



Water Quality Monitoring 2019 Data Summary

Overview

The Gulf Coast Network (GULN) Water Quality Monitoring Program began collecting samples in September 2007. The program was developed primarily from protocols of the U. S. Geological Survey (USGS) National Water-Quality Assessment Program and the Texas Commission of Environmental Quality's (TCEQ) Surface Water Quality Monitoring Program. The GULN program monitors 54 sites across seven parks which are sampled on a set rotation.

The GULN Water-Quality Program was designed to provide an integrated assessment of the spatial and temporal distribution of general water-quality conditions and the transport of major inorganic constituents of stream and estuary water in relation to hydrologic conditions and major sources.

The network began long-term monitoring of water quality at San Antonio Missions National Historical Park (SAAN) in October 2008. Water quality is measured every other month at four park sites (see map on next page) including Acequia de Espada, San Juan Acequia, Piedras Creek, and the San Antonio River at San Juan Mission, through a contract with the San Antonio River Authority. Monitoring is conducted concurrently with the Upper San Antonio River Texas Clean Rivers Program (CRP). Parameters are the same as the Upper San Antonio River and include standard field measures (water temperature, specific conductance [SpC], dissolved oxygen [DO] and pH) and laboratory analysis for key ions and nutrients.

In a semi-arid land like south-central Texas, the spring-fed San Antonio River has been a cultural oasis for centuries. The importance of this water is evident throughout the 334 hectares (826 acres) of San Antonio Missions National Historical Park. The Missions would not have been built if not for the river. Missionaries and the Coahuiltecan irrigated their fields via an intricate system of acequias. Acequias are gravity-driven ditches tapped into the river above low-head dams. Missions also held large grazing areas including Mission Espada's Rancho de las Cabras, located about 80 kilometers (50 miles) downstream at the confluence of Picoso Creek and the San Antonio River.

This brief summarizes data collected from January 1, 2019 through December 31, 2019. 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](#).



Above: San Pedro Creek located along the San Antonio River Walk. NPS photo.

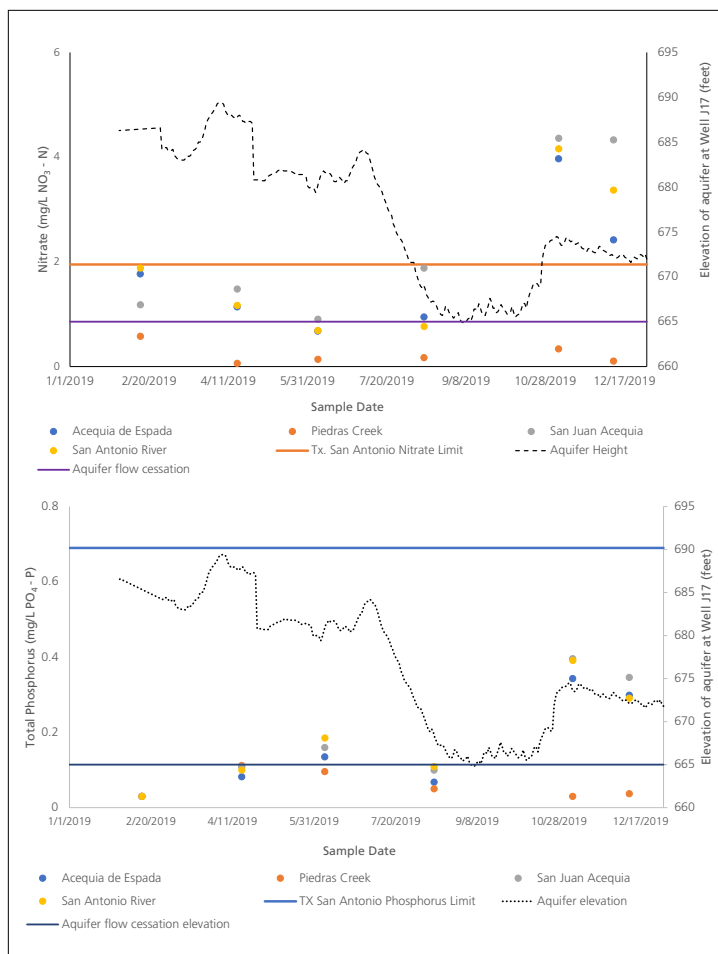


Figure 1. Relationship between nitrate (A) and phosphorus (B) at San Antonio Missions National Historical Park and the elevation of Edwards Aquifer Authority J17 in 2019.

