Texas Water Use Data Workplan

Prepared for
Texas Water Development Board

AUGUST 2016

Prepared by
Freese and Nichols, Inc.

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1 Project Purpose

The United States Geological Survey (USGS) is charged with collecting and evaluating the nation's water use data. USGS compiles data supplied by each state and publishes reports on estimated water use in the United States on a five-year basis. The last report, published in 2014, documents water use for the United State in 2010[1]. Each state has an agency which is responsible for collecting and reporting water use data to USGS. In Texas, the responsible agency is the Texas Water Development Board (TWDB).

For Fiscal Year 2015, USGS issued applications for non-competitive grants to provide assistance to the responsible data collection agencies in each state to develop water use data workplans. In Fiscal Year 2016, the USGS will have additional funds to distribute to states on a competitive basis. A state must complete a water use data workplan to be eligible for additional funding from USGS. This document is the Texas Water Use Data Workplan prepared for the TWDB by Freese and Nichols Inc. (FNI). The Texas Water Use Data Workplan includes three primary components described in sections 2 through 4 of this report.

Section 2 evaluates existing water use data collection occurring in the state of Texas. TWDB collects water use data through annual surveys sent to Public Water Systems (PWSs) (municipal use) and industries (industrial use). Estimates for agricultural (irrigation and livestock use), mining (primarily oil and gas use), and steam electric power generation are developed by the TWDB with input from other agencies. While the TWDB is the primary agency to report water use data to the USGS, they are not the only agency collecting water use data within Texas. The Texas Water Code requires all water right holders to report their water use to the TCEQ. In areas without a Watermaster, water right holders self-report their annual water use to the TCEQ, including the amounts of water used in each month. For Watermaster areas, diversion data is reported to the Watermaster on a real-time basis. In Texas, Groundwater Conservation Districts (GCDs) are the preferred entities for groundwater management. The GCDs collect water use data, but the type and level of detail varies greatly from district to district. During the development of this workplan, several of the agencies other than TWDB were interviewed to seek their input on how water use data is collected in Texas. Insight gained from these interviews was used in developing some of the potential data collection projects discussed in Section 4.

Section 3 of the report evaluates the USGS research priorities to be used by the reporting agencies. FNI evaluated all of the research priorities to identify data gaps between the priorities and current data collection efforts. This analysis informed several of the potential data collection projects, which are included in Section 4.

Section 4 identifies and describes a list of seven potential data collection projects that meet USGS identified research priorities. Each of the identified projects includes the following data:

- A description of data sources,
- The primary data collection/estimation organization,
- The sustainability of data collection,
- A high-level cost estimate of the project,

- How the data project aligns with USGS program goals and research priorities.

The projects were developed in such a way that each project could be implemented individually or collectively. While the projects included are recommended prioritized projects to meet the state's data gaps, there has been no ranking of the individual projects due to the necessary individualized actions and coordination to undertake each. Should funding become available, TWDB staff will determine which projects would be implemented.

2 Existing Data Collection in Texas

2.1 Agencies Collecting Data

2.1.1 Texas Water Development Board (TWDB)

The TWDB has been collecting water use data for the state of Texas since its creation in 1957. Statewide water use data serves multiple objectives at the TWDB. The data serves as the basis for demand projections used in developing regional water plans, which are incorporated into the State Water Plan. The data supports various water related research and conservation programs administered through the TWDB. The data is also provided to the USGS in support of their development of water use for the United States and to other agencies and individuals for their use.

One of the primary methods used by TWDB to collect data is their annual water use survey. According to TWDB staff, the water use survey is sent annually to approximately 4,500 PWSs. An additional 1,500 surveys are sent to industrial facilities that use significant amounts of water relative to the area. Water use data collected from these two surveys represents a majority of the municipal and industrial water use in the state. Estimates for areas without a PWS are developed based on the best available data.

Since agricultural use (irrigation and livestock use) represented 60 percent of water use in Texas in 2013, estimates of agricultural use are critical. The outline below represents a high-level overview of irrigated agricultural water use data collection efforts at TWDB:

1. TWDB compiles irrigated crop acreage data for each county in the state. USDA Farm Service Agency (FSA) certified irrigated crop acreage data is used as the starting point. The FSA data is compared to historical county averages since not all producers participate in FSA programs. Acreage for self-supplied golf courses is also included.
2. Irrigation rates (5-year rates) are developed by crop (expressed as inches per irrigated acre by crop). These rates do not include naturally occurring crop watering from precipitation. Weather data (evapotranspiration (ET), relative humidity, wind) is evaluated and compared to conditions experienced during the previous five years. County-level adjustments are made to account for departures from average conditions.
3. For each county, irrigated crop acreage is multiplied by irrigation rates to determine irrigation water use by crop.

4. The source of irrigation water is determined as either surface water, groundwater, or wastewater reuse. Surface water diversion data for the previous growing season is provided by TCEQ on an annual basis. Other readily available data, such as from the Lower Colorado River Authority annual reports or the Rio Grande Watermaster, are evaluated to determine where and how much water was applied in certain areas. Irrigation from wastewater reuse is determined from the TWDB Water Use Survey or received from groundwater conservation district feedback. Groundwater use is estimated as the portion of county totals not attributed to either surface water or wastewater reuse.
5. Draft estimates of irrigation water use are sent to every GCD for their input. In some cases, the GCD collects detailed water use data through metering, although many other GCDs reply that they do not have any better estimates.
6. TWDB Agriculture Conservation staff provide final irrigation estimates to the TWDB Water Use Survey staff to incorporate into the Historical Water Use Survey database.

Livestock use is estimated based on the number of head in each county as estimated by the Texas Agricultural Statistics Service. Total water use for each county is calculated by multiplying the number of heads (Texas Agricultural Statistics Service) by the estimated water demand per head of livestock.

The TWDB mining water use estimates are based on a combination of sources. For water use estimates of hydraulic fracturing, data is downloaded from the FracFocus Chemical Disclosure Registry. All operators of hydraulic fracturing operations in Texas must report information to this national online registry. For other types of mining activities, such as coal, sand, gravel, aggregates, and other types of mining, a water use survey is annually sent to the active facilities. In addition, dewatering information is annually received from the Texas Railroad Commission.

The steam electric power generation water use estimates are based upon the annual water use survey of roughly 90 power generation facilities. Co-generation, hydropower, solar, and wind facilities are not included in the steam-electric power water use estimates.

2.1.2 Texas Commission on Environmental Quality (TCEQ)

The TCEQ has been legislatively mandated to manage the surface water resources of the state. Under this mandate, TCEQ issues and oversees water rights for the diversion of state surface water. The frequency and level of reporting requirements for water rights varies depending on whether or not the right is in a Watermaster area. Figure 2-1 shows the Watermaster areas in Texas.

Source: http://www.tceq.state.tx.us/permitting/water_rights/wmaster/wmaster.html

Figure 2-1 Watermaster Areas within Texas

In a Watermaster area: If a user plans to divert water, they fill in a form giving the amount, location and duration of the proposed diversion and provide this information to the Watermaster. The actual diversion amounts are then reconciled after the fact through metering records. All use is required to be metered for reporting to the Watermaster. Diversion requests are submitted by diversion location as needed and usually the Watermaster reports use on a monthly basis. Water use data in Watermaster areas is maintained by TCEQ in the Watermaster's database.

Non-Watermaster area: Each year paper forms are sent in January to water right holders and are due back to TCEQ in March. TCEQ can issue a notice of violation if a water right holder does not report their use. The paper forms are collected annually and entered into a database. Diversions are reported by water right authorization and use type, so if multiple diversion locations are permitted only the aggregate use is reported. The data is currently stored in a Microsoft Access database; TCEQ has an ongoing project to transition this data to an Oracle database.

2.1.3 Other Agencies

Many additional agencies in Texas collect water use data independently of TWDB and TCEQ. These include PWSs, GCDs, irrigation districts and river authorities. While this data is collected independently, it may be represented in water use data collected by TWDB through their surveys or included in the irrigation use provided by the GCDs. Section 2.2 documents conversations with several other agencies that collect water use data.

2.1.4 Data Collection Summary

In order to understand the water use currently being collected by agencies in Texas, a summary table is provided below. Table 2-1 shows the category of use, agency/organization collecting the data, the frequency and geographic level of the data.

