



Modernizing the Flow: Streamlining Groundwater Data Submission to the TWDB

Charles Dunning, VP Hydrology, WellIntel



Groundwater Data are Central to GCDs' Mission...

Essential value of water-level data

- ***improving the understanding*** of local/shared groundwater resource
- ***providing the necessary information*** for quantifying, justifying, and enforcing curtailment
- more

...and Require Substantial Investments

Investments in:

- Equipment
- Expertise



...and Require Substantial Investments

Investments in:

- Equipment
- Expertise
- Field operations



...and Require Substantial Investments

Investments in:

- Equipment
- Expertise
- Field operations
- Stakeholders

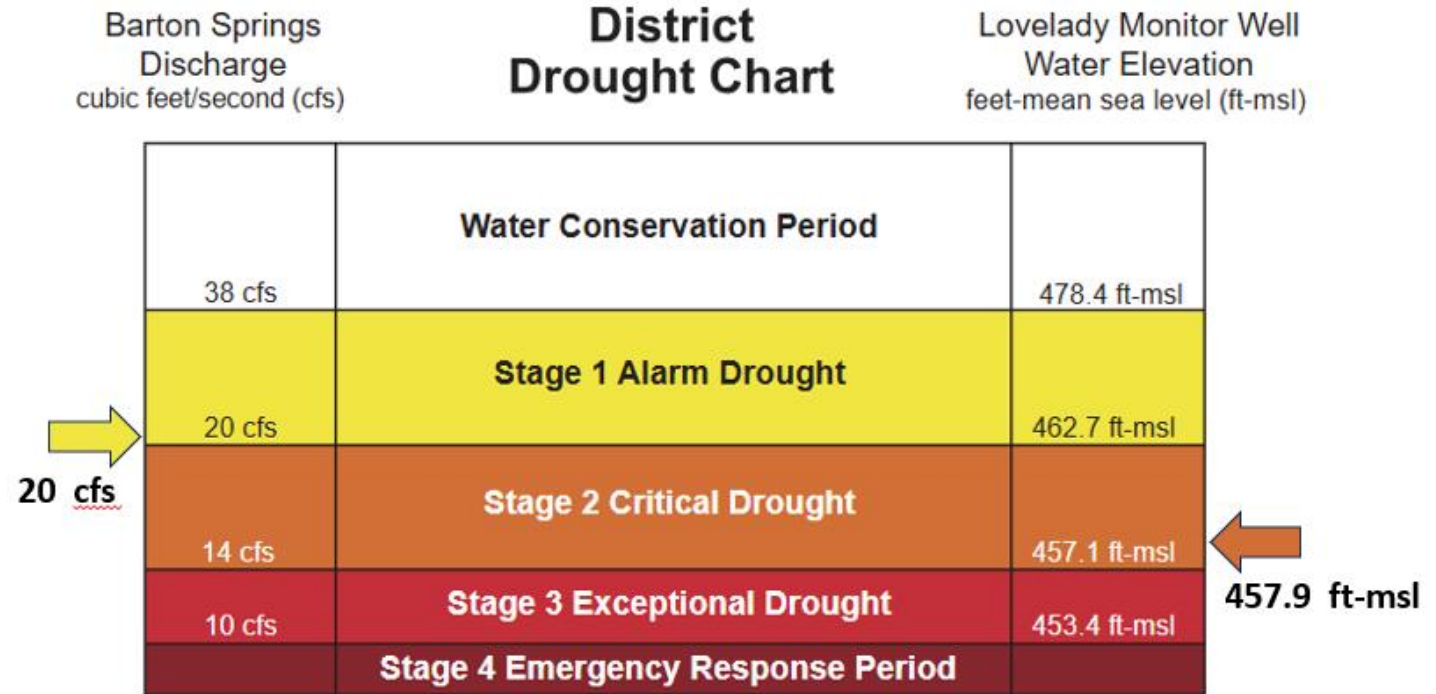


...and Require Substantial Investments

Investments in:

