Governor’s Water Augmentation, Innovation, and Conservation Council
Non-AMA Groundwater Committee
February 7, 2020

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- Place your telephone on mute when you are not speaking
- Leave your computer microphone on mute at all times if you have dialed in with a phone
- Announce your