Table 2-1 Data Collection Summary for Texas

Category	Use Type	Agency/ Organization	Frequency	Geographic Level
Annual Water Use Survey - Public Water Supplier	Municipal	TWDB	Annual	PWS Boundary
Annual Water Use Survey - Industries	Industrial	TWDB	Annual	Facility
Agricultural Use – Irrigation and Livestock	Irrigation and Livestock	TWDB	Annual	County
Mining	Mining	TWDB	Annual	Facility
Steam Electric Power	Steam Electric Power	TWDB	Annual	Facility
Surface Water	Multiple	TCEQ	Annual*	Diversion Location
Groundwater	Multiple	GCDs	Annual**	Well Location
Reuse	Multiple	Multiple	Annual	Multiple

*At a minimum surface water use is reported annually. It may be reported more frequently in Watermaster Areas.
**Data collection by GCD's is variable across the numerous districts in the state.

2.2 Interviews

FNI conducted nine interviews with agencies that collect water use data in Texas, as shown in Table 2-2. A standard set of questions were asked of each agency and their responses to those questions are included in Appendix B.

Table 2-2 Agencies Interviewed and Contacts

Entity	Contact
Edwards Aquifer Authority	Roland Ruiz (GM)
Hidalgo County Irrigation District No. 2.	Sonny Hinojosa
North Plains GCD	Steve Walthour
Panhandle GCD	C.E. Williams
Texas A&M University	Dr. Guy Fipps
Texas Alliance of Groundwater Districts	Sarah Rountree Schlessinger
Texas Commission on Environmental Quality	Kim Wilson
Texas Water Resources Institute	Dr. Kevin Wagner
Texas Water Development Board	Cameron Turner

Several key themes began to emerge from those conversations.

- Consistent and standardized reporting of water use - During several interviews a concern was expressed that different methodologies are being used across the state to estimate non-metered water use. Reported water use data may be inconsistent because of the different methodologies employed. In addition, the way data is reported to TWDB and the level of accuracy may vary depending on the entity or individual submitting the report.
- Water use reporting manual similar to what North Plains GCD has developed - During the interview with the North Plains GCD, Steve Walthour discussed in some detail their reporting manual for well owners. This manual was also identified as the type of resource that TWDB might develop in conjunction with the TAGD. The value of such a manual is that it would provide consistent methodology for water use reporting.
- Increased coordination/collaboration with other agencies collecting data (TCEQ, Watermasters, GCDs, etc.) – Several of the entities interviewed felt that the state agencies which request data should better coordinate their data collection and better collaborate to share data. A specific example identified was GCDs that collect metered water use data and report that information but are still required to report the data by irrigated acreages and crop type. It should be noted that each independent data collection is required by independent legislation and may require inter-agency coordination and/or legislative action to change.
- Need to streamline data reporting, same data being reported multiple times to different agencies – This is similar to the theme identified above where similar data is being request multiple times by different agencies. A specific example provided was an irrigation district in a Watermaster area that reports directly to the Watermaster which has data for the entire basin, but individual surveys are also sent by TWDB requesting water use data.
- Multiple data-reporting requests from TWDB for different programs, water use survey, annual water conservation reports and water loss audit reporting – This is primarily for PWSs who are required to submit multiple reports to TWDB each year. The forms require similar water use data, however depending on the individual completing the form

the water use data can be different for the same supplier. TWDB staff are currently working on a project known as the "Water Loss, Use and Conservation Data Consolidation Project (LUC)" to simplify TWDB reporting requirements. This project will create online forms for each report that populates with the necessary data for each form. For example, the water use data entered into the annual water use survey will now be populated for the annual water conservation report and water loss audit. It is anticipated that this project will be completed by the end of 2016.

- Improved estimation of irrigation water use based on consumption data rather than irrigated acreage and crop type – The current method applied by TWDB to estimate irrigation use is detailed in Section 2.1 and includes an estimate of the irrigated acres and crop type for each county. One interviewee stated that the irrigation application rates were based on full ET values although many areas in West Texas deficit irrigate or are not able to pump enough water to meet demand. (Note: TWDB irrigation estimates are intended to reflect actual water use, not potential ET and full, calculated usage. In addition, any known delivery losses are included within the application rates for those counties with surface water irrigation.)
- Acknowledgement of funding gap - Some of the interviewed agencies estimated their expenses for data collection. For these agencies, estimated costs exceed $4.6 million dollars annually as shown in Table 2-2. This is in addition to the annual expenditures by TWDB, TCEQ, and thousands of other agencies, entities, and individuals to collect water use data.

Table 2-2 Estimated Water Use Data Collection Costs from Agencies

Entity	Estimated Water Use Data Collection Cost
North Plains GCD	$400,000
Edwards Aquifer Authority	$750,000
Hidalgo County Irrigation District No. 2*	$3,200,000
Panhandle GCD	$250,000
Texas Alliance of Groundwater Districts	$3,500
Total	$4,603,500

*This represents the entire operating budget.
The amount for data collection was not reported separately.

- TWDB quality control of self-reported data – During some of the interviews the question was raised about the accuracy of the water use data being self-reported to TWDB. The potential sources of errors identified included transcription errors from paper forms to the database, data entry errors where the user entered the wrong units or errors resulting from the user not understanding the forms. It was suggested that a more extensive quality control by TWDB might improve the quality of the data.

3 Evaluation of USGS Data Requirements and Data Collection Gaps

In the Water Use Data and Research Financial Assistance Guidance, the USGS has identified eleven research priorities. The USGS does not rank the list of priorities, but they have been numbered in this report for reference purposes. The list of USGS priorities is included below with a brief discussion of Texas' data collection gaps that might be addressed in Section 4, Potential Priority Data Use Projects.

3.1 USGS Identified Research Priorities

1. **HUC 8 water-use reporting**

A USGS research priority is the collection forms of water data - diversions, pumping, use, and return flow - at the smallest subregion or watershed level, described as the hydrological unit code (HUC) 8 level. Currently, such data is collected at various geographic levels in Texas. Diversions related to surface water rights can be linked to one or more diversion points. Pumping volumes may be associated to individual wells when collected by GCDs, but when collected by the TWDB water use survey, the total pumping is generally associated to an aquifer and county/major river basin area. The location of use for industrial facilities is a specific latitude and longitude; for public water systems, locations are based on a 2010 shapefile of boundaries, and for other types of water use estimates, the location is by county and river basin. The county and major river basins do not necessarily align with the 211 HUC 8 reporting units, as shown in Figure 3.1. The wastewater return flow data would be available at the discharge point, but such information is not currently readily available.

