Oklahoma Water Resources Board

Water-Use Data Enhancement Plan

Submitted to United States Geological Survey
December 2, 2016
Cooperative Agreement - G15AC00355

Oklahoma Water Resources Board
3800 Classen Blvd, Oklahoma City, OK 73118
Oklahoma Water-Use Data Enhancement Plan for Alignment with USGS National Water Census Reporting Standards

Introduction and Goals

Authorized by the Secure Water Act, the United States Geological Survey (USGS) Water Availability and Use Science Program has offered state water resource agencies a cooperative agreement opportunity to participate in its Water-Use Data and Research (WUDR) program. This program will provide financial assistance to improve the availability, quality, compatibility, and delivery of state water-use data and ensure that the data can be integrated with datasets maintained by the USGS. The USGS is the sole federal agency responsible for documenting water-use through the collection of water-use data reported to state water rights authorities and using other means to estimate use in twelve specific categories and numerous subcategories. The Oklahoma Water Resources Board (OWRB) welcomes the opportunity to collaborate with the USGS and other federal, state, and local partners to develop and implement these enhancements.

The OWRB currently administers more than 13,000 water rights in Oklahoma and collects annual water-use reports from each water right holder. The OWRB is statutorily bound to compile and update Oklahoma’s Comprehensive Water Plan, the state’s 50-year plan that reports and projects Oklahoma’s water-use in each sector. Aligned with USGS goals, the OWRB has planned for several initiatives to modernize its water-use information system for water-use reporting.

During state FY-16 the OWRB partnered with Oklahoma Management Enterprise Services (OMES), the state agency charged with information technology services, to launch an automated annual water-use survey and invoice delivery tool. Additionally, for state FY-17, a fund has been established to develop a web-based use reporting platform backed by a more robust water-use database. The reporting platform will include automatic validation tools that will significantly improve data quality, and because it will be more convenient to complete than mail-in forms, will potentially increase the percentage of reports submitted by water right holders. The OWRB will request federal assistance over the next few years through the WUDR Program to fund further development of these projects.

The OWRB is also currently contributing to the development of the Water Data Exchange network through partnerships with the Environmental Protection Agency, Western States Water Council, and State of Texas. This ongoing project will complement enhancements to the OWRB’s water planning, use, and allocation data by building an open-publishing data exchange to enable sharing of between state water agencies that comprise the WSWC body (18 western states), federal agencies, and the public.
Information provided by the USGS Oklahoma Water Science Center has been essential in development of the OWRB's Water-Use Data Enhancement Plan. Beneficial information was also provided by Water-Use Data and Research Program grants webinars, water-use webinar series and website, Interstate Council on Water Policy meetings, and discussions with other online data reporting platform administrators in the state. Summaries of current and future collaborators on this project, including the USGS Oklahoma Water Science Center, Texas Water Science Center, and numerous federal, state agencies and associations and councils are provided in this plan.

The following priorities outline a comprehensive preliminary analysis of the activities deemed vital to enable the state to meet four mutual goals of the USGS and State of Oklahoma: improving data quality, availability, delivery, and compatibility. An analysis of Oklahoma's current water-use reporting program is included followed by three priority tasks and potential associated action steps. A summary of additional products resulting from the 2015WUDR cooperative agreement, including a preliminary comparison of USGS baseline standards and OWRB methods and potential changes in collection and estimation techniques that would provide better alignment of water-use data for the public water supply and irrigation use categories is also included.

- Priority Task 1 - Improve Water-Use Data Collection and Data Quality
- Priority Task 2 - Additional Database Categories to Advance USGS Three-Tier Goals
- Priority Task 3 - Improve Water-Use Data Delivery

Current State Water-Use Program

As the state’s designated water management agency, the OWRB appropriates Oklahoma stream water and groundwater. Permits are required for all uses of water with the exception of domestic use. Water is allocated in acre-feet, the amount that would cover one acre of land with water one foot deep or 325,851 gallons. The OWRB performs required tracking, management, and modification of nearly 13,000 active long-term surface and groundwater rights and provides public access to historical water-use and permitting data.

In Oklahoma groundwater is private property that belongs to the overlying surface owner and is subject to reasonable regulation by the OWRB. Stream water (or surface water) is considered to be publicly owned and subject to appropriation by the OWRB. To acquire a water right in Oklahoma, a permit application must be filed and considered for approval by the State's nine-member Board. Surface supplies in the Grand River Basin, including a major portion of northeast Oklahoma, are under the jurisdiction of the Grand River Dam Authority.

The OWRB Water Rights Database Application (database) was developed in-house utilizing a Visual Basic.Net 4.0 application designed to support the agency’s water rights permitting functions. The application uses Oracle 11g R1 for back-end data storage, integrates with Crystal Reports for reporting functions, generates data from the agency’s spatial GIS database for both internal use and website customers, and generates data to support the annual required mail-out of water-use
forms. The Water Rights Database also generates data required to produce more than 16,000 forms and invoices to water rights holders. The forms are used to obtain water-use information from water rights holders and collect mandated fees. The Water Rights Database also is used to generate interactive GIS maps that display various data.

