

COVER PAGE

AWARD NUMBER: G23AC00298

SPONSORING ORGANIZATION: Grand County

PROJECT TITLE: Expansion of Data Provided to the NGWMN in Grand County, UT

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TERM COVERED: August 1, 2023, to July 31, 2024

DATE: November 14, 2024

MAJOR GOALS: Continue the flow of data from wells established in the NGWMN (Objective 2: Support persistent data service to NGWMN). Expand the amount of data flowing to NGWMN by adding wells with continuous water level collection equipment to that flow (Objective 6: Purchase and install equipment to support continuous water level data collection).

PROJECT SUMMARY: Grand County, Utah prepared and delivered well and water level data to the Utah Geological Survey (UGS) for five wells previously established in the NGWMN. Grand County, Utah established three more wells to the NGWMN and installed transducers in them. The data from those three new wells was prepared and delivered to the UGS. Grand County was hoping to also add about three more wells to the NGWMN database but the utility provider that collects that information has yet to deliver any data to us. UGS was contracted by the Grand County to use their portal to the National Ground-Water Monitoring Network (NGWMN) for Grand County collected data. This project establishes a long-term goal to continue integrating county groundwater level data into one secure database that is publicly available at a national level. The funding available for this project was \$15,031.38 but the effort was performed with only \$7,248.51 invoiced and approximately \$3,200 in match.

OVERVIEW OF WORK

The Grand County cooperated with the UGS and provided data for eight sites. Five of those sites were previously established and three were new sites added to the UGS data base.

Transducers were installed at the three new sites. Three of the original sites Grand County is responsible for were being serviced and maintained by UGS as part of another study and the daily average water depth for those three during that time is available to be to the UGS for inclusion in their database. Since then, responsibility for servicing and maintaining those three sites has returned to Grand County. Grand County will continue to provide support and data to the UGS for inclusion in their database. The UGS has continued connection between the UGS Water-Quality Network and the NGWMN, providing the NGWMN with the selected sites and related quality-controlled data. The UGS linked a database from their network for entry and integration of data to the NGWMN portal. The UGS provided ongoing maintenance by updating the list of Grand County network sites, populating data elements for new sites acquired and ensuring the NGWMN Portal connection to the databases stayed operational. Additionally, the Appendix includes hydrographs of water levels transformed from transducer and barologger data logs for all eight sites.

Data flow maintenance by Grand County and UGS consisted of the following four tasks:

- 1. Ongoing network maintenance (persistent data services)**

Grand County does not perform this effort. Grand County has a contract with the UGS to perform this work. The UGS staff that performs this work are- Janae Wallace, Paul Inkenbrandt, Nathan Payne, and Kiersten Winwood (1 & 2 year)

- a. administered and maintained the UGS database;
- b. performed regular manual and automated quality assurance and quality control (Paul Inkenbrandt and Kiersten Winwood);
- c. maintained a user interface (UI) application that

allows for upload of site and field chemistry information (Kiersten Winwood);

- d. Created and maintained data services for water level and well construction information. Kiersten was on maternity leave/sick leave for 4 months, returned for one month, and then resigned leaving UGS without a GIS staff member until October 21, 2024.

2. Updating network site list (Objective 2)

Arne Hultquist coordinated with other County cooperating individuals, agencies and groundwater geologists at the UGS to check station data at all sites and add water level data for all sites as needed. The UGS groundwater geologists inspected records related to the respective sample sites and verified the accuracy of the information of each location to ensure that it is correct and current. Under the direction of Paul, the geologists entered new data related to the NGWMN sites into the UGS database, which allowed for the flow of that data to the NGWMN.

3 Ensured an operational connection between the UGS and the NGWMN Portal

Grand County has a Memorandum of Agreement with the UGS for this connection. The UGS provides these services to Grand County for a fee. The UGS works closely with the USGS and the UGS continued to provide data to the NGWMN. The UGS:

1. ensured that the data is flowing from UGS to WQX to NGWMN;
2. maintained data integrity and proper flow of results data;
3. established best practices for data transfer and upkeep;
4. maintained a schema/field mapping and conversion in cooperation with USGS;
5. maintained REST service to serve data via web service in cooperation with USGS;
6. Communicated with Candice Hopkins (USGS) to ensure data were mapping correctly.