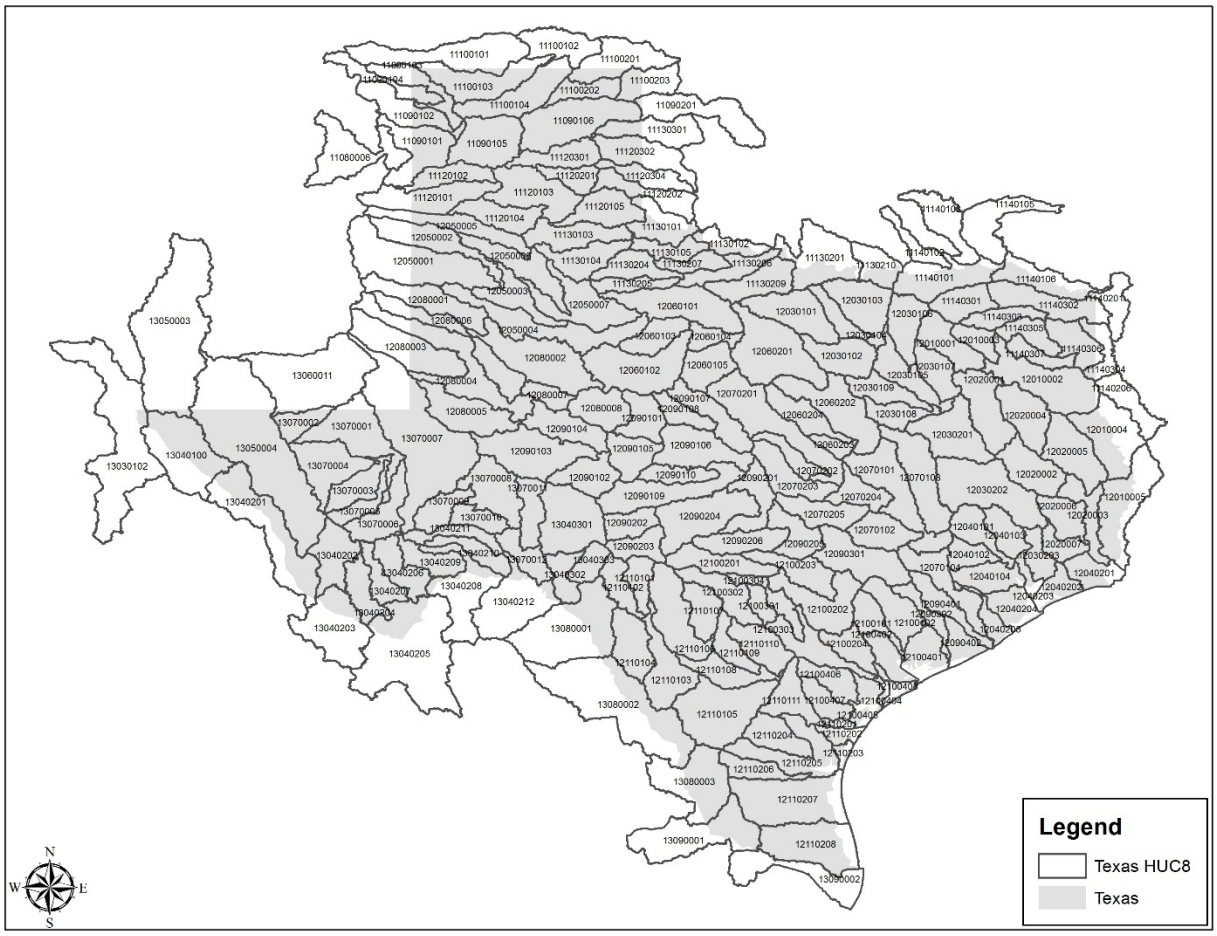

Figure 3-1 HUC 8 Units within Texas

2. Water-tracking and interbasin transfer (between HUC 8 units)

In Texas water rights that authorize interbasin transfers report their water use like any other water right. These water rights can be tracked to the HUC 8 level based on the diversion point authorized in the water right. However, the level of specificity would depend on the authorizations in the individual water right. For groundwater, the transfer between HUC 8 units is not tracked since groundwater is not constrained by these boundaries. Water use tracking would need to be tied spatially to the surface water diversion and groundwater pumping locations so that interbasin transfers could be tracked between HUC 8 reporting units.

3. System uses (internal and other non-revenue uses) and losses from public supply systems

Nearly all community PWSs in Texas receive an annual water use survey which asks for the volume of water delivered internally to six customer categories: single-family residential, multi-family residential, commercial, institutional, industrial, and agriculture. In addition, retail PWSs in Texas with a financial obligation to TWDB or with more than 3,300 connections are required

to submit a Water Loss Audit report to TWDB annually. All other PWSs in the state must submit a report every five years with the most recent reports submitted May 1, 2016. These reports contain non-revenue uses along with losses from PWSs. The data from these reports are used primarily for supporting regional water planning and identifying systems that need to address water losses before receiving TWDB funding.

4. **Irrigation: sources and volumes (including golf courses)**

Irrigation water use estimates are developed by TWDB at the county, basin and aquifer level. Golf courses rely on multiple sources of supply including municipal supplies, self-supplied ground and surface water and non-potable reuse. In cases where golf courses receive water from a public water system, the water used for irrigation is included as municipal use. If they are self-supplied using surface water and have a water right, then they would report use to TCEQ. TWDB staff includes self-supplied golf courses in their estimates of irrigation water use. In some cases, a golf course using groundwater may report use to a GCD that is in turn reported to TWDB. With the data currently being collected, it would be challenging to get a complete estimate of golf course water use.

5. **Inventory of self-supplied industrial**

This data is currently being collected through the TWDB annual water use survey for industrial facilities that use significant amounts of water relative to the area. Smaller self-supplied industrial users may be captured if they are required to report their water use to TCEQ (surface water users) or a GCD (some ground water users). Since industrial use is one of the specific authorized uses of state appropriated water, industrial users of surface water must report this use on their annual water right use report to TCEQ or their Watermaster if applicable.

6. **Mining: withdrawals with source and commodity identified**

Mining water use estimates are developed by the TWDB through data collected through the water use survey and downloaded from the FracFocus national registry for hydraulic fracturing. Data collected through the survey is associated with a specific water source and the North American Industrial Classification System (NAICS) code for the facility. Hydraulic fracturing operation data is associated with a specific well location, but no information is provided regarding the water source: purchased, surface water, fresh groundwater, brackish water, or treated effluent. However, since, mining use is one of the specific authorized uses of state appropriated water, industrial users of surface water must report this use on their annual water right use report to TCEQ or their Watermaster if applicable. This would not be available for mining uses of groundwater. This could be accomplished through an integrated database that is linked to a GIS database.

7. **Improvement of the domestic per capita coefficients**

Domestic per capita water use is calculated based on the PWS surveyed water use and estimated population. Texas currently spends significant effort in calculating municipal per capita water use since this forms the basis for water demand projections in the regional water planning

process. Water volumes for domestic water use is collected through the water use survey, and water systems are increasingly able to categorize their internal water deliveries by customer categories. Continued emphasis needs to be placed on accurately identifying these factors with respect to an entity's per capita use; however, the estimation of population served is more difficult. The state does not currently have updated service-area boundaries for water systems, which complicates the estimation of population and the geographical linking of the systems to weather and socio-economic data. In addition, per capita rates are sensitive to multiple factors such as the weather conditions which drive outdoor water use, population growth and industrial, commercial and institutional uses. Continued emphasis needs to be placed on accurately identifying these factors with respect to an entity's per capita use.

8. **Groundwater use: identifying aquifer and HUC of withdrawal, and further refining the definition of saline/brackish water**

TWDB currently estimates groundwater use by county and aquifer. The data is not reported by HUC 8 unit or by category (saline/brackish or fresh). However, some individual GCDs or subsidence districts may collect well specific data that could be summed to HUC 8 areas. The Texas legislature recently funded a study to categorize saline/brackish water sources in the state.

9. **Estimation of public supply deliveries to customer groups or classes, such as commercial, industrial, and domestic**

In the annual water use survey, PWSs categorize their deliveries to residential users (single family and multi-family), institutional users (schools, universities, churches, hospitals, etc.), commercial, industrial, agricultural, and reuse. PWSs are making gains in their ability to report internal water deliveries, however, it would be beneficial to have consistent categorization of water use for all water use that is reported in Texas.

10. Public systems stratified by socioeconomic factors

TWDB currently has a geodatabase of service area boundaries for PWSs from 2010, which would allow water systems to be associated with U.S. Census Bureau socioeconomic data. However, no process or application exists to update these boundaries or add new boundaries as new water systems are established.

11. **Improved data collection and delivery**

As mentioned previously, several agencies in Texas collect water use data for different purposes. Water use data is being collected in paper and electronic format at different frequencies by different agencies. Distributing the data collected to other agencies not only presents a technical challenge but also incurs organizational costs which may be a burden.

4 Potential Priority Data Improvement Projects

Based on discussions with TWDB staff and various data collection agencies in Texas, seven potential projects were identified. Similar to the USGS Identified Research Priorities, these projects have been identified as priorities for the state's water use data. For each project the corresponding USGS research priorities that each potential project would meet are identified. All of the projects have potential benefits associated with the project along with a high-level cost estimate to implement the project.

The cost estimates were developed in collaboration with TWDB staff. Each cost estimate was based on an estimate of the hours to complete a project multiplied by an assumed labor rate. The costs are presented as a range since there is an appreciable level of uncertainty regarding the scope and effort required to complete the project.

The projects were developed in such a way that each project could be implemented individually or collectively. While the projects are shown in a given order, no particular priority has been assigned and, should funding become available, TWDB staff will determine which projects would be implemented. Table 4-1 shows a summary of each project and includes the potential lead organizations, project sustainability, estimated project cost and USGS identified research priorities. For many of the projects, collaboration with other agencies will improve the project, and for some, collaboration may be essential. Project sustainability identifies whether the project has significant up-front effort and then minimal ongoing maintenance or significant effort is required throughout the lifetime of the project.

Table 4-1 Data Collection Project Summary

	Project Name	Lead Organization(s)	Project Sustainability	Estimated Project Cost	USGS Identified Research Priorities
1	Water Use Data Integration	TWDB/TCEQ	High initial investment, lower invest to maintain	$1-$10 million	3, 4, 5, 6, 7, 9, 10, 11
2	Develop Water Use GIS Database and Reporting Tools	TWDB	High initial investment, lower invest to maintain	$250,000-$300,000	1, 2, 8
3	Water Data Exchange (WADE) Deployment	TWDB	High initial investment, lower invest to maintain	$250,000-300,000	11
4	Texas Pollution Discharge Elimination System (TPDES) Data	TCEQ	High initial investment, lower invest to maintain	$900,000-$1,000,000	1, 2, 4,10
5	Unmetered Water Use Reporting Manual	TWDB/TAGD	Low initial investment, minimal investment to maintain	$30,000-$50,000	3, 4, 9, 11
6	Annual Water Use Survey Supporting Documentation	TWDB	Low initial investment, minimal investment to maintain	$25,000-$50,000	11
7	Enhanced Agricultural Use Estimates	TWDB	Moderate initial investment, moderate investment to maintain	$200,000-$250,000	4, 11

4.1 Water Use Data Integration

The purpose of this project would be to integrate the surface water and ground water use data sets collected by various agencies into a single online water use database. Although an integrated water use database would be useful, TCEQ would need to continue to collect surface water data required to comply with the statues and rules for its programs. TCEQ could provide its collected surface water use data for incorporation into an integrated database. The benefit of this project to the state and national data collection efforts would be higher quality data and more efficient collection and delivery:

- Streamlines data reporting requirements, lessening workload on both state agencies and reporting entities;
- Increases data reporting workflow efficiency;
- Eliminates redundant data, improving data integrity;
- Promotes tighter integration of all water use data.

