UTAH DNR GEOLOGICAL SURVEY

Utah's National Ground-Water Monitoring Network Effort

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UGS contribution to USGS NGWMN data provider since 2014

https://cida.usgs.gov/ngwmn/index.jsp

NGWMN framework by SOGW design and implementation of a long-term, nationwide groundwater quantity and quality monitoring network- initiated 2011 involving 6 pilot states- by 2013 update of Framework document and invited UGS to participate as data provider- by 2015 funds open to all states

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National Ground-Water Monitoring Network - Google Chrome

cida.usgs.gov/ngwmn/index.jsp

Apps | Bookmarks | Utah-ID Login | Utah-ID Login | myHealthyUtah - Acc | KUER | Front page - Utah Dep | Utah-ID LoginPortalTr | Sign in to Comcast | Other bookmarks

ACWI Advisory Committee on Water Information

National Ground-Water Monitoring Network

NGWMN NETWORKS

Water level:

Subnetwork: All
- Background
- Suspected Changes
- Documented Changes

Monitoring Category: All
- Surveillance
- Trend
- Special

Water quality:

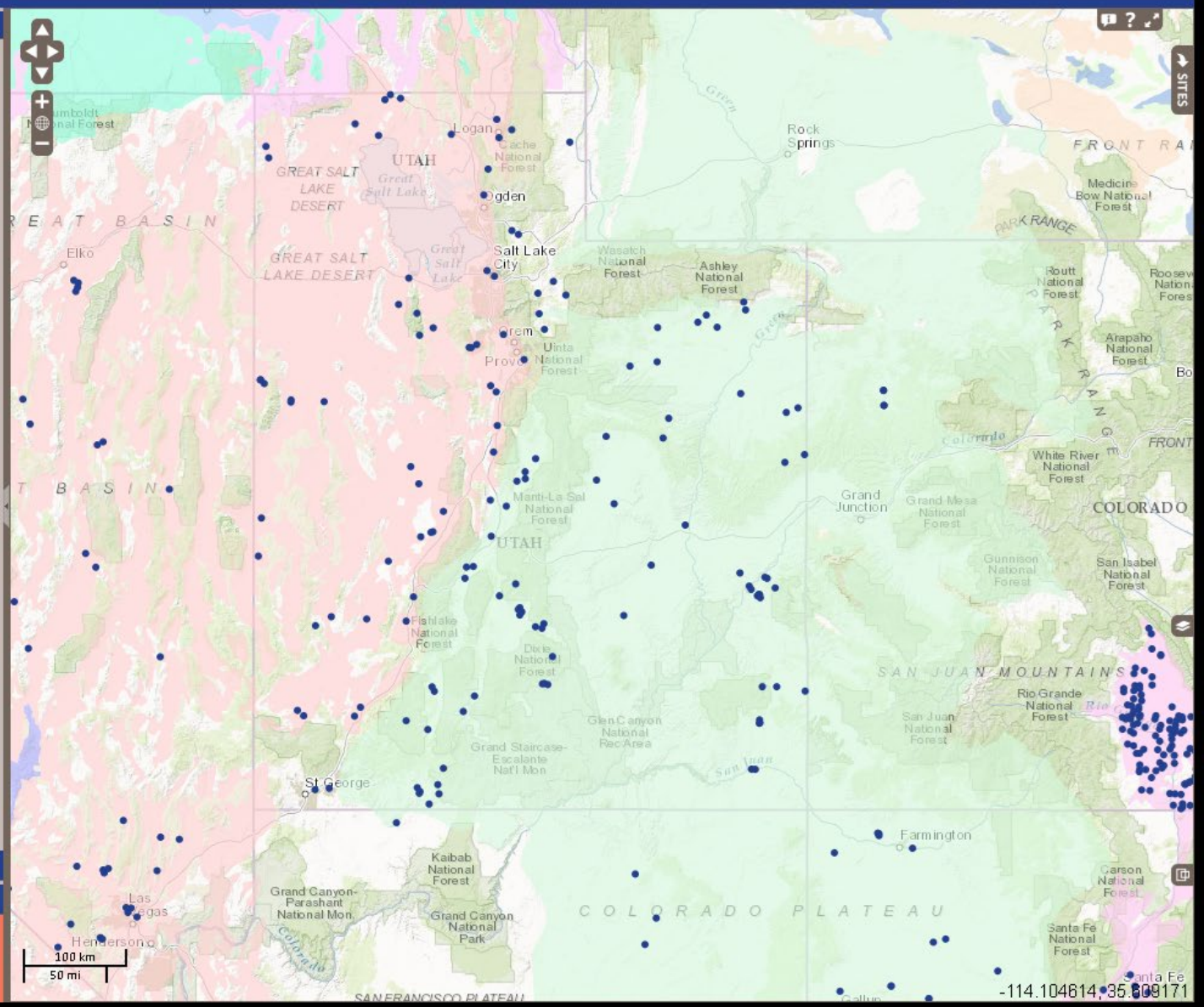
Subnetwork: All
- Background
- Suspected Changes
- Documented Changes

