Water Quality Monitoring 2022 Data Summary

Overview

The Gulf Coast Network (GULN) Water Quality Monitoring Program began in September 2007. The program monitors 54 sites across seven parks on a set rotation. The GULN Water Quality Monitoring Program provides an integrated assessment of the spatial and temporal distribution of general water quality conditions of stream and estuary water in relation to hydrologic conditions and major sources.

The network began long-term monitoring of water quality at Gulf Islands National Seashore (GUIS) in February 2011, conducting monthly grab sampling and continuous autonomous sampling. There are three sites in the Florida District (Figure 1) which include sites in two different bodies of water (Big Lagoon and Santa Rosa Sound). Original field sites included Spanish Cove (in Big Lagoon), and Naval Live Oaks and Big Sabine (in Santa Rosa Sound). Beginning in October of 2022, sampling sites were shifted to a new site near the EPA office in the Santa Rosa Sound which replaced Naval Live Oaks and Big Sabine. The change in sample sites was due to frequent interruptions in sampling because of disturbance of the instruments arising from incidental or intentional human activities. Additionally, this change removes the panel rotation sampling that was being performed initially while maintaining the spatial separation of the two separate bodies of water within the park boundaries.

Grab samples are collected for a common suite of nutrients standard to the Gulf of Mexico Alliance, a state-led network of partners working on priority issues along the Gulf Coast. These data are integrated into our routine seagrass monitoring program to better understand estuary health.

This brief summarizes data collected from January 1 through December 31, 2022. Water quality data are available upon request to the Gulf Coast Network. Past water quality reports and briefs are available on the Gulf Coast Network website (https://www.nps.gov/im/guln/monitoring-reports.htm).

Additionally, data for the western portion of the park in Mississippi are found at Mississippi Sound at USGS East Ship Island Light - USGS Water Data for the Nation (https://waterdata.usgs.gov/monitoring-location/301527088521500/#parameterCode=00065&period=P7D). This monitoring site will be ending at the end of calendar year 2023 and monitoring will be starting at a new location in the Mississippi side of the park where real-time monitoring data will no longer be available.

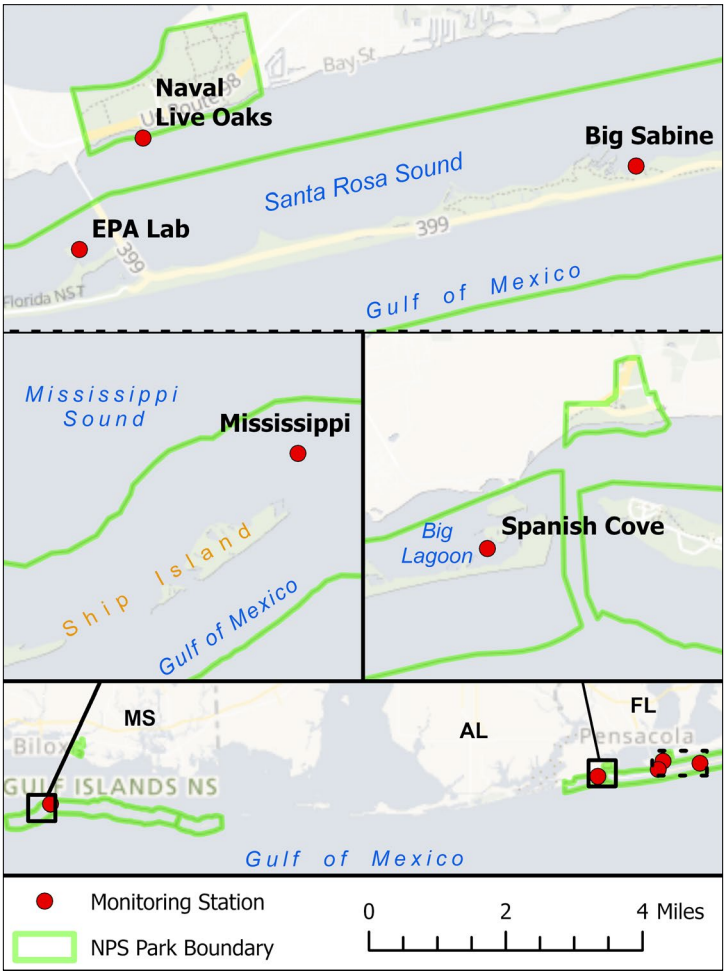


Figure 1. Map of Gulf Islands National Seashore water quality monitoring sites that are sampled by NPS staff and cooperators for both the Florida and Mississippi sides of the park. Big Sabine and Naval Live Oaks have been discontinued due to anthropogenic issues and were replaced by the EPA site where the sampling instruments are protected from anthropogenic tampering.