State agencies and districts benefiting from this project include, but are not limited to, TWDB, TCEQ, GCDs, Subsidence Districts, and the BEG. The project would require significant coordination among agencies to integrate their data with consistent unique identifiers (entity codes, timeframes, geography, etc.) and provide access through online portals. Although significant effort would be needed for the initial development, once in place, this project could result in long-term cost savings.

Project tasks would include:

1. Coordinate with TCEQ, Watermasters, Chapter 36 GCDs, and Subsidence Districts to determine specific data needs and relationships;
2. Perform data modeling and create physical database to store data;
3. Determine data migration and integration needs and create data mapping specification;
4. Migrate existing data from the various entities (e.g. customer, permit data);
5. Create web-based data entry forms and tools, perform testing, and place system into production.

The cost to implement this project with state agency resources (TWDB and TCEQ) would be approximately $1-$10 million.

4.2 Develop Water Use GIS Database and Reporting tools

The purpose of this project would be to organize, maintain, report, and present water use data spatially. The project would create tools for TWDB staff to manage the data and create reports,

and create web-mapping applications to present water use data to the public and allow PWSs to maintain their own service area boundaries.

The primary benefits of maintaining water use data spatially are:

- It would allow water use data to be aggregated/disaggregated and reported at various spatial resolutions, e.g. HUC-8 or county;
- Improves the ability of TWDB to track the movement of water, from diversion location to place of use to return flow location;
- Allow water use data to be made publicly available via a web mapping application;
- Allow PWSs to update their boundaries using a secure web mapping application.

The primary spatial data of interest is collected and maintained by various agencies/districts. Proposed spatial datasets are listed in Table 4-2 along with the collecting agency/district, and associated water use data. Most data listed is publicly available, though it may not be readily available to the public.

Table 4-2. GIS Spatial Datasets

Spatial Dataset	Agency/District	Associated Water Use Data
Public Water System (PWS) boundaries	TWDB/TCEQ	- Volumes used, sold, purchased; - Reuse volume;
PWS surface water intake locations	TCEQ	Surface water intake volume (M&I)
PWS groundwater well locations	TCEQ	Groundwater intake volume (M&I)
Groundwater well locations	GCDs, TWDB	Well production volumes
Surface water right diversion locations	TCEQ	Municipal, Industrial, Irrigation, Mining, Hydroelectric, Navigation, Recreation, Other, Recharge, Domestic & Livestock, Storage
Wastewater discharge locations	TCEQ/EPA	Wastewater discharge volume (M&I)
County boundaries	TNRIS	Intake and use volumes
HUC-8 boundaries	USGS	Intake and use volumes

4.2.1 Project tasks would include:

1. Create specifications document containing:
    a. Functional requirements;
    b. Data model diagram;
    c. Data dictionary;
    d. Data migration/integration mapping specifications;
    e. Graphical user interface prototypes;
    f. Tools and procedures to be developed;

g. Development software and standards.

2. Create geodatabase and populate spatial tables;
3. Create public facing web map;
4. Create secure web mapping application to allow PWS staff to edit service area boundaries;
5. Allow users to provide feedback on water use data through the online web map application;
6. Develop software procedures to handle data integration with other systems;
7. Develop geoprocessing procedures to facilitate aggregation/disaggregation of data;
8. Develop reporting procedures;
9. Perform testing and place system into production.

The cost to implement this project with TWDB in-house resources would be approximately $250,000-$300,000.

4.3 Water Data Exchange (WaDE) Deployment

The Water Data Exchange (WaDE) program (http://www.westernstateswater.org/wade/), created by the Western States Water Council (WSWC), provides a standardized data schema to facilitate the transfer of water use data between states and to federal agencies. WaDE would be deployed within TWDB by developing a WaDE-specific data schema within the agency, integrating the agency's existing data with that schema, and creating a web service to allow USGS and other agencies to retrieve data.

The benefit to TWDB and USGS is more efficient data delivery. The cost to implement the project with in-house resources is approximately $250,000 - $300,000.

4.4 Texas Pollution Discharge Elimination System (TPDES) Data Clearinghouse

Individual TPDES permit holders are required to submit monthly reports on discharges to TCEQ. Each permit specifies the reporting parameters and monthly limits for each parameter. Currently, the process for obtaining TPDES data includes a request through TCEQ central records. Once the data is requested, TCEQ processes the request and provides the data in a Microsoft Excel spreadsheet. In order to use the data significant effort is required to organize the data in a usable format.

TCEQ does not store the TPDES data in a state database, but rather data is entered and stored directly in an EPA database. The EPA has made the TPDES information accessible to the public through the ECHO website (https://echo.epa.gov/) and has an initiative to make the data more

transparent and accessible to the public. As such, the state may wait until this initiative is completed before pursuing this project.

This project would include the development of a state clearinghouse where discharge data associated with a TPDES permit would be searchable, location specific (based on latitude and longitude) and available for download. The benefits from this project would include:

- Online database representing all municipal and industrial return flows;
- Graphical user interface that could be searched based on location or facility name;
- Data could be downloaded directly to minimize staff time and user wait times;
- The user could specify the data download format (MS Excel, GIS, text, other);
- Useful in developing beneficial use estimates, extended hydrology, etc.;
- Allows aggregation of location-specific data at the HUC-8 and county levels.

Project tasks would include:

- Development of an online database of TPDES data,
- Development of a web interface for users to search and obtain data,
- Migrate existing TPDES data,
- Create public facing web map,
- Implement data download procedures,
- Perform testing and put system into production,

The estimated cost to implement this project with in house resources would be approximately $900,000-$1,000,000. This could be done as a stand-alone project, but it would be much more cost-effective if this work was performed in conjunction with the water use GIS database project (Section 4.2).

4.5 Unmetered Water Use Reporting Manual

When an entity collects metered water use data, the volume of water used reported to the TWDB should be an aggregation of all metered use. Many surface water rights permits include specific requirements for how reporting must be done. Water right with those types of permit conditions are required to report in accordance with the requirements in their permits.

While meters are widely used by PWSs and the industries they serve, areas outside of these suppliers using groundwater are typically unmetered domestic and livestock use. Irrigation and agricultural groundwater use is also often unmetered in many parts of Texas and the method by which GCDs collect and estimate this data varies widely. This project would develop a document to aide in the calculation and estimation of water use for unmetered groundwater withdrawals. During interviews for this workplan, an example of such a document was provided by the North Plains GCD

(http://www.northplainsgcd.org/phocadownload/information/DistrictDocs/meter%20and%20production%20reporting%20%20final%202013.pdf). The benefits from this project would be development of consistent methodology for collecting and reporting water use for entities across the state. It should be noted that district rules vary widely in regards to metering, monitoring, and reporting, so such a manual may need to address many different situations. The manual could be developed in coordination with an agency such as the TAGD. It is estimated that the water use reporting manual could be developed for approximately $30,000-$50,000.

4.6 Annual Water Use Survey Supporting Documentation

During the interviews and discussions with other entities responsible for completing the annual water use survey the idea of documentation for the survey was identified. The TWDB water use survey forms are not always the most intuitive forms for entities to complete. There are also many situations in which, based on staff turnover, the person completing the water use survey has never completed one previously. TWDB would develop documentation that would correspond with the water use survey. The documentation would provide definitions, background information on the data being requested, possible sources where the data may be obtained, and contacts at TWDB to help with questions. This would provide clarity in the how the water use data being requested should be collected so that entities could provide consistent and accurate data. It should also help to increase to understanding of those reporting the water use data and increase the accuracy of the data reported. The estimate cost for this project is approximately $25,000-$50,000.