Monitoring Category: All
- Surveillance
- Trend
- Special

FILTER MAP DATA

CURRENT STATUS

318 Sites mapped
4269 Sites matching filter
237 Water-level network wells
108 Water-quality network wells



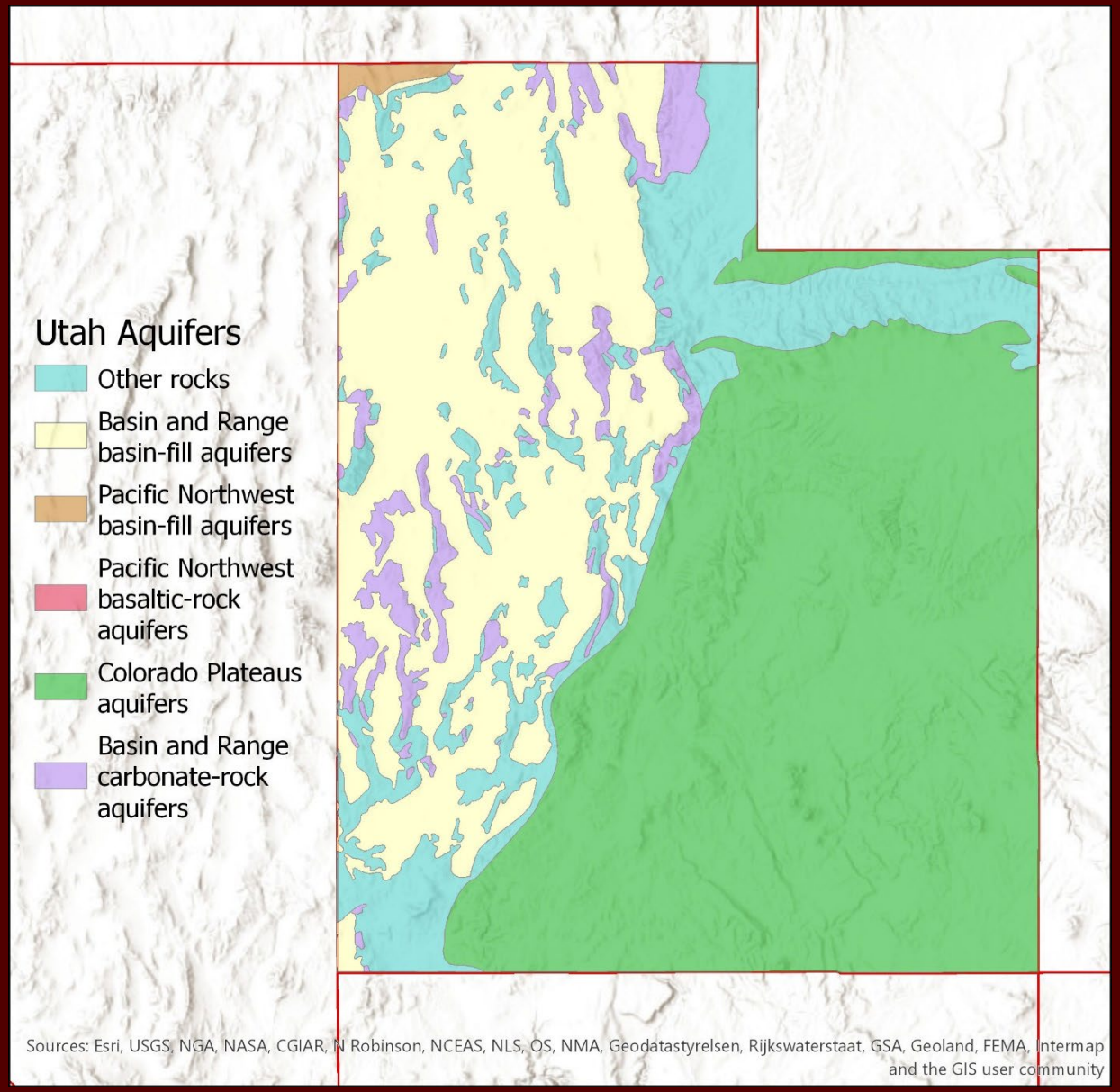
geology.utah.gov

TASKS 2015-2022
triggered by USGS funding

USGS Funds- $159,072 -- agency in-kind $98,351

- QAPP establishment (adopted and modified from previous UGS investigations)
- Added/substitute sites to those collected in 2014
- Develop and maintain database
- Flow of UGS water-quality data and water-level data to NGWMN
- Well maintenance- servicing wells to maintain aquifer connection (Snake, Castle, Uinta Basin)
- Next round of funding to install transducers