4. Purchase and installation of transducers in new water quality sites in order to collect water-level data (Objective 6)

Arne Hultquist visited 3 wells and equipped new NGWMN water quality trend wells with

Rugged TROLL transducers. We downloaded the water level data and generated hydrographs.

Objective 2: Persistent data services-water level data

Water level data for Objective 2 for all water level sites is not available on the Portal at this time due to staffing issues at UGS. During Year 1, Nathan Payne took family leave and then switched to a new position at UGS leaving a GIS vacancy. During Year 2, Kiersten Winwood replaced Payne, who also took an extended absence for maternity leave and two months later resigned. The Groundwater Program has had a vacancy for the GIS position that was recently filled by Diane Menuz, who begins work on October 21, 2024.

However, Grand County via Arne Hultquist has presented all data for the last two years and historical data, some of which dates back almost ten years on one well, to the UGS. They have assured us that the data we provided them will be on the Network by December 1, 2024.

WEB SERVICES

In the same Memorandum of Agreement the UGS provides web services that facilitate access to Grand County garnered data through the NGWMN portal. Grand County appreciates UGS providing the following web services for Grand County. The UGS uses an ESRI-based ArcGIS SDE (spatial database engine) to store data collected for the UGS networks. The ArcGIS platform allows us to serve data via REST-based public web services. The schema of the database was modeled after the EPA's WQX database under the guidance of the USGS, where the primary tables are a Results table that holds measured data and a Stations table that holds monitoring location/site information. Many of the field names are different from those of the WQX to meet field name limitations of the SDE and some fields have been added to comply with the minimum data requirements (Subcommittee on Ground Water, 2013) of the NGWMN. Well owner information, well construction information, and lithology information tables are included. Well owner information is not made publicly available by the UGS.

All the data transmitted and services follow existing federal schemas, specifically the WQX schema. The UGS provides services that contain the following tables:

1. Stations

- a. unique identification is the station identification number
- b. contains minimum data requirements for sites

2. Results

- a. many to one relationship with stations
- b. joined to stations using station identification number
- c. parameter per row format
- d. daily average groundwater level data as below ground water level
- d. contains results returned by the U.S. EPA laboratory and the Utah Department of Epidemiology and Lab Services
- e. contains measured field parameters

3. Lithology

- a. lithology describes the geology from the well driller's record
- b. this information is connected to the station table via the station identification number

4. Well Information

- a. this table includes completion and well construction
- b. it is derived from the Utah Division of Water Rights database

The current UGS services can be found at the following web addresses:

- REST URL:
https://webmaps.geology.utah.gov/arcgis/rest/services/Groundwater/NGWMN_USGS_V2/MapServer
- SOAP URL:
https://webmaps.geology.utah.gov/arcgis/services/Groundwater/NGWMN_USGS_V2/MapServer

Objective 6: Purchase water-level measuring equipment

The Town of Castle Valley (Town) (a community in Grand County) purchased 3 transducers. Arne Hulquist of Grand County installed the 3 transducers. The State of Utah currently has a purchasing contract with an In-Situ distributor for pressure transducers and the Town was able to purchase transducers under that contract. For this project, we are using In-Situ RUGGED TROLL 100 pressure transducers. These transducers are non-vented and have a built-in data logger. For the barologgers, we are using the BAROTROLL pressure transducers, which

also has a built in datalogger. Grand County obtained a BAROTROLL for Spanish Valley wells from the UGS when Grand County resumed responsibility for servicing and maintaining those wells. There is a BAROTROLL installed as part of another UGS project in Castle Valley and the UGS shares that data with Grand County. Metadata on the three new sites where the transducers were installed is shown in Table 1. Additionally, the Appendix includes hydrographs of these water levels transformed from transducer and barologger data logs for all eight sites.

Table 1. Sites instrumented with transducers for Objective 6.

