



Water Quality Monitoring 2020 Data Summary

Overview

The Gulf Coast Network (GULN) Water Quality Monitoring Program began in September 2007. The program monitors 54 sites across seven parks. The GULN Water Quality Program was designed to provide 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 water quality monitoring at Vicksburg National Military Park (VICK) in August 2007. Water quality is measured by park or network staff every quarter at three sites: Durden Creek, Glass Bayou at Union Avenue, and Mint Springs Bayou (see map on next page). Field measures include water temperature, specific conductance (SpC), pH, dissolved oxygen (DO), and turbidity. Historically, recurring measurements of *Escherichia coli* (*E. coli*) have not been conducted at these sites; however, with assistance from the network, the park has started sampling in-park streams for *E. coli* to establish baseline values due to park specific concerns.

Vicksburg National Military Park drains via three small, perennial streams: Mint Springs Bayou, Glass Bayou, and Durden Creek, as well as numerous ephemeral and seasonal streams. Mint Springs and Glass Bayous drain into the Yazoo River while Durden Creek flows into Hatcher Bayou, which flows into the Mississippi River. Mint Springs Bayou is divided into the upper and lower reaches by a 10-meter (33-foot) high waterfall. This waterfall, located adjacent to the Vicksburg National Cemetery, forms a natural impediment to upstream fish movement; only one species of fish, the exotic fathead minnow (*Pimephales promelas*), exists above the falls. All park streams respond immediately to rainfall events; clear base-flow gives way to extremely turbid storm flow as the steeply sloped loess terrain provides ample runoff.



Above: Durden Creek sampling location at Vicksburg National Military Park.

This brief summarizes data collected from January 1, 2020, through December 31, 2020. Calendar year 2020 was limited in sampling frequency and opportunities due to the COVID pandemic outbreak. Network and park staff sampled as frequently as possible while taking into consideration public health decisions, but the total number of samples collected in this particular year for many monitoring programs are reduced compared to other years. Our sampling schedule at the park survived more intact than other parks in our network and only one sampling event was not possible due to the on-going pandemic. 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) (<https://www.nps.gov/im/guln/monitoring-reports.htm>).

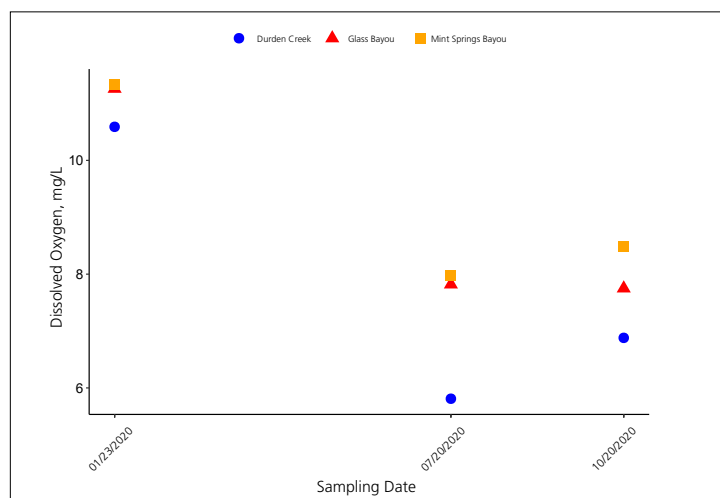


Figure 1. Dissolved oxygen measured at all three sites during 2020. Dissolved oxygen is important for aquatic organisms and routinely elevated DO helps support aquatic communities. Sites did not violate any freshwater Fish and Wildlife (F&W) standards as a reference.

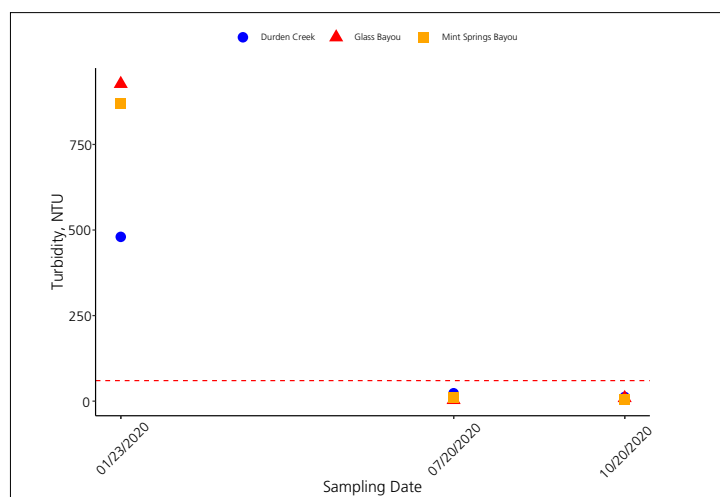


Figure 2. Turbidity measured at all sites in 2020. Turbidity was elevated in January of 2020. F&W state standard is designated by the red dashed line.