USGS Principal Aquifers in Utah



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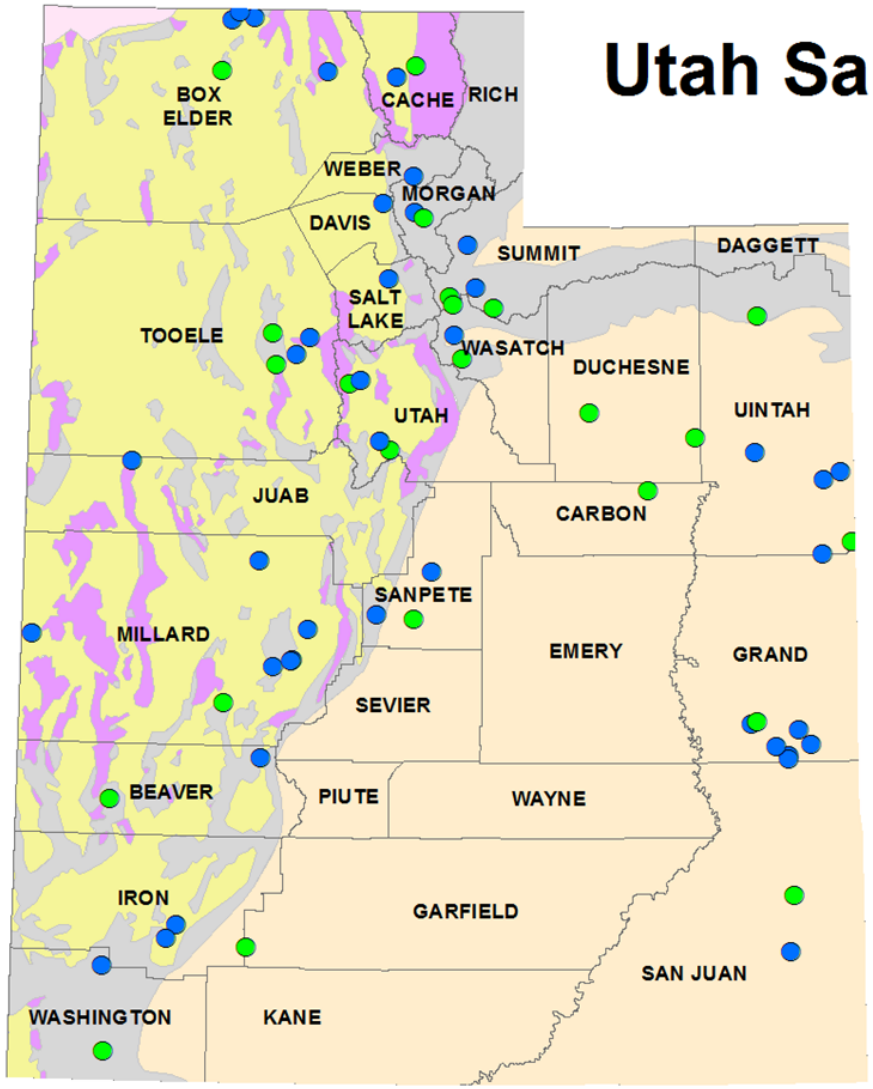
Utah Sample Sites NGWMN 2014



- Spring (23)
- Well (40)

NAWQA Aquifer

- Colorado Plateaus aquifers
- Basin and Range basin-fill aquifers
- Basin and Range carbonate-rock aquifers
- Other rocks
- Pacific Northwest basin-fill aquifers

Site Statistics - 2014

- 40 wells
- 23 springs
- 2 Carbonate Aquifer
- 23 Basin and Range
- 21 Colorado Plateau
- 17 transition zone and other

BACKGROUND

- Samplers and data collectors: 7 geologists from UGS Groundwater Group
- Data portal: 3 staff from Groundwater Group and 1 IT specialist
- Site selection –
  - previous studies and 3 areas regularly monitored wells (Snake Valley and Castle Valley; Uinta Basin);
  - ease of access (continuous)
  - areas of high-water use; pending development
  - additional sites selected to fill in gaps in Utah aquifers geographically, most sites include previously sampled wells from prior research
- Financial support of lab analysis by U.S. EPA

Selection Criteria

- USGS Principal Aquifers
  - Basin & Range Carbonate, Basin Fill, Colorado Plateau, Middle Rocky Mountains, and local aquifers
  - Wells and Springs
- Well Density (following framework document)
- Geographic Spread
- Aquifer Importance

Colorado Plateau

Middle Rocky Mountain (Other-alluvial aquifers)

Basin and Range

BLM well

Goshen Valley along Wasatch Front

UGS network and goals

- Consists of ~100 sites of wells and springs
- Samples are collected April through October for chemistry analyzed by EPA Region 8 Lab varies each year: anions, cations, ammonia (currently only nitrate)
- Some sites have stable isotope data
- Maintain a trend network for the lifetime of the Portal, filling in gaps if/where a site is no longer viable for sampling
- Sample key sites having long-term water quality issues (e.g., high As or NO_3)
- Missing data elements: paper well logs and historic water level data
- Installation of new transducers to add water level data to the NGWMN Portal

