

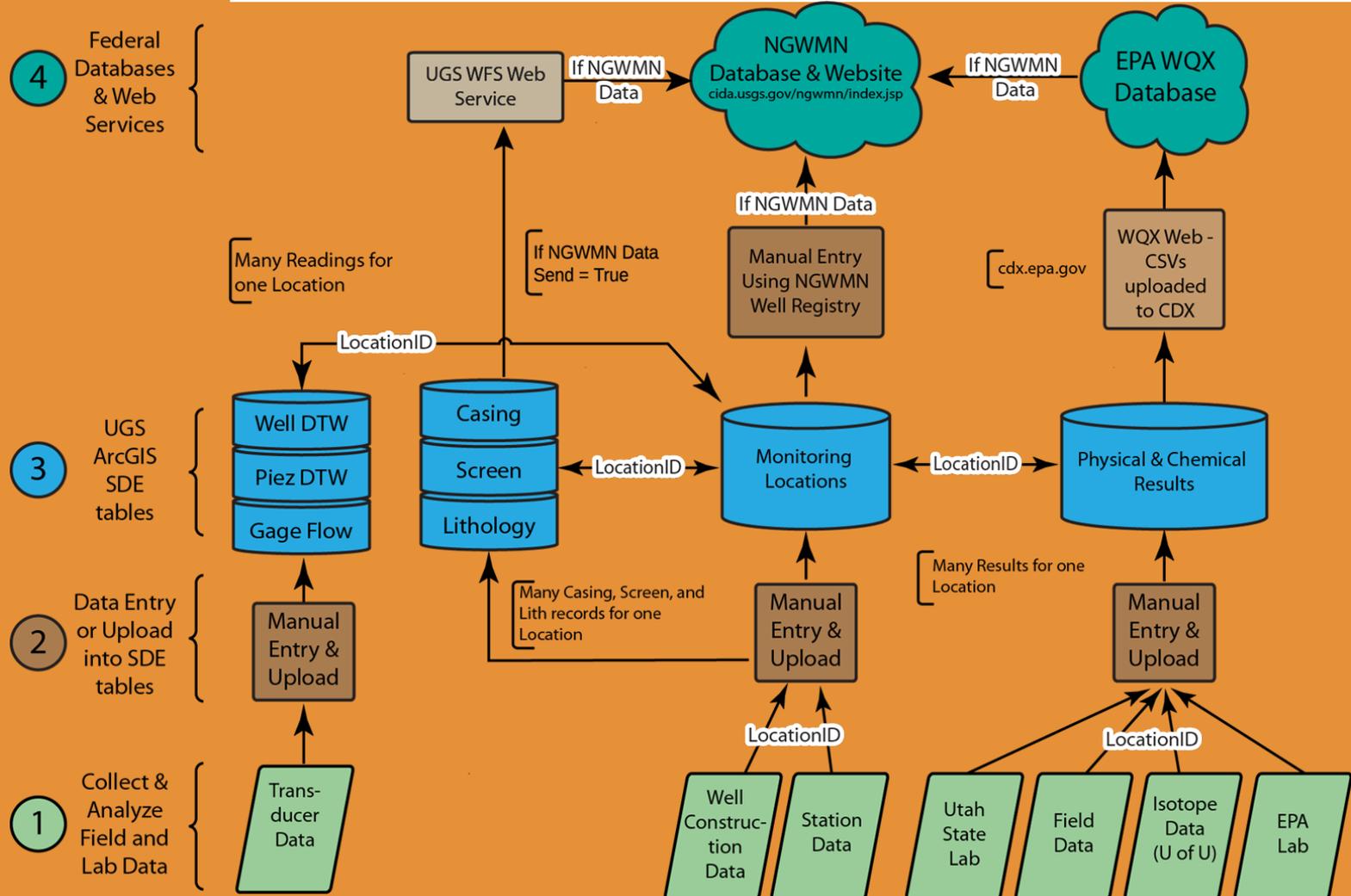
Utah Geological Survey Data Flow to the NGWMN



