UTAH DNR GEOLOGICAL SURVEY

Utah's National Ground-Water Monitoring Network Effort

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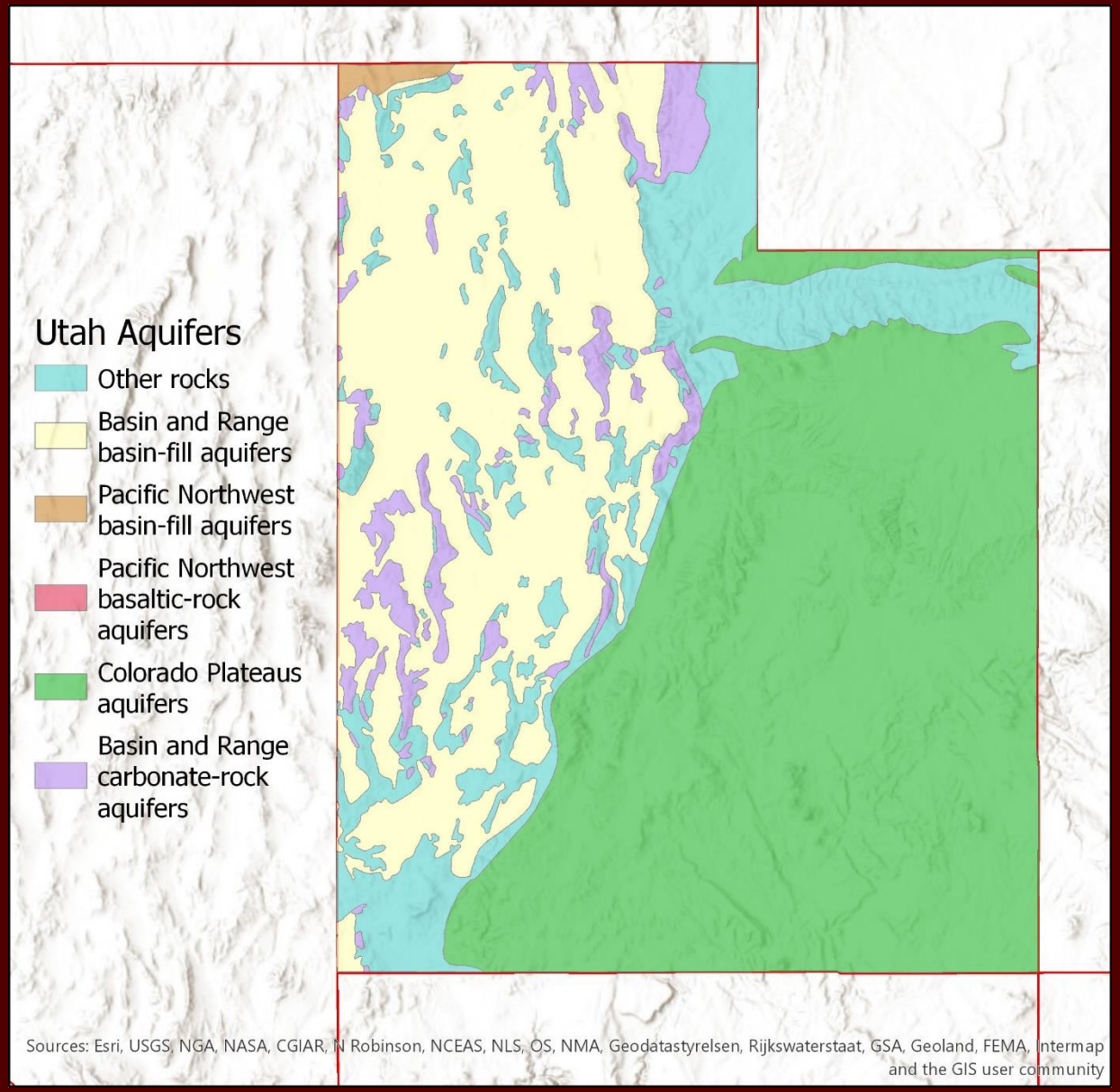
UGS contribution to USGS NGWMN data provider since 2014

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- 2014 UGS supported by EPA lab services as unique WQ provider; by 2015 funds open to all states overseen by NGWMN Board

USGS Principal Aquifers in Utah



Selection Criteria

- USGS Principal Aquifers
  - Basin & Range Carbonate, Basin Fill, Colorado Plateau, Middle Rocky Mountains, and local aquifers
  - Wells and Springs-UGS 1st data provider to add spring data
- Well Density (following framework document)
- Geographic Spread
- Aquifer Importance

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);
  - additional sites selected to fill in gaps in Utah aquifers geographically, most sites include previously sampled wells from prior research
  - ease of access (continuous)
  - areas of high-water use; pending development
- Financial support of lab analysis by U.S. EPA: 2014-19 cations/anions/ nutrients/metals (~$11k/yr); NO COVID; 2021-22 Nitrate ($1k/yr)

UGS NETWORK AND GOALS

- ~100 wells and springs
- Samples are collected April through October
- Chemistry analyzed by EPA Region 8 Lab
- Anions, cations, nutrients, metals (currently only nitrate)
- Maintain a trend network for the lifetime of the Portal
- Sample key sites w/ water quality issues (e.g., high As or NO_3)
- Missing data elements: paper well logs and historic water level data
- Add water level data to the NGWMN Portal