4.7 Enhanced Agricultural Use Estimates

As mentioned in Section 2.1.1, the TWDB develops use estimates for agricultural (irrigation and livestock) use. During the interviews, it was mentioned that agricultural water use should be based on consumption data rather than irrigated acreage and crop type where consumption data are available. There are some entities that meter agricultural use, and where available this data should be used in lieu of current estimation techniques. Other remote sensing techniques are also being developed using LiDAR to estimate land use, crop type and water use. TWDB should evaluate whether any of these alternative methods could be applied to more accurately estimate irrigation use since this is the largest single use of water in Texas. The benefits from the project would include:

- Development of a more accurate methodology to estimate agricultural water use where use data is not currently collected.
- An alternative method may improve consistency in estimates and supplant USDA and FSA collected irrigated acres and crop type which are being collected with less regularity.
- An alternative method may be able to estimate use to a smaller unit than the current method which estimates irrigation use at the county level.
- An alternative method may also be able to be automated which could significantly reduce staff effort.

Project tasks would include:

1. Evaluating potential remote sensing methods;
2. Compare results to current estimation methods;
3. Develop methodology to implement alternative methods.

The evaluation of potential alternative methods is estimated to cost approximately $200,000-$250,000. On-going costs have not been calculated but are likely to be equal to or less than the current amount TWDB is spending.

APPENDIX A
REFERENCES

List of References

1. United Sates Geological Survey, Estimated Use of Water in the United States in 2010, Circular 1405, U.S. Geological Survey, Reston, Virginia 2014.

APPENDIX B
INTERVIEW TRANSCRIPTS

Interview Transcript

Date: March 31, 2016

Organization: Edwards Aquifer Authority (EAA)

Contact Name: Roland Ruiz, Mark Hamilton

Contact Phone Number: (210) 222-2204

Contact e-mail: rruiz@edwardsaquifer.org

Interview Questions

1. Tell us about your organization and the water use data you collect?

EAA is different from other GCD's Primary function to regulate withdrawals from the Edwards Aquifer. On an annual basis collect use data from flow meters for Municipal, Industrial and Agriculture customers with permits and assess fees. Exempt domestic and livestock (same as state definition) use is estimated. All this data is available on their website http://www.edwardsaquifer.org/.

2. How is the data collected?

Flow meters for all permit holders which are self-reported, field verified with some meters with telemetry. Annual use reports from all permit holders which are transmitted by paper or electronically to EAA.

3. How frequently is the data collected?

At a minimum annually. During a critical period, users are required to submit their use monthly. EAA has several types of monitoring wells. Index wells which are read every 15 minutes like J-17 and J-27 that measure the various pools (Bexar and Uvalde respectively). They have 50 wells with pressure reducers and manually measure 200 wells for their synoptic survey.

4. Is the data collected by source, water user, or diversion location?

Reported by well and categorized by use. Fees assessed by use and type.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

By use type.

6. Please provide an estimate of how much your organization spends annually on data collection?

Contract with USGS for streamflow and recharge data collection. Annual budget is approximately $750,000. The $750K is a combination of internal costs and USGS contract.

USGS data collection contract is about $330K, while the remainder is EAA labor and equipment costs.

7. What does your agency do with the collected data?

Verify compliance with permit holders. Assess fees. The collected data is critical for sound science and research.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

Already share water level and recharge data. Trying to better collaborate with TWDB.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

The more metered wells you have the more accurate the data. EAA only estimates exempt well use.

Interview Transcript

Date: April 1, 2016

Organization: Hidalgo County Irrigation District No. 2.

Contact Name: Sonny Hinojosa

Contact Phone Number: 956-787-1422

Contact e-mail: hcid2@sbcglobal.net

Interview Questions

1. Tell us about your organization and the water use data you collect?

   Irrigation district, one of twenty-six in the region. Purpose is to divert and distribute Rio Grande water. Primarily irrigation, raw water for municipal, some industrial and occasionally mining.

2. How is the data collected?

   Diversion from the river are metered. Diversion are submitted to the water master. On a monthly basis the diversions are distributed based on use. Submit requested diversion to the water master on a monthly basis, at the end of the month account for use.

3. How frequently is the data collected?

   Monthly at a minimum. Certify diversion from the Rio Grande on a weekly basis. Staff read all meters.

4. Is the data collected by source, water user, or diversion location?

   A little of each. Diversions from the Rio Grande are metered. Individual irrigation uses are not usually metered with a small number of irrigation customers that have meters (golf courses, amenity ponds, etc.)

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   Irrigation and municipal, some industrial and occasionally mining.

6. Please provide an estimate of how much your organization spends annually on data collection?

   $3.2 million annual operating budget all function are part of data collection.

7. What does your agency do with the collected data?

   How they bill users, how they comply with TCEQ and the Rio Grande water master.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

Yes, through TCEQ.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

   He provided a copy of the recent monthly Rio Grande Water master report. Suggests that TWDB work with the water master to collect data rather than the individual user. They are currently installing automated canal gates and will be able to measure flow on each lateral, help in identifying water loss.

Interview Transcript

Date: March 21, 2016

Organization: North Plains Groundwater Conservation District

Contact Name: Steve Walthour (General Manager), Pauletta Rhoades (Finance and Administration Coordinator), Dale Hallmark (Assistant General Manager/Hydrologist)

Contact Phone Number: 806-935-6401

Contact e-mail: swalthour@northplainsgcd.org

Interview Questions

1. Tell us about your organization and the water use data you collect?

   The North Plains Groundwater Conservation District covers approximately 7,400 square miles and all or a portion of 8 counties in the Northern Panhandle. The District has been monitoring water levels since 1955. In 2007 the district began collecting production data for their own purposes and Regional Water Planning.

2. How is the data collected?

   Required for all wells above a certain size. The reporting is due to the District by March 1 of each year. The use is reported by property location. Small domestic and livestock use is exempt. The water use data is measured by a flow meter, or calculated based on hours for irrigation or fuel use. The methods are outlined in the "Metering and Production Reporting Manual" available online at http://www.northplainsgcd.org/phocadownload/information/DistrictDocs/meter%20and%20production%20reporting%20%20final%202013.pdf

3. How frequently is the data collected?

   Annually, by a paper survey. Hoping to automate the process in the next couple of years.

4. Is the data collected by source, water user, or diversion location?

   The data is collected for 12,000 wells by groundwater production unit which can be in up to 1,500 acre increments.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   Aggregate amount, do not distinguish by use type, can make educated estimates of use type.

6. Please provide an estimate of how much your organization spends annually on data collection?

   The following are ballpark estimates. $400,000 collecting production data, $1.5 million for all collection and reporting including water level measurements, groundwater production data, groundwater quality data and data associated with various grants and programs.

7. What does your agency do with the collected data?
    a. Production limits, make sure users are not producing more than their limit.
    b. Groundwater management planning including district-wide analyses, GMA Joint Planning, and Regional Water Planning.
    c. Monitoring and assessing aquifer conditions.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

    Yes, North Plains GCD is a public agency and will share the data. The North Plains GCD would like to see the production numbers they generate used rather than having to break down their estimates by crop type. This task requires them to hire an irrigation engineer to make these estimates. They would like to see the TWDB use their raw production data and then develop other estimates as necessary. Dale stated that the district limits use to 1.5 acre-feet per acre, which minimizes double cropping.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?
    a. Recommend using flowmeters or alternative measurement methods. Develop a standard method to estimate use. Example of their manual.
    b. The TWDB should quit trying to calculate groundwater production based on areal extent. For instance, in Dallam and Hartley Counties for the Rita Blanca TWDB historically has used an areal extent to calculate groundwater production from that aquifer at over 30,000 acre-feet. Only about a dozen wells produce groundwater from that aquifer.
    c. Talk to High Plains GCD, Jason Coleman (General Manager).

Interview Transcript

Date: March 29, 2016

Organization: Panhandle GCD

Contact Name: C.E. Williams

Contact Phone Number: (806) 883-2501

Contact e-mail: cwilliams8@aol.com

Interview Questions

1. Tell us about your organization and the water use data you collect?

   Main data is at the farm level with meter (720).

Also county level with 850 monitoring wells.

2. How is the data collected?

   Field technicians collect the data at least annually. Same with monitoring wells. Estimate exempt use, looking to meter all use in the future. Any new wells >4" are required to have a meter.

3. How frequently is the data collected?

   2-3 times annually for study areas, the remainder at least annually.

4. Is the data collected by source, water user, or diversion location?

   Mostly by location.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   By far and away mostly irrigation. Municipal (CRMWA, Amarillo, others) comes from quarterly reports for exporters out of the GCD. These are usually sent in by e-mail.

6. Please provide an estimate of how much your organization spends annually on data collection?

   $200,000-$250,000

7. What does your agency do with the collected data?

   Mostly used for aquifer management.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

   Yes, routinely share.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

Hope to get to a point in time with good meter data that is defensible. Next five years all their users will be metered. The district is currently conducting a project on their meter readings.