The OWRB utilizes an online provisional temporary water-use permit system for short-term water needs of users within the State. A provisional temporary permit authorizes an appropriation of water in an amount and from a source approved by the Board. A provisional temporary permit is granted by the Board’s Executive Director for a period not to exceed 90 days, is non-renewable, does not vest in the holder any permanent right and is subject to cancellation at any time within its term. It is not required to hold a hearing, publish application data or notify adjacent property owners or downstream domestic or appropriative users prior to consideration of this type of permit. The permit may be issued summarily and immediately at the discretion of and upon administrative approval by the Executive Director. Permit data is stored within the water rights database. Whereas no water-use reporting is required for this type of permit, the OWRB assumes that the fully permitted amount is used by the permit holder unless the permit is revoked or rescinded.

Water-use report forms are mailed during January of each year to every holder of a valid water right. These reports must be completed and returned with the annual file maintenance fee to the OWRB within thirty days of receipt. The reports become a component of the formal and legal record of each stream-water and groundwater right holder. Willful failure to complete and return a report with the appropriate filing fee can result in cancellation of the permit. Generally, a second mail-out occurs in early August to water right holders who have failed to submit reports.

The OWRB contracts with Presort First Class mailing services for several tasks in the generation of the forms. These services include the National Change of Address process, which is used to evaluate the current data stored in our database to identify changed, undeliverable, and correct addresses to generate a report for the OWRB, which is used to make corrections. The mailing service then prints the forms and prepares first class rate envelopes and flats for delivery to the US Postal Service.

The mail-out currently requires OMES IT staff to perform semiannual enhancement programming. The programming requires extensive testing by IT staff and numerous reviews from Permitting staff to identify errors that have been introduced. Generally, a substantial number of new errors are identified, which requires a labor intensive effort by both permitting and IT staff to meet mailing deadlines.

Water-use report forms provide site-specific water-use data for individual water-use permits for several categories, including public supply, irrigation, livestock and aquaculture, thermoelectric-power generation, commercial, industrial and mining. The categories are entered manually into the OWRB’s water rights database. The reports show metered, estimated, or calculated amounts of annual use of both surface water and groundwater. Forms for municipal, industrial, mining, and
power generation uses contain summary questionnaires requiring more detailed information, such as self-supplied and/or purchased amounts by month, population served, water sales to other entities, system features, and other information. In addition, large managed animal feeding operations receive an agriculture questionnaire requesting additional site information.

Completed water-use report forms filed by permit holders are scanned and indexed into the agency’s On Base imaging system, a single enterprise information platform for managing content, processes, and cases. There are two workflows used for processing water-use documents that are part of the annual mail-out: 1) water-use invoice verification; and 2) water-use report review. These workflows have been designed to identify and confine as many errors as possible, including missing and duplicate documents, to ensure that every report, invoice, and fee payment received from the permit holder is processed, and when necessary, to route for additional action to be taken as requested by the permit holder. This process provides a formal record that meets the OWRB’s records retention policy.

All water-use data is entered manually into the Oracle 11g R1 OWRB Water Rights database. Currently, no electronic QA/QC is performed on these data, potentially allowing introduction of data errors and misinterpretations of units during this phase. Following data entry, a substantial amount of staff time is spent performing non-holistic QA/QC for various purposes. Intensive manual QA/QC is performed by staff as individual basins and/or watersheds are studied as part of specific hydrologic investigations, including maximum annual yield studies.

It is critical that the OWRB increase timeliness and accuracy of water-use record keeping through a more holistic plan of specific actions, procedures, policies, and appropriate infrastructure. Major limitations associated the current water-use reporting and data collection system include the following:

- Water-use data forms are filled out by hand and mailed to the OWRB. The information is then manually entered by staff. Both of these steps allow for potential data entry errors and misinterpretations. Online submittal would greatly improve timeliness and quality control.
- Electronically generated quality assurance checks to correct or even flag potential errors are not available with the current system. Additional staff time must be spent on this task. Lack of timeliness and accuracy of data could allow for unauthorized use of water.
- The percentage of water-use report forms that are returned is hindered by the lack of a computerized online system.
- Data queries, tracking, and compilation needs are difficult and time consuming.
- Errors in compilation of water-use report forms are difficult to correct. This currently requires IT staff to compile complex computer code, further reducing the timeliness of water-use data availability.
- The current water-use mail-out system is costly and time consuming, making it difficult to meet deadlines.
Priorities for Improving Water-Use Data and Associated Activities to Address Priorities

The following priority tasks and associated activities address water-use data collection, quality, delivery, and compatibility. To determine data gaps, an assessment of data currently collected by the OWRB compared to the USGS Baseline Standards for Major Water-Use Categories table was conducted. A preliminary assessment of data calculations and estimation techniques used for assembling demand estimates for the OCWP was also performed as detailed in Priority Task 3.