SITE ID	General Location	Staff	Meas. Freq.	National Aquifer	Monitoring Category	Transducer Model
383747109214001	Castle Valley	AH	Continuous	Colorado Plateaus aquifers	Surveillance	Troll 100
383709109230701	Castle Valley	AH	Continuous	Colorado Plateaus aquifers	Surveillance	Troll 100
383832109243901	Castle Valley	AH	Continuous	Colorado Plateaus aquifers	Surveillance	Troll 100

Appendix: Hydrographs for the period of record for the eight wells supported by this grant.

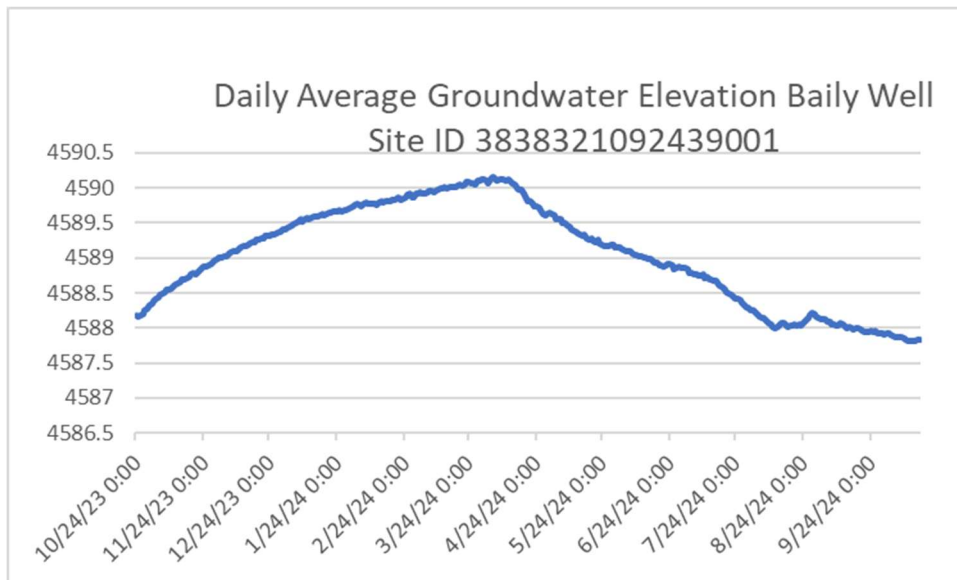


Figure 1: Daily Groundwater Elevation at the Baily well Site Id: 38382109243901

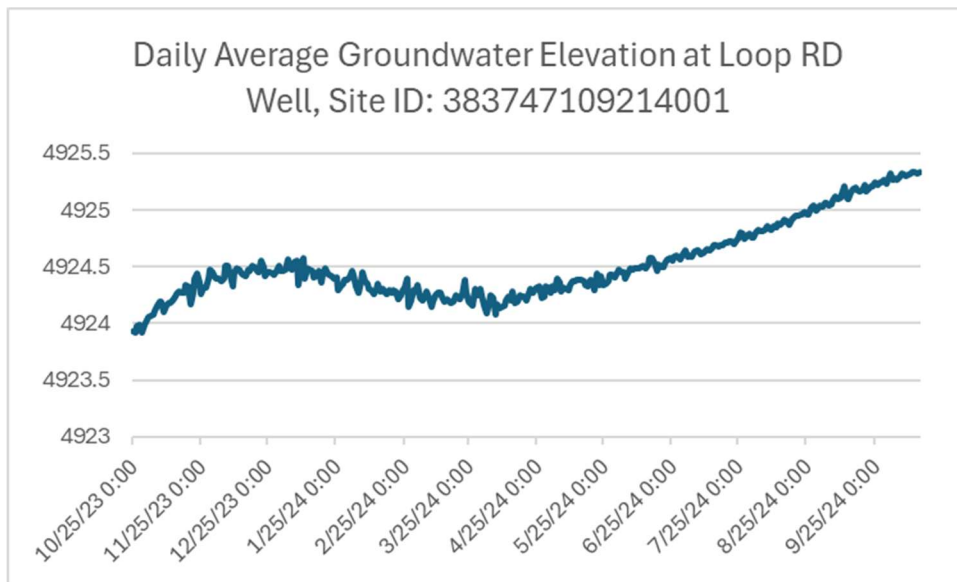


Figure 2: Daily Groundwater Elevation at the Loop Road Well, Site ID 383747109214001