Private ranch well with high arsenic

Castle Valley

USES of Portal data

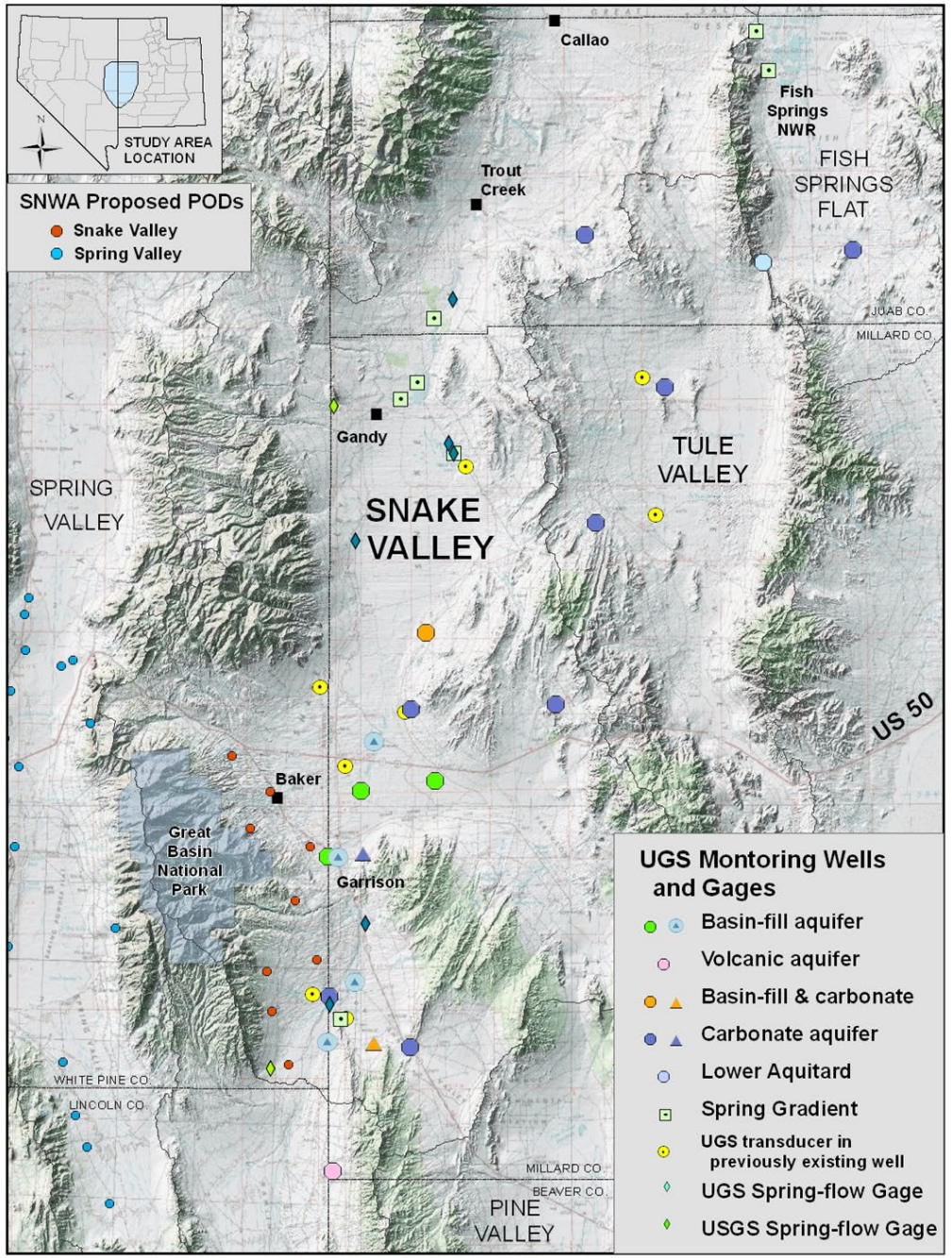
- How UGS uses data from our network:
  - establishes baseline for future studies
  - used to advise regulatory sister agencies

- How UGS has used chemistry data to help management questions:
  - septic tank density maps
  - groundwater quality classification maps

