ESTUARY TRENDS: WEATHER & WATER QUALITY

Resilient estuaries and coastal watersheds - where human and natural communities thrive.

Photo Credit: Julie Drevenkar

Rookery Bay National Estuarine Research Reserve (NERR)

This Florida reserve is a prime example of a nearly pristine subtropical, mangrove forested estuary. Located south of Naples on the Florida Gulf coast, the total estimated surface area of open waters within the boundary is 70,000 acres--64 percent of the reserve. The remaining 40,000 acres are primarily mangroves, fresh to brackish water marshes, and upland habitats. A myriad of wildlife thrive in this estuarine environment and surrounding uplands. For more information go to:

https://rookerybay.org/

For more information about how Hurricane Ian impacted Rookery Bay NERR go to:

https://storymaps.arcgis.com/stories/dadfb1ada294d20b8 aeffce678c547e

2022 HIGHLIGHTS

It was **wetter** - **rainfall** was **above** average compared to the long-term historical average

It was **warmer - air temperatures** were **considerably** warmer in March and November compared to long-term historical average

Dissolved inorganic **nitrogen** (DIN) concentrations **were** in the **good** range for most of the year at all locations

An **algal bloom** occurred in the **fall** at one out of four locations

Water quality issues influence human and environmental health.
The more we monitor our water, the better we will be able to recognize and prevent problems.

HOW IS OUR ESTUARY CHANGING?
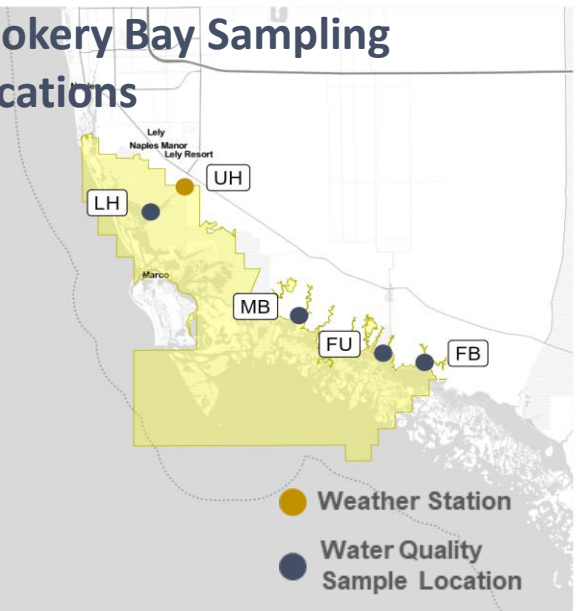
Precipitation is increasing

Air Temperature is increasing

Phosphorus (ortho-phosphate) is increasing at one out of four locations

Algae growth is not changing

Water Temperature is increasing

Rookery Bay Sampling Locations

- 🟠 Weather Station
- 🔵 Water Quality Sample Location

Trends in Weather & Water Quality*

Location ID	Location Name	Air Temperature	Precipitation
UH	Upper Henderson Creek	↑	↑

Location ID	Location Name	Water Temperature	Salinity	Dissolved Oxygen	pH	Turbidity
FB	Fakahatchee Bay	↑	↓	↓	—	↓
FU	Faka Union Bay	↑	↓	↓	—	↓
LH	Lower Henderson Creek	↑	↓	—	—	↓
MB	Middle Blackwater River	↑	↓	↓	↓	↓

Location ID	Location Name	Ortho-phosphate	Ammonium	Nitrite	Nitrate	Algae
FB	Fakahatchee Bay	—	—	—	—	—
FU	Faka Union Bay	—	—	—	—	—
LH	Lower Henderson Creek	↑	↓	↓	—	—
MB	Middle Blackwater River	—	↓	↓	↓	—

Based on data collected from 2000-2022

| X	Insufficient Data	↑	Increasing	—	Not Changing	↓	Decreasing

Weather & Climate – What is the Difference?

WEATHER is what you see outside on any particular day in terms of precipitation, temperature, humidity, cloudiness, visibility and wind.

CLIMATE tells us the average daily weather for an extended period of time (years, decades, centuries) at a certain location.

