

# ESTUARY TRENDS: WEATHER & WATER QUALITY

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



## ACE Basin National Estuarine Research Reserve (NERR)

This reserve helps protect the natural beauty, abundant wildlife, and unique cultural heritage of the South Carolina lowcountry. The ACE Basin is one of the largest undeveloped estuaries on the East Coast. It is named for the Ashepoo, Combahee, and Edisto Rivers, which meet at St. Helena Sound. Although the basin is largely undeveloped, it is influenced by growth in the nearby cities of Charleston and Beaufort. The reserve protects cypress swamps, historic plantation homes, old rice fields, oyster reefs, and expansive tidal marshes while providing a variety of outdoor recreational opportunities.

For more information go to:  
<http://www.dnr.sc.gov/marine/NERR/index.html>

## 2018 HIGHLIGHTS

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

Air **temperatures** were fairly **consistent** with the long-term historical average- except for a slightly warmer February.  
.....

**Nutrient quality** overall was fairly **consistent** with the long-term historical average.  
.....

**Salinity** was **decreasing** at three sites compared to the long-term historical average.

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.

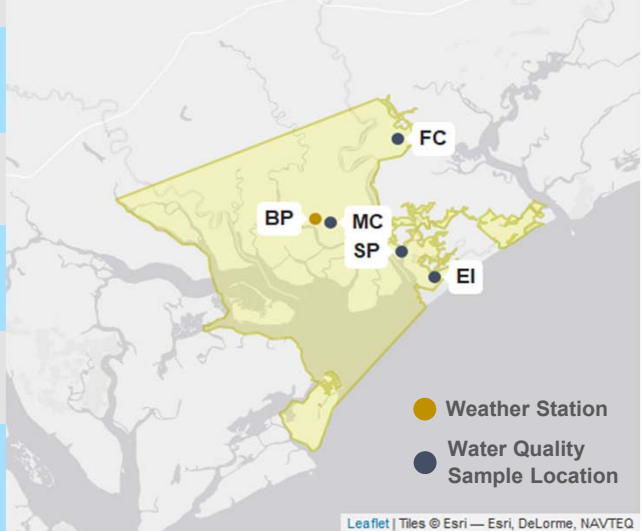
Air Temperature is not changing.

Phosphorus (ortho-phosphate) is decreasing at two out of four locations.

Algae growth is decreasing at two out of four locations.

Dissolved Oxygen is not changing.

## ACE Basin Sampling Locations



## Trends in Weather & Water Quality\*

Location ID	Location Name	Air Temperature	Precipitation
BP	Bennett's Point	—	↑

Location ID	Location Name	Water Temperature	Salinity	Dissolved Oxygen	ph	Turbidity
EI	Edisto Island	X	X	X	X	X
FC	Fishing Creek	—	↓	—	↓	↑
MC	Mosquito Creek	—	↓	—	↓	↑
SP	St. Pierre	↑	↓	—	↓	↑

Location ID	Location Name	Ortho-phosphate	Ammonium	Nitrite+Nitrate	Chlorophyll-a
EI	Edisto Island	X	X	X	X
FC	Fishing Creek	↓	—	—	—
MC	Mosquito Creek	↓	↓	—	↓
SP	St. Pierre	—	↓	—	↓

\*Based on data collected from 2007-2018

X Insufficient Data   ↑ Increasing   — Not Changing   ↓ Decreasing

## Weather & Climate – What is the Difference?

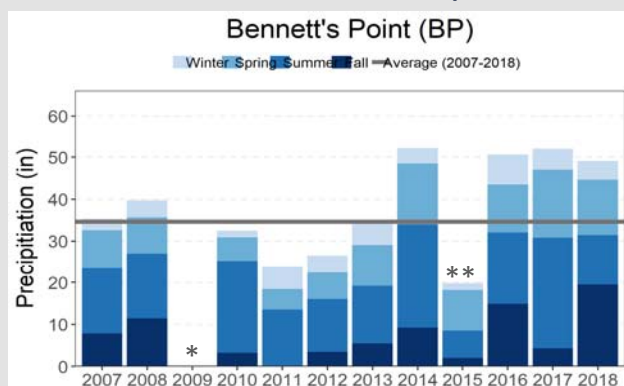
**WEATHER** is what you see outside on any particular day in terms of precipitation, temperature, humidity, cloudiness, visibility and wind.



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

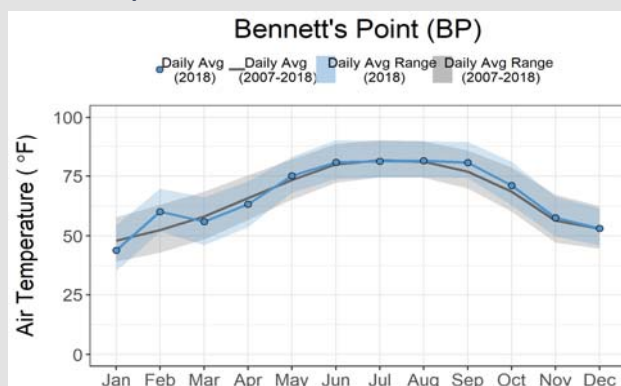
## Weather Can Have A Major Impact On Water Quality

### Precipitation & Air Temperature



Rainfall was ~15 inches greater than the long-term historical average in 2018.