Priority Task 1 - Improve Water-Use Data Collection, Quality, and Compatibility

The objective of activities under this task is to improve the percentage of completed and returned Water-Use Report forms, the quality of the data reported, and the compatibility of data collection methods with USGS’s methods in order to standardize the data. Accurate and timely water-use data is critical for determining water demand and calculating available supply for both daily and long-term water management and planning. The State’s current water law recognizes this fact by requiring annual water-use reporting as a condition for maintaining a water right in good standing.

The law also requires that appropriation of groundwater under a water right be based on a hydrologic study conducted by the OWRB to determine quantities of water in storage, recharge rates, yields, and ultimately each landowner’s fair share of water. The OCWP set a priority goal of completing yield studies by 2022 for all unstudied groundwater and river basins and groundwater basins where an existing study is greater than 20 years old.

As the first task in each hydrologic study, water-use data for the basin to be used in groundwater and surface water availability models is verified and corrections are made if errors are identified. Verifications and corrections on Water-Use Report forms have been completed or are in progress for ten major groundwater basins and seven surface water basins. This review includes an analysis of both current and historic water-use data for each basin. Each permit is reviewed in detail and permit holders are contacted when reports are missing or reported numbers are greatly different than previously reported amounts.

In 2008 the OWRB set a goal of improving data reporting and has taken steps to improve the percentage of reports submitted, including promulgating a new late fee and file maintenance fee, integrating second reminder mailings into the reporting process, and dedicating staff to complete change of ownership reviews for wrong addresses. A review of all reports received that year showed that only 59% of reports were submitted and of those approximately 15% had obvious errors (e.g., blank reports, missing data, over-reporting). With the improvements in place report submittals have increased to approximately 73% with an estimated 75% of those containing usable data. The ultimate goal for return rates is at least 90% or above within five years after implementing improvements. To accelerate this effort, a special follow-up letter is now sent to public water suppliers that have not returned Water-Use Report forms by August 1 of each year.
Proposed Activities

1. Development of the Water-Use Information System Redesign (WISR) project.

*Redesign of the OWRB’s water-use reporting database and development of a reporting application to enhance the collection, storage, processing, and reporting of water-use data in Oklahoma.*

Key components of WISR include the following:

- Permit holders will have the option of reporting annual water usage online.
- The database will be redesigned to allow for data not currently collected to be stored and retrieved including the entry of the USGS HUC 8 basin boundary code for each new and existing permit.
- The database will be more compatible with USGS Tier 1, 2, and 3 water-use standards.
- The application will perform automated quality assurance verifications at the time of entry and/or as required.
- The production and mail-out of water-use survey forms will be automated.
- Tracking mechanisms for financial invoices and records will be employed.

Initial work will entail contracting with an IT business analyst to examine the operations of the project, work closely with water rights administration staff to gather business requirements, and assist with the formulation of a viable system. The business analyst will also determine additional categories and subcategories to be built into the system that will meet USGS compatibility requirements, marginal quality water/reuse tracking, and other desired data. This process will establish technical requirements, stakeholders, tasks, deliverables, documenting/tracking requirements. The OWRB hopes to receive USGS WUDR funding to complete this project and the establishment of related policy, rules, methods, data management techniques. Anticipated outcomes related to data collection and data quality include the following:

Increased productivity of staff through the minimization of printing, mailing, and data entry;
- Increased accuracy of data through the minimization of manual data entry (includes verification of permit holders through a personal identification number);
- Increased accuracy of data through the elimination of manual calculations with the inclusion of water quantity calculators and lookup utilities;
- Decreased cost to permit holders and the state through the elimination of printing, sorting and postage fees for willing participants; and

2. Enhancement of water-use data quality assurance.

*Improving the quality of existing water-use data and developing a new methodology to improve the quality of water-use data reporting and the estimation of use for missing reports.*
Includes establishing deadlines and automated follow-up with water-users. This will require editing current reporting forms to clarify what data is being requested, revising report completion instructions, and developing new mail-out procedures as needed. The OWRB will perform this activity under state funding sources or through USEPA funding related to the Water Data Exchange project detailed under Priority Task 2.

3. Research and development of survey methods.

*Research and develop proven survey methodologies (e.g., the Dillman Total Design Survey Method used by the State of Wisconsin) and implement new reporting forms, mail-out procedures, information to generate buy-in and interest in reporting, and possibly enforcement procedures to improve percentage the of reports submitted.*

The OWRB will perform this activity under state funding sources.

4. Enhancement of the ownership verification process.

*Improve the change-of-ownership verification process to correct bad addresses and reduce non-reporting.*

Past analyses have shown that up to 15% of non-reporting has been attributed to change of ownership and incorrect addresses. The OWRB will update SOPs and conduct reviews and corrections on a more frequent basis, and streamline the hearing process to improve efficiency. The OWRB will perform this activity under state funding sources.

5. Analysis of water-use reporting requirements.

*Investigate rule changes and additional enforcement requirements to implement surface-water forfeiture procedures for water right holders that do not file reports.*

Initially, these changes will require an additional time commitment by legal staff for hearings. The OWRB will perform this activity under state funding sources.