Weather Can Have A Major Impact On Water Quality
Precipitation & Air Temperature
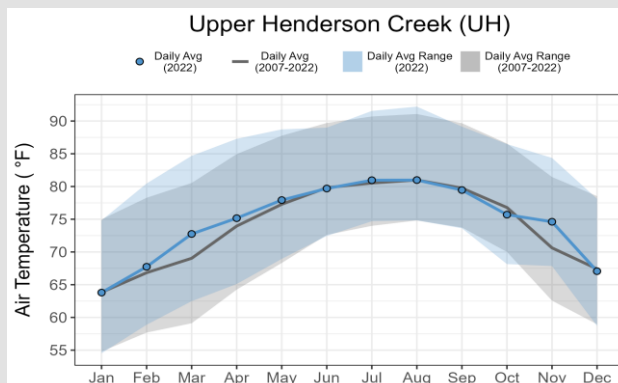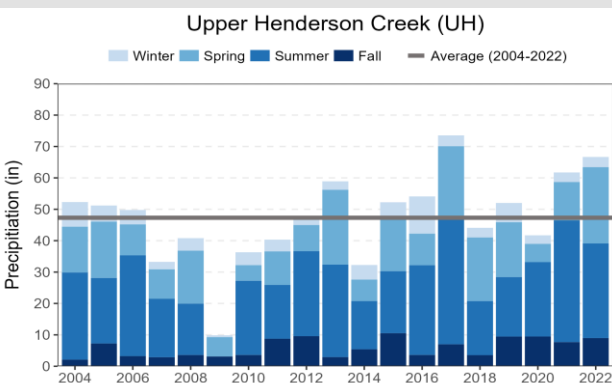
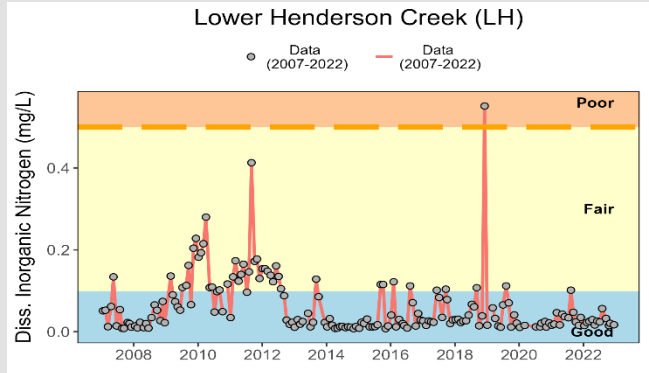Rainfall was ~16 inches greater than the long-term historical average in 2022

Air Temperature in 2022 was warmer than the long-term historical average from February through May and November.

Weather data helps scientists and managers understand water circulation patterns, plant growth, shellfish and fish distribution, storm frequency and intensity and much more…

Do We Have Too Many Nutrients In The Water?

Phytoplankton (also called microalgae) are tiny, plant-like organisms that need nutrients (nitrogen and phosphorus) to grow. Phytoplankton are critical to estuarine and ocean health. However, some conditions, such as excess nutrients, can cause phytoplankton blooms. The blooms can decrease the dissolved oxygen underwater life needs to survive, negatively impact human health, and close fishery harvest areas.
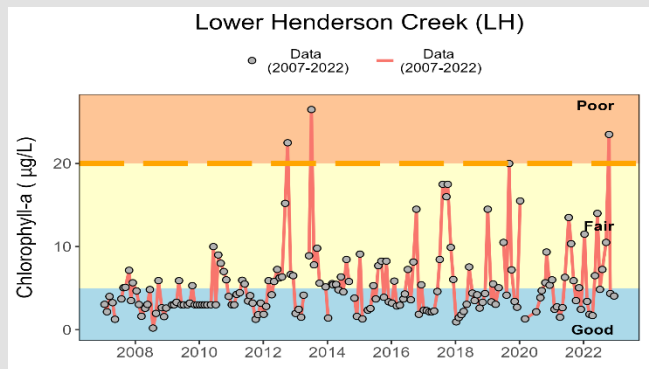
Nitrogen

Lower Henderson Creek (LH)
Data (2007-2022) · Data (2007-2022)
Diss. Inorganic Nitrogen (mg/L)
Poor / Fair / Good
0.4 / 0.2 / 0.0
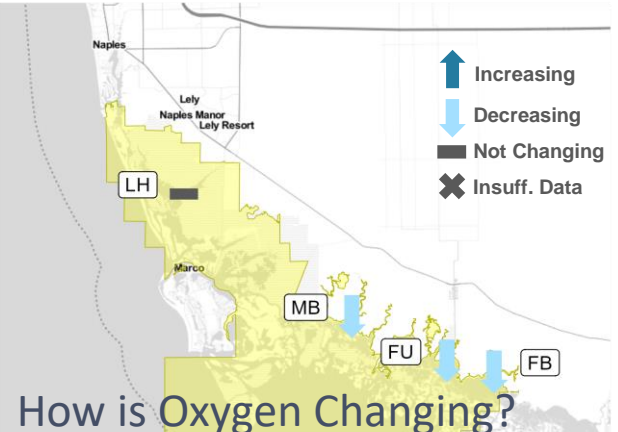2008 2010 2012 2014 2016 2018 2020 2022

A critical threshold value is used to determine if a water quality measurement is at a level where negative impacts may occur.