Significant Findings

Highlights of Calendar Year 2019 Monitoring

The Upper San Antonio River is supplemented by the addition of reuse water (highly-treated sewage plant effluent) and at times this internationally famous water source is 100% reuse water. This reuse water is generally higher in nutrients than the traditional water from the natural springs. While water managers have done an outstanding job at improving water quality by reducing runoff, there are still times when water quality exceeds state standards. Sampling of our four routine sites occurs every other month. Samples were found to exceed state limits in 2019 with a total of 27 violations. Six violations of the nitrate screening level of 1.95 mg/L occurred in 2019. Each site exceeded the state standard for *E. coli* resulting in a total of nine violations. Dissolved oxygen was below the state standard at least once for each site resulting in 10 total violations. The ammonia limit was exceeded only once (Piedras Creek). State criteria for chloride was exceeded once in 2019.

Relationship between Nutrients (Phosphorus and Nitrogen) and

Significant Findings (continued)

Water Table Elevation

Previous water quality analyses noted a relationship between in-stream nitrogen and the water table as monitored by the Edwards Aquifer Authority (at well J17). In previous years, when the aquifer height dropped below 665 feet elevation the river’s headwaters cease flowing and were supplemented by reuse water. Reuse water is, typically, higher in nutrients than the typical spring water that feeds the San Antonio River and acequias. This year the aquifer did not drop below this threshold (665 feet) noted in earlier briefs, but found that nitrogen and phosphorus both increased at the end of the sampling year (October and December 2019, Figure 1). This uptick in measured nutrient values did not present at Piedras Creek which, historically, is not supplemented by reuse water.

Water Quality Standards

The Upper San Antonio River is designated as “Contact Recreation” and “High Aquatic Life,” although the city of San Antonio prohibits swimming in the river. Both the river and the acequias that flow in or out of it are expected to adhere to the water quality standards listed below.

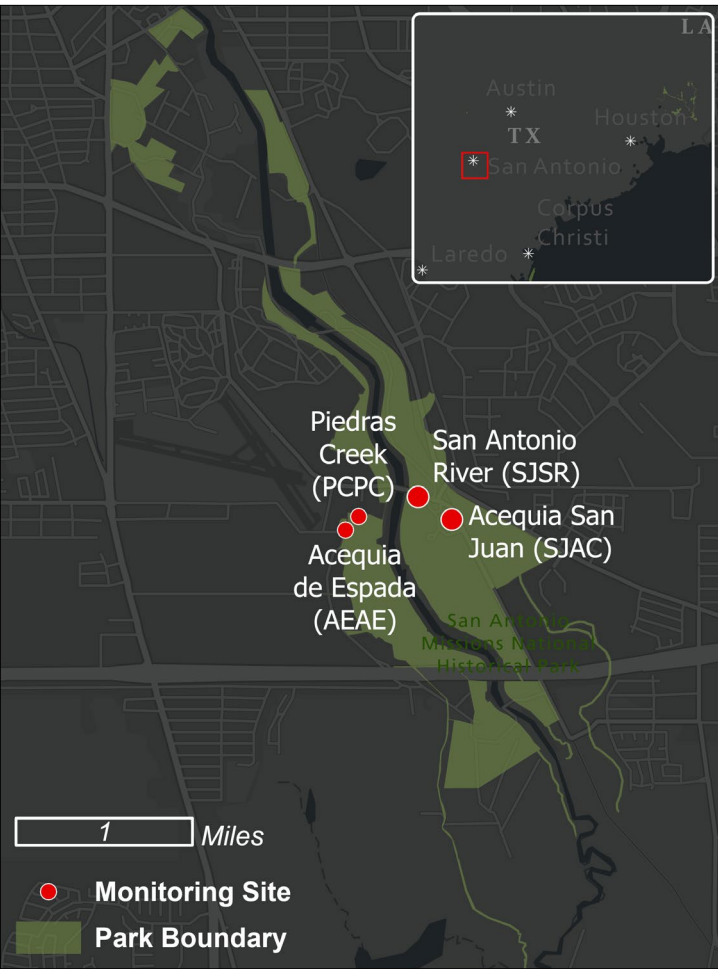
Below: Parameters and criteria.

Parameter	Criteria
Ammonia*	< 0.33 mg/L
Chloride	< 150 mg/L
Dissolved oxygen	> 5.0 mg/L
Nitrate*	< 1.95 mg/L
pH	Between 6.5 and 9.0 Standard Units
Phosphorus*	< 0.69 mg/L
Sulfate	< 150 mg/L
Water temperature	< 32.2° C

*Proposed State Screening Levels

Future Monitoring

Water-quality sampling will continue through fiscal year 2020.



Map of San Antonio Missions National Historical Park water-quality monitoring sites. The large map shows the full extent of the main unit of the park, with a boxed inset showing the locations of the four sampling sites. In the upper right inset, the black arrow shows the location of the park with Texas.

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 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>