- Equipment
- Expertise
- Field operations
- Stakeholders
- Culture

District Drought Chart and Status

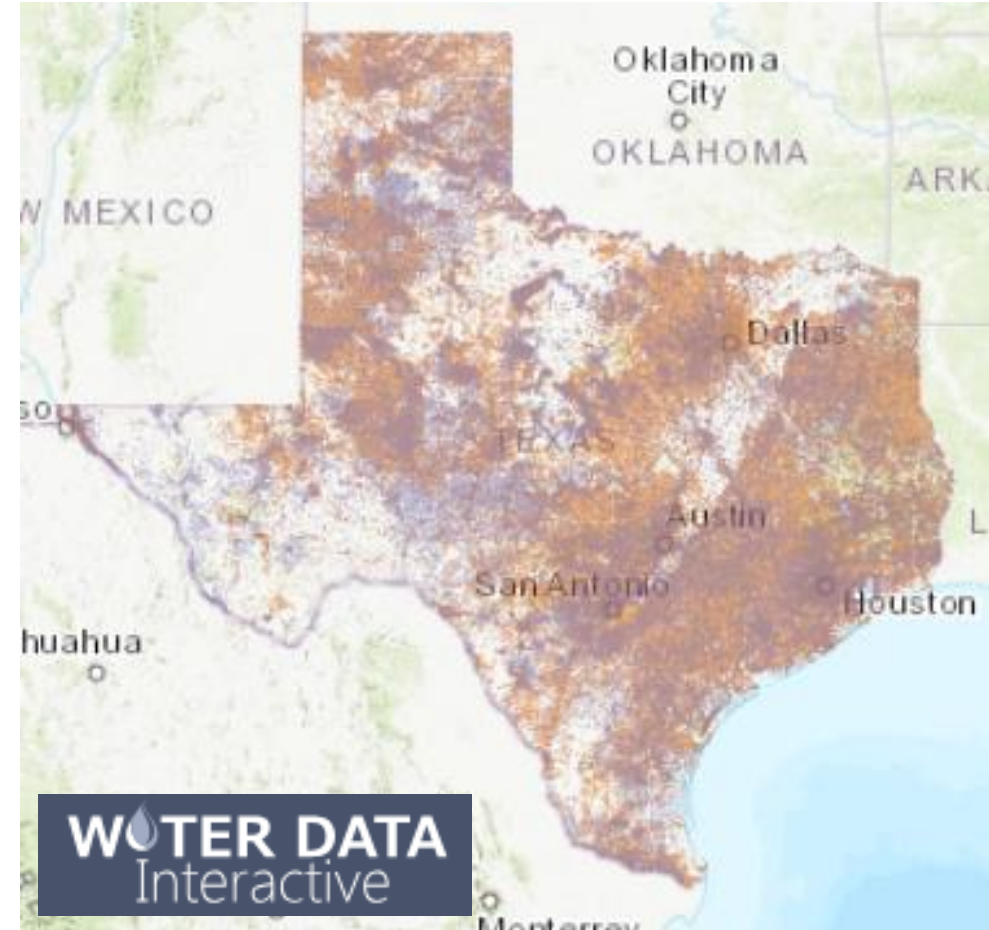


This is the official drought chart used by the Barton Springs-Edwards Aquifer Conservation District.

Last Updated: 8/19/26

Texas Groundwater

Nearly 2 Million water wells have been drilled in Texas since the late 1890s



Texas Groundwater Database

The *TWDB GWDB*



transforms thousands of individual groundwater measurements collected across Texas into a statewide resource



The *TWDB GWDB*

with the purpose to:

- gain representative information about Texas aquifers (9 major and 22 minor aquifers)
- support water planning from the local to a more regional perspective

Texas Groundwater Database



The *TWDB GWDB*

that supports:

- planning
- management
- research
- drought assessment
- public understanding of Texas aquifers

Texas Groundwater Database – DATA SOURCES

The *TWDB GWDB*



contains information for around 143,000 water wells and springs with specific data on:

- water levels
- water quality
- oil/gas tests

Texas Groundwater Database – DATA SOURCES

The *TWDB GWDB*



the TWDB and cooperators annually add around 70,000 measurements from 8,000 sites:

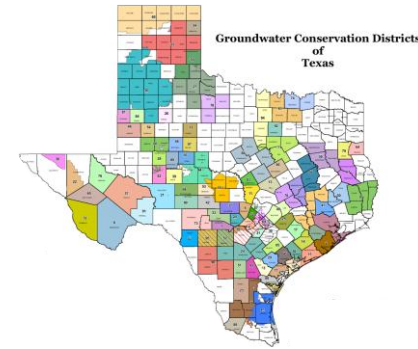
- GCDs
- federal agencies such as the USGS
- numerous municipalities
- universities