    https://apps.geology.utah.gov/gwdp/

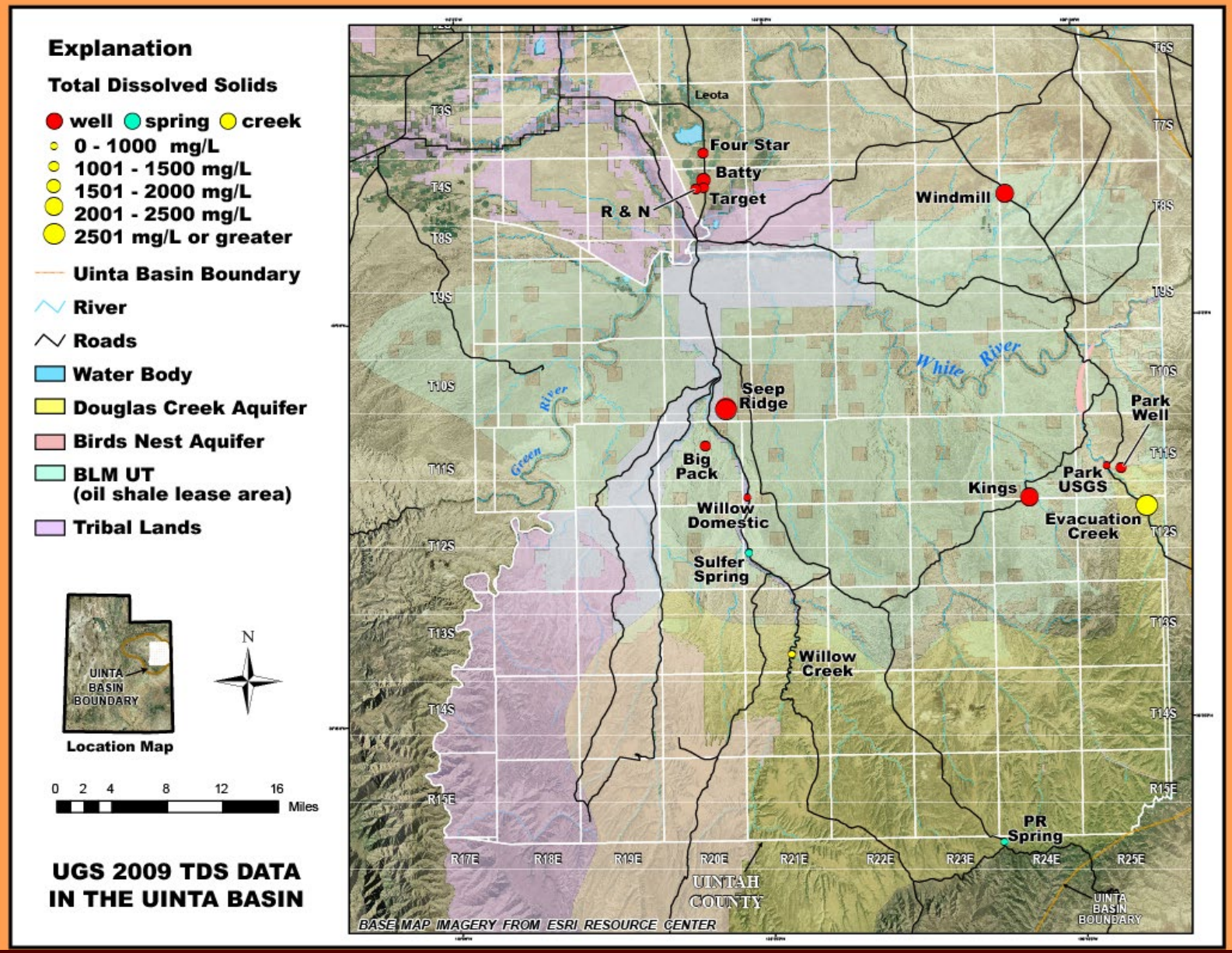
Snake Valley

66 piezometers~hourly recording
6 springs with gages



Castle Valley Monitoring Sites

6 wells for water quality



Sample sites for data collected during spring of 2009

USGS Monitor well 1970s-Uinta Basin

Sampling a Uinta Basin well 2021. Note oil wells and wild horses on the mesa.

SITE STATISTICS- 2021

- 60 wells
- 40 springs
- 2 Carbonate aquifer
- 43 Basin and Range
- 39 Colorado Plateau
- 16 transition zone and other

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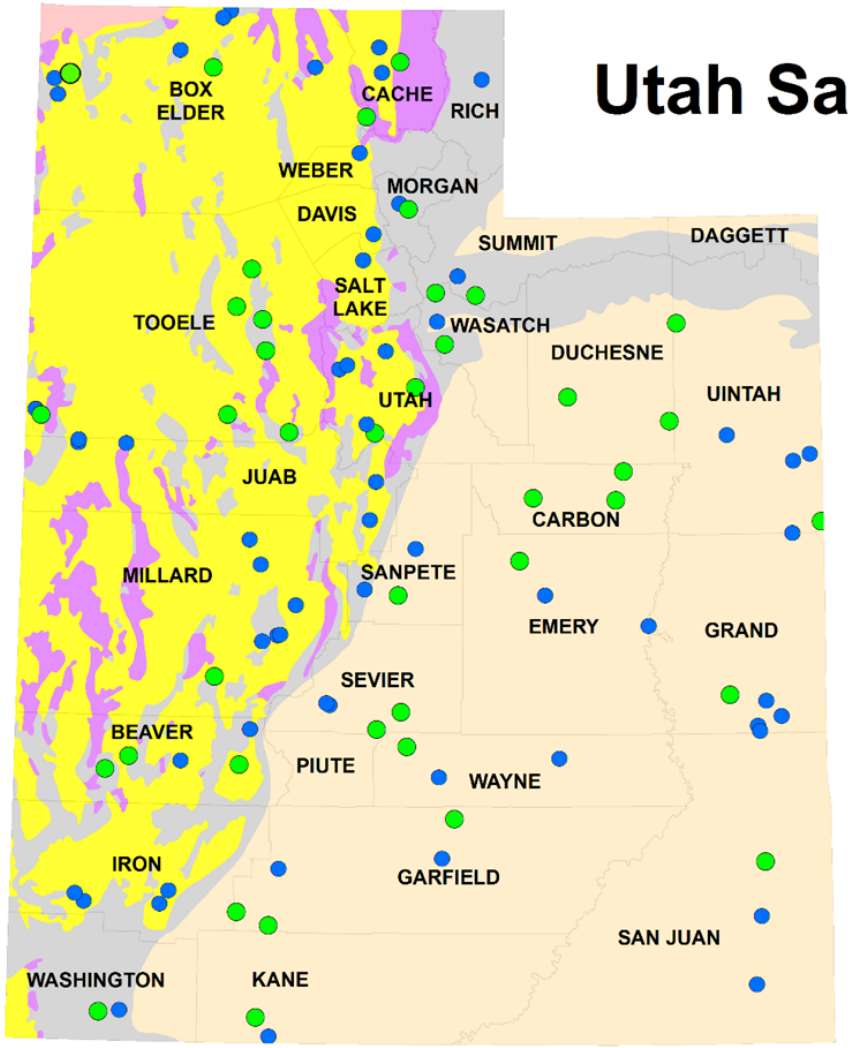
Utah Sample Sites NGWMN 2017