Significant Findings

Highlights of Calendar Year 2020 Monitoring

Park streams are generally well-aerated and have high dissolved oxygen (Figure 1). In calendar year 2020 there were periods of lower dissolved oxygen than in previous years. In comparison to Fish and Wildlife water quality standards (listed in the table below) these lower values of dissolved oxygen are still above the criteria of concern for aquatic organisms. Stream pH is well buffered by abundant calcium carbonate in the loess soils. Streams have occasionally exceeded the state maximum based on Mississippi Fish and Wildlife mandates for pH (9.0 standard units) and turbidity (60 NTU) in previous years. For 2020, pH was within the range specified for aquatic organisms; however, turbidity in January (Figure 2) was well above the provided reference criteria for aquatic organisms (but not a site-specific violation as such criteria do not currently exist). Turbidity is routinely elevated in this region due to the surrounding soil and the high frequency of soils being washed into the stream channel.

Water Quality Standards

The state of Mississippi has not assigned specific designated uses, which are used to set water quality standards, for park streams. As no water quality standards have been developed by the state of Mississippi with regards to water quality through designated use categories, the use of standards developed by the Mississippi Fish and Wildlife are used as guidelines, but are not official. The Mississippi Fish and Wildlife standards for biotic integrity are in the table below.

Below: Parameters and criteria.

Physical Characteristic	Fish and Wildlife Criteria
Dissolved oxygen	> 4.0 mg/L
pH	Between 6.0 and 9.0 standard units
Specific Conductance	< 1,000 µS/cm
Turbidity	< 60 NTU
Water Temperature	< 32.2°C

About the Gulf Coast Network

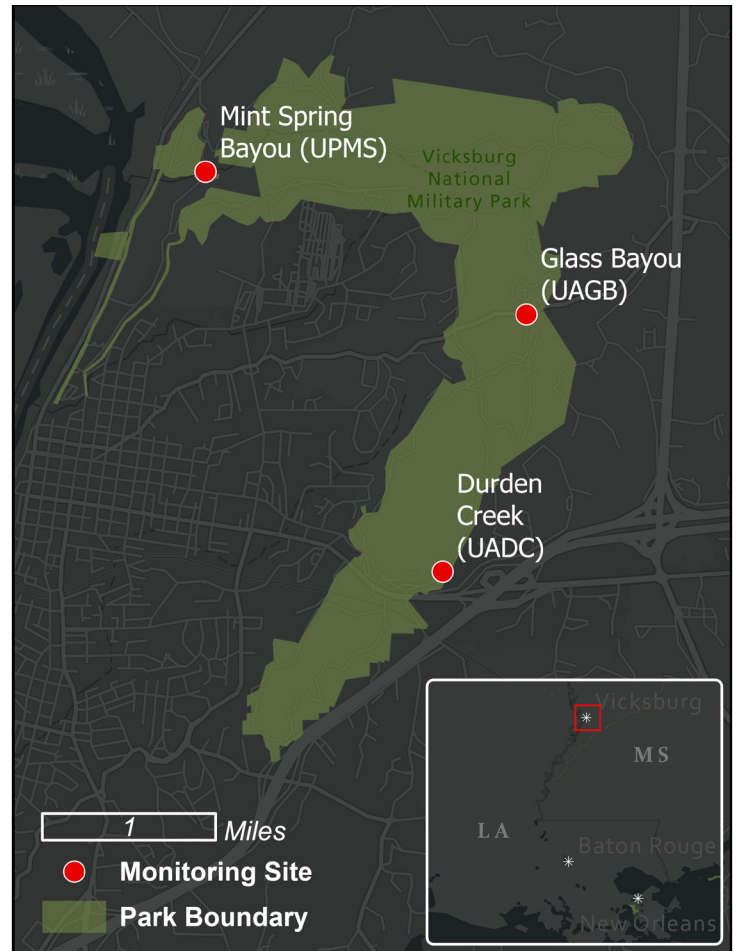
In 1999, the National Park Service initiated a long-term ecological monitoring program, known as “Vital Signs Monitoring,” to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource 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

Future Monitoring

Water quality monitoring will continue a quarterly sampling schedule through 2021.



Map of Vicksburg National Military Park water quality monitoring sites.

of park ecosystems,

- Provide data to meet certain legal and Congressional mandates, and
- Provide a means of measuring progress towards 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>

Data Downloads via the Natural Resource Information Portal:

<https://irma.nps.gov>