\* No data. \*\*Missing data.



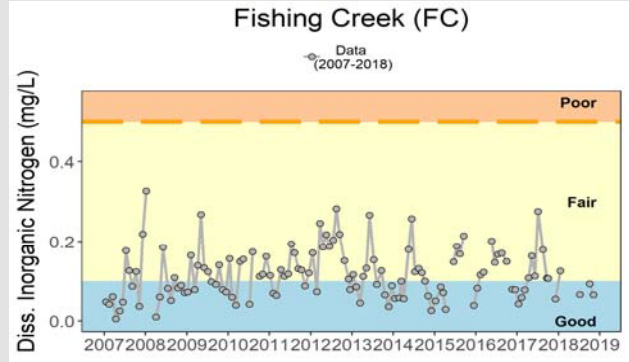
Air Temperature was fairly consistent with the long-term historical average in 2018, except for a warmer February.

*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.

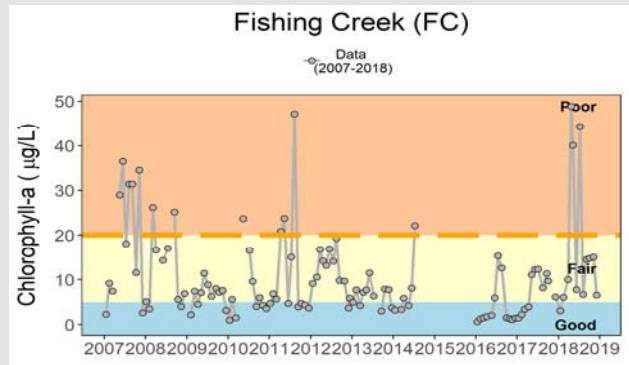
## Nitrogen



*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 ACE Basin NERR, data show that DIN concentrations are not changing over the long-term. Most of the measurements are in the fair to good range. The critical threshold of 0.5 mg/L has not been exceeded at any ACE Basin sampling location.

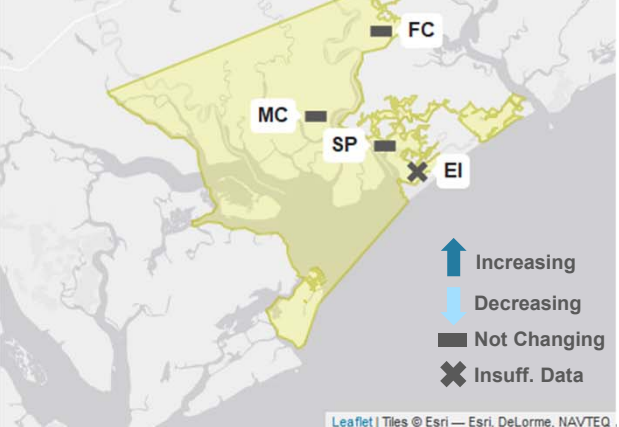
## Algae



Phytoplankton growth is measured by chlorophyll a concentrations. At ACE Basin NERR, data show that chlorophyll a levels are decreasing over the long-term at the two locations and not changing at one location. Most of the measurements are in the fair to good range. Concentrations exceed the critical threshold of 20 ug/L, at times, at two out of four sampling locations. Concentrations most often exceed the critical threshold at Fishing Creek.

## How is Oxygen Changing?

Dissolved oxygen is not changing at ACE Basin locations. Most of the measurements were within the fair to good range.



## 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

## 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 53 million jobs and contributed \$7.4 trillion (nearly 44%) of the nation's gross domestic product in 2012.

## 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.

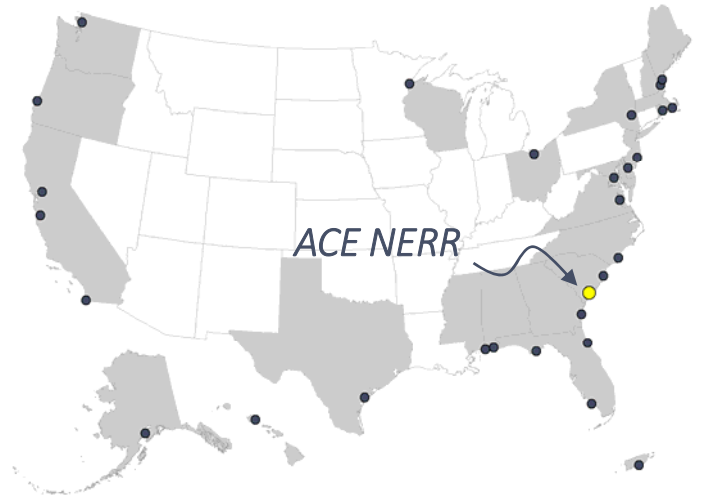
## Habitat Diversity



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/>



NERRS is a network of 29 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?

Contact Denise Sanger  
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(843) 953-9074

ACE BASIN NERR - providing the science needed for today and tomorrow