6. Increased cancellation and reduction review.

*Develop SOPs and assess time commitment for increasing the frequency of statewide stream-water right forfeiture review.*

Historical funding shortcomings have prevented the OWRB from conducting regular reviews of stream-water-use compliance. The OWRB will perform this activity under state funding sources.

7. Increased outreach.

*Elevate outreach efforts to generate interest and convey the value of accurate and timely water-use reporting to the public, water right holders, legislators, and others.*

The OWRB will perform this activity under state funding sources.
8. Other state supported activities.

- Develop QA/QC training workshops, videos, etc. for water right holders.
- Submit articles for publication by various water-use sector organizations (e.g., Oklahoma Farm Bureau, Oklahoma Municipal League, Oklahoma Rural Water Association, Oklahoma Independent Petroleum Association, Association of County Commissioners, etc).
- Create brochures on water-use reporting.
- Increase field presence and permit information verifications.
- Find opportunities to coordinate training/education with other agencies and organizations, at trade shows, annual conferences, etc.
- Investigate validation criterion used by other states and organizations to improve data verification SOPs. For example, the criterion used by the State of Texas includes online survey pre-submittal and post survey QC checks (such as intakes < or > 50% of previous year, sales < or > 50% of previous year, matching buyer-reported and seller-reported sales, etc.). The State of Wisconsin utilizes a procedure that includes identifying mistakes by comparing reported data with pump capacity.

Priority Task 2 - Additional Database Categories to Advance USGS Three-Tier Goals

Improvement of the USGS Water-Use in Oklahoma Report necessitates a comparison of USGS's Tier 1, 2, and 3 Standards with the types and formats of data currently collected by the OWRB to identify opportunities for the collection of additional data, at the scale that can be readily incorporated into USGS reports. Initial review and recommendations will be developed according to USGS and State priorities for the two largest water-use sectors: Irrigation and Public Water Supply. Baseline Goals (Tier 1) will be assessed, followed by Tier 2 and Tier 3 for each category, as funding allows. The OWRB requests USGS WUDR funding to complete this task.

1. Evaluation of USGS water-use categories

   Evaluate USGS water-use compilation methodologies and data sources to determine how the OWRB can utilize similar methodologies to expand the types of data collected.

Data for many USGS water-use categories are already being collected by the OWRB. However, many subcategories used by the USGS cannot be derived from OWRB data. Retrieval and compilation of these subcategories will require modification and code development or the format itself may differ, i.e. PWS values may include industrial and commercial consumption.

Certain USGS sub-categories, such as saline waters, will likely not be incorporated unless as part of a new and more inclusive field for “marginal quality waters” that the State is considering. Many of the USGS categories already exist but are considered subcategories and will be defined as such.
Appendix A contains the OWRB’s preliminary comparison of USGS categories and subcategories contrasted with Oklahoma’s current water-use data for Tier 1, 2, and 3 goals. An assessment of potential changes necessary to meet those goals yet unattained is also included. Examples of potentially viable adaptations to current data collection efforts are as follows:

- Revise forms to request and collect water-use data not currently collected, such as confirmed per capita values, monthly reporting, additional parameters such as accounting for reuse, golf course irrigation, and irrigation crop type.
- Expand water-use database to add fields such as monthly breakouts of what is currently only reported annually where possible, pulling Commercial, Industrial, and Golf-Irrigation from the PWS values, assigning USGS Aquifer codes for ease of data query, new fields for accounting for marginal quality and recycled waters, and adapt SIC codes for various water-uses to improve reporting industrial use and query capability.
- Convert sources currently defined by OWRB-studied HUC8 basin boundaries to a corresponding USGS basin and assign HUC8 basin boundaries to groundwater permits through GIS queries of permits that fall within the new USGS HUC8 boundaries.
- Provide redundant reporting in multiple units (e.g. AFY and MGD).

In addition to improved data collection, QA, and data delivery, the announcement for FY 16 Cooperative Funding Agreements for the WUDR Program prioritizes improved data for irrigation and improved estimation of public supply deliveries to customer groups or classes. The following discussion provides a general assessment of potential easily recognized adaptations that could improve compatibility of these two categories.

a. Improved Estimation of Public Supply Deliveries.

In Oklahoma, almost 92 percent of the population and nearly all commercial and light industrial establishments are serviced by public water supply (PWS) systems. The OWRB’s current water-use reporting forms do not require data regarding transfer or sale of PWS water for these specific uses. According to the USGS, in general, Oklahoma’s larger cities can provide data on PWS deliveries to industry, commercial, and domestic customers, but smaller systems do not have methods in place for providing this data. Additional work will include an in-depth analysis for potential data requests to be added to the Water-Use Reporting form as well as the potential to collect additional useful data in the next Water Provider Survey that is slated to be sent statewide to providers in 2018 as part of the next update of the OCWP. This survey, previously sent to 785 water providers in 2008 for the last update, is designed to gather information on public water suppliers’ planning efforts, supply needs, and infrastructure needs.

b. Improved data for Crop Irrigation

Much of this dataset can be improved simply by requesting for more information on the Report form, i.e. Self Supplied Golf-Course use, crop type and associated acreage.
Reclaimed water-use is not under OWRB permitting authority but can be accounted for through collaboration with ODEQ’s permitting database. Through discussions with the USGS, Oklahoma Water Science Center, procedures used prior to 2010 will be assessed to determine if those calculations are more accurate than the procedure adopted in 2010, which primarily relied on data reported to the state, in comparison to data reported in 2005, and evaluation of rainfall and crop acreages. Previous estimates using acreage data of irrigated crops compiled by OWRB permit holders, with ET/Irrigation estimates were made using the Blaney-Criddle method. Other computation methods will also be assessed.