Paul Inkenbrandt



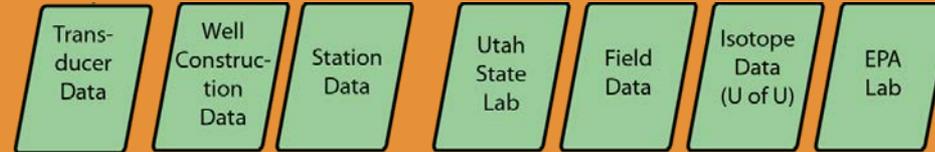
Data Upload Workflow



1

Collect &
Analyze
Field and
Lab Data

Data Upload Workflow - Data Collection



- Most travel expenses covered by UGS General Funds
- Limited general chem. analyses supported by year-to-year EPA funds
- Data from other projects follows some of this workflow
- Multiple Labs required to analyze data (U of U, State Lab, and EPA Lab)
- Data comes in the form of transducer files, lab spreadsheets, scanned well logs, and field notes

2

Data Entry
or Upload
into SDE
tables

Data Upload Workflow - Data Entry

The screenshot displays the 'Groundwater Monitoring Data Portal' interface. At the top left, the Utah Geological Survey logo is visible. The main area is a satellite map of Utah and surrounding regions, including parts of Nevada and California. Numerous red circular markers are scattered across the map, representing groundwater monitoring data points. Key geographical features and cities are labeled, such as Salt Lake City, Provo, and Reno. The interface includes a 'Menu' button and navigation controls like a zoom-in (+) and zoom-out (-) icon.

2

Data Entry or Upload into SDE tables

Data Upload Workflow - Data Entry

UTAH GEOLOGICAL SURVEY National Groundwater Monitoring Network

Menu Location ID [Delete](#)

Location ID

Location Name

Location Type

Well Type

Location Description

USGS ID

WIN

WR Number

State

County

Latitude [Show Map](#)

Longitude [Get Current Location](#)

Location Determination Method

Location Coord Ref System

Vertical Measure

Vertical Unit

Vertical Collection Method

Vertical Coord Ref System

HUC Eight-Digit Code

Well Formation Type

Well Hole Depth

Well Hole Depth Unit

Offset

Tribal Land Indicator

Tribal Land Name

National Aquifer

Local Aquifer

Aquifer Type

WL Sub-Network

WL Baseline?

WL Well Type

WL Well Characteristics

WL Well Purpose

WL Well Purpose Notes

WQ Sub-Network

WQ Baseline?