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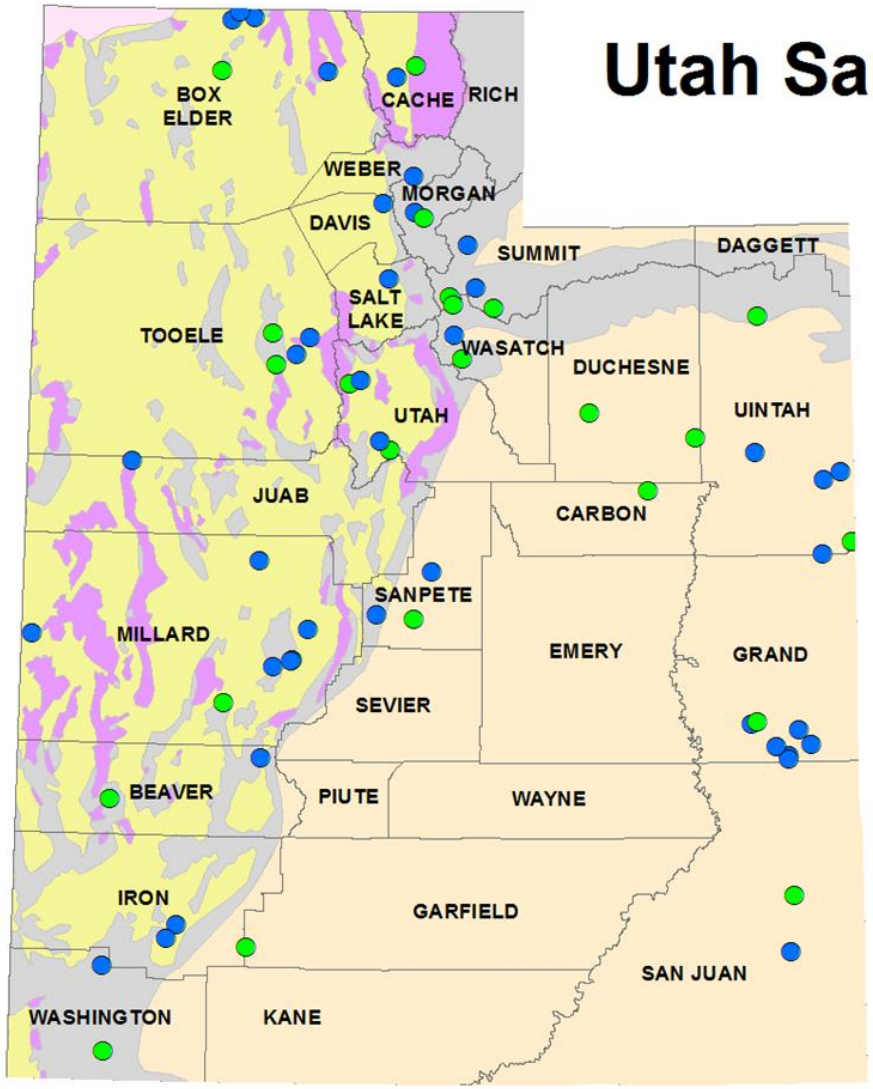
Utah Sample Sites NGWMN 2014



- 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

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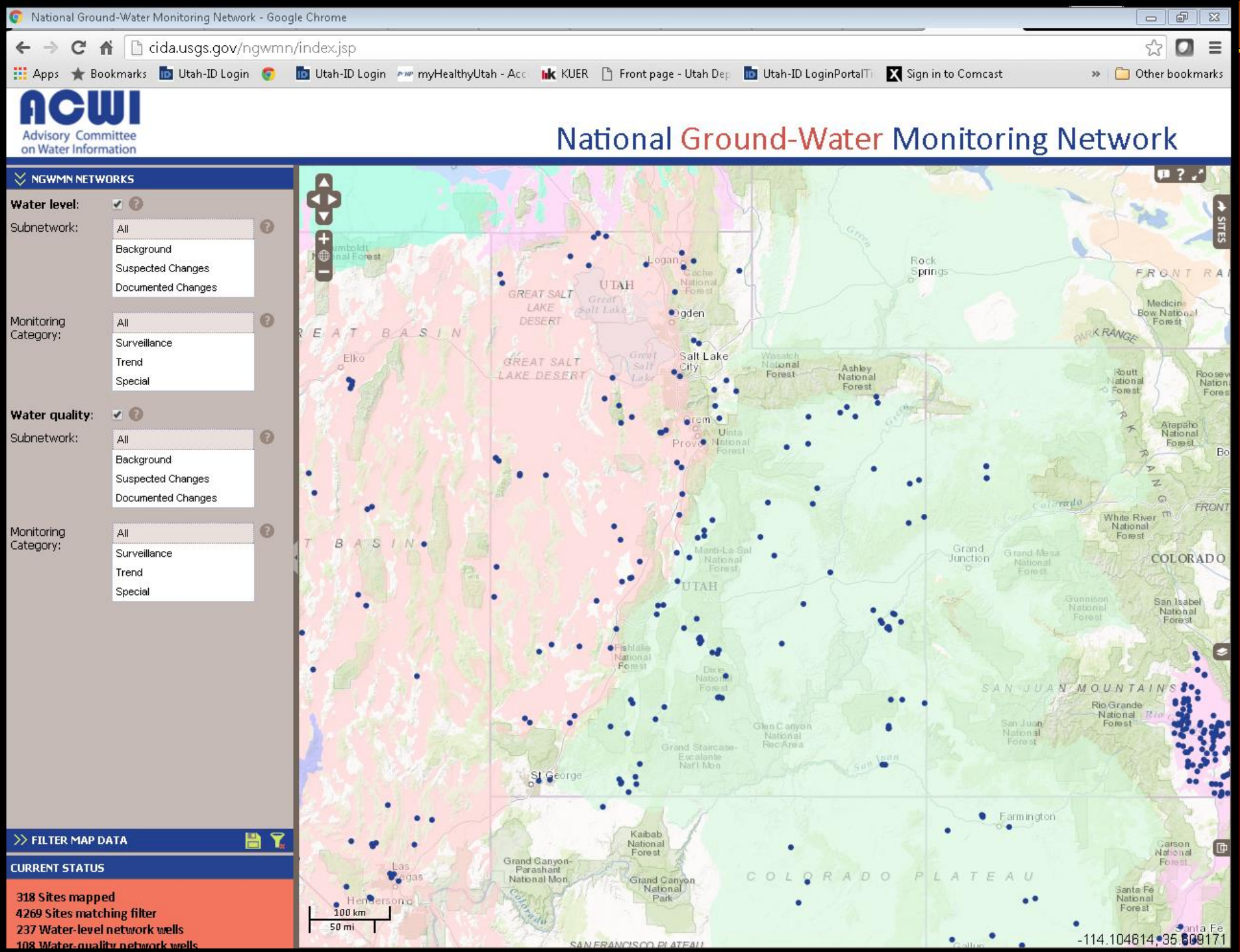
https://cida.usgs.gov/ngwmn/index.jsp