2. Grand River Dam Authority Water Plan and Water-Use Reporting System Development

The OWRB, GRDA, and U.S. Army Corps of Engineers Tulsa District (USACE) are collaborating on a phased project to develop the 50-year Grand River Comprehensive Water Plan (GRCP)--a first-ever effort to develop a surface water permitting system for the region, quantify supplies and demands, develop a multi-reservoir management model, and conduct a groundwater yield study of the Roubidoux and Boone aquifers. This project will assist GRDA in protecting and enhancing the beneficial uses of the surface and groundwater resources in the Grand Region.

Several opportunities exist with this project to establish a permitting system with built-in compatibilities with USGS data categories. This portion of the project is currently slotted to be funded with $200,000 state matching funds and FY 16 USACE Planning Assistance to States funding. Using data and modeling tools to support decision-making, the OWRB and IDC consulting engineers will assess the region’s water budget and other factors necessary to allocate and permit surface water rights in the region.

Priority Task 3 - Improve Water-Use Data Delivery

Data delivery is comprised of two components that are essential for increasing efficiency and timeliness in tracking water demand across the State:

- Collection of data from water-users submitting Water-Use Reports and
- Delivery of verified electronic water-use data, statistics, estimates, and calculations from the OWRB to the USGS for inclusion in the National Water Census and for other interested parties.

The Secure Water Act requires that states receiving financial assistance through the Water-Use Data Research program generate water-use or availability datasets that are available in an electronic format that can integrate with and be maintained by the USGS.

Priority Task 1 outlines tools the OWRB is currently developing, such as electronic platforms and reporting tools, that will greatly improve efficient and timely data delivery. The OWRB will regularly collaborate with the USGS, Oklahoma Water Science Center, and other USGS personnel throughout the design and development process for input on how these tools could be designed to provide the most compatible information and configuration for integration into their datasets.
These projects include the following:

1. **Water-use Information System Redesign (WISR)**

   The redesigned water-use reporting system will be focused on the deliverability of data with a much higher level of accuracy and completeness through an automated verification processes. The redesigned system also will greatly improve the timeliness of delivery. The OWRB and contractors will collaborate with the USGS Water Science Center to ensure design is compatible with the USGS database to ensure ease of retrieval of data. The OWRB will seek USGS funding for this work.

2. **Water Data Exchange (WaDE), Oklahoma Node, National Environmental Information Exchange Network**

   Several federal agencies, the WSWC, and other intergovernmental organizations have established a water data exchange project that would allow Oklahoma agencies to participate in obtaining and sharing standardized, accurate, and uniform water allocation, water supply, and water demand data maintained by several states, federal agencies, Native American tribes and multi-state cooperative government entities. The improved sharing and use of this data would allow Oklahoma more accurate forecasting of future water availability and demand by providing information regarding supply, reporting, and use from other states, federal agencies, and tribes.

   In 2015 the OWRB received USEPA funding through the WSWC to conduct a demonstration project with the goal of providing water-use data sharing opportunities for state government water organizations, the USEPA, and other interested parties. This project consists of aligning business logic, business procedures, data collection methods, database schema, and data transmission processes with the WSWC project. Additionally, historical water-use data would be transformed into the standardized format of the WSWC data standards. This project is slated for completion by September 30, 2017.

   Anticipated outcomes of the project include the following:

   - Improved ability to share and receive accurate and timely water supply and allocation data between entities;
   - Efficient and expeditious sharing of water data between WSWC states and other entities;
   - Automation of data formatting and data transmission between WSWC member states and other entities;
   - Greater transparency and direct public access to water data collected by Oklahoma; and
   - Improved data quality through dedicated funding by the EPA WaDE grant to perform quality assurance on a portion of existing data.
3. ArcGIS Open Data Platform

The OWRB is working to implement an ArcGIS Open Data web page to facilitate sharing live data with the public. This platform allows users to download full or filtered datasets as CSVs, KMLs, and shapefiles. However, before water-use data is ready to be shared in this way or on a web viewer, it must go through the QA/QC process described in Priority Task 1. Making this data available for download would give state and federal agencies and other users the ability to query water-use by watershed, county, aquifer, use category, etc. This data has applications for assessing use in hydrologic groundwater and Stream water models, instream flow studies, interstate compact water delivery computation, water plan updates, public water supply studies, etc. The proposed WISR as described used in conjunction with the ArcGIS Open Data Platform will greatly improve the online accessibility and deliverability to all stakeholders. Deliverability should occur with a higher accuracy level and in a timelier manner. Furthermore, shareholders will have access to additional data not currently collected and stored in the Water-Use Database.