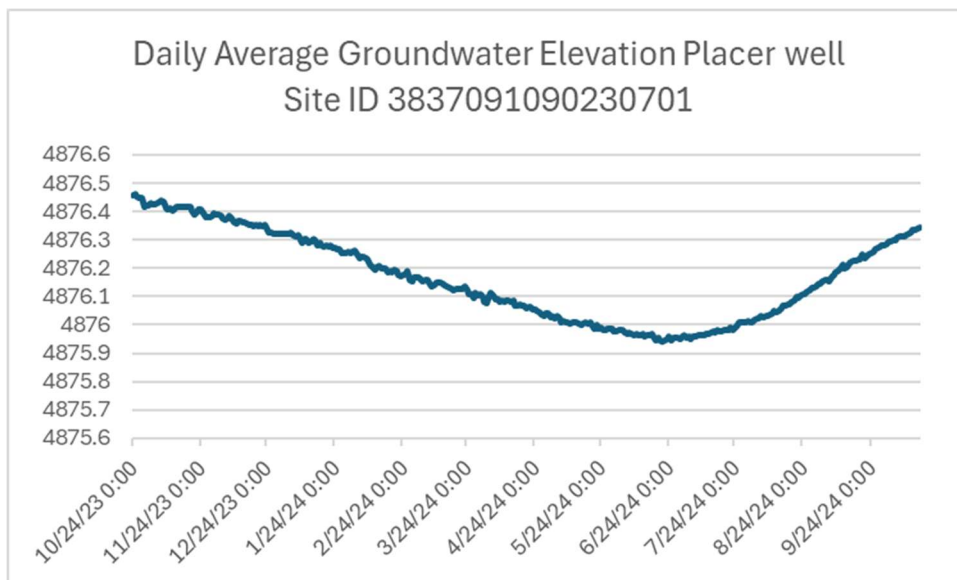


Figure 3: Daily Groundwater Elevation at the Placer Well, Site ID 383709109230701

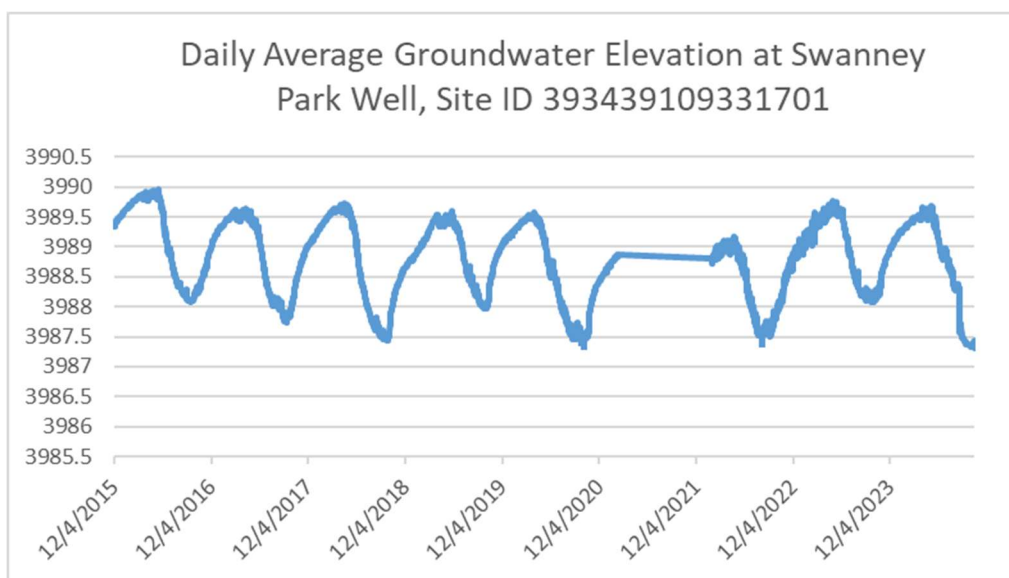


Figure 4: Daily Groundwater Elevation at the Swaney Park Well, Site ID 383439109331701