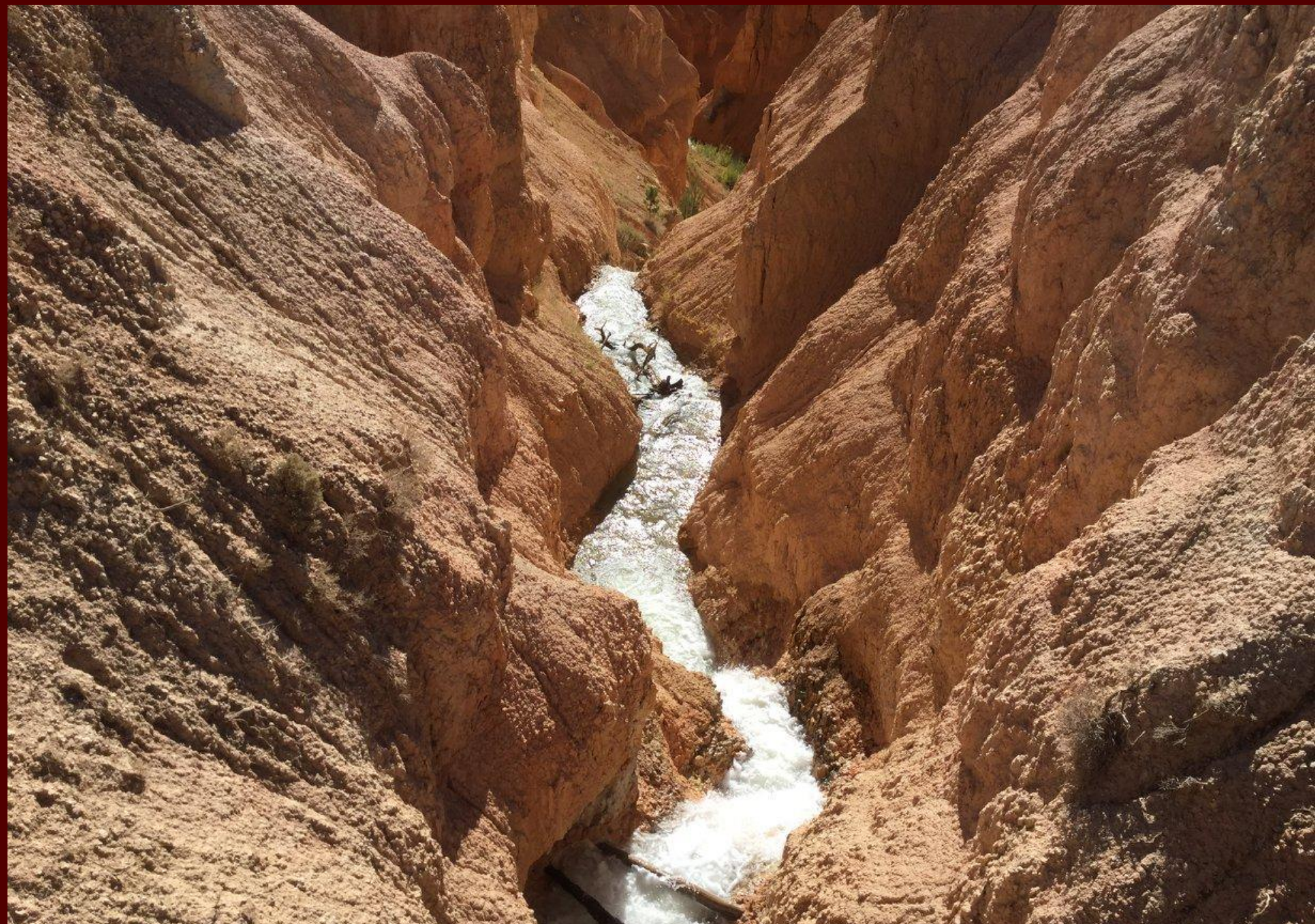


Accomplishments 2014-2022 triggered by USGS funding

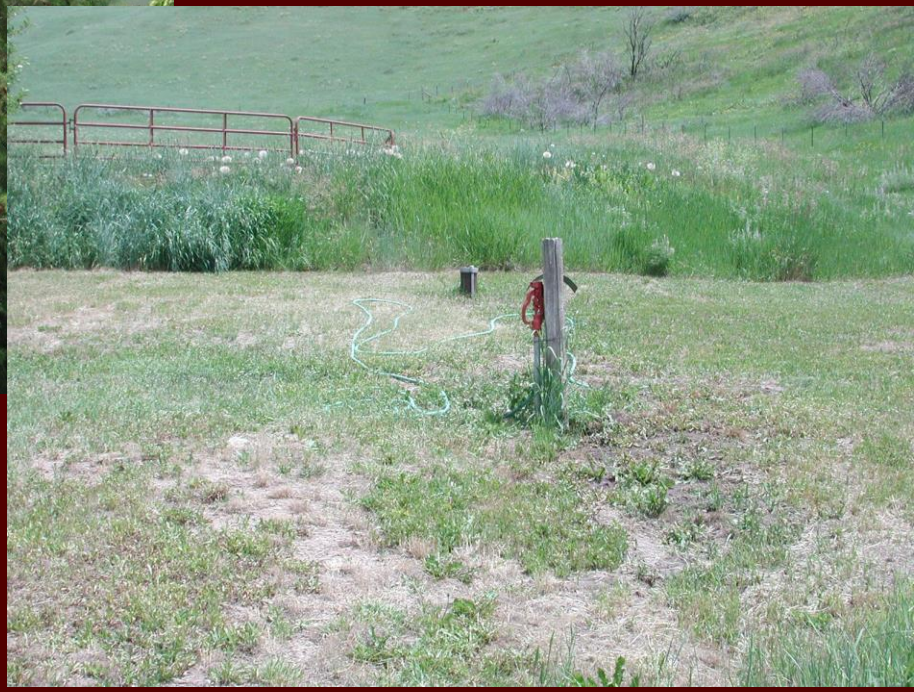
USGS Funds- $159,072 -- agency in-kind $98,351--EPA funds ~$57k (guestimate)

