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 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 monitoring of water quality at Big Thicket National Preserve with quarterly sampling in October 2007. Quarterly sampling continued from October 2007 to September 2013 where sampling shifted to a monthly schedule. Sampling changed again in October 2017 and was decreased from monthly to every other month sampling at the following sites: Menard Creek (MCMC), Big Sandy Creek (BSVC), Little Pine Island Bayou (LPLR), Turkey Creek (TCTC), Village Creek at McNeely Road (MRVC) and Village Creek at State Park (SPVC; Figure 1). Field measures include water temperature, specific conductance (SpC), pH, dissolved oxygen (DO), and turbidity. Samples are collected for *Escherichia coli* (*E. coli*), chloride, sulfate, total suspended solids, alkalinity, ammonia, nitrate, and nitrite.

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).

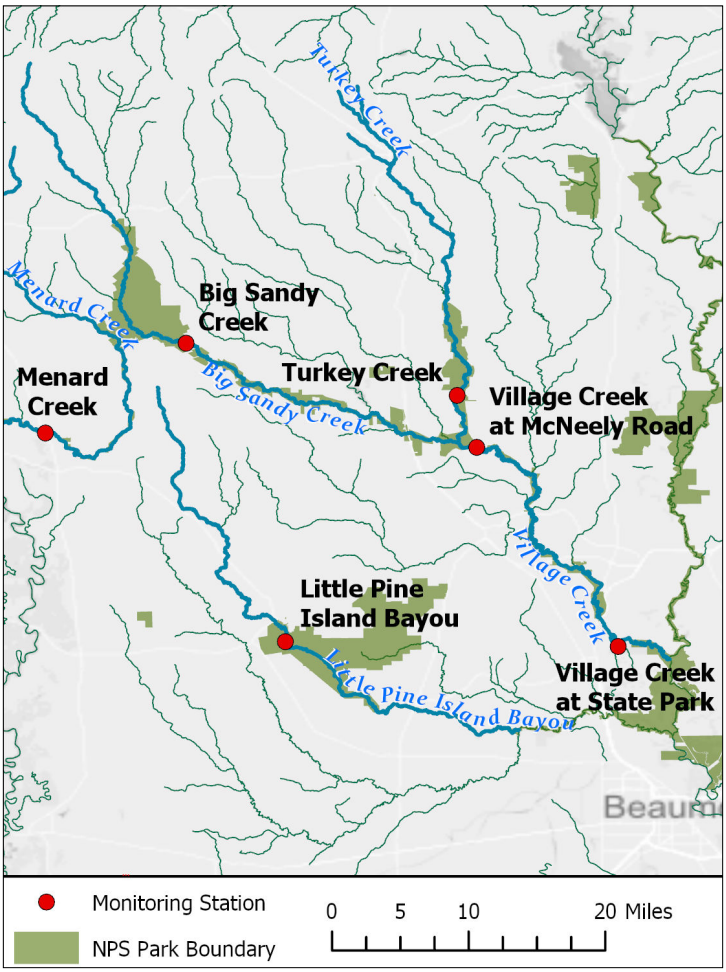


Figure 1. Map showcasing the park boundary, and sampling locations of Big Thicket National Preserve in east Texas. Inset map showing location of the park and the Texas-Louisiana state border.

Significant Findings

Highlights of Calendar Year 2022 Monitoring

There were several violations of state water quality standards (see Table 1 for standards) and screening limits documented during 2022. *E. coli* was detected above the state criteria during several different sampling events. Violations for *E. coli* occurred at all sites in February, and again for several sites in April, August, and December (Figure 2). Examinations of *E. coli* measurements in relation to regional precipitation may provide insight into the patterns of violations.

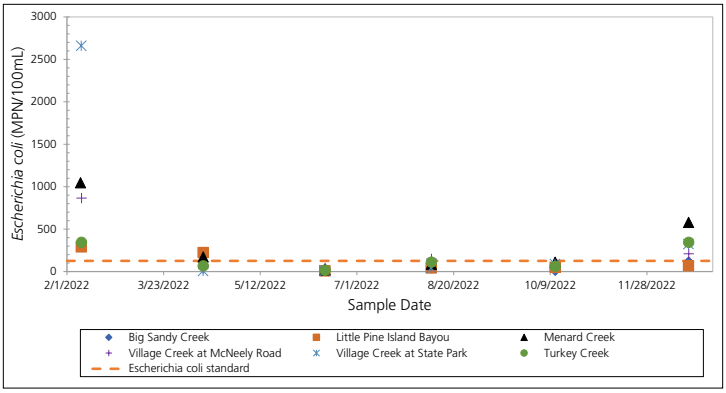


Figure 2. *Escherichia coli* measurements at sites in Big Thicket National Preserve for 2022. The orange line represents the state *E. coli* criteria for the creeks in this area of Texas. Violations of the water quality standard occurred several times of the year and included every site at least once.

Dissolved oxygen (DO) concentrations below the limit of 5 mg/L were reported at Little Pine Island Bayou on four different occasions (Figure 3). All remaining sites maintained DO levels above the water quality standard set by the state of Texas. Little Pine Island Bayou routinely violates DO levels in the summer or warmer periods of the year. Increased temperature results in a decrease in the storage of dissolved oxygen in aquatic systems which is compounded by low flow events, and potentially large quantities of organic matter being broken down through cellular respiration at Little Pine Island Bayou.

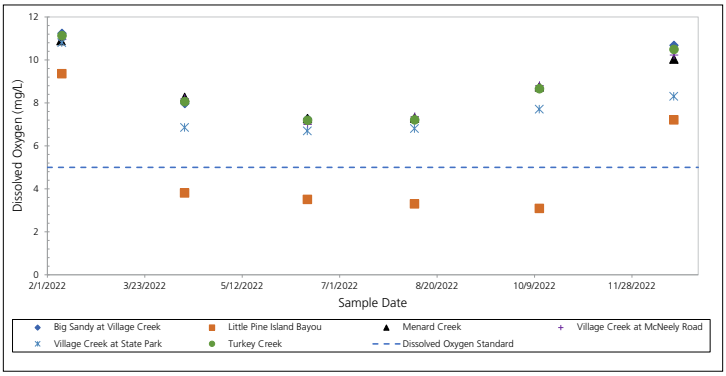


Figure 3. Dissolved oxygen measured at sites in Big Thicket National Preserve for 2022. The blue line represents dissolved oxygen criteria for streams in this area of Texas. Only one site had violations for dissolved oxygen in 2022 (Little Pine Island Bayou) at all sampling events except for January, and November.

Water Quality Standards

Texas designates the waters of the Preserve as "High Aquatic Life Use." All sites at Big Thicket National Preserve are designated as "Primary Contact Recreation." Designated uses are used to set water quality standards. Temperature and sulfate standards are different for Little Pine Island Bayou than the remaining five sites on Village and Menard Creeks. State standards are listed in Table 1.

Table 1. Field measurements and state standards.

Field Measurement	State Standard
Ammonia as N	< 0.33 mg/L
Chloride	< 150 mg/L
Specific conductance	No state standard
Dissolved oxygen	> 5.0 mg/L
E. coli	< 126 MPN/100 mL
Nitrite as N	< 1.95 mg/L
pH	Between 6.0 and 8.5 SU
Sulfate	< 50 mg/L (Little Pine Island Bayou) < 75 mg/L (Village and Menard Creek)
Water temperature	< 35°C (Little Pine Island Bayou) < 32.2°C (Village and Menard Creek).

Future Monitoring

Water quality sampling will continue every other month through 2023.

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
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