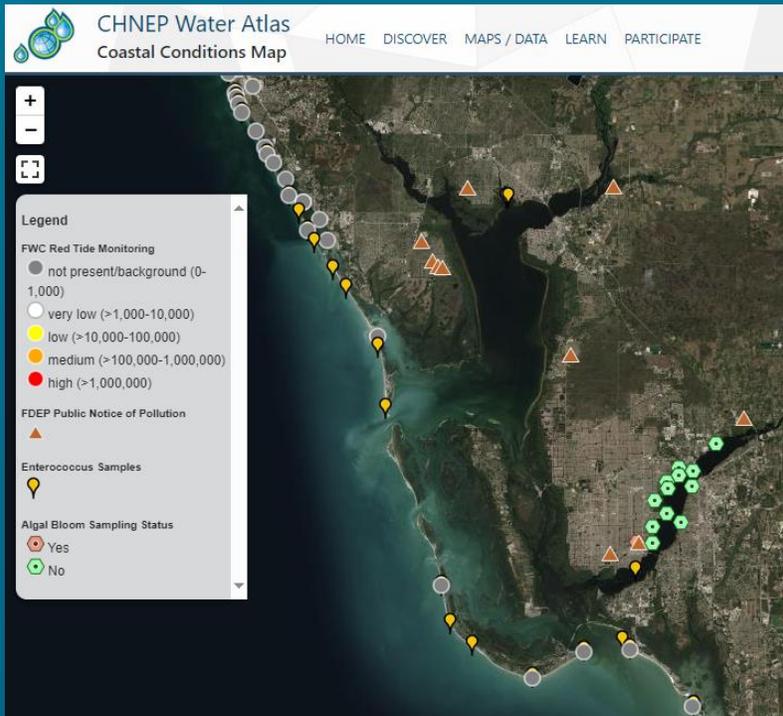
- Habitat evolution model developed to predict changes in vegetative communities caused by accelerated SLR
- ACUNE coastal vulnerability assessment tool developed to understand how saltwater intrusion will impact habitats and communities



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# ALTERED PRECIPITATION, WATER QUALITY AND HYDROLOGY

- Maps of water quality information related to red tide, blue-green algae, fecal bacteria, and wastewater spills. Maps of rainfall estimates & freshwater flows



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# INTERACTIVE ESTUARIES & HABITAT REPORT CARD

- CHNEP Strategic Plan and tools (ex: Water Atlas) designed to support partners shift toward collaborative efforts focused consistent messaging, and holistic-adaptive management strategies.
- Bringing all data collected by partners in one place to give holistic management picture. Water Quality
  - Hydrology
  - Wildlife/Habitat
  - Climate Stressors

The screenshot shows the CHNEP Water Atlas interface for Charlotte Harbor. At the top, there are navigation tabs: HOME, DISCOVER, MAPS / DATA, LEARN, and PARTICIPATE. The main content area is titled "Charlotte Harbor" and includes a map, introductory text, and several data panels.

**Map:** Shows the location of Charlotte Harbor in Florida, with a zoomed-in view of the harbor area.

**Text:**

- Charlotte Harbor covering 56,747 acres, is a bay situated in Charlotte County, with the associated WBIID(s) 2065A, 2065B, 2065C, 2065D.
- Charlotte Harbor is the second largest estuary in Florida and the largest, deepest and most diverse of the New Charlotte Harbor Aquatic Preserves, encompassing the *Sarasota Sound*, *Charlotte Harbor*, *Joseph's Pass*, *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.
- 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 Study (IWS)**. The IWS evaluates whether waters meet their designated use, 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.](#)
- Florida also has mercury impairment statewide, its largest source being atmospheric deposition from local and global power generation. The Florida Department of Health (DOH) and Florida Department of Environmental Protection have identified over 400 water bodies, most freshwater lakes and rivers but also some coastal marine areas, that are impaired due to mercury found in fish tissue. Florida Fish Consumption Advisories, updated annually by the DOH, provide guidance on how to limit mercury exposure from these waters.

**Water Quality:**

- Charlotte Harbor Environmental Volunteer Water Quality Network
- Water Atlas Sample Sites
- Impaired Waters
- CC-MN Grid Strata
- CC-MN Partners

**Hydrology:**

- Recent Rainfall

**Wildlife/Habitats:**

- Seagrass Extent
- Oyster Restoration Suitability
- Clam Restoration

**Climate Change:**

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

**Water Quality Snapshot:**

The Water Quality Snapshot compares the most current water quality data to applicable water quality standards for Chlorophyll *a*, Phosphorus, Nitrogen, Bacteria, and Dissolved Oxygen to provide a snapshot of how a waterbody is doing. Water quality standards are outlined in Florida Administrative Code 62-202 for freshwater waterbodies of different types and uses. A Water Body Identification number (WBIID) is an assessment unit that is intended to represent Florida's waterbodies at the watershed or sub-watershed scale. The assessment units are drainage basins, lakes, lake or shrimp areas, springs, rivers and streams, seagrass, coastal bay and estuarine waters in Florida.