- 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)
- Recent round of funding to install transducers

Colorado Plateau



Middle Rocky Mountain (Other-alluvial aquifers)



Basin and Range

BLM well

Goshen Valley along Wasatch Front

Private ranch well with high arsenic

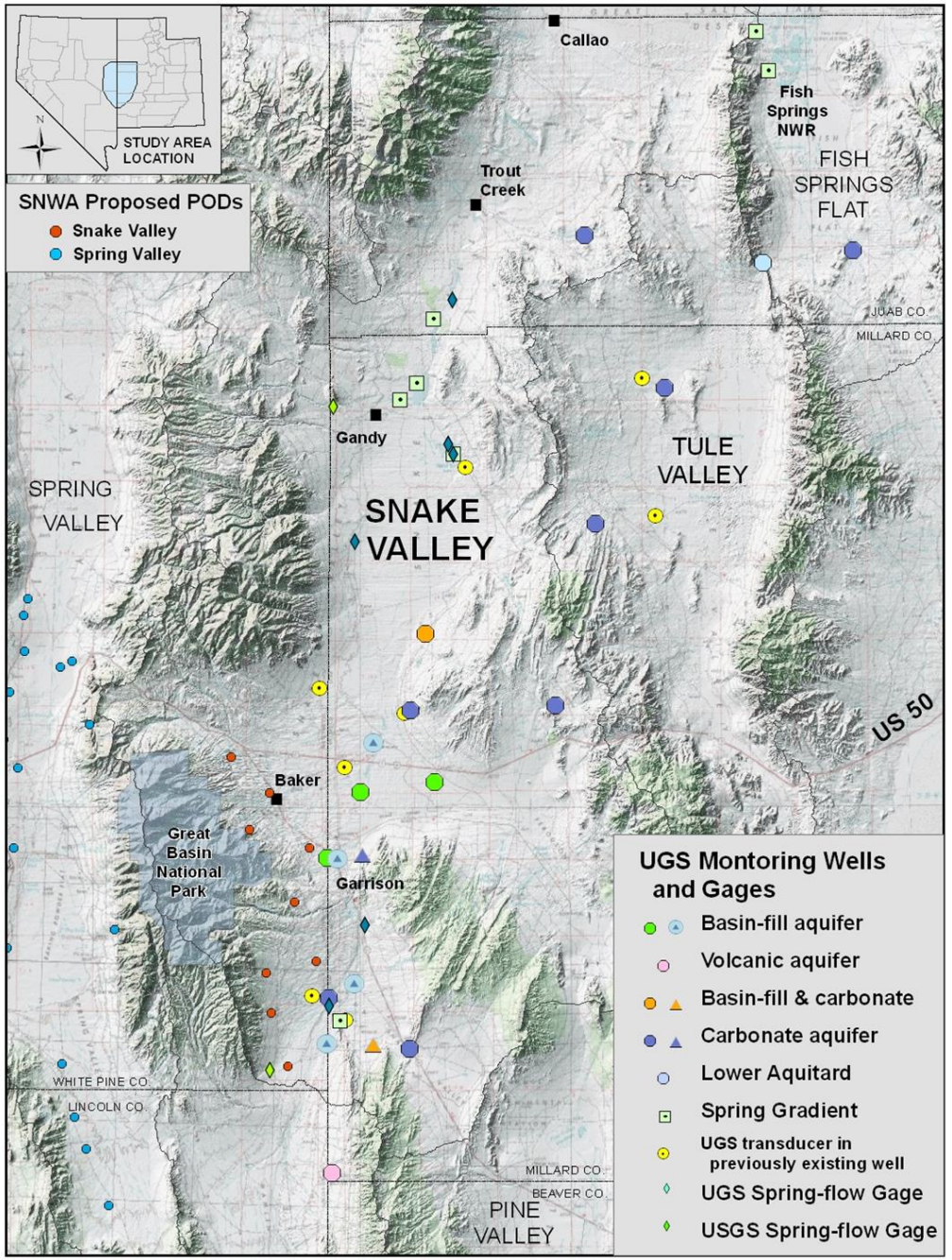
Castle Valley Monitoring Sites

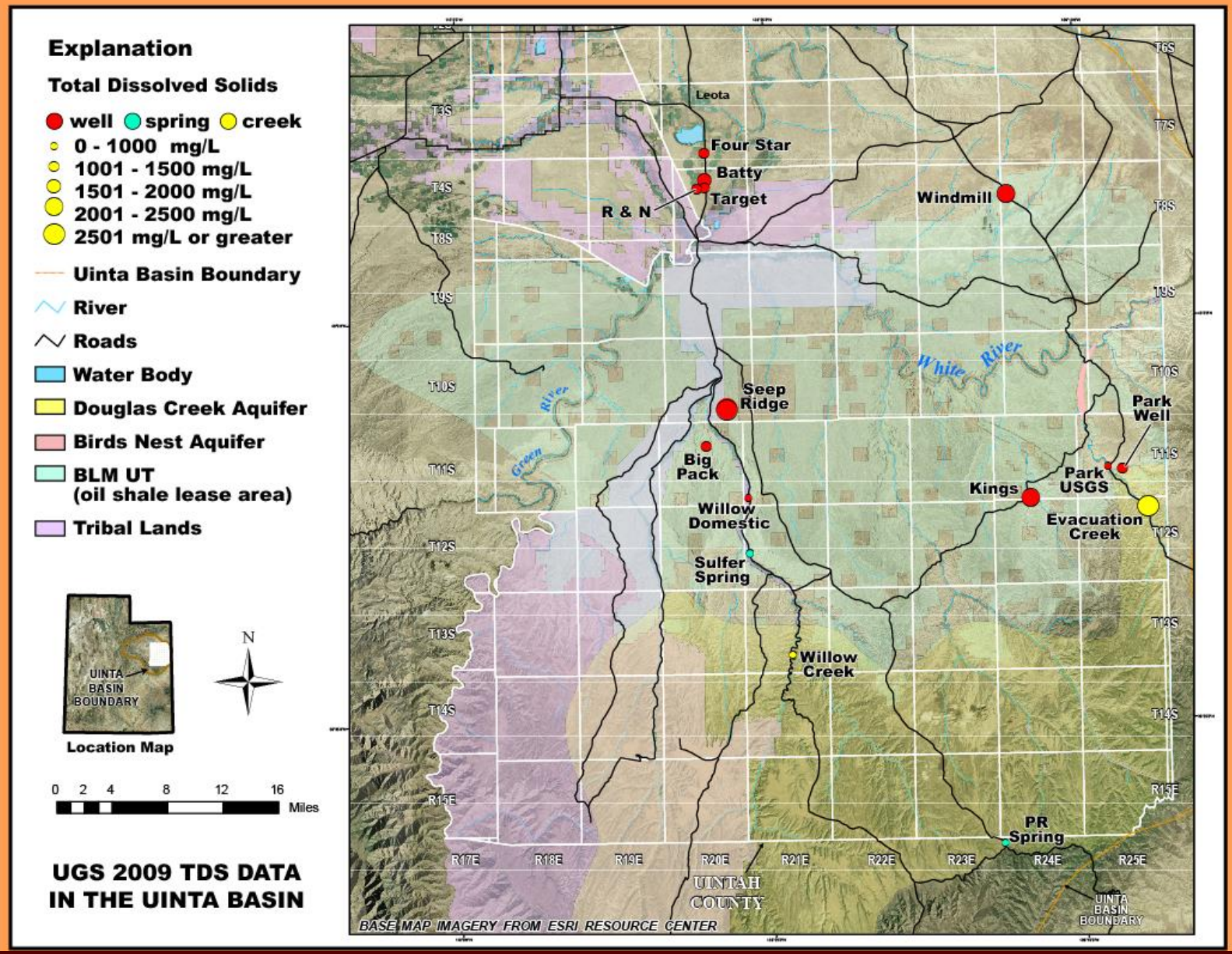
6 wells for water quality
2 for water levels