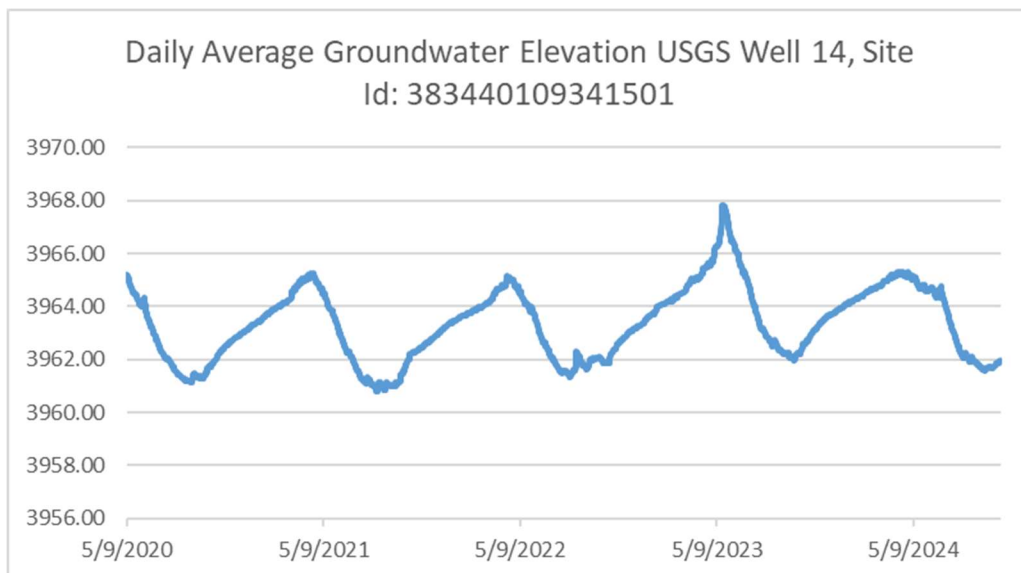


Figure 5: Daily Groundwater Elevation at the USGS Well 14, Site ID 383440109341501

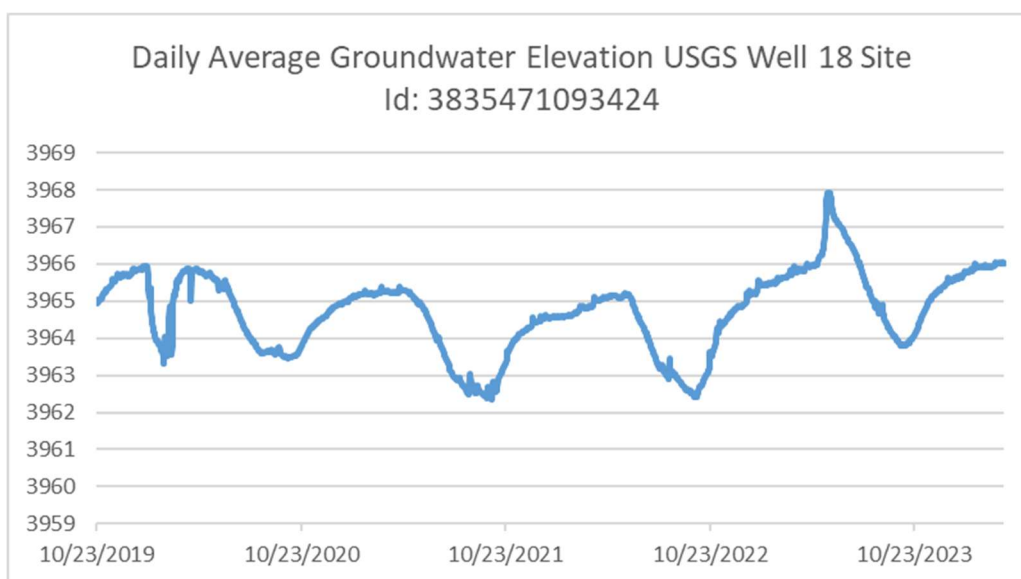


Figure 6: Daily Groundwater Elevation at the USGS Well 18, Site ID 383547109342401