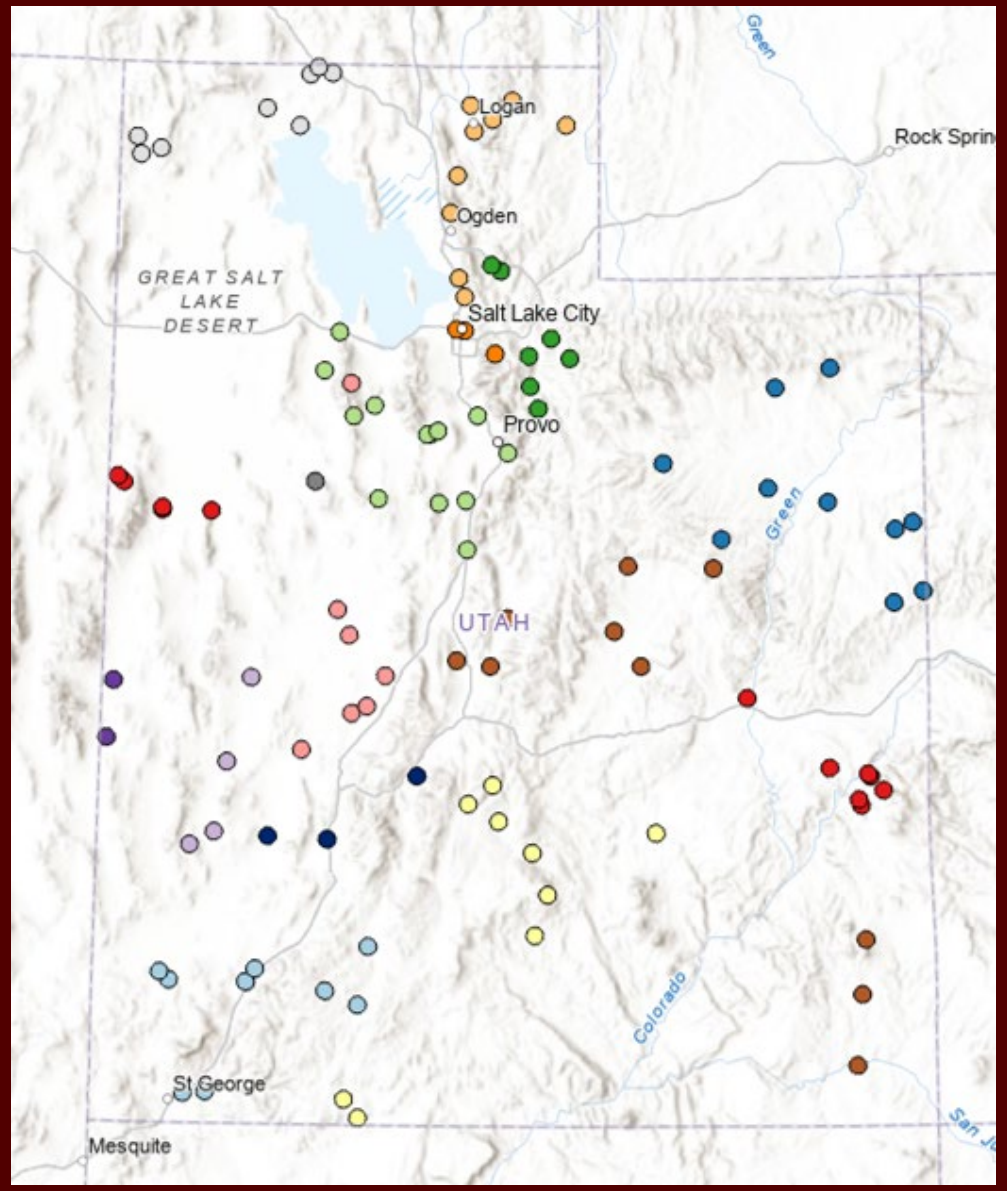
- Spring (40)
- Well (60)

NAWQA Aquifer

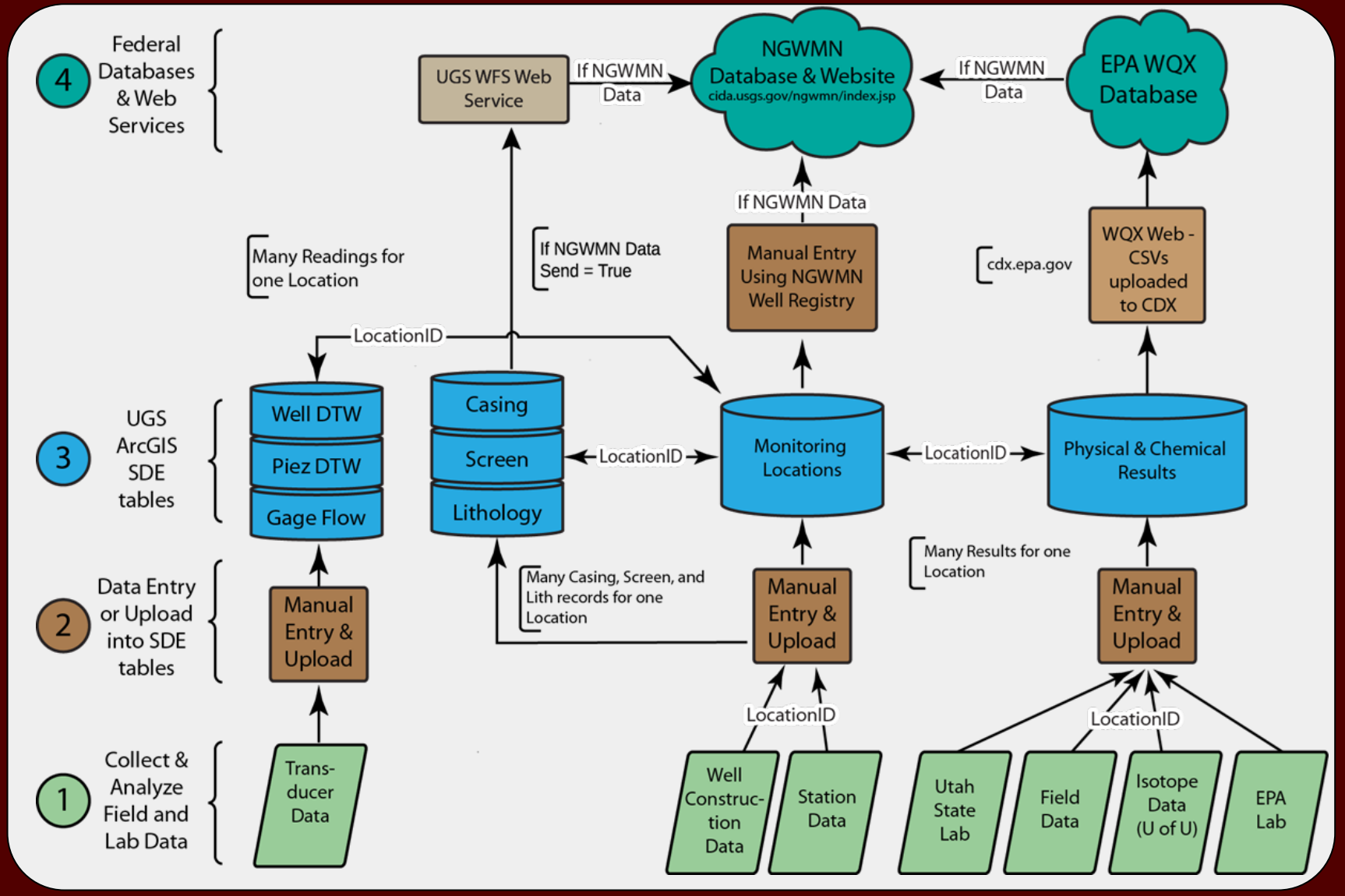
- Colorado Plateaus aquifers
- Basin and Range basin-fill aquifers
- Basin and Range carbonate-rock aquifers
- Other aquifers
- Pacific Northwest basin-fill aquifers