Current & Planned Collaborations Related to Water-Use Data Enhancement Plan Development or Other WUDR Funding

<table>
<thead>
<tr>
<th>Entity</th>
<th>Contact</th>
<th>Research Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>USGS Oklahoma Water Science Center</td>
<td>Bill Andrews, Carol Becker</td>
<td>Estimated Water-Use in Oklahoma Scientific Investigation-data needs, OWRB data availability, collection methods, database needs, timing of 5-yr. reports, etc.</td>
</tr>
<tr>
<td>USGS Texas Water Science Center</td>
<td>Kristine Blickenstaff</td>
<td>USGS Red River Water Availability and Use Focus Area Study</td>
</tr>
<tr>
<td>Oklahoma Office of Management &amp; Enterprise Services</td>
<td>David Hamilton</td>
<td>IT agency contractor for Water Rights Database modernization, retrieval, and maintenance. New online water-use reporting application, changes to water-use reporting form,</td>
</tr>
<tr>
<td>Carollo Engineering</td>
<td>John Rehring</td>
<td>2012 Oklahoma Comprehensive Water Plan water demand estimations, data used, etc. and advice on use reporting improvements, etc.</td>
</tr>
<tr>
<td>Grand River Dam Authority</td>
<td>Darrell Townsend</td>
<td>Current data collection/estimation efforts, OWRB contract for development of new water-use permitting/reporting initiative, etc.</td>
</tr>
<tr>
<td>Interstate Council on Water Policy</td>
<td>Ryan Mueller</td>
<td>Member- Survey states for successful online reporting systems</td>
</tr>
<tr>
<td>Association of Western State Engineers</td>
<td>Ryan Mueller</td>
<td>Member- Survey states for successful online reporting systems</td>
</tr>
<tr>
<td>Select Oklahoma Communities</td>
<td>City manager or engineer</td>
<td>Advise on ease and ability to break out water-use data into priority subcategories, improving water-use reports, developing web-based reporting tools, beta-testing, etc.</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Oklahoma Municipal League and Oklahoma Rural Water Assn.</td>
<td>Kelly Danner/Jeannie Anthony</td>
<td>Advise on ease and ability to break out water-use data into priority subcategories, improving water-use reports, developing web-based reporting tools, beta-testing, etc.</td>
</tr>
<tr>
<td>USGS South Central Climate Science Center</td>
<td>Kim Winton</td>
<td>USGS Red River Drought Resiliency Study</td>
</tr>
<tr>
<td>Oklahoma Department of Environmental Quality</td>
<td>David Pruitt</td>
<td>PWS water-use data, SIDWIS, Water reuse data availability- irrigation and purple pipe, Recycled water: golf course irrigation, wash down, car washes, stormwater</td>
</tr>
<tr>
<td>Oklahoma Water Resources Board Financial Assistance Div.</td>
<td>Joe Freeman</td>
<td>Recycled water-use reported to EPA through Clean Water State Revolving Fund</td>
</tr>
<tr>
<td>Oklahoma Corporation Commission</td>
<td>Tim Baker</td>
<td>Marginal (saline waters) produced water reporting, etc.</td>
</tr>
<tr>
<td>Western States Water Council</td>
<td>Sara Larsen</td>
<td>Online National Water Data Exchange project</td>
</tr>
<tr>
<td>Groundwater Protection Council</td>
<td>William Blackwell</td>
<td>FracFocus Online Chemical Disclosure Registry- reporting system for Oil and Gas industry</td>
</tr>
<tr>
<td>Oklahoma Produced Water Working Group</td>
<td>Michael Dunkel</td>
<td>OWRB chairs this group established to determine quantities of produced water available and potential reuse opportunities. CH2M lead engineering firm.</td>
</tr>
<tr>
<td>Oklahoma Department of Agriculture/USDA</td>
<td>Jim Reese</td>
<td>Irrigation and agriculture water data availability, quality</td>
</tr>
<tr>
<td>Great Plains LLC/ USGS SCCSC</td>
<td>Grant Recipient</td>
<td>Restoring Natural Flow Regimes in the Great Plains Study</td>
</tr>
</tbody>
</table>
Additional Tasks and Products Proposed or Resulting from the 2015 WUDR Cooperative Agreement

As described in Priority Task 3, the OWRB conducted a preliminary comparison of USGS categories and subcategories contrasted with Oklahoma’s current water-use data for Tier 1, 2, and 3 goals as well as a summary of estimations of water use used in the compilation of statewide water-use statistics for determining water demand for the OCWP. This research also included an assessment of potential changes necessary to meet those goals yet unattained. This analysis is located in Appendix A.