WQ Well Type

WQ Well Characteristics

WQ Well Purpose

WQ Well Purpose Notes

Link

Attachment File Name

Send Data to NGWMN

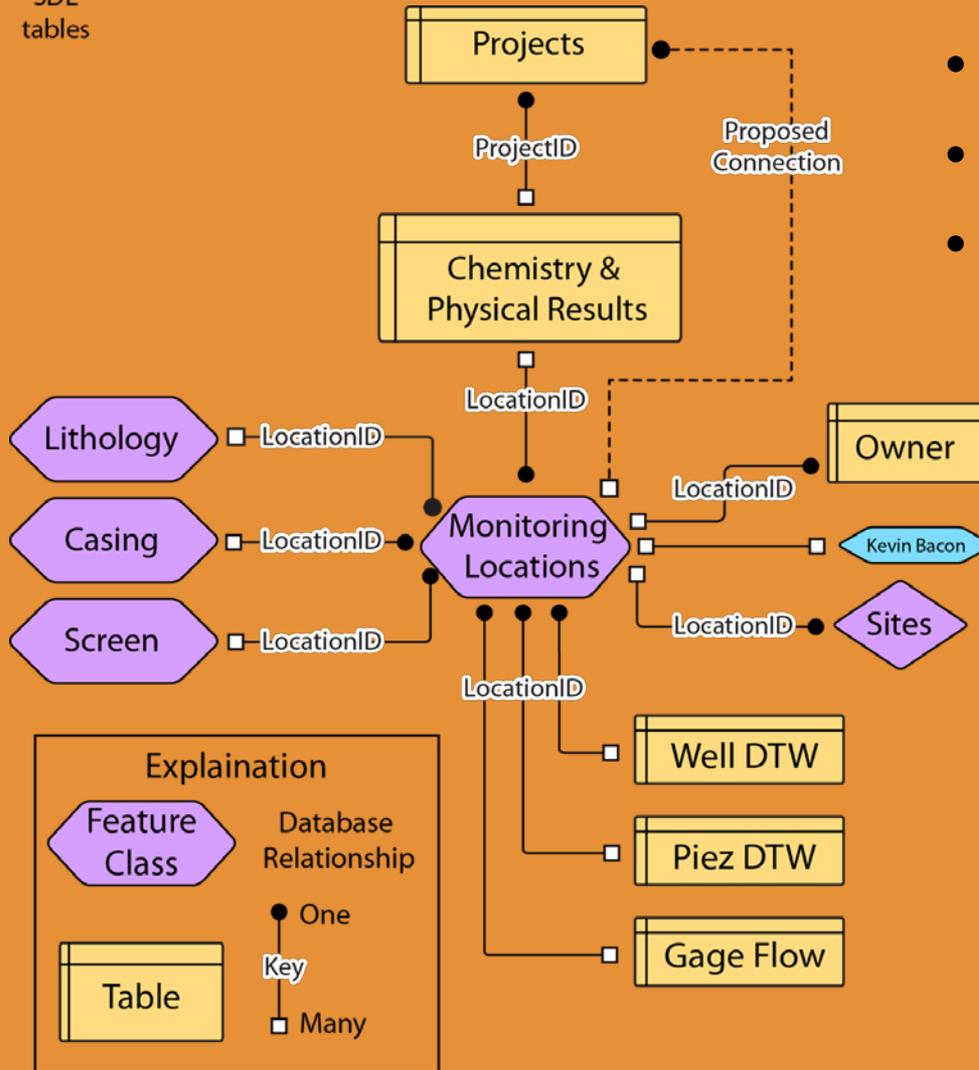
Image Path

Notes

Back Save

http://apps.geology.utah.gov/ngwmn_admin/index.html

Data Storage - UGS SDE Database Structure



- Following EPA WQX Database
- Projects, Sites, Monitoring Locations
- Chemistry - one row per parameter per sample (ex. Calcium)

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

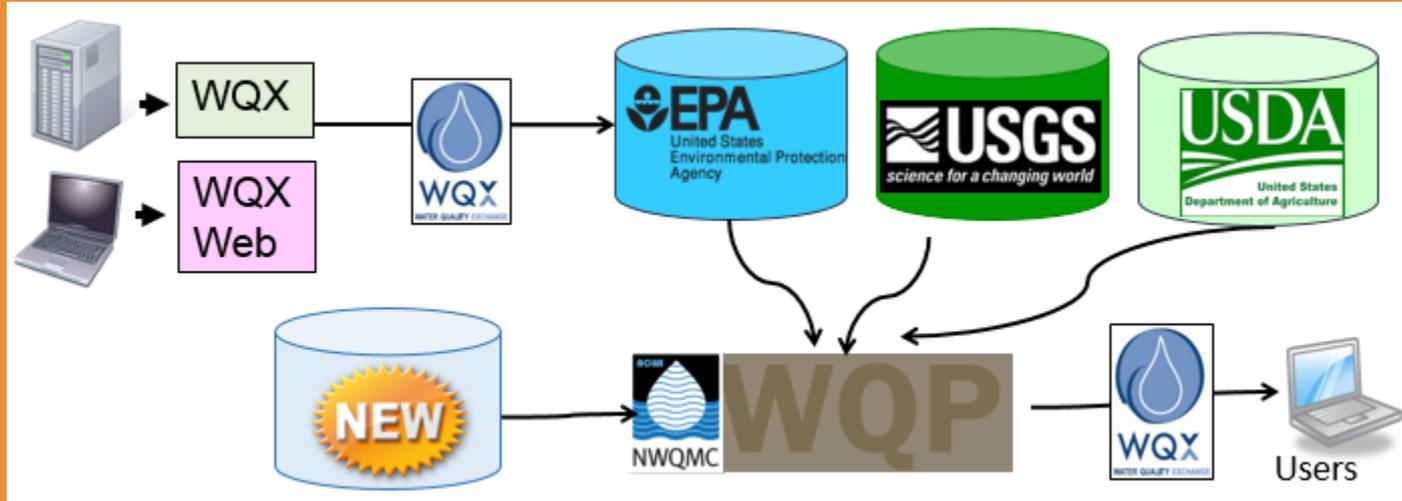
- Query process can be slow if database is large
- Standard complex SQL queries not easy
- Data hosting can be expensive in the current setting
- The software is proprietary and expensive
- Inable to deal with complex symbols and geography