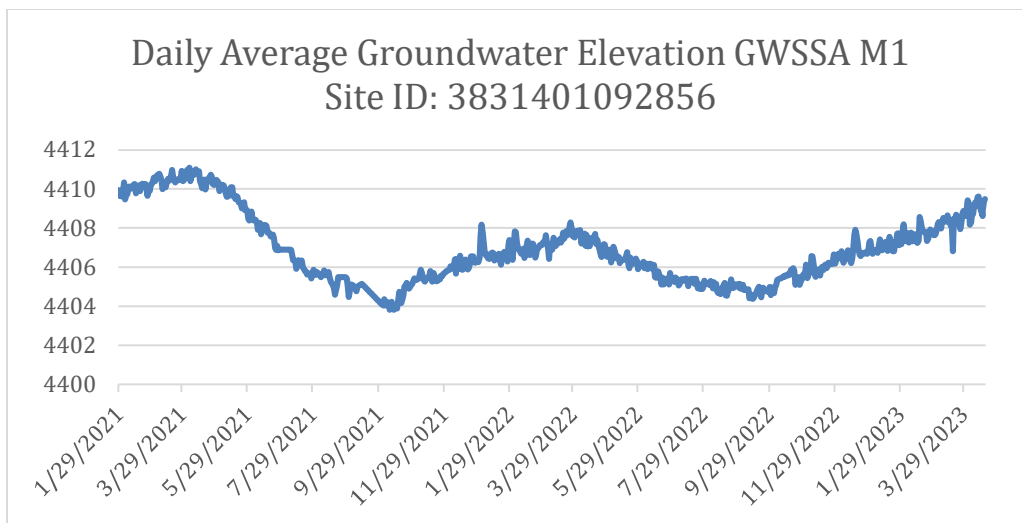


Figure 7: Daily Groundwater Elevation at the GWSSA Well M1, Site ID 3831401092856 (Data since 2023 is still undergoing QA/QC)

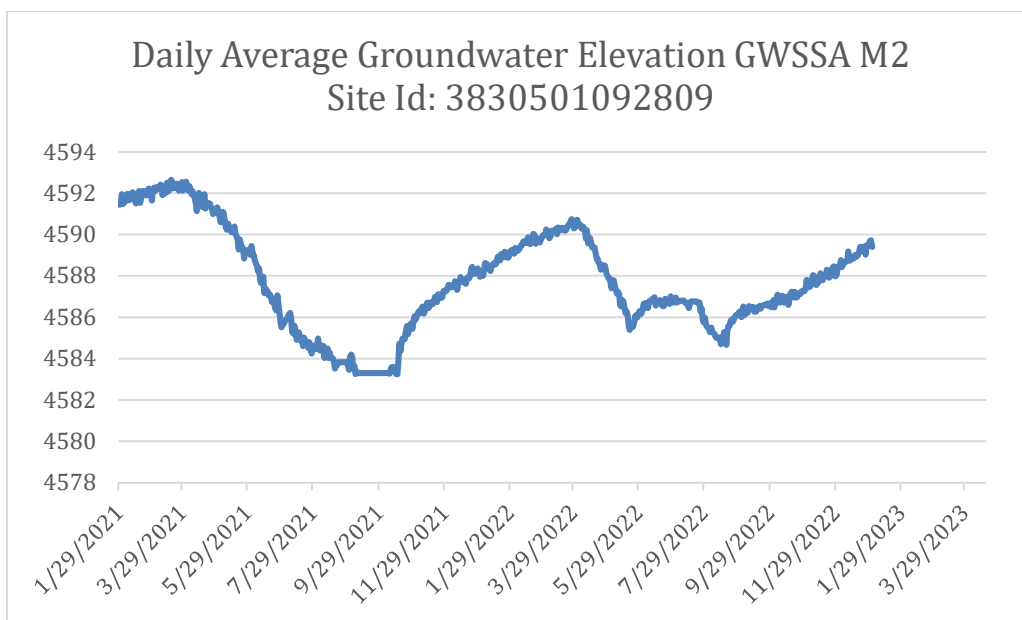


Figure 8: Daily Groundwater Elevation at the GWSSA Well M2, Site ID 3830501092809 (Data since 2023 is still undergoing QA/QC)