

Suwannee River Water Management District
Final Technical Report

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SUWANNEE RIVER
WATER MANAGEMENT DISTRICT

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Project Overview

In 2022, the United States Geological Survey (USGS) awarded a National Groundwater Monitoring Network (NGWMN) grant to the Suwannee River Water Management District (District), an existing data provider, to fund persistent data services to the NGWMN.

During the previous grant cycle, 85 sites within the District's monitoring network were identified as suitable for inclusion in the NGWMN, and were added to the NGWMN well registry for data transmission. Since that time, the District has maintained the web service licensing and required infrastructure for data transmissions to the NGWMN. The District currently maintains accessible groundwater level information for 82 sites on the NGWMN Data Portal.

Funds provided by the current grant were anticipated to offset the District's annual web services licensing fees that enable data transfers to the NGWMN, thus supporting the District's efforts to continue providing data services.

Work Plan: Objective 2a – Persistent Data Services

- Grant Years 1 and 2
- Total Objective 2a Cost: \$13,230.00
- USGS Funding: \$13,230.00

Objective 2a Work Accomplished

In fulfillment of Objective 2a, the District performed annual reviews of the list of network sites and documented changes in the monitoring network affecting the sites. Additionally, District staff maintained ongoing data collection and data quality assurance, performed station equipment maintenance, and worked to address data transfer issues that arose.

Work accomplished to support Objective 2a:

- 2022
 - Annual network review
 - Ongoing data collection at 85 sites
 - Data quality assurance review
 - Replacement of shaft encoders with pressure transducers
 - Quarterly station equipment maintenance
 - Data transfer troubleshooting
- 2023
 - Annual network review including review of registry metadata
 - Ongoing data collection at 85 sites
 - Data quality assurance review
 - Quarterly station equipment maintenance/replacement as needed
 - Data transfer troubleshooting
 - Automated data transfer refinement – from hourly to daily

- Separation of continuous and discrete data streams
- Initiation of data conversion from levels to depth to water
- 2024
 - Annual network review including review of registry metadata
 - Ongoing data collection at 85 sites (reduced to 82 sites in July)
 - Data quality assurance review
 - Quarterly station equipment maintenance/replacement as needed
 - Completion of data conversion from surveyed datum levels to depth to water (DTW) below land surface
 - Coordination of updates to web service calls

Data collection methods

The District maintains continuous data collection stations at 72 of the NGWMN registry wells. At these telemetry-supported stations, groundwater levels are measured continuously using pressure transducers and level data are transferred hourly to the District’s hydrologic database. Manual depth measurements are also collected at least quarterly at these continuous stations, as part of the data quality assurance process. In addition, ten NGWMN wells are manual-only wells which are visited monthly and measured by trained Hydrologic Data Collection Specialists.

Data quality assurance procedures

The District follows a multi-step process for quality-assuring groundwater data, consisting of daily automated system checks to ensure continuous and manually collected data are transmitting properly; quarterly station maintenance and equipment calibration with manual level readings; initial quality assurance review of continuous and manual data by a dedicated the Water Resources Data Analyst, and final quality assurance review and archiving by the Water Resources Hydrologic Program Manager. Data are coded as “Provisional” in the District’s hydrologic database until they are reviewed and quality-assured. Reviewed data are coded according to District QA/QC Standard Operating Procedures and archived in the District’s hydrologic database.

District wells represented in the NGWMN

Eighty-five groundwater sites were added to the NGWMN registry during a previous grant project cycle. Two of the sites originally included in the registry (S041014001 and S101516017) were removed from the registry in 2024 because the District is no longer collecting data from them due to site access constraints, and one site (S031105006) was removed from the registry because the well failed. With removal of these three wells, the NGWMN registry currently includes 82 sites monitored by the District. No new or replacement wells were added to the NGWMN during the project.

The current 82 groundwater sites are categorized as follows:

- Monitoring Category
 - 44 Surveillance

- 38 Trend
- Subnetwork
 - 21 Background
 - 25 Known Changes
 - 36 Suspected/Anticipated Changes

Updates made to web services

- In March 2023, at the request of NGWMN staff, District staff adjusted the web service data call to provide data as daily values rather than hourly values.
- In September 2023, in coordination with NGWMN staff, District staff adjusted the data call to distinguish continuous and discrete data streams.
- In June and July 2024, District staff completed data conversions from surveyed level values to depth to water (DTW) and created new variables and automated processes in the District’s hydrologic database to accommodate the conversion.
- In July and August 2024, District staff worked with NGWMN staff to adjust the data calls for the converted DTW values.

Problems encountered in serving data to the NGWMN data portal

In October 2022, NGWMN staff contacted District staff to report web services were inaccessible. District staff examined the automated web services and data transfer jobs for errors and verified that the services remained available. Several test calls were performed, and data was retrieved in the WaterML 2 format. At that time, NGWMN staff made additional inquiries regarding lithology and well construction information. District staff advised that well log data are not compatible with web service calls, however where available this information may be incorporated into site metadata.

In May 2023, NGWMN staff notified the District of a data transmission issue suspected to be a result of connection fixes which interfered with the continuous and discrete data streams. District staff examined the dataflow process and provided a summary of findings to the NGWMN, with instructions for adjusting the data call. In September 2023, the web service calls for the continuous and discrete data streams were adjusted using the District suggestions and the NGWMN began to receive consistent values for both streams.

During the coordination to adjust the continuous and discrete data stream web service calls, NGWMN staff requested level information expressed as depth to water below land surface (DTW) rather than level in a surveyed datum (NAVD88 or NGVD29). Because the District has historically collected surveyed level data, District staff alerted NGWMN staff that accommodating this request would require significant staff time to perform data conversions for each well site. NGWMN and District staff agreed to “turn off” the District’s well sites from displaying on the NGWMN data portal until the conversions were complete. Work on the level data conversions began in 2023, however this work was delayed by staffing changes at the District. Site maintenance, groundwater data collection, and data

quality review continued during this time. The DTW data conversions were completed for the 82 registry wells in July 2024 and the data are now available for data calls.

In July 2024, District and NGWMN staff met virtually to reestablish and troubleshoot ongoing problems with the data calls. The primary problem appears to be incompatibility between the way the District well data are organized and how NGWMN portal retrieves data via application programming interface (API). The District's 82 registry wells are divided into four groups – 58 continuous NGVD29 wells, 9 manual NGVD29 wells, 14 continuous NAVD88 wells and 1 manual NAVD88 well. Level data from these wells are stored in the District's hydrologic database by different variable numbers corresponding to each of those groups, which necessitates four separate API data calls. This creates a data retrieval conflict with established NGWMN API data retrieval methodology. After several attempts to revise current and test rewritten data calls, District and NGWMN staff determined the best immediate solution is to focus on one API data call for the largest group of wells, the 58 continuous NGVD29 wells. This data call was implemented, and the level data for these wells are now transmitting correctly.