Benefits of Using WFS (Web Feature Services)

- Compliant with the Open Geospatial Consortium (OGC)
- Easy to publish with ESRI products (ArcGIS Server)
- Returns actual features and attribute tables
- WFS uses Geography Markup Language, which is basically geographic XML (eXtensible Markup Language)

Drawbacks

- Limited to publishing features (not rasters &, in our case, tables)
- Obviously not ESRI's favorite way to share data



- Ideal endpoint for all UGS water quality data.
- Works best if station data entered as well (possible point of redundancy)



National Ground-Water Monitoring Network

>> NGWMN NETWORKS

✓ FILTER MAP DATA

>> Principal Aquifer

>> Available Data

>> Site Type

>> State and County

✓ Contributing Agency

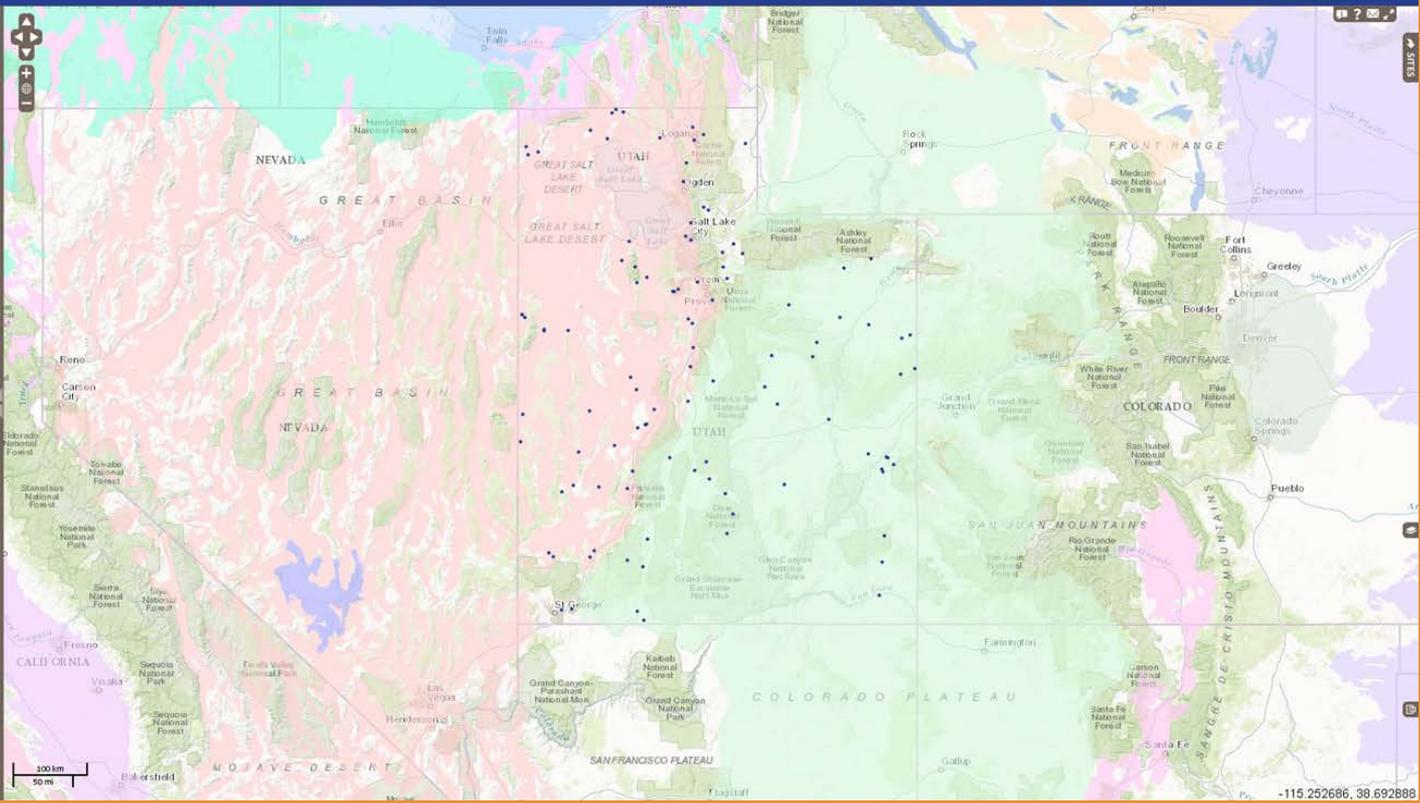
All

- Alaska Department of Natural Resources
- Delaware Geological Survey
- Illinois Environmental Protection Agency
- Illinois State Water Survey
- Kansas Geological Survey
- Minnesota Department of Natural Resources
- Minnesota Pollution Control Agency
- Mississippi Department of Environmental Quality
- Montana Bureau of Mines and Geology
- North Carolina Department of Environmental Quality
- Oklahoma Water Resources Board
- Oregon Water Resources Department
- South Carolina Department of Natural Resources
- Texas Water Development Board
- U.S. Geological Survey
- Utah Geological Survey

>> Aquifer Characteristics

CURRENT STATUS

- 106 Sites mapped