Interview Transcript

Date: March 31, 2016

Organization: Texas A&M University

Contact Name: Dr. Guy Fipps

Contact Phone Number: (979) 845-7454

Contact e-mail: g-fipps@tamu.edu

Interview Questions

1. Tell us about your organization and the water use data you collect?

   ET Network – Texas Agrilife Extension. The ET network was started 20 years ago by Dr. Fipps. The ET data is used throughout the state to provide data for ET calculations. It was primarily used for agricultural purposes, but has recently been used for urban landscape irrigation through watermyyard.org.

2. How is the data collected?

   Through a system of ET weather stations. Starting to develop a dense urban ET network (Dallas and Houston).

3. How frequently is the data collected?

   Record hourly data, download data daily.

4. Is the data collected by source, water user, or diversion location?

   At the weather station.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   Ag irrigation, landscape irrigation.

6. Please provide an estimate of how much your organization spends annually on data collection?

   Distributed amongst sponsors. Will get back with a dollar amount. All funded by the sponsors with no funding from Agri-Life.

7. What does your agency do with the collected data?

   Publish online, sell to consulting firms.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

Not for free. Need to participate in the cost of operating the stations.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

   State Agency (TWDB) to help fund the ET network and provide QA/QC. TWDB should be more active in data collection. All these agencies are collecting data and self-reporting to TWDB, but how accurate is the water use data.

Interview Transcript

Date: March 29, 2016

Organization: Texas Alliance of Groundwater Districts (TAGD)

Contact Name: Sarah Rountree Schlessinger

Contact Phone Number: 512-660-9622
Contact e-mail: sarah@texasgroundwater.org

Interview Questions

1. Tell us about your organization and the water use data you collect?

   TAGD acts as a "Centralized database of GCD's". Represent 79 of the 100 confirmed GCDs in Texas. Provide technical training and support to their members. They host some data on GCD's through their GCD index (http://www.texasgroundwater.org/gcdi-map.html). They have some water use data. Individual GCD's collect water use data for their issued permits, non-permitted and municipal uses.

2. How is the data collected?

   Most survey data is collected by TAGD through electronic surveys. The data used for the GCD index is contained in a Microsoft Excel spreadsheet.

   Some GCD's collect permitted water use data through meters, some require voluntary use reports from permittees, although all use is not metered. Meters can be cost prohibitive and certain permit types, such as exempt use permits, do not require metering. Wells that are used solely for domestic or livestock use if the well is either located on a tract of land greater than 10 acres or if the well is incapable of producing more than 25,000 gallons of water a day are exempt from GCD requirements to obtain a permit. In addition, wells used to supply water for a rig that is actively engaged in O&G drilling or exploration, or authorized by the RRC for mining activities are also exempt. There is not a standard for calculating exempt use so this data is less accurate. One improvement would be to standardize the calculation of exempt use.

   Many GCD's also have monitoring wells they use to measure water depth and water quality for aquifer management.

3. How frequently is the data collected?

   Annually for GCD index

   Individual GCDs collect data annually at a minimum.

4. Is the data collected by source, water user, or diversion location?

For GCDs, water use permits are recorded with an instantaneous rate and acre foot per year, meaning the well capacity and annual use. Data recorded on actual usage will depend on the individual GCD and their requirements.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   Yes, most of the livestock and municipal may be exempt use. See note above regarding exempt use specifications.

6. Please provide an estimate of how much your organization spends annually on data collection?

   Web design to create the GCD index $3,500, annual updates cost TAGD approximately $500 plus staff time

7. What does your agency do with the collected data?

   GCD index published online and serves as a resource to the public.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

   Available for everyone, work closely with the groundwater division staff at TWDB.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

TWDB could coordinate with TAGD to seek input through the online surveys.

Texas would benefit from more accurate water use data being recorded, and for it to better reflect reality. That data in turn needs to be used more effectively in management and planning processes such as the Regional Water Planning Groups. For example, Regional Water Plans should show unmet needs if no reasonable water management strategy is available to meet the demand. Interest for data collection to more accurately reflect reality.

Standard methods for estimating exempt use and non-metered use.

Interview Transcript

Date: March 28, 2016

Organization: Texas Commission on Environmental Quality

Contact Name: Kim Wilson, Kelly Mills and Kathy Alexander

Contact Phone Number: 512-239-4691

Contact e-mail: kwilson@tceq.state.tx.us

Interview Questions

1. Tell us about your organization and the water use data you collect?

   Non-water master: Paper forms sent in January back in March through the summer. TCEQ can issue an NOV if a water right holder is not reporting. The data is stored in an access database which is moving to an Oracle database.

   Water master: If a user wants to divert water, fill in form, amount, location and duration. Will then reconcile after the fact. All use is metered. Data is maintained in a separate database.

   Data Quality – started enforcement in 2011-2012 timeframe. A lot of phone call and massaging to get data right.

2. How is the data collected?

   Non-Water master: Paper forms sent to individual water right holders.

   Water master: Call in, email or fax of diversions.

3. How frequently is the data collected?

   Non-Water master: Annually

   Water master: As needed less than annually

4. Is the data collected by source, water user, or diversion location?

   Non-Water master: By water right authorization, so if multiple diversion locations only aggregate reported

   Water Master: by diversion location

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   The form asks for use type.

6. Please provide an estimate of how much your organization spends annually on data collection?

   Not able to provide at this time.

7. What does your agency do with the collected data?

   Enforcement, available for use for naturalizing flows etc.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

   Yes, TCEQ already shares this with TWDB. At the moment they think this is done with a Microsoft Excel Spreadsheet.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

   Electronic reporting.

Interview Transcript

Date: March 28, 2016

Organization: Texas Water Resources Institute

Contact Name: Kevin Wagner

Contact Phone Number: 979-845-2649

Contact e-mail: klwagner@ag.tamu.edu

Interview Questions

1. Tell us about your organization and the water use data you collect?

   Texas Water Resources Institute (TWRI) work with the Texas A&M Agrilife extension service. It was established in 1952 in response to the drought. In the 1960's lead research agency. Key focus on water related research projects. Research projects with some cities for AMI development of dashboards.

2. How is the data collected?

   Provided directly by cities for AMI, daily downloads. Collect data for specific research projects.

3. How frequently is the data collected?

   See previous.

4. Is the data collected by source, water user, or diversion location?

   Livestock by County, Irrigation statewide, AMI for individual meters.

5. Is the data broken out by water use type (Irrigation, Livestock, Municipal, etc.)?

   See previous.

6. Please provide an estimate of how much your organization spends annually on data collection?

   AMI – $100,000 to $120,000 with 10% for data collection about $12,000 per year.

7. What does your agency do with the collected data?

   Research, education (water conservation), target programs to a specific area. AMU achieve conservation through a dashboard tool to identify behaviors.

8. Would you be willing to share this data with TWDB to be used for their reporting to USGS?

Yes, would have to check back with research sponsors.

9. Do you have any recommendations on how water use data should be collected in Texas based on your experience?

   Need standardized approaches and data collection routinely conducted. Little specific irrigation on irrigation. Top two,

   a. Routinely collect the data.
   b. Standardized data collection.

Interview Transcript

Date: March 3, 2016

Organization: Texas Water Development Board

Contact Name: Cameron Turner

Contact Phone Number: 512-936-6090

Contact e-mail: Cameron.turner@twdb.texas.gov

I called Cameron to introduce myself and provide an overview of the project. I asked Cameron to briefly describe the role of his group and how they collected data and developed use estimates. Below is a summary of my (incomplete) notes:

1. USDA Farm Service Agency (FSA) irrigated acreage data is used as the starting point. To address lack of data, estimates are sent to every groundwater conservation district (GCD) for their input. Often the GCD replies that they don't have any better information.
2. Irrigation rates (5 yr rates) are developed by crop (expressed as inches/acre by crop). Weather data and reference evapotranspiration (ET) rates used.
3. Reference ET rates are developed using satellite imagery.
4. Surface water diversion data provided by TCEQ:
    a. Available in summer for previous year
    b. Same data supplied to Kevin Kluge
    c. Other data brought in to determine where and how much water applied (e.g. LCRA annual reports, Rio Grande Watermaster)
5. Mentioned contract with Bureau of Economic Geology (BEG) for remote sensing (?)
6. Attempt to determine wastewater reuse volumes for agricultural customers
7. Golf course irrigation: including those that use groundwater is challenging
8. Ag conservation group coordinates with WCIDs in addition to GCDs
9. Kevin Kluge working with TWDB's Groundwater Division to refine groundwater estimates
10. The USGS 5-year water census attempts to identify water use trends
    a. Cameron has told local USGS staff that one problem with the 5 year cycle is that it can miss extremes such as drought. E.G. reporting water use in 2010 and 2015 missed the worst part of the drought.
    b. I mentioned another potentially misleading situation would occur if one year was an extremely dry year and the fifth year after that was an extremely wet year would show a misleading trend of severely declining agricultural water use.