Texas Groundwater Database – DATA SOURCES

The *TWDB GWDB*

about 2/3 of data are submitted by GCDs

- ~ 80 Districts data-collection programs
- ~ 68 Districts submit data annually



Texas Groundwater Database – DATA SOURCES

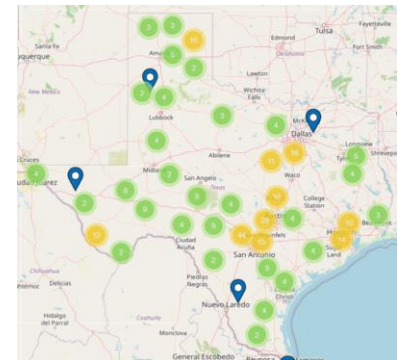
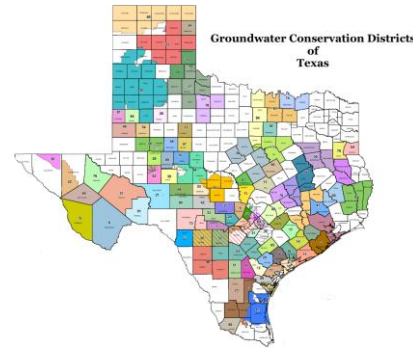
The *TWDB GWDB*

about 2/3 of data are submitted by GCDs

- ~ 80 Districts data-collection programs
- ~ 68 Districts submit data annually

about 1/3 of data are collected by TWDB

- Manual measurements (~2,000 sites)
- Recorder Well Network (~300 sites)



Texas Groundwater Database – VALUE

The *TWDB GWDB*

- preserves Texas' groundwater history
- provides transparent public access
- supports regional and cross-boundary groundwater management



Texas Groundwater Database – VALUE

The *TWDB GWDB*



the Regional Water Planning Department uses data and information from the GWDB for crucial plans:

- 2027 State Water Plan
- Regional Water Plans



Texas Groundwater Database – VALUE

The *TWDB GWDB*

Amplifies the value of local groundwater monitoring investments by making district-collected data available for regional planning, scientific analysis, and statewide water management



Texas Groundwater Database – VALUE

The *TWDB GWDB*



“IDEAL” water-level monitoring network is a goal, based on monitoring targets of

- one well per 25 sq mile – major aquifer
- one well per 125 square – minor aquifer

80% of the estimated 4,000 wells that fit the county/aquifer criteria

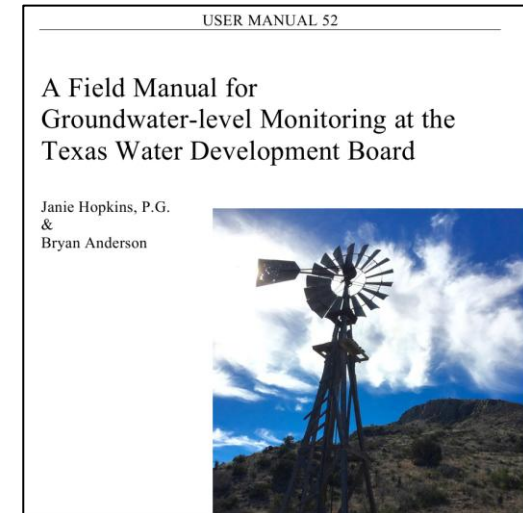
Submitting Groundwater Data to the TWDB

Submitting Groundwater Data to the TWDB

<https://www.twdb.texas.gov/groundwater/data/submitdata.asp>

Resources for Submitting Groundwater Data

- Templates
 - State Well Number Assignment
 - Water Level Submission
- Guidance Documents
 - TWDB-Approved Water-Level Methods for Cooperators
 - A Field Manual for Groundwater-level Monitoring at the Texas Water Development Board



Submitting Groundwater Data to the TWDB

TWDB-Approved Water-Level Methods for Cooperators

- Graduated Steel Tape
- Electric Tape/Line (E-line)
- Acoustic Groundwater Level Devices
- Recorders (Float & Weight, Pressure Transducer)