Since submittal of the July 2016 draft Plan, additional Quality Assurance of existing water use data has been conducted to improve accuracy of current data. Our IT staff has also enhanced the computer code to generate water use forms in a manner to reduce errors and omissions. Efforts have already improved the accuracy of names and addresses for permit holders in the database subsequently improving the percentage of returned forms. The SOP for entry of water use data has been revised to improve the accuracy and timeliness of data entered. Additional outreach effort in the form of specific training on the proper procedure and format for reporting water use information has been conducted with rural water district providers across Oklahoma in an effort to improve accuracy of data submitted.
Appendix A

Comparison of USGS-OWRB Water-Use Data
Appendix A: Comparison of USGS-OWRB Water-Use Data

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>BASELINE GOAL TIER 1</th>
<th>OWRB</th>
<th>Proposed Change</th>
<th>TIER 2</th>
<th>OWRB</th>
<th>Proposed Change</th>
<th>TIER 3</th>
<th>OWRB</th>
<th>Proposed Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Water Supply (OWRB, M&amp;I)</td>
<td>Monthly withdrawals reported by system, water source, and water type.</td>
<td>Yes, but Fresh Only</td>
<td>site specific (intake or well/field) withdrawals</td>
<td>Yes, Annual and Fresh Only</td>
<td>Add Monthly data field to db and forms</td>
<td>Interbasin transfers</td>
<td>Not reported</td>
<td>Add Purchase/Seller name/quantity fields to db and forms; develop cross-ref. Db will ID when sales cross basins.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deliveries to domestic users from public-supply systems, and populations served</td>
<td>Deliveries yes, but not required Population reported, may not be able to distinguish Ind/Comm.</td>
<td>Add Population Served field to forms</td>
<td>Purchases and sources between systems</td>
<td>Sometimes, not required, and not set up for retrieval</td>
<td>Add Purchase/Seller name fields to db and forms</td>
<td>Internal non-revenue uses and losses</td>
<td>Not reported: Most systems do not have accurate information for this.</td>
<td>Add field for water produced vs. water sold; program encouraged to get water audit.</td>
</tr>
<tr>
<td></td>
<td>Report system information relevant to HUC-8 and county</td>
<td>Correct for SW systems</td>
<td>Reporting and verification of these deliveries</td>
<td>Sometimes, not required, and not set up for retrieval</td>
<td>Add quantity fields of purchases and source fields to forms</td>
<td>Improved estimates of population served by Diversion or Well field</td>
<td>Use of reclaimed wastewater for public or landscape irrigation.</td>
<td>Not reported</td>
<td>Add Population field to form (also in Baseline Tier 1)</td>
</tr>
<tr>
<td></td>
<td>Groundwater withdrawals with aquifer designation</td>
<td>Using Oklahoma derived boundaries</td>
<td>Can report also by USGS national boundaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual withdrawals by facility, reported by water source, by water type</td>
<td>Correct for SSI, Fresh Only</td>
<td>Require PWS to report Ind; develop matching SIC</td>
<td>Site-specific (by intake and/or well) annual and monthly withdrawals reported by water source, by water type</td>
<td>Correct by annual only and fresh water only</td>
<td>Monthly reporting</td>
<td>Site-specific consumptive use estimates.</td>
<td>Not reported</td>
<td>Add field to form (Systems would need to subtract out any public supply and reuse values from their total).</td>
</tr>
<tr>
<td></td>
<td>Withdrawal by industry classification</td>
<td>Only for SSI and PWS for transfers outside of regular service area. SIC codes may not match</td>
<td>develop matching SIC</td>
<td>Site-specific withdrawal by industry classification</td>
<td>correct for transfers outside of regular service area. SIC codes may not match, annual only</td>
<td>Require all Ind. in report, develop matching SIC</td>
<td>Site-specific discharges to surface water, or land application.</td>
<td>Not reported</td>
<td>Collaborate with ODEQ for database link.</td>
</tr>
<tr>
<td></td>
<td>Groundwater withdrawals reported with reference to aquifer.</td>
<td>Yes, when reported</td>
<td>Convert to USGS boundaries</td>
<td>Deliveries from public supply to industrial facility, and deliveries from other sources, such as treated wastewater.</td>
<td>Sometimes, not required, and not set up for retrieval</td>
<td>Add &quot;Other&quot; field for marginal quality water in report. (Important to track for WDF606*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial (OCWP_SSI, SubCat_M&amp;I)</td>
<td>Annual and monthly deliveries from public supply for commercial use.</td>
<td>Yes, when reported, Annual only</td>
<td>Require PWS to report Com; develop matching SIC</td>
<td>Site-specific annual and monthly withdrawals for self-supplied establishments.</td>
<td>Yes, Annual Only</td>
<td>Monthly reporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Groundwater withdrawals reported by water source, by water type.</td>
<td>Correct, Fresh Only, HUC8 for SW only (gw by basin)</td>
<td>Convert to HUC8 for GW Annual Only</td>
<td>Monthly reporting</td>
<td>Evaluation/reporting on water use by process (commodity processing, dewatering, dust suppression, etc.). Reporting on return flows/discharge of water from dewatering.</td>
<td>Not reported</td>
<td>Not an OWRB priority</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1
## Appendix A: Comparison of USGS-OWRB Water-Use Data