11. Cameron recommend that we contact Dr. Guy Fipps at Texas A&M University. He has extensive knowledge of Rio Grande basin Ag use and basin initiatives, and has done some interesting work with UAVs/drones.
12. Recommended talking to Sonny Hinojosa with the Texas Irrigation Council.

APPENDIX C
TWDB COMMENTS ON DRAFT TEXAS WATER USE DATA WORKPLAN

Texas Water Development Board
P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

June 22, 2016

Mr. Tom Gooch
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Austin, Texas 78746

RE: Contract between the Texas Water Development Board (TWDB) and Freese and Nichols, Inc. (F&N); TWDB Contract No. 1600011920, Draft Report Comments for **"Texas Water Use Data Workplan"**

Dear Mr. Gooch:

Staff members of the TWDB have completed a review of the draft report prepared under the above-referenced contract. ATTACHMENT 1 provides the comments resulting from this review. As stated in the TWDB contract, F&N will consider revising the final report in response to comments from the Executive Administrator and other reviewers. In addition, F&N will include a copy of the Executive Administrator's draft report comments in the Final Report.

The TWDB looks forward to receiving one (1) electronic copy of the entire Final Report in Portable Document Format (PDF) and six (6) bound double-sided copies. **Please further note, that in compliance with Texas Administrative Code Chapters 206 and 213 (related to Accessibility and Usability of State Web Sites), the digital copy of the final report must comply with the requirements and standards specified in statute. For more information, visit http://www.sos.state.tx.us/tac/index.shtml.** If you have any questions on accessibility, please contact David Carter with the Contract Administration Division at (512) 936-6079 or David.Carter@twdb.texas.gov.

F&N shall also submit one (1) electronic copy of any computer programs or models and operations manual developed under the terms of this Contract if applicable.

If you have any questions concerning the contract, please contact Kevin Kluge, the TWDB's designated Contract Manager for this planning project, at (512) 936-0829 or kevin.kluge@twdb.texas.gov.

Sincerely,

Jessica Zuba
Deputy Executive Administrator
Water Supply and Infrastructure

Enclosure

c: Kevin Kluge, TWDB

Our Mission
To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas

Board Members
Bech Bruun, Chairman | Kathleen Jackson, Board Member | Peter Lake, Board Member

Jeff Walker, Executive Administrator

Attachment 1
TWDB Comments on "Texas Water Use Data Workplan"
TWDB Contract No. 1600011920

Level One Comments (Must be addressed in Final Report):

1. Page 1, paragraph 3, sentence 4 – Please revise sentence to "While the TWDB is the primary agency to report water use data to the USGS, they are not the only agency..."
2. Page 1, paragraph 3, sentences 5 – 8 – Please reword sentences 5 through 8 similar to the following: " The Texas Water Code requires all water right holders to report their water use to the TCEQ. In areas without a Watermaster, water right holders self-report their annual water use to the TCEQ, including the amounts of water used in each month. For Watermaster areas, diversion data is reported to the Watermaster on a real-time basis."
3. Page 2, paragraph 1, sentence 2 – Please include the statement: "While the projects included are recommended prioritized projects to meet the state's data gaps, there has been no ranking of the individual projects due to the necessary individualized actions and coordination to undertake each."
4. Page 2, paragraph 3, sentence 3 – Please replace "...industrial users with greater than 10 million gallons of water annually." with "...industrial facilities that use significant amounts of water relative to the area."
5. Page 2, paragraph 4, sentence 2 – Please revise sentence to: "The outline below represents a high-level overview of irrigated agricultural water use data collection efforts at TWDB:"
6. Page 3, step #4, sentence 4 – Please revise sentence to note that some information regarding wastewater reuse is received from groundwater conservation district feedback.
7. Page 3, paragraph 5 – The description of how mining water use estimates are developed is incorrect. Please replace with a description similar to the following: "The TWDB mining water use estimates are based on a combination of sources. For water use estimates of hydraulic fracturing, data is downloaded from the FracFocus Chemical Disclosure Registry. All operators of hydraulic fracturing operations in Texas must report information to this national online registry. For other types of mining activities, such as coal, sand, gravel, aggregates, and other types of mining, a water use survey is annually sent to the active facilities. In addition, dewatering information is annually received from the Texas Railroad Commission."
8. Page 3, paragraph 6 – The description of how steam-electric power water use estimates are developed is incorrect. Please replace with a description similar to the following: "The steam electric power generation water use estimates are based upon the annual water use survey of roughly 90 power generation facilities. Co-generation, hydropower, solar, and wind facilities are not included in the steam-electric power water use estimates."
9. Page 6, bulleted paragraph 2 – This type of collection duplication is being addressed through the LUC (Loss, Use & Conservation) project. At some point in the report, please note that this is being dealt with though a currently-implemented project since LUC-related efforts will be taken off of the potential project list.
10. Page 6, bulleted paragraph 3, sentence 2 – Please consider clarifying that this was an assumption held by a stakeholder outside of the TWDB. Also, please note that TWDB irrigation estimates are intended to reflect actual water use, not potential ET and full,

calculated usage. In addition, any known delivery losses are included within the application rates for those counties with surface water irrigation.

11. Page 6, Table 2-2 – Please correct the following topics: Table lists High Plains GCD, but should be North Plains GCD, and according to the transcript the cost of collecting water use (production) data is only $400,000, however the $1.5 million is for the collection of a much larger range of data, including demonstration projects. Hidalgo County ID 2's stated cost is their entire operating budget, rather than strictly data-collection costs; this should be noted in a footnote to the table.
12. Page 7, Subsection 3.1.1 – This subsection discusses the USGS HUC 8 water-use reporting priority and the associated data gap in Texas. Please include additional information regarding the geographically-specific data gaps. The following is an example of such information: "A USGS research priority is the collection forms of water data – diversions, pumping, use, and return flow – at the smallest subregion or watershed level, described as the hydrological unit code (HUC) 8 level. Currently, such data is collected at various geographic levels in Texas. Diversions related to surface water rights can be linked to one or more diversion points. Pumping volumes may be associated to individual wells when collected by GCDs, but when collected by the TWDB water use survey, the total pumping is generally associated to an aquifer and county/major river basin area. The location of use for industrial facilities is a specific latitude and longitude; for public water systems, locations are based on a 2010 shapefile of boundaries, and for other types of water use estimates, the location is by county and river basin. The county and major river basins do not necessarily align with the 211 HUC 8 reporting units, as shown in Figure 3.1. The wastewater return flow data would be available at the discharge point, but such information is not currently readily available."
13. Page 8, Subsection 3.1.3 – Please include information regarding internal water use for utilities, as collected in the annual water use survey. The following sentence could be added to convey the information: "Nearly all community PWSs in Texas receive an annual water use survey which asks for the volume of water delivered internally to six customer categories: single-family residential, multi-family residential, commercial, institutional, industrial, and agriculture. In addition, retail PWSs in Texas with a financial..."
14. Page 8, Subsection 3.1.3, last sentence – Please delete the sentence, as it goes beyond identifying a data gap related to the USGS data priority and discusses a potential project.
15. Page 9, Subsection 3.1.4, sentence 3 – Please clarify description of golf course irrigation: "In cases where golf courses receive water from a public water system, the water used for irrigation is included as municipal water use."
16. Page 9, Subsection 3.1.5 – Please replace "...industrial users with greater than 10 million gallons of water annually." with "...industrial facilities that use significant amounts of water relative to the area."
17. Page 9, Subsection 3.1.6 – Please replace the current incorrect text with text similar to the following: "Mining water use estimates are developed by the TWDB through data collected through the water use survey and downloaded from the FracFocus national registry for hydraulic fracturing. Data collected through the survey is associated with a specific water source and the North American Industrial Classification System (NAICS) code for the facility. Hydraulic fracturing operation data is associated with a specific well

location, but no information is provided regarding the water source: purchased, surface water, fresh groundwater, brackish water, or treated effluent."