Castle Valley

Snake Valley

66 piezometers~hourly recording
6 springs with gages





Sample sites for data collected during spring of 2009

USGS Monitor well 1970s-Uinta Basin

SITE STATISTICS- 2022

- 60 wells- water quality
- 40 springs- water quality
- 9 new water level wells
- 2 Carbonate aquifer
- 43 Basin and Range
- 39 Colorado Plateau
- 16 transition zone and other

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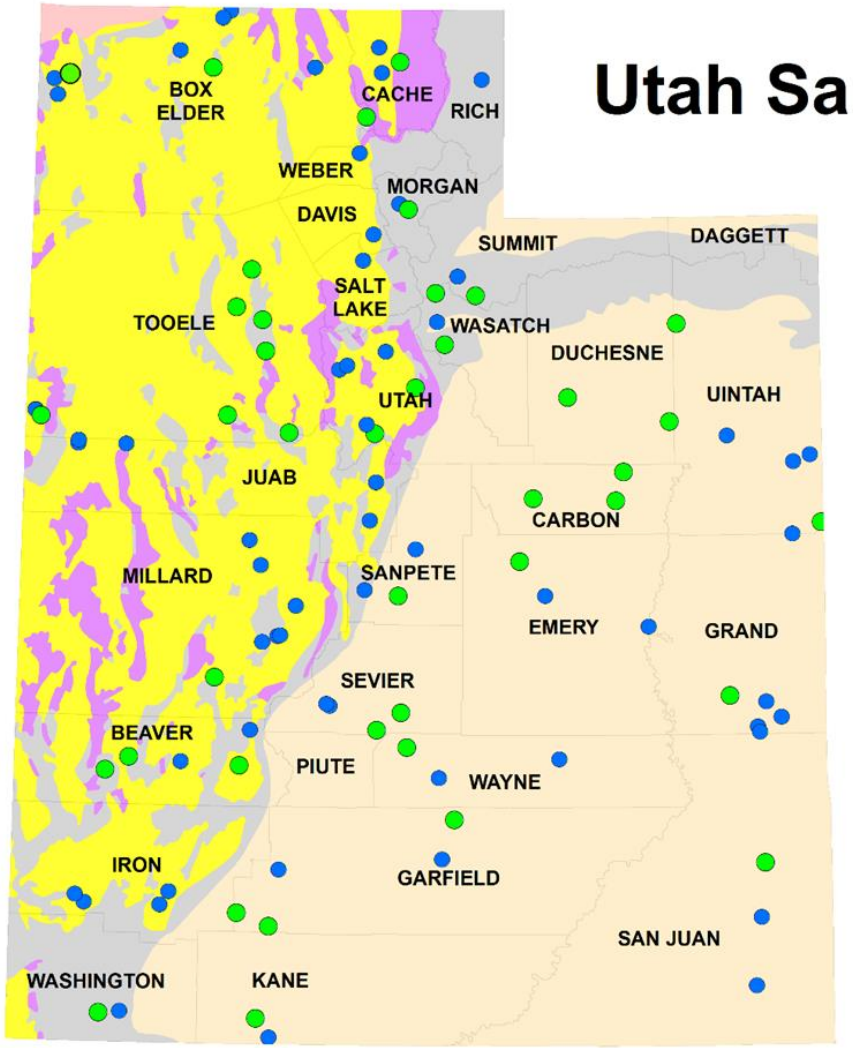
2022
Utah Sample Sites NGWMN



- 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

Data Collection

- ArcGIS Online Map: https://arcg.is/eP4uu
- colored by sample run
- 1-3 people sampling per month
- April - October

NGWMN UGS Sample Sheet

STATION ID: 370209112274701

Person Sampling: _____

Station Name: Marty

ID# on EPA Bottle: _____

Lab(s) used: StateLab UofU BYU Other:_____

Longitude	-112.463193
Latitude	37.035893

Date:	
Time:	

