

Southeast Coast Network Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Division
Southeast Coast Network



Estuarine Water-Quality Monitoring—Fixed Station

Overview

Aquatic ecosystems, both fresh and saline, are vulnerable to impacts from various sources, including urban and industrial development and dredging. Severe impacts include alterations to hydrodynamic processes, exposure to levels of chemical contaminants that cause mortality, altered growth and reduced reproduction, and exposure to more frequent and severe hypoxia. Estuaries contain critical habitat for a variety of fish and wildlife species. They serve as nursery habitats for fish, crustaceans, and shellfish and foraging habitat for birds and mammals, while providing a multitude of recreational opportunities such as boating, fishing, and bird watching.

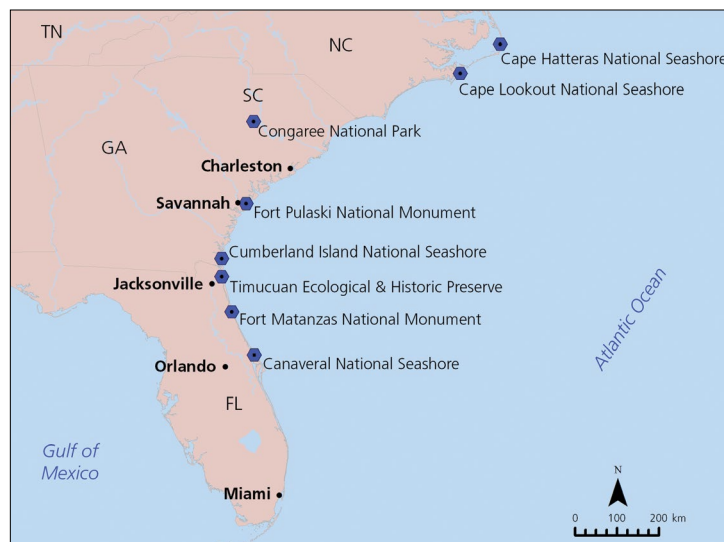
Water resources are important to park management from ecological, regulatory, and visitor experience perspectives; therefore, water quality in and around parks was selected as one of several vital signs to be monitored by the National Park Service (NPS) Inventory and Monitoring (I&M) Program. Data collected as a part of this effort are intended to foster a better understanding of water resources in and around parks and contribute to a better understanding of park ecological processes and physical systems.

Approach and Objectives

The network has implemented a two-pronged monitoring approach to effectively evaluate estuarine water quality. This consists of collecting data from continuously-recording fixed stations located in each park and also collecting periodic discrete water samples for analysis. When combined, these approaches give a more complete picture of physical processes and diurnal and seasonal variations during critical portions of the year.

The network has initiated fixed-station continuous water-quality monitoring at seven parks. For each park, the network deploys a sonde, which collects measurements of salinity, specific conductance, turbidity, dissolved oxygen, temperature, and depth, in 15- to 30-minute intervals. In select parks (Fort Pulaski NM, Cumberland Island NS, Cape Hatteras NS, Cape Lookout NS), grab samples are collected monthly for laboratory analysis of measured chlorophyll *a* and total and dissolved concentrations of nitrogen and phosphorous. Field measurements are collected along with grab samples and include water temperature, pH, dissolved oxygen, and salinity. Water clarity, which requires a Secchi depth measurement, is calculated when possible. The network also monitors a stream site in Congaree as part of this effort, and monitoring for Timucuan EHP and Cape Lookout is conducted by partner agencies.

The continuous water-quality monitoring addresses two of four specific monitoring objectives for which data are collected and analyzed as part of this effort:



The network conducts fixed-station water-quality monitoring in the vicinity of eight SECN park units.

- Determine daily and seasonal water-quality patterns for five core parameters (dissolved oxygen, salinity, temperature, pH, and turbidity) at fixed monitoring stations using continuous data loggers, and
- Determine monthly and seasonal patterns in nutrient concentrations (nitrogen, phosphorus, and chlorophyll *a*) by collecting discrete water samples.

Data Reporting

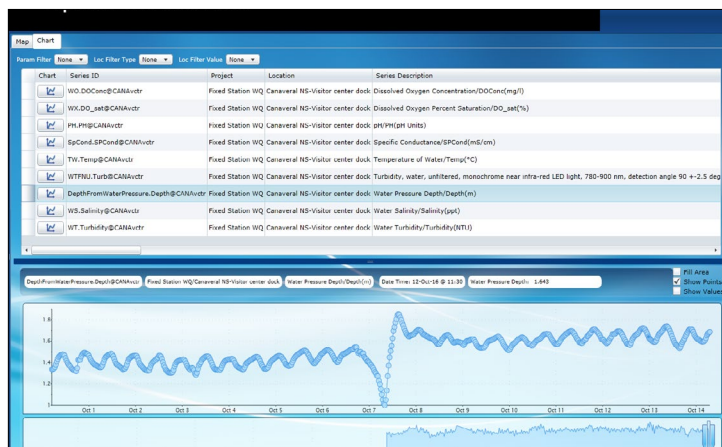
Fixed-station water-quality data are reported in several formats and in several locations. Continuous water-quality data collected by the sondes is retrieved approximately monthly by the water-quality technician. This data are uploaded to the Aquarius data management system. This provisional data are available immediately on upload at <https://irma.nps.gov/aqwebportal/> (Figure 2), and are updated monthly. This portal requires a browser with Microsoft Silverlight.

Monthly grab samples are filtered and sent to a certified lab for processing. These monthly samples are analyzed for chlorophyll *a* concentrations, total dissolved nitrogen concentrations, and total dissolved phosphorus concentrations. In the second month of each quarter (February, May, August, and November), samples are additionally analyzed for dissolved inorganic nitrogen and dissolved inorganic phosphorus concentrations. Nutrient data are checked for quality assurance and quality control after they are received from the lab, and then entered into the SECN database.

Quality assurance and quality control checks are performed on continuous water-quality data in Aquarius. Additionally, data are graded for quality according to accepted methods.

Once data have been QAQC'd and graded in Aquarius, they are processed along with the nutrient data stored in the SECN database. These two datasets are combined in annual water-quality data summaries, which are internally reviewed, edited, and published in the National Park Service Natural Resource Data Series of reports. These data summaries are also distilled into two-page resource briefs.

These reports and resource briefs are available on the IRMA web portal at <https://irma.nps.gov/DataStore/>. Additionally, updates are posted on Twitter when reports are published to IRMA.



A screenshot of the Aquarius Web Data Portal.



A data sonde is secured inside a guard and mounted to the dock at Cape Hatteras National Seashore.

About the Southeast 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 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:

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

The Southeast Coast Network includes 20 parks, 17 of which contain significant and diverse natural resources. In total, SECN parks encompass more than 184,000 acres of federally-managed land across North Carolina, South Carolina, Georgia, Alabama, and Florida. The parks span a wide diversity of cultural missions, as they include four national seashores, two national historic sites, two national memorials, seven national monuments, and two national military parks, as well as a national recreation area, a national battlefield, and an ecological and historic preserve. The park units range in size from slightly more than 20 to nearly 60,000 acres, and, when considered with non-federal lands jointly managed with NPS, the Southeast Coast Network encompasses more than 253,000 acres.

For More Information

SECN Home Page:

<http://science.nature.nps.gov/im/units/secn/index.cfm>

About the NPS Inventory & Monitoring Division:

<http://science.nature.nps.gov/im/index.cfm>

Data Downloads via the Natural Resource Information Portal:

<http://irma.nps.gov>

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