



Fixed-Station Water-Quality Monitoring, 2005–2009

Overview

In 2005, the Southeast Coast Network began collecting water-quality data in the estuarine waters near Cape Hatteras National Seashore. This monitoring station is located at a dock at the Ocracoke Village boat ramp. Data collected includes continuous pH, dissolved oxygen, temperature, salinity, turbidity, and water-level. Monthly samples are collected and analyzed for water clarity, nutrients, and chlorophyll *a*. Information collected can be used to help managers make better-informed decisions through understanding trends and variability related to water-quality conditions in Park waters.

Study Area

Cape Hatteras National Seashore (CAHA or Seashore) is located along the northern section of the Outer Banks and contains 35,400 acres of land and 74 miles of beaches (Figure 2). The U.S. Fish and Wildlife Service administers the Pea Island National Wildlife Refuge within the boundary of the Seashore. Seashore marshes contribute heavily to primary estuarine productivity and provide habitat for numerous wildlife and aquatic species. The Seashore's varied habitats include mature broad-leafed evergreen forest and shrub, freshwater marsh, and bog and these support an unusual assemblage of aquatic, terrestrial, and avian species. Nags Head, located on the northern end of the Seashore, and nine other smaller towns that border the Seashore are causing some developmental pressure from outside Cape Hatteras. The replacement of natural areas near the seashore with impervious surfaces increases storm water runoff which often contains associated contaminants. Thus, there is reason for concern and a need to monitor offshore water quality.

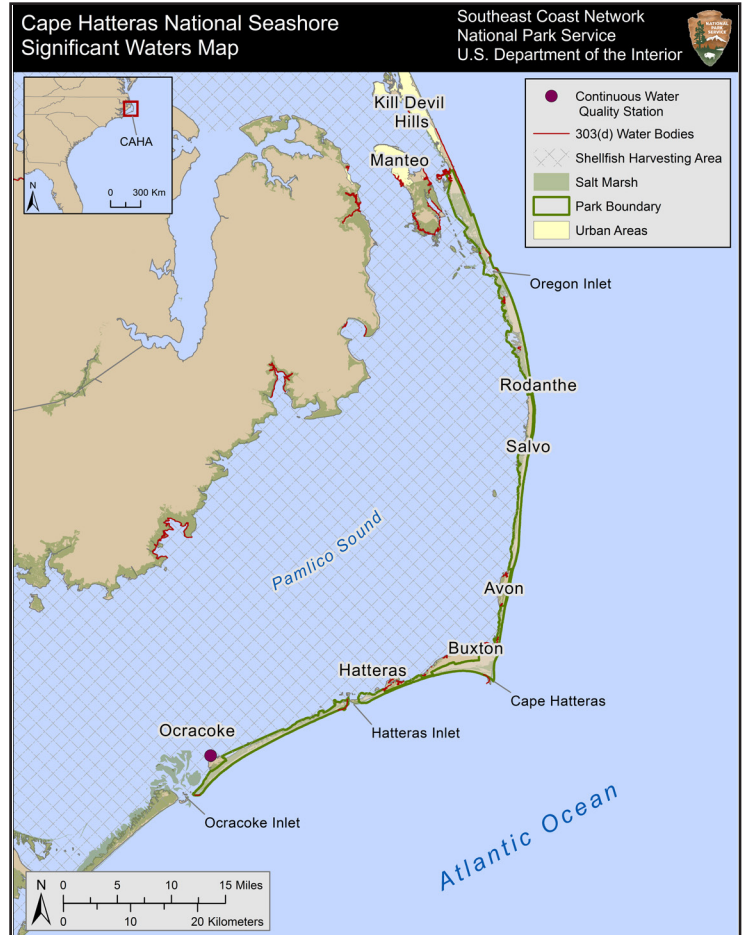


Figure 2 Map showing the location of the continuous water-quality monitoring station at Cape Hatteras National Seashore in North Carolina.

