

Fort Pulaski National Monument

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program
Southeast Coast Network



Fixed-Station Water-Quality Monitoring Data Summary, 2012

Vital Sign Overview

In 2006, the National Park Service (NPS) Southeast Coast Network (SECN) Inventory and Monitoring Program began collecting water-quality data in the estuarine waters near Fort Pulaski National Monument (FOPU) as part the NPS Vital Signs Monitoring Program. The fixed water-quality station collects pH, dissolved oxygen, water temperature, salinity, turbidity and water-level data at 30-minute intervals. Additional water-quality measurements included monthly measurements of water-clarity conditions, nutrients, and chlorophyll *a* levels. Methods used are adapted from the water-quality monitoring program established by the National Estuarine Research Reserve Program. The FOPU fixed-station water-quality monitoring site is part of the SECN estuarine water quality monitoring program, which routinely collects data in the vicinity of seven coastal parks along the southeastern U.S. coast. Information collected by this monitoring program will be used to help managers make better-informed decisions by understanding trends and variability related to water-quality conditions in park waters.

Significant Findings

Monthly average water temperatures ranged from a low in of January 12.7°C (54.7°F) to a high in July of 30.0°C (86.0°F). Individual water temperature readings ranged from 9.0°C (48.2°F) in January to 32.2°C (89.9°F) in July.

Mean monthly salinity values ranged from 25.1 parts per thousand (ppt) in March to 27.8 ppt during August. Individual salinity readings ranged from 17.3 ppt in June to 37.9 ppt in April.

Orthophosphate levels were *fair* in August and November, while dissolved inorganic nitrogen levels were *good* in August and *fair* in November. Chlorophyll *a* levels rated as *good* in October and November, and *fair* from June to September and in December. Dissolved oxygen concentrations measured during monthly sampling were all rated *good*. Water-clarity conditions were *good* on most monthly sampling events, with February, June and December reported as *fair* during 2012 (Table 1).

The highest monthly mean turbidity levels occurred in September (32.1 NTUs). Turbidity readings made at the continuous recording station ranged from near 0 NTUs in January to 701.7 NTUs in July.

Mean monthly pH values fluctuated from 7.7 to 8.3, trending to lower levels during the late spring and early summer months. Individual pH values ranged between 7.32 and 8.65 throughout the year with the most acidic conditions occurring episodically throughout the summer months.

Mean monthly dissolved oxygen concentrations ranged from 5.1 mg/L in August to 8.9 mg/L in January. Individual dissolved oxygen readings made at the continuous recording station ranged from 2.6 mg/L in October to 9.6 mg/L in January. Mean daily dissolved oxygen levels commonly fell below 5 mg/L in the vicinity of this site between late July and October.

Status of Conditions

Table 1. Median measurements and ratings of monthly water-quality data from sampling stations at FOPU in 2012. Numbers in brackets indicate the number of months in 2012 when water-quality measurements indicated a *poor* rating. Green (■) = *good*; yellow (■) = *fair*; red (■) = *poor*. The light attenuation coefficient (*k*) was used as a relative measure of water clarity.

Water Clarity (<i>k</i>)	Chlorophyll <i>a</i> (µg/L)	Dissolved Inorganic Nitrogen (mg/L)	Dissolved Inorganic Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
1.67 [1]	4.12 [0]	0.1094 [0]	0.0192 [0]	6.31 [0]

Sampling Area

Fort Pulaski National Monument is near the mouth of the Savannah River Estuary in Georgia (Figure 1). The Monument is composed of a series of small islands surrounded by salty, tidally influenced river channels and creeks. The primary habitats in the Monument are maritime forest, intertidal salt marsh, and the main channel of the estuary with its associated tidal creeks. Although there are no major sources of pollutants at Fort Pulaski itself, both point and nonpoint sources of pollutants can be found nearby that have the potential to affect its water resources.

Wastewater treatment plants and pulp and paper mills are the primary point sources of organic matter and nutrient loading in the lower Savannah River watershed. Numerous industries (including 20 Superfund sites) release contaminants to the groundwater, soil, or air, and there are also contaminants associated with dredge spoil sites. Non-point loading of pollutants occurs via stormwater runoff and atmospheric deposition. In addition, two major nuclear facilities and the Port of Savannah are located upstream of the Fort Pulaski study area.

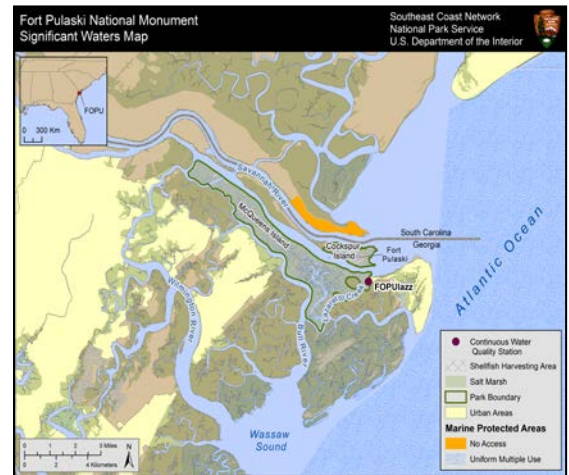


Figure 1. Location of continuous water-quality monitoring station at Fort Pulaski National Monument.

About the Southeast Coast Network

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 also, including four national seashores, two national historic sites,

two national memorials, seven national monuments, two national military parks, as well as a national recreation area, national battlefield and an ecological and historic preserve. The parks 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 Network encompasses more than 253,000 acres.

About the Inventory & Monitoring Program

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 ecosystem,
- 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 towards performance goals.

For More Information

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

SECN Reports & Publications: <http://science.nature.nps.gov/im/units/secn/publications.cfm>

Inventory & Monitoring Program: <http://science.nature.nps.gov/im/index.cfm>

Data Downloads via the Natural Resource Information Portal: <http://nrinfo.nps.gov/Home.mvc>

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