ArcGIS Data Management

- ArcGIS Online Map
- colored by sample run
- one to three hydrogeologists out per month
- April to October



Data Flow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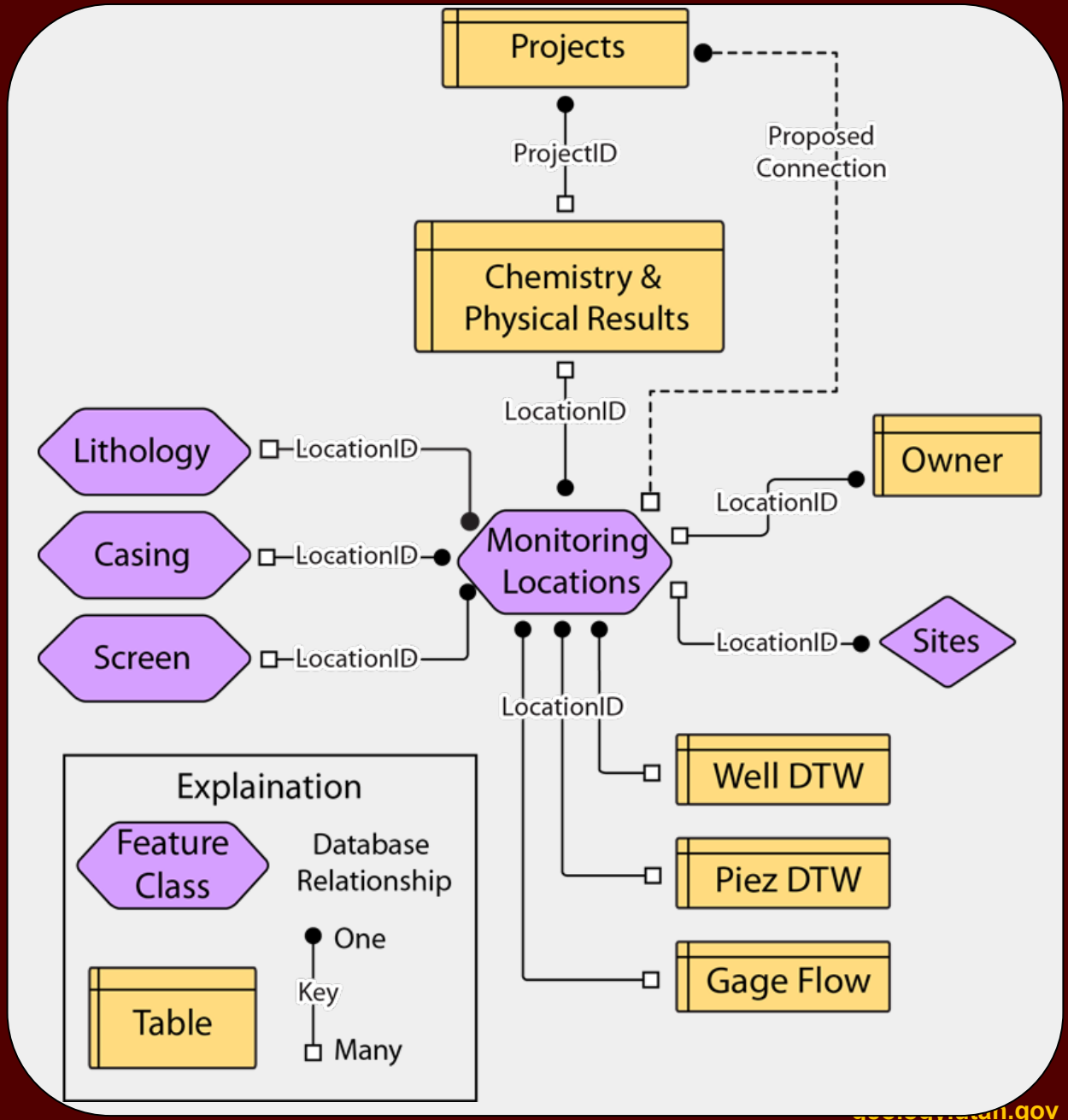
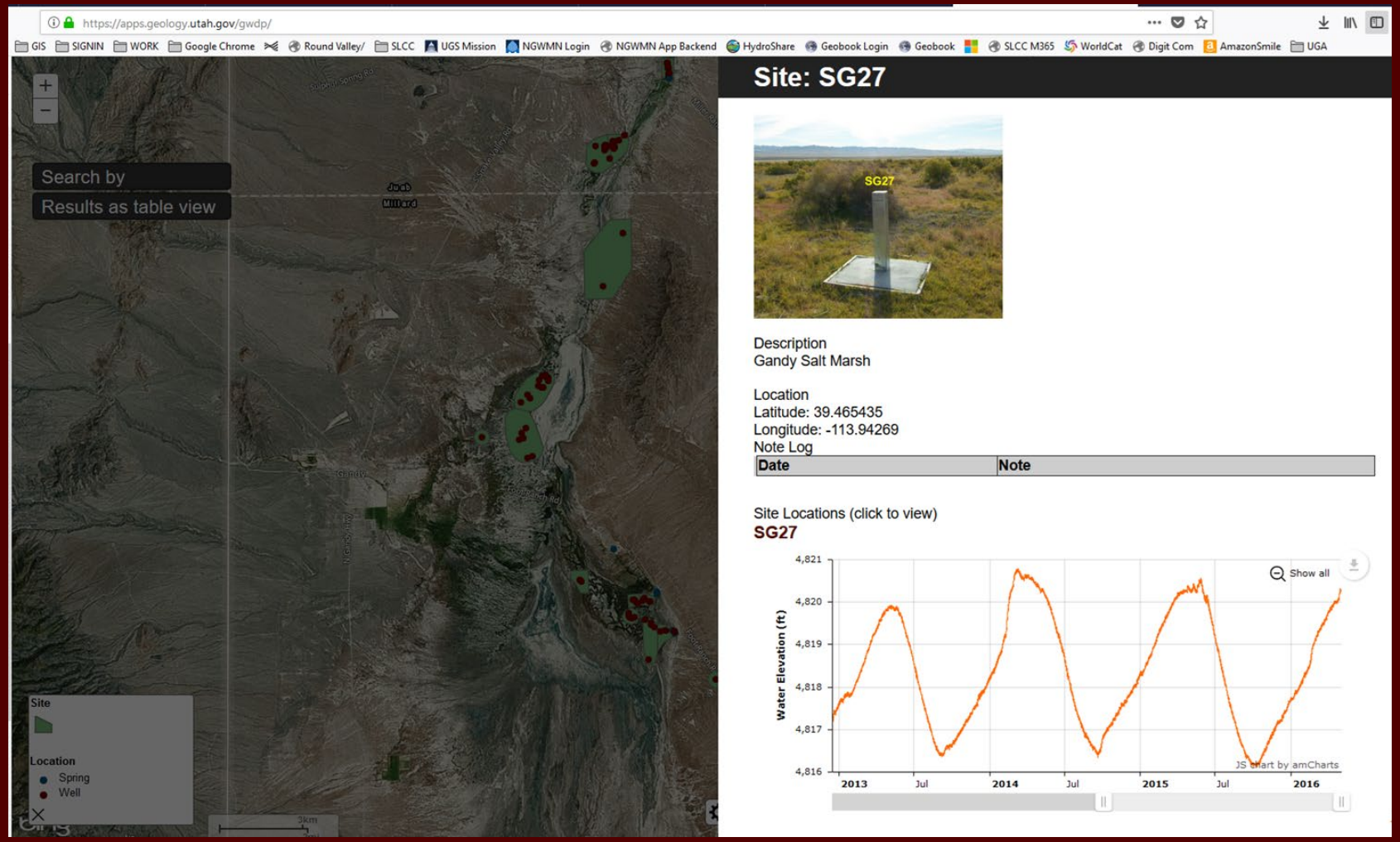
Federal Databases & Web Services
UGS WFS Web Service
If NGWMN Data
NGWMN Database & Website
cida.usgs.gov/ngwmn/index.jsp
If NGWMN Data
EPA WQX Database
If NGWMN Data
Manual Entry Using NGWMN Well Registry
Many Readings for one Location
If NGWMN Data Send = True
cdx.epa.gov
WQX Web - CSVs uploaded to CDX
LocationID
3
UGS ArcGIS SDE tables
Well DTW
Piez DTW
Gage Flow
Casing
Screen
Lithology
LocationID
Monitoring Locations
LocationID
Physical & Chemical Results
Many Casing, Screen, and Lith records for one Location
Many Results for one Location
2
Data Entry or Upload into SDE tables
Manual Entry & Upload
Manual Entry & Upload
Manual Entry & Upload
LocationID
LocationID
1
Collect & Analyze Field and Lab Data
Trans-ducer Data
Well Construc-tion Data
Station Data
Utah State Lab
Field Data
Isotope Data (U of U)
EPA Lab

Database Layout



Water Level Data Portal



https://apps.geology.utah.gov/gwdp/

https://services.arcgis.com/ZzrwjTRez6FJiOq4/arcgis/rest/services/GWDP/FeatureServer

http://arcg.is/2BLwtT0

ArcGIS Data Management

Benefits of Using ArcGIS SDE geodatabase tables

- Many data collectors familiar with this interface
- Easy to view and edit
- Allows for connection to ArcGIS Online
- Can use Collector App to collect field data
- Relatively Easy to create web services
- Built-in security

Drawbacks

- Query process can be slow if database is large
- Standard complex SQL queries not easy
- Data hosting can be expensive in the current setting
- The software is proprietary and expensive
- Unable to deal with complex symbols and geography

Benefits of the NGWMN

- Improved data management
- Impetus to organize all UGS data
- Cause us to evaluate our field practices
- UGS Data Flowing to the EPA WQX
- Utah Network reorganized
- Recognition from other Utah agencies
- Special bonus for UGS geologists to spend time in different geologic areas in Utah!

QUESTIONS?

Crimson Spring
Logan Canyon
Bear River Range
Cache County Utah