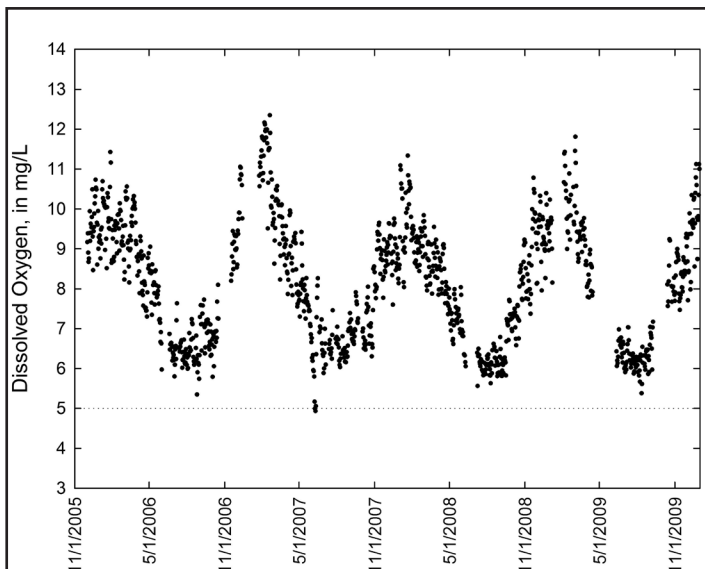


Figure 1. Mean daily values for dissolved oxygen at Cape Hatteras National Seashore during 2005–2009. Breaks in the data record indicate missing or flagged data. The dotted line indicates the EPA minimum value for a rating of *good*.

Significant Findings

Monthly water-quality data indicated *good* to *fair* water-clarity conditions throughout the period of record, with only two *poor* ratings in November 2007 and January 2008.

Monthly water-quality data also showed *good* dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorus (DIP) levels throughout the entire period of record with the exception of one *fair* DIP concentration in August 2009.

Monthly water-quality data indicated *fair* (14 months) to *good* (18 months) chlorophyll *a* levels.

Continuous water-quality data indicated water temperatures ranged from a minimum of 0.0°C in January 2009 to a maximum of 32.1°C in August 2006.

Mean daily values for dissolved oxygen were nearly all above the EPA rating for *good* (Figure 1).

Sampling Methods

Data collection at the fixed-station monitoring location at Cape Hatteras is based on methods established by the National Estuarine Research Reserve Program.

Continuously collected data at this location include dissolved oxygen, pH, specific conductance, water temperature, water depth, and turbidity. Readings for these parameters are collected at 30-minute intervals using a YSI data sonde (Model 6600) which is deployed in 3- to 5-week intervals.

The data collection platform consists of a 4-inch diameter PVC tube attached vertically to a piling on the Ocracoke boat ramp dock with the sonde suspended within and approximately 0.5 meters from the bottom (Figure 3). Prior to deployment the data sonde is calibrated.

Monthly water sample collection also occurs at this location and discrete data derived from these samples include information about water clarity, chlorophyll *a*, dissolved inorganic nitrogen, dissolved inorganic phosphorus, dissolved oxygen, total dissolved nitrogen, and total dissolved phosphorus.

Water quality was assessed for each of the monitored parameters following the East and Gulf Coast site criteria in the EPA National Coastal Assessment IV Report using data from the monthly samples. These categorical assessments (i.e., *good*, *fair*, and *poor*) use measurements of chlorophyll *a*, nutrients, dissolved oxygen, and water clarity to determine water quality and are intended to highlight a range of conditions including acutely degraded water-quality conditions.



Figure 3. Continuous data collection platform on the Ocracoke boat ramp dock near the Cape Hatteras visitor center parking lot. Photo by Jocelyn Wright, NPS.

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 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.

The Southeast Coast Network (SECN) includes twenty parks, seventeen 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.

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>

About the NPS Inventory & Monitoring Program:

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

Data Downloads via the Natural Resource Information Portal:

<http://irma.nps.gov>

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