Conductivity		
Temperature		
pH		

Other field parameters		
param	value	unit

Sample Comments

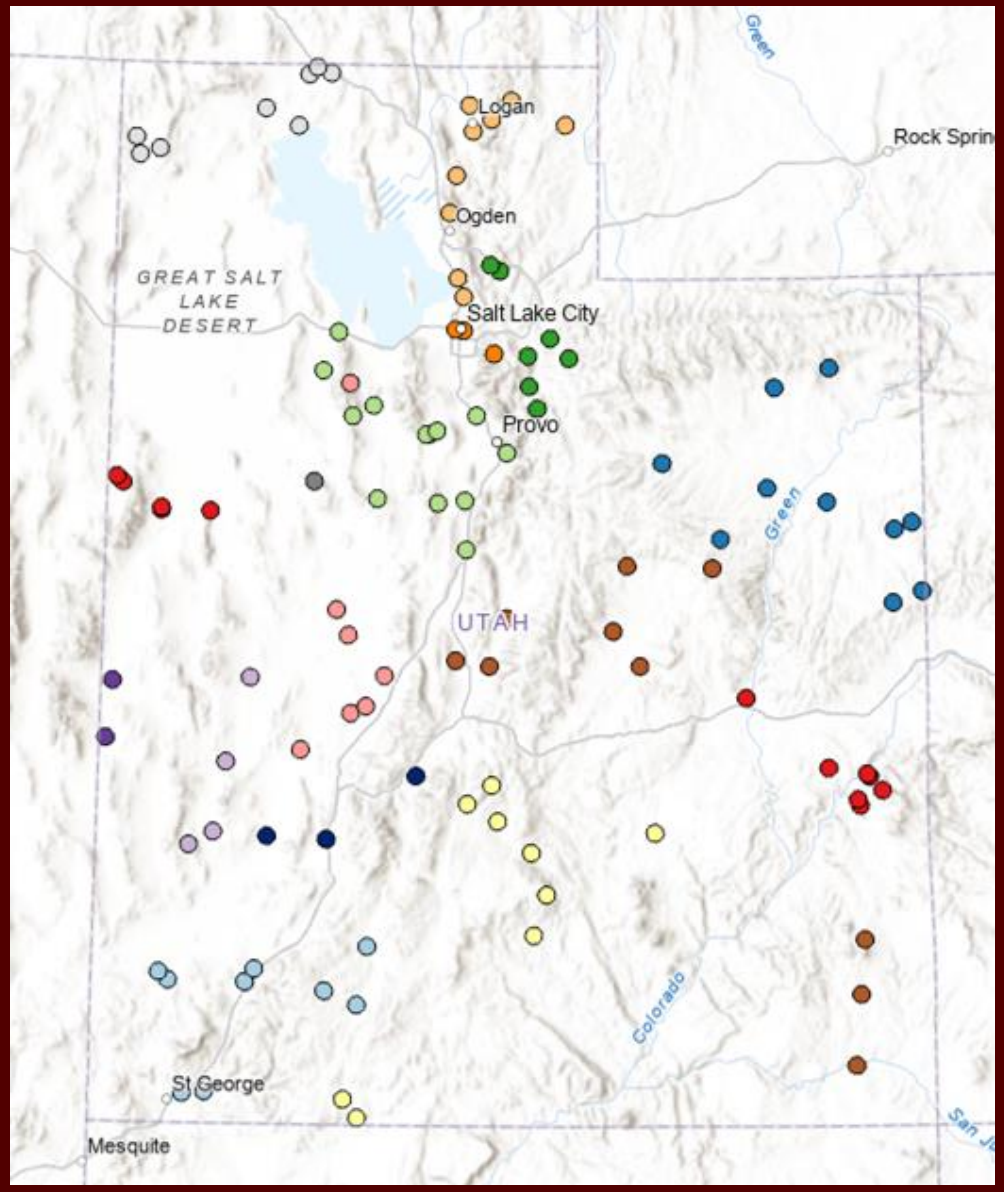
Owner Information	
Name	
Phone	
Address	
email	

Use this Lab Sample ID if not EPA: WL-Marty-2022

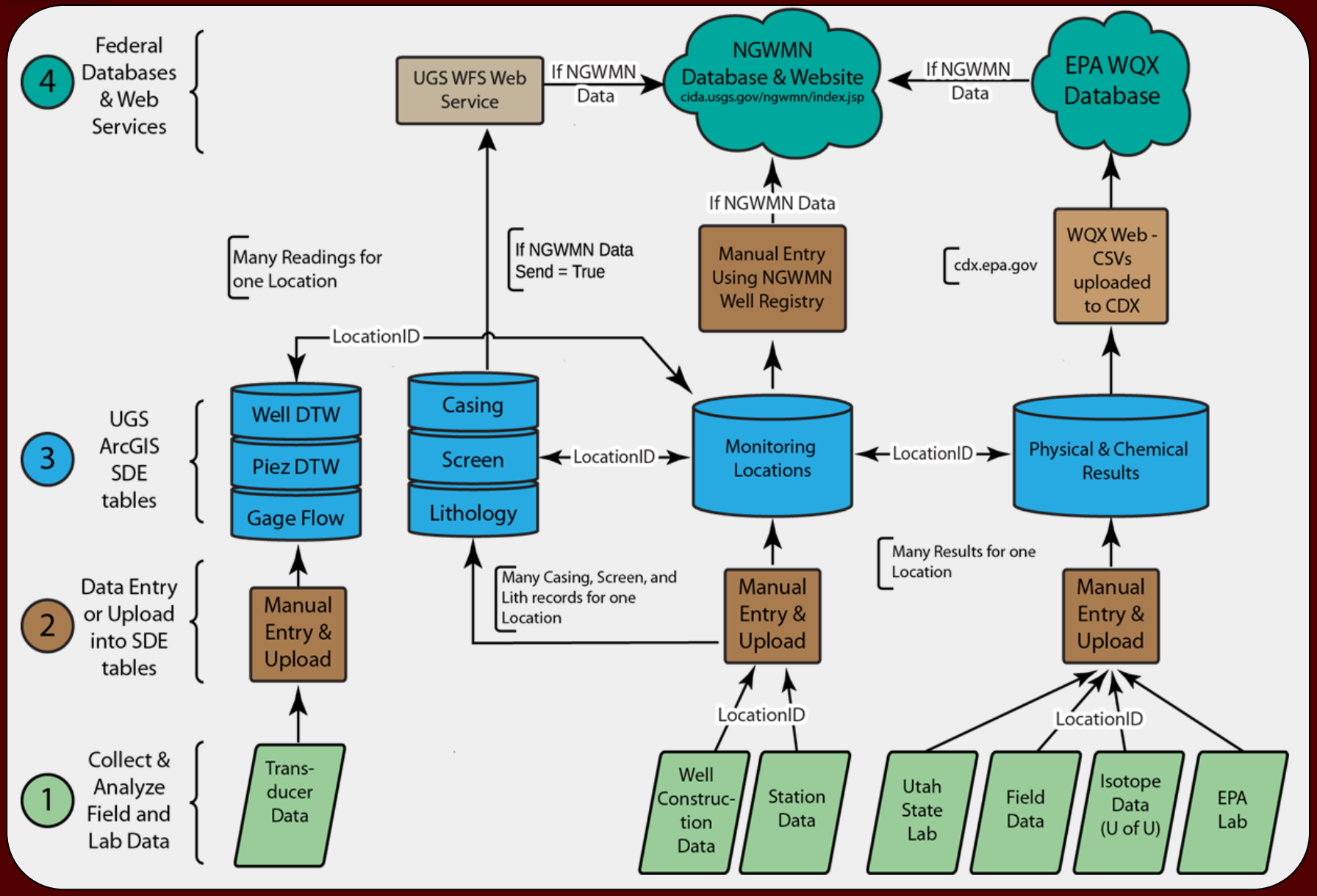
Non-EPA Lab Samples Bottles Collected? Use State Lab Sample ID (above) w/ NGWMN on description