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>BASELINE GOAL TIER 1</th>
<th>OWRB Proposed Change</th>
<th>TIER 2</th>
<th>OWRB Proposed Change</th>
<th>TIER 3</th>
<th>OWRB Proposed Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Supplied Domestic (OCWP Sub SW)</strong></td>
<td>Self-supplied domestic populations, by HUC8 and county, and by water source.</td>
<td>No information is collected specifically for this category</td>
<td>Studies of actual metered domestic withdrawals, monthly by source</td>
<td>Studies may be done statewide to improve estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tier 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OWRB Proposed</strong></td>
<td>≤5 AFY for normal domestic use and grazing capacity of farm or domestic animals and growing of gardens/lawn of up to 3 ac of land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tier 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Irrigation-Crop (OCWP CI): OK same</strong></td>
<td>Aggregate annual withdrawals reported by water source, by water type, acres irrigated, and method of irrigation.</td>
<td>Yes, but Fresh and Method is not required to be unreliable.</td>
<td>Site-specific monthly withdrawals by well and/or diversion from surface-water feature, or delivery from reclaimed wastewater.</td>
<td>Yes from diversion; no on reclaimed wastewater</td>
<td>Add field for tracking all reclaimed wastewater or pull from ODEQ.</td>
<td></td>
</tr>
<tr>
<td><strong>Aggregate areas may be sub-county levels, but are feasible to summarize to county or HUC8</strong></td>
<td>County level and HUC8 where applicable</td>
<td></td>
<td>Monthly withdrawals reported by water source, water type, well associated acres irrigated and crop type, and method of irrigation system.</td>
<td>Yes on source and type (fresh only). No on Acres and crops irrigated and method</td>
<td>Questions are already on the forms, just add a field to track.</td>
<td></td>
</tr>
<tr>
<td><strong>Irrigation - Golf Courses (Sub of PWS)</strong></td>
<td>Site-specific annual and monthly withdrawals reported by water source, by water type, and acres irrigated. Groundwater withdrawals designated by aquifer.</td>
<td>Annual yes; Source yes; Type Yes, Fresh only, GW basin no</td>
<td>Consumptive use estimates, by course, reported by month or annual. Acres irrigated by system type, by course.</td>
<td>No information is collected specifically for this category</td>
<td>May require reporting for Water For 2060* tracking initiative, reuse only.</td>
<td></td>
</tr>
<tr>
<td><strong>Livestock (OCWP L): OK Sub of Ag</strong></td>
<td>Annual withdrawals for major facilities, reported by water source and by water type.</td>
<td>Annual by source, fresh water only</td>
<td>Site-specific annual and monthly withdrawals for all facilities reported by source of water, and by water type. Site-specific animal counts and animal type.</td>
<td>Annual only by source, fresh water only, no animal counts</td>
<td>Annual data by county and interpolated into OCWP basins. Add monthly.</td>
<td></td>
</tr>
<tr>
<td><strong>Thermoelectric (OCWP Same)</strong></td>
<td>Site-specific, annual and monthly withdrawals, and net power generation reported by cooling-system type (once-through or recirculating), by water source and by water type, and the source of the information (plant, gov't. agency, etc.). Site-specific return flows.</td>
<td>Annual withdrawals; Power generation no; Source yes; water type Fresh only; Source water no: Return flows no;</td>
<td>Site-specific annual and monthly consumptive use.</td>
<td>Annual only</td>
<td>Add monthly reporting and new field for return flows.</td>
<td></td>
</tr>
</tbody>
</table>

\* Water For 2060 is an initiative to track water use for the years 2010-2060. Uses are tracked but losses are not. County info is only for SW/GW and HUC8 for SW.
## Appendix A: Comparison of USGS-OWRB Water-Use Data

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>BASELINE GOAL</th>
<th>TIER 1</th>
<th>OWRB</th>
<th>Proposed Change</th>
<th>TIER 2</th>
<th>OWRB</th>
<th>Proposed Change</th>
<th>TIER 3</th>
<th>OWRB</th>
<th>Proposed Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquaculture</td>
<td>Annual withdrawals reported by HUC 8 and county, by source of water, and by water type; Site-specific return flows.</td>
<td>Annual withdrawals; HUC 8 (SW only) and County; by source; Fresh only; HUC8 for GW where applicable</td>
<td>Site-specific annual and monthly withdrawals; Site-specific facility information (method, species cultured, etc.); Site-specific return flows.</td>
<td>Annual withdrawals only; by facility; no detail information on facilities;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydroelectric Power (see Thermoelectric)</td>
<td>Site-specific, annual and monthly water use (water use to spin turbines) by water source and water type, and the source of the information (plant, gov't, agency, etc.); Site-specific return flows.</td>
<td>See Thermoelectric</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater Treatment (see Thermoelectric)</td>
<td>Annual and monthly deliveries from wastewater treatment plants to other users. Specify category delivered to (i.e. industrial, thermoelectric, irrigation, etc.)</td>
<td>No information is collected; Will be developed and specifically for this category; Water For 2060* initiative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Water for 2060 (Wf2060) is an Oklahoma conservation initiative. Its relevance regarding this summary is that it will track use of fresh water and marginal / brackish water (see website for more information: owrb.ok.gov)