Dissolved inorganic nitrogen (DIN) is the type of nitrogen in the water phytoplankton need to grow. At Rookery Bay NERR, data show that DIN concentrations are not changing over the long-term. Measurements are in the fair to good range. The critical threshold of 0.5 mg/L has been exceeded once at three Rookery Bay sampling locations.

Algae

Lower Henderson Creek (LH)
Data (2007-2022) · Data (2007-2022)
Chlorophyll-a (µg/L)
Poor / Fair / Good
20 / 10 / 0
2008 2010 2012 2014 2016 2018 2020 2022

Phytoplankton growth is measured by chlorophyll a concentrations. At Rookery Bay NERR, data show that chlorophyll a levels are not changing over the long-term. Most of the measurements are in the fair to good range. Concentrations exceed the critical threshold of 20 ug/L, mostly during tropical storms, at Lower Henderson Creek.

Naples · Lely · Naples Manor · Lely Resort · LH · Marco · MB · FU · FB

- ↑ Increasing
- ↓ Decreasing
- ▬ Not Changing
- ✖ Insuff. Data

How is Oxygen Changing?

Dissolved oxygen decreased at Fakahatchee Bay, Faka Union Bay and Middle Blackwater River. Most of the measurements vary between the poor to good range at all locations.

Small Changes You Can Make To Help

- **Limit** use of **fertilizers/pesticides** and apply responsibly
- Use **compost** as fertilizer in **gardens**
- **Collect** pet droppings
- **Plant** trees and rain gardens
- **Redirect** downspouts away from impervious surfaces like **driveways** and **sidewalks**
- **Wash** cars and boats on **lawn** and not the driveway

Photo Credit: Jean Hall

Water Quality is a MAJOR Driver of Ecosystem Change
What happens on the land affects the quality of the water and the health of the plants and animals that live in the estuary.

Why Estuaries Matter

Economic Impacts

Coastal shoreline counties provided 54.6 million jobs and contributed $9.6 trillion (nearly 45%) of the nation's gross domestic product in 2020.

Community Benefits

Estuaries protect coastal communities by reducing flooding and storm surge impacts, enhancing water quality, and providing commercial and recreational benefits.

Healthy Ecosystems

Up to two-thirds of the nation's commercial fish and shellfish spend some part of their life cycle in an estuary or depend on this resource for food.

Habitat Diversity

Habitat types include shallow open waters, freshwater/salt marshes, swamps, sandy beaches, mud/sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools and seagrasses.

Tracking The Health of Our Estuaries 24/7

The **NERRS** is a partnership program between NOAA and the coastal states to manage designated reserves. More than 1.3 million acres of estuarine land and water are protected. Each reserve is managed on a daily basis by a lead state agency or university with input from local partners. The health of every reserve is continuously monitored by the **System Wide Monitoring Program** (SWMP). SWMP is a **robust**, **long-term**, and **versatile** monitoring program that uses the NERRS network to intensively study estuarine reference sites for evaluating ecosystem function and change. Reserve-generated data and information are available to local citizens and decision makers. For more information, go to: **https://coast.noaa.gov/nerrs/**

Rookery Bay NERR
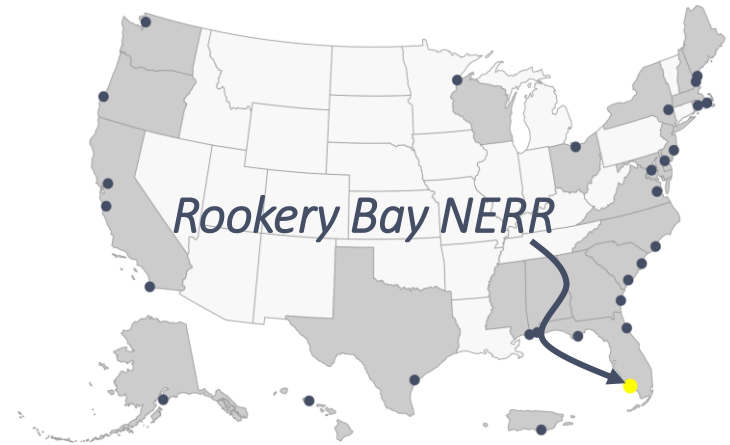
NERRS is a network of 30 coastal reserves established for long-term **research**, **education** and **stewardship**.

More Information...

For Stakeholders

Access data at the System Wide Monitoring Program (SWMP) Graphing Application website: **https://coast.noaa.gov/swmp/**

For Scientists

Access data at the Central Data Management Office (CDMO) website: **http://www.nerrsdata.org/**

Have Questions?

Julie Drevenkar
Julie.Drevenkar@floridadep.gov
(239) 530-5940

Rookery Bay NERR - providing the science needed for today and tomorrow

NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM

Rookery Bay
Research Reserve