- 106 Sites matching filter
- 21 Water-level network wells
- 106 Water-quality network wells



Environmental Information **exchange** Network
 Utah Water Chemistry Database 1.1.0-1 Help Welcome, Paul Inkenbrandt

Add Filter select a filter

County (1) x

Site Type (1) x

Atmosphere Facility

Lake, Reservoir, Impoundment Land

Other Groundwater Other Spring Stream

Surface Water Well Wetland

clear all

Charts

sodium Time-series Scatter Plot

Generate Chart

Showing 6,961 results from 951 stations.

Stations
Results
Download

Parameter	Measure Value	Measure Unit	Sample Date	Station Id	Detection Condition
hardness, total (as cac03)	346.7	MG/L	05/30/2004	5796	
alkalinity, total	217	MG/L	05/30/2004	5796	
tds	476	MG/L	05/30/2004	5796	
selenium	1.6	UG/L	05/30/2004	5796	
nitrogen-ammonia as (n)	0.4	MG/L	05/30/2004	5796	

geology.utah.gov/apps/waterchem/
test.mapserv.utah.gov/ugschemistry/

- Refine and standardize field data procedures to improve data flow
 - Data sheets
 - Web interface?
 - ArcGIS Collector?
- Reduce data redundancy
- Establish automatic data flow from our databases to the EPA WQX
 - EPA Exchange Network (node client or virtual node)
 - Requires field mapping and high-level QA/QC
- Establish automatic data flow to the NGWMN database
 - Already done for well construction
 - Why not monitoring locations (stations)?
- Looking forward:
 - Flow of data and compliance to CUAHSI HIS (hiscentral.cuahsi.org/)



Questions?