18. Page 9, Subsection 3.1.7 – Please add additional information regarding the collection of domestic/residential water use and the challenge of population estimation. A potential revision may be: "Domestic per capita water use is calculated based on the PWS surveyed water use and estimated population. Texas currently spends significant effort in calculating municipal per capita water use since this forms the basis for water demand projections in the regional water planning process. Water volumes for domestic water use is collected through the water use survey, and water systems are increasingly able to categorize their internal water deliveries by customer categories. Continued emphasis needs to be placed on accurately identifying these factors with respect to an entity's per capita use, however, the estimation of population served is more difficult. The state does not currently have updated service-area boundaries for water systems, which complicates the estimation of population, as well as geographically linking the systems to weather and socio-economic data. In addition, per capita rates are sensitive to multiple factors such as the weather conditions which drive outdoor water use, population growth and industrial, commercial and institutional uses. Continued emphasis needs to be placed on accurately identifying these factors with respect to an entity's per capita use."
19. Page 9, Subsection 3.1.5 – Please include text stating that industrial is one of the specific uses authorized in water rights. Surface water right holders with these authorized uses report that use on their annual water use reports or to the Watermaster.
20. Page 9, Subsection 3.1.6 - Please include text stating that mining is one of the specific uses authorized in water rights. Surface water right holders with these authorized uses report that use on their annual water use reports or to the Watermaster.
21. Page 9, Subsection 3.1.8, sentence 2 – Please add 'reported' between 'not' and 'by'.
22. Page 9, Subsection 3.1.8 – Please note that individual GCDs or subsidence districts may collect well-specific data that could be summed to the HUC 8 areas.
23. Page 9, Subsection 3.1.8, last sentence – Please delete the sentence, as it goes beyond identifying a data gap related to the USGS data priority and discusses a potential project.
24. Page 10, Subsection 3.1.9 – Please note that PWSs are making gains in their ability to report internal water deliveries, though it would be beneficial to have consistent categorization of all water use.
25. Page 10, Subsection 3.1.10 (Improved data collection…), sentence 3 – 5 - Please delete the sentences, as they goes beyond identifying a data gap related to the USGS data priority and discusses a potential project.
26. Page 10, Subsection 4.1 – As was discussed, the feasibility of a single database for all water-use related program is quite small. The option could be retained, but the recommendation should acknowledge the coordination that would be necessary between agencies and organizations to integrate their individual datasets through common data (entity codes, timeframes, geography…) and online data portals. In addition, please remove TNRIS as the proposed data collection organization.
27. Page 10, Subsection 4.1 – TCEQ reviewers comment that: "Although an integrated water use database could be useful, TCEQ would need to continue to collect the data required to comply with the statues and rules for its programs. TCEQ could potentially provide its collected water use data for incorporation into an integrated database." Please incorporate this feedback into the potential project description.

28. Page 11, Subsection 4.2, last sentence – Please revise sentence to "Most data listed is publically available, though it may not be readily available to the public."
29. Page 12, Table 4-1 – The identified uses for surface water diversions do not include all of the uses authorized in water rights permits across the state, please revise to include all types of surface water uses.
30. Page 12 – One of the eleven USGS data priorities was omitted: 10 - "Public systems stratified by socioeconomic factors". Please include. Within the potential description of associated data collection in Texas for this data priority, please note that the TWDB currently has a geodatabase of 2010 service area boundaries for PWSs, which would allow water systems to be associated with U.S. Census Bureau socioeconomic data. However no process or application exists to update these boundaries or add new boundaries as new water systems are established."
31. Page 13, Subsection 4.4, paragraph 2, first sentence – Please clarify that TWDB does not collect or distribute the data.
32. Page 13, Subsection 4.4 (TPDES Data Clearinghouse) – Lynley Doyen of the TCEQ Compliance Monitoring Section noted in a June 9th, 2016 email to Kevin Kluge that TCEQ does not store the TPDES data in a state database, but rather data is entered and stored directly into an EPA database. The EPA has made the TPDES information accessible to the public through the ECHO website (https://echo.epa.gov/) and has an initiative to make the data more transparent and accessible to the public. Please revise the project description to include such information.
33. Page 14, Subsection 4.5 – Please specify that such a report would be most appropriate for unmetered groundwater withdrawals. TCEQ contacts note that many surface water rights permits include specific requirements for how reporting must be done. Water rights with those types of permit conditions would be required to report in accordance with the requirements in their permits.
34. Page 14, Subsection 4.7 – Please remove this entire section of the report as this project largely reflects what is being done already in the TWDB's LUC project.
35. Page 16 - Please provide a description regarding how the costs were estimated.
36. Page 16, Table 4-2 – Please add works "Preliminary" or "Estimated" before the project cost header to acknowledge the limitation of the cost estimate.
37. Page 16, Table 4-2 – Please remove TNRIS as a Responsible Organization in the Water Use Data Integration project.

Level Two Comments (Comments for consistency);

1. Page 1, paragraph 2, last sentence – Please consider revising the sentence to "The Texas Water Use Data Workplan includes three primary components described in sections 2 through 4 of this report." The initial wording was somewhat confusing when referencing 3 sections and the next sentence started with "Section 2..."
2. Page 2, Section 2 – Please consider adding a summary table of data that is collected by category, agency/organization, frequency, and geographic level.
3. Page 3, #6 – Please consider adding "Agriculture Conservation" between "TWDB" and "staff".
4. Page 4, paragraph 1, last sentence – Please consider revising the last sentence to: "Water use data in Watermaster areas is maintained by TCEQ in the Watermaster's database."

5. Page 6, bulleted paragraph 1 – Please consider noting that each of the independent data collections are required by legislation independently, and so may require inter-agency coordination or legislative action.
6. Page 7, Section 3, paragraph 1, sentence 3 – To provide clarification, please consider revising the sentence to "The list of USGS priorities is included below with a brief discussion of associated Texas' data collection gaps that might be addressed in Section 4, Potential Water Use Data Projects."
7. Page 7, Section 3 – In Table 4.9, the USGS priorities are numbered 1-11. Please consider numbering the 11 priorities listed in Section 3 as 1-11, rather than '3.1.1', to make it easier to match the text to the table.
8. Page 8, Figure 3-1 – Please consider adjusting the colors in the map; when printed in black and white the HUC 8 areas cannot be distinguished.
9. Page 8, Subsection 3.1.2, last sentence – To provide additional clarity, please consider revising sentence to something similar to: "Water use tracking would need to be tied spatially to the surface water diversion and groundwater pumping locations so that interbasin transfers could be tracked between HUC 8 reporting units."
10. Page 8, Subsection 3.1.2 – Please consider the comment from TCEQ: "Water rights that authorize interbasin transfers report their water use like any other water right. These water rights can be tracked to the HUC 8 level because the diversion point is authorized in the water right. However, the level of specificity would depend on the authorizations in the individual water rights."
11. Page 10, Subsection 3.1.10 (Improved data collection...) – Please consider noting that the challenge in disseminating information is not only technical, but also involve organizational costs.
12. Page 10, Section – Please consider changing the section title to "Potential Priority Data Improvement Projects", as these projects are considered priority, though they are not ranked amongst themselves and not all of the projects involve collection.
13. Page 10, Section 4, first paragraph – Please consider adding a sentence similar to the following between the first and second existing sentences: "Similar to the USGS Identified Research Priorities, these projects have been identified as priorities for the state's water use data, but the projects are not ranked amongst the group."
14. Page 12, Subsection 4.2.1 – Please consider moving the development of a service-area web-mapping application (#8) higher on the project task list. It is much more likely that such an application would be developed prior to any integration of geographically displayed information between various agencies and organizations.
15. Page 12, Subsection 4.2.1 - Please reconsider task #3 – Migrate water use data. As individual agencies and organizations will continue to collect and hold their own data, it might be more feasible to develop an online mapping application that displays the various dataset via online mapping web services.
16. Page 13, Subsection 4.3, paragraph 2 – If the cost estimate was developed in communications with WSWC staff, please insert this information as a footnote.
17. Page 14, Subsection 4.5 – Please consider revising the project title to "Unmetered Water Use Reporting Manual" as the methodology focuses on unmetered estimation. In addition, please note that district rules vary widely in regards to metering, monitoring, and reporting, so such a manual may need to address such different situations.

18. Page 16, Table 4-2 – Please consider moving this table between section 3 and section 4, as it provides a bridge between the potential priority projects and the USGS Identified Research Priorities.
19. Page 16, Subsection 4.9 – Please consider changing the section title to "Summary of Potential Priority Data Improvement Projects".
20. Page 16, Subsection 4.9 and Table 4-2 – Please consider changing "Responsible Organization(s)" to "Lead Organization(s)" or a similar description, as this report does not obligate any state agency or political subdivision to take a particular action.
21. Page 16, Table 4-2 – In Project 5, please consider revising the project title to "Unmetered Water Use Reporting Manual.
22. Appendix B – Please consider reviewing the transcript notes. A USGS reviewer was happy to see the transcripts included but found some notes difficult to understand.