Showing water quality snapshots for 1 out of 4 WBIIDs. [View snapshot of values.](#)

**2065A - CHARLOTTE HARBOR (UPPER SEGMENT)**

Indicator	Value	Threshold
Chlorophyll <i>a</i> (corrected for pheophytin)	2.25	6.50
Total Nitrogen (mg/l)	0.83	0.67
Total Phosphorus (mg/l)	0.16	0.19

**View Detailed Data About the Following Topics:**

- WATER QUALITY** (Back Title, Treatment Community, Water Clarity, Salinity, Bacteria, Dissolved Oxygen, Other Indicators, Impaired Waters)
- HABITATS / ECOLOGY** (Seagrass Coverage, Artificial Reefs)

**Seagrass Coverage** (Seagrass Coverage, Artificial Reefs)

Among the most important habitats in Florida's estuarine environments, seagrass beds are indispensable for the role they play in cycling nutrients, supplying food for wildlife, stabilizing sediments, and providing habitat for juvenile and adult fish and shellfish. Use the interactive map below to observe the size, density and location of seagrass beds from year to year. The graph shows how the total amount of seagrass in the bay has changed over time. [Click here about seagrass.](#)

The interactive map below shows seagrass extents as they existed between 1948 and 2022. Use the slider to toggle the year being displayed to demonstrate how seagrass coverage has changed over time. **Note:** Seagrass acreage data are collected bi-annually by each Water Management District in alternate years. As a result, some years have no acreage data.

**2022 Seagrass Coverage**

**Seagrass Acreage Variation**

Download Seagrass Coverage Data for All Years

Source: Southeast Florida Water Management District, South Florida Water Management District



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# HOLISTIC MANAGEMENT APPROACH

- **FWC State Wildlife Action Plan:** “Evaluating the status of each habitat identified in the Action Plan is essential for measuring the success of habitat-based conservation actions.” In 2022, FWC adopted a more holistic management approach for sportfish focused on smaller regions, in which management decisions are informed by 6 metrics: escapement, relative abundance, habitat, harmful algal blooms, fishing effort, and stakeholder feedback.
- **2020 SWFWMD Charlotte Harbor SWIM Plan Update** includes the following quantifiable objectives for the three major focus areas: Water Quality, Hydrologic Restoration, and Natural Systems Protection and Restoration.
- **Lake Okeechobee System Operating Manual (LOSOM):** “The Caloosahatchee River and its estuary require regular, adequate and appropriate levels of freshwater flow from the Lake to maintain proper salinity in its tidal reach for maintaining conditions for its aquatic life.”



# FINAL THOUGHTS/ RECOMMENDATIONS

- Please visit the CHNEP Water Atlas ([chnep.wateratlas.usf.edu/](http://chnep.wateratlas.usf.edu/)) for data and mapping relevant to your work.
- Need partners to continue to share relevant studies, maps and data so that the CHNEP Water Atlas is an effective monitoring and planning tool.
- 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)
- Other recommendations for future efforts?



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## Dona & Roberts Bays Basin Water Quality Status Report

### WATER QUALITY IMPROVEMENT

**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.

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 water quality standards pursuant to the Impaired Waters Rule (IWR 62-303 F.A.C.).

**Land Use / Land Cover Categories as a Percentage of Basin Area**

Dona & Roberts Bay Basin

Category	Percentage
Urban & Built-up	31 %
Water	25 %
Agriculture	15 %
Wetlands	12 %
Upland Forests	10 %
Rangeland	4 %
Barren Land	<1 %
Transportation and Utilities	3 %

**PREVIEW**  
Live Pages Coming Soon

### CHNEP WATER ATLAS

DONA & ROBERTS BAYS BASIN PAGE

COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP

the IWR 62-303 and 62-302, F.A.C. Once a WBID is verified impaired, it is to be placed on a schedule for TMDL development. TMDLs are waterbody-specific pollutant limits aimed at restoring attainment of water quality standards.

The following WBIDs are currently not meeting water quality standards for nutrients:

- Cow Pen Slough
- Curry Creek (Freshwater Portion)
- Dona Bay
- ICWW (Sarasota County Near Venice)
- Lyons Bay Canals
- Roberts Bay

Pink areas are verified impaired for nutrients on the map to the right. No TMDL development has yet occurred at the state level for nutrients within the Dona & Roberts Bays Basin.

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# THE POWER OF PARTNERSHIP

A serene sunset scene over a calm body of water. The sky is a mix of soft pinks, oranges, and blues, with the sun's glow reflecting on the water's surface. In the foreground, four dark, vertical wooden posts are scattered across the water, their silhouettes standing out against the lighter background. The overall mood is peaceful and contemplative.

**Thank you to our partners!**

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