Submitting Groundwater Data to the TWDB

Resources for Submitting Groundwater Data

- Templates

TWDB has a straightforward 3-step process

1. Obtain a State Well Number
2. Organize level data in CSV or Excel table
3. Send data file to GroundwaterData@twdb.texas.gov

Submitting Groundwater Data to the TWDB

Resources for Submitting Groundwater Data

- Templates
 - State Well Number Template

Latitude	Longitude	Method for obtaining coordinates	Datum of coordinates	Location identification	County	Well use	District well number
<i>required</i>	<i>required</i>	<i>required</i>	<i>required</i>	<i>required</i>	<i>required</i>	<i>required</i>	<i>required*</i>
		GPS, map, Google Earth, etc. Also provide format of coordinates (degrees, minutes, seconds; decimal degrees; degrees decimal minutes; etc.)	NAD83, WGS84: your GPS unit should provide you with this information	provide either an address or narrative of well location, or provide a location sketch in separate attachment	county the well is located in	observed or reported use of the well (domestic, irrigation, stock, unused, etc.)	*only required if one exists

- Latitude
- Longitude
- Method for obtaining coordinates
- Datum of coordinates
- Location identification
- County
- Well use
- District well number

Submitting Groundwater Data to the TWDB

Resources for Submitting Groundwater Data

- Templates
 - Water Level Submission Template

- State well number
- Water level
- Date of measurement
- Method of measurement
- District well number
- Any comments about measurement

state well number	water level	date of measurement	method of measurement	district well number	any comments about measurement
<i>required</i>	<i>required</i>	<i>required</i>	<i>required</i>	<i>required*</i>	<i>required*</i>
must have state well number assigned by TWDB staff before sending water level measurements	must be reported as depth in feet from land surface to top of water, please subtract the top of casing or measuring point	can be in one field in month/day/year (mm/dd/yyyy) format, or with the month day year in separate fields (MUST PROVIDE FULL DATE)	either in code or written out : 0 - sonic meter, 1 - steel tape, 2 - eline, 3 - airline, 5 - pressure gage, 9 - transducer, 10 - continuous acoustic technology	*only required if one exists	*not required for good, static measurments

Explore Streamlining Data Submission to TWDB

At the District

- Early discussions with several CDs on ways to streamline data management and file creation
 - data centralization protocols for multiple, disparate data streams (different data types and/or time intervals, minimize written records)
- automate the aggregation of continuous data to daily values

Explore Streamlining Data Submission to TWDB

At the District

- Early discussions with several CDs on ways to streamline data management and file creation
 - generate internal reports automatically to track progress
 - support QA/QC protocols, statistical assessment, visualizations

Explore Streamlining Data Submission to TWDB

At the GMA

- Early discussions with a GMA on achieving goals to integrate data collected and shared by members
 - coordination and standardization of members' datasets across a GMA to ensure that the CDs', GMA and TWDB datasets are consistent
 - consistency in the datasets provided to consultants working on GAM and DFC revisions saves time and \$

Explore Streamlining Data Submission to TWDB

At the TWDB

- Exploring a pilot project using an API endpoint to test a new way for Districts to submit their datasets
 - automated transfer of data on agreed upon schedule
 - staff time could be directed toward GWDB management and other data collection rather than wrangling Excel files arriving by email

Explore Streamlining Data Submission to TWDB

At the TWDB

- Exploring a pilot project using an API endpoint to test a new way for Districts to submit their datasets
 - reduced direct work with data files and spreadsheets, minimizing transcription and merging errors
 - summary reporting of dataset attributes
 - standardized visualizations of transferred data

Take Away Points

Modernizing the Flow:

Streamlining Groundwater Data Submission to the TWDB

- 80% of Districts have a monitoring program
- 68% of Districts submit data to the TWDB and GWDB
- GWDB amplifies the value of the Districts' investments in data
- GWDB is the central resource for groundwater monitoring data in the state

Take Away Points

Modernizing the Flow:

Streamlining Groundwater Data Submission to the TWDB

- at the District – innovate around centralization and automation
- at the GMA – coordinate to integrate and streamline consistency
- at the TWDB – explore secure API practices to modernize data and information flow, many complimentary benefits

Thank you!

Charles Dunning
WellIntel - VP Hydrology, PhD
cpdunning@wellIntel.com
414-343-6408