Significant Findings

Highlights of Calendar Year 2022 Monitoring

The estuaries of Gulf Islands National Seashore are part of a much larger ecosystem directly influenced by human activities that can alter the natural physiochemical range of the water. To better define this range, a set of water quality parameters, focused on nutrients, was chosen for routine analysis based on park specific needs and matched to regional water quality monitoring standards.

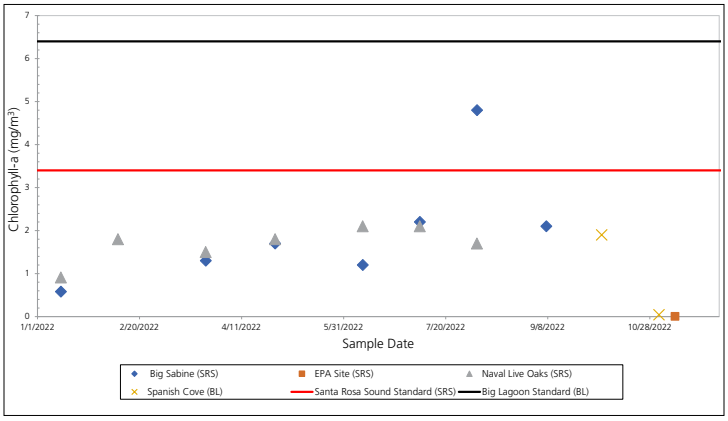


Figure 2. Chlorophyll-*a* measurements at our sites that were active in 2022. Chlorophyll-*a* water quality standards are represented by the orange line for Santa Rosa Sound sites, and the black line for Big Lagoon sites (identified by [SRS] and [BL] respectively). There was one violation of chlorophyll-*a* in 2022.

Significant Findings (continued)

There were no violations of the Florida water quality standards for nutrients (Table 1), but there was one violation of the state standard for chlorophyll-*a* in calendar year 2022. Many of the nutrients measured by a certified laboratory came back as below detection limit which likely played a role in the relatively low chlorophyll-*a* measurements seen over the year similar to 2021 (Figure 2). Chlorophyll-*a* is a measurement of concern as increased quantities indicate increases in the abundance of algae at the monitoring site generally as a result of eutrophication (nutrient enrichment), light availability (increased light typically equals more growth [to a point and then it becomes inhibiting]), and water temperature (warmer water generally results in more abundance until it becomes too warm). Algal growth that becomes excessive has the potential to result in large impacts on the environment including light attenuation, and hypoxic events during low light diurnal periods resulting from an accumulation of organic matter being broken down by bacteria. Bacteria utilize available oxygen in their cellular respiration processes while decomposing organic matter, and if larger than normal amounts of organic matter are being deposited by senescing algae/sinking algae, then there is potential for commensurate increase in bacterial density increasing oxygen consumption during non-photosynthetic periods and potentially resulting in hypoxic periods that may stress, or kill other aquatic organisms.

Water Quality Standards

Florida designates the estuaries of the seashore as "Outstanding Florida Waters" (Rule 62-302.532 F.A.C.) with site-specific water quality standards (Rule 62-302.700).

Table 1. Water quality standards as designated by the State of Florida.

Parameter	Santa Rosa Sound	Big Lagoon
Water temperature	–	–
Dissolved oxygen	**	**
pH	–	–
Chlorophyll-*a*	< 3.4 mg/m^3	< 6.4 mg/m^3
Total nitorgen	< 0.041 mg/L†	< 0.61 mg/L†
Total phosphorus	< 0.022 mg/L†	< 0.036 mg/L†

** Based on averages of various sampling periods

† Annual geometric mean

About the Gulf Coast Network

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as "Vital Signs Monitoring," to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and to determine how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses five goals for all parks with significant natural resources:

- Determine the status and trends in selected indicators of the condition of park ecosystems,
- Provide early warning of abnormal conditions,
- Provide data to better understand the dynamic nature and condition of park ecosystems,
- Provide data to meet certain legal and Congressional mandates, and
- Provide a means of measuring progress toward performance goals.

Gulf Coast Network Website
(https://www.nps.gov/im/guln/index.htm)
Gulf Coast Network Reports and Publications
(https:// www.nps.gov/im/guln/reports-publications.htm)
About the NPS Inventory & Monitoring Program
(https://www.nps.gov/im/index.htm)
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