

COVER PAGE

AWARD NUMBER: G117AC00174

SPONSORING ORGANIZATION: Utah Geological Survey

PROJECT TITLE: Request for Funding by the Utah Geological Survey to Add New and Existing Wells to the National Groundwater Monitoring Network

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MAJOR GOALS: The primary goal of this project was to: Expanding services (Obj.1); Provide Persistent data service (Obj.2), and to service wells via well maintenance (Obj. 4) for the NGWMN.

PROJECT SUMMARY: The UGS provided the USGS quality assurance procedures for data management of 80 initial sites to the NGWMN, maintaining a database for connection to the NGWMN, and creating a continuous flow of data to the NGWMN, within a two-year time frame. We established and continue to maintain water-quality and water-level databases as part of the UGS Water-Quality Network for integration into the NGWMN web portal.

WORK DONE

The Utah Geological Survey (UGS) added water-level information from existing Snake Valley monitor wells (Obj 1), continued to support persistent data flow from the UGS Water-

Quality Network to the National Groundwater Monitoring Network (NGWMN) by filling data gaps in the UGS database (objective 2) and maintaining some of the wells in our network (objective 4). The UGS filled new information at Snake Valley Utah monitor sites and now NGWMN sites (objective 1) and maintained NGWMN sites (objective 4) by pumping select wells in the network to ensure connection with the aquifer.

With U.S. Environmental Protection Agency (EPA) analytical and laboratory support, the UGS has established a monitoring network consisting of approximately 108 wells and springs, where water quality is regularly measured; the goal of which is to document changes in water quality over time. This project establishes a long-term goal to provide an opportunity to recognize and help protect high-quality water resources documented through a well administered and maintained database, and a short-term goal of integrating our state-level data with a national-level database.

The UGS continues to closely follow the guidelines outlined in appendix 5 of the Framework Document (Subcommittee on Ground Water, 2013) to meet the requirements of the minimum data elements, and assures that minimum data elements are provided via the Well Registry or web services.

Data service of wells from Snake Valley water-level monitor network

For this project, we created a data service of well water level data from our Snake Valley Water- Level Monitoring Network (http://apps.geology.utah.gov/groundwater/map.php?proj_id=1) to the National Ground-Water Monitoring Network. These wells are dedicated monitoring wells used for monitoring trans-

boundary water-level conditions between Nevada and Utah. Both states have already made use of data from this network to mediate issues on groundwater. The UGS has monitored hourly water level in these sites since 2011. Some of the wells in the UGS Water-Quality Network are also in the Snake Valley Water-Level Monitoring Network. For this component of the project, we selected appropriate representative wells from our network to provide to the NGWMN, added the necessary metadata and well registry components, and created an active data service.

Support persistent data service from existing data providers

Working closely with the USGS, the UGS provided data to the NGWMN via Web Feature Services (WFS) published through an ArcGIS Server. Services include water quality data, lithology, casing, screen, and other well construction information. Results are manually uploaded to the EPA WQX database through CDX and accessed by the NGWMN through the WQX. From our database, the UGS provided a WFS (REST-based) connection using ESRI products to allow for direct connection to our chemical database. All of the data transmitted and services provided follow existing federal schemas, specifically the WQX schema. To upgrade to a new version of php (a server-side programming language), the UGS has changed servers and updated the associated web services. No schema changes have occurred that would disrupt services. The current UGS services can be found at the following web addresses:

- https://webmaps.geology.utah.gov/arcgis/services/Groundwater/NGWMN_USGS/MapServer/WFSServer?request=GetCapabilities&service=WFS
- https://webmaps.geology.utah.gov/arcgis/rest/services/Groundwater/NGWMN_USGS/MapServer

Well maintenance

For select sites that require pumping by UGS staff, Janae Wallace and Hugh Hurlow performed routine maintenance of eight wells in the NGWMN to ensure the chemistry data are of high quality. A portable submersible pump pumped at a rate of about one to five gallons per minute for several well volumes, until field parameters (pH, temperature, and specific conductance) stabilized, indicating a connection to the aquifer. As these sites are only pumped once a year during sampling, the pumping-during-maintenance visits maintain well connection to the aquifer. In particular, the sites that require routine pumping are located in Snake Valley in western Utah, Castle Valley in southeastern Utah, and the Uinta Basin in eastern Utah. Some of the wells took considerable time to recover after they were pumped, and all of the wells are in fairly remote parts of Utah, requiring overnight stays for the maintenance trips.

PROBLEMS ENCOUNTERED

No significant issues were encountered during this project. The biggest impediment the UGS deals with is the lack of dedicated funding for travel to the remote sample locations when maintaining our chemistry network. Paul Inkenbrandt experienced difficulty in compiling historical data into a format that was consumable for the WQX, as some of the report data were in PDF format, that had to be manually transcribed.

EXPECTED CHANGES

Within the next year, the UGS expects to migrate from a Microsoft SQL database for its SDE to a Postgresql database. The UGS may also explore using alternative agencies to host its data, like CUAHSI, as they meet the XML delivery requirements that the USGS currently maintains.

REFERENCES

- Hurlow, H., 2014, Hydrogeologic studies and groundwater monitoring in Snake Valley and adjacent hydrographic areas, west-central Utah and east-central Nevada: Utah Geological Survey 135, 304 p.
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- Sub-committee on Ground Water, 2013, A national framework for ground- water monitoring in the United States: The Subcommittee on Ground Water of The Advisory Committee on Water Information, 182 p.
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- Wallace, J., Thomas, K., and Lowe, M., 2010, Evaluation of sources of poor quality ground water in the Bothwell Pocket area, lower Bear River valley, eastern Box Elder County, Utah: Utah Geological Survey Special Study 135, 56 p.