☐ Isotopes ☐ TDS
☐ Nitrate ☐ Other:_____

Site Comments:	Site Sketch



Data Flow

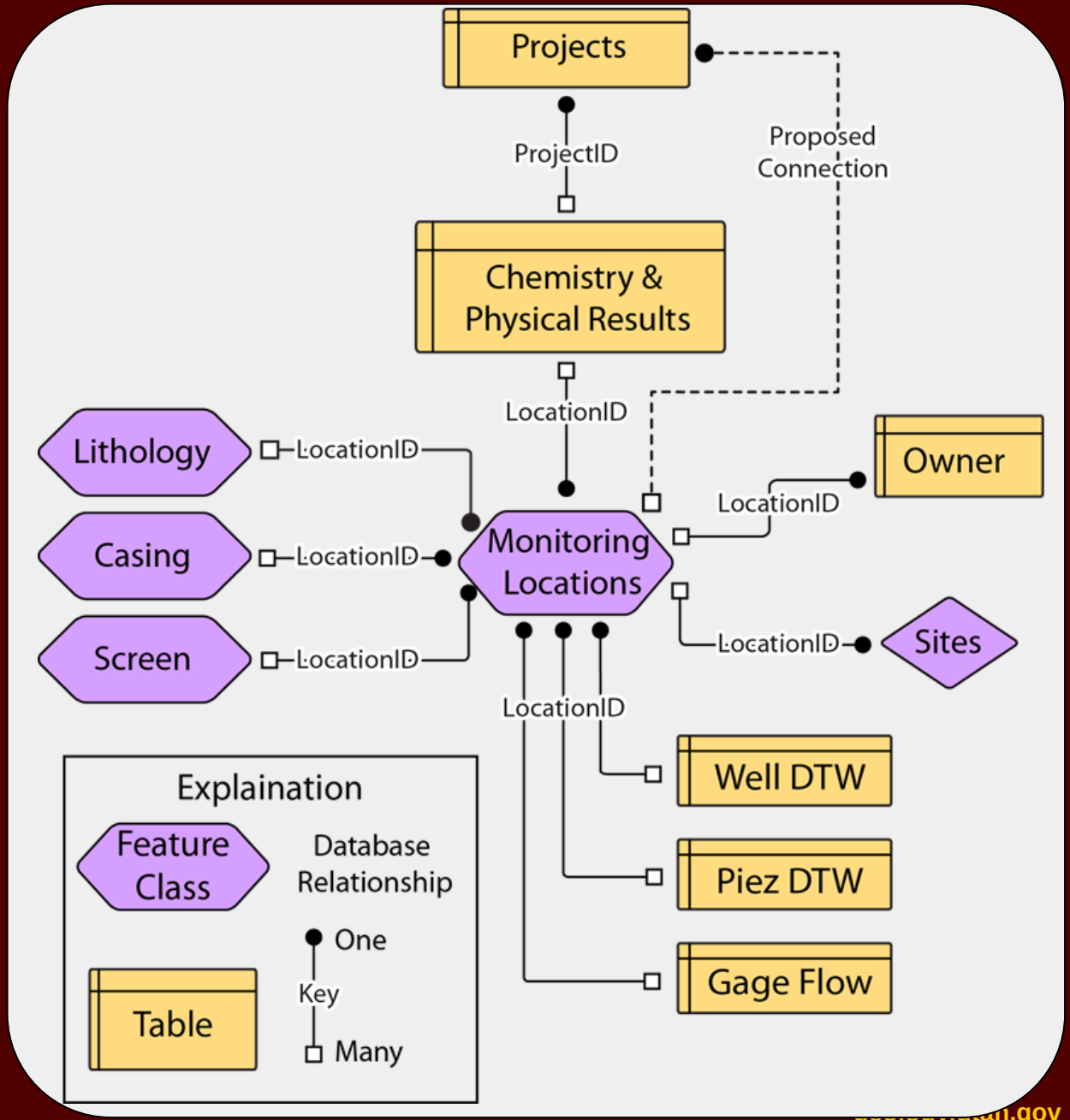


UGS Sites in WQX: https://www.waterqualitydata.us/provider/STORET/UTAHGS/

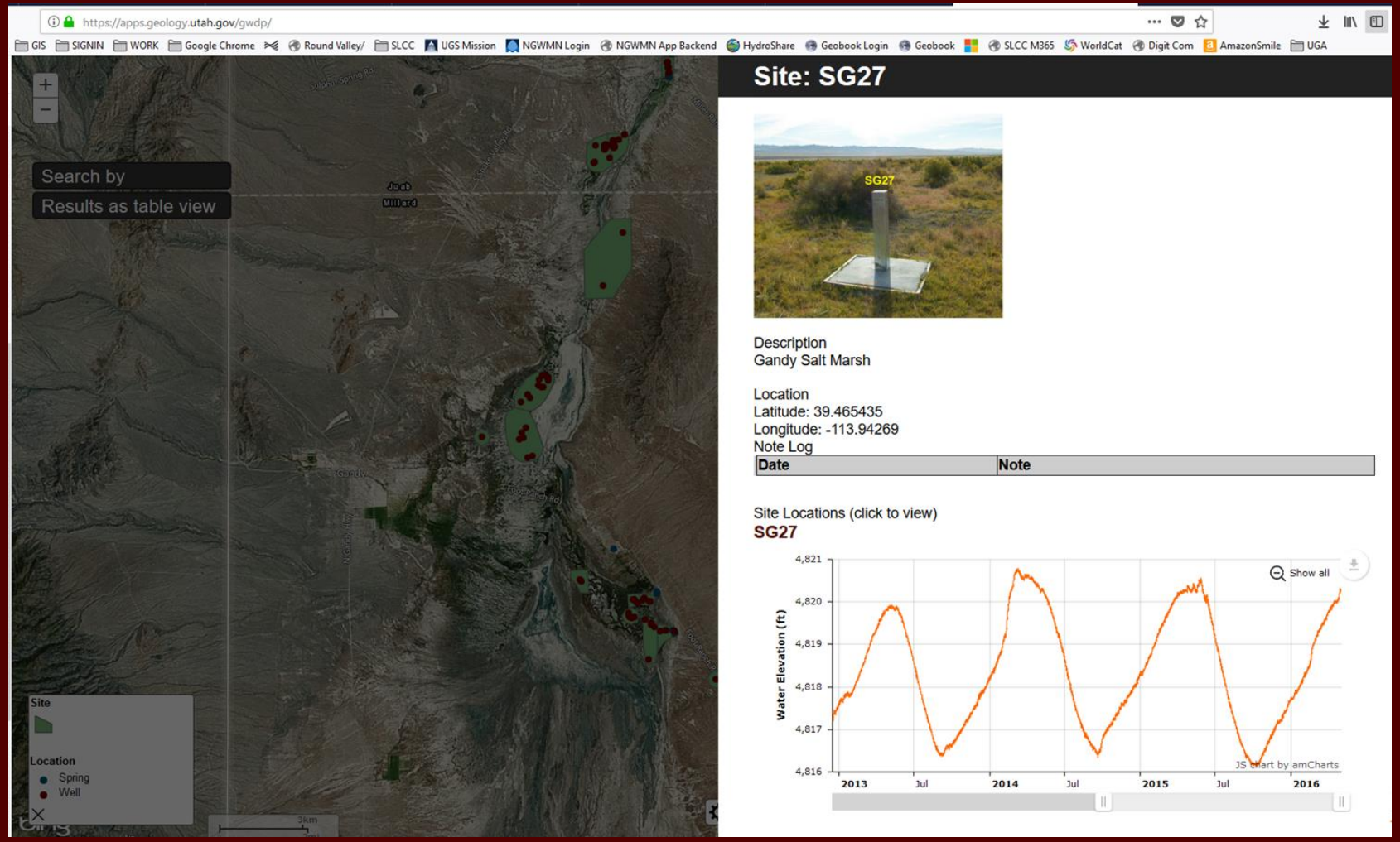
Scripts and notes on data flow: https://github.com/utah-geological-survey/NGWMN

Data Services: https://webmaps.geology.utah.gov/arcgis/rest/services/Groundwater/NGWMN_USGS_V2/MapServer

Database Layout



Water Level Data Portal



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 data to help management questions:
  - septic tank density maps
  - groundwater quality classification maps
  - https://apps.geology.utah.gov/gwdp/

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

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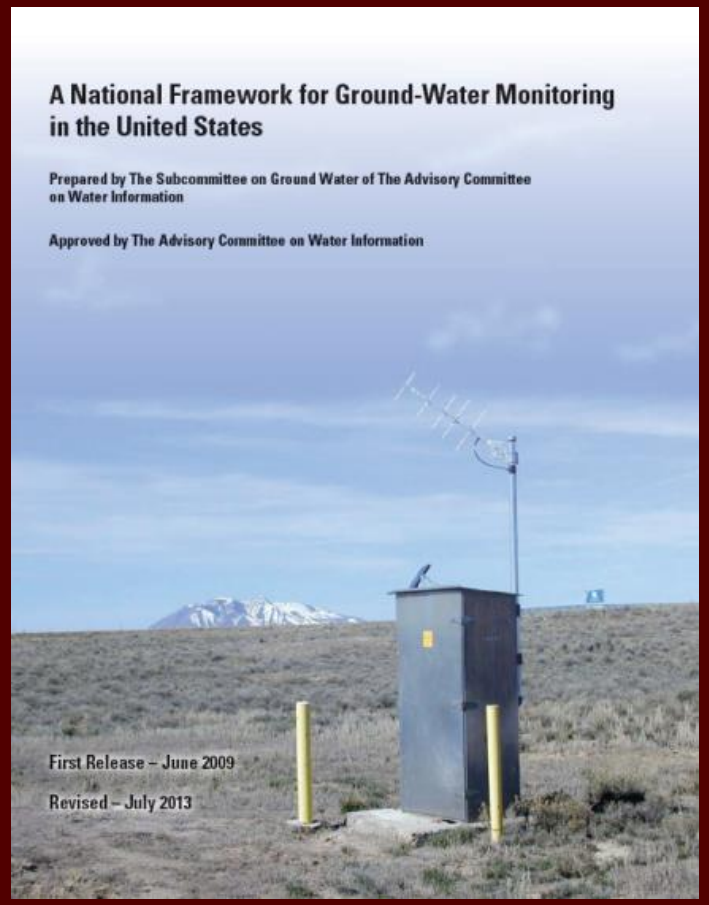
Definition of “Network” aka Portal

- Selected, Key:
  - Monitoring Points
  - Parameters
- NOT a “Repository” (data dump)
- Can Access Repositories:
  - Federal: NWIS, STORET
  - States’ and Other Entities’



ArcGIS Data Management

Using ArcGIS SDE geodatabase tables

Benefits

- Many data collectors familiar
- Easy to view and edit
- Allows for connection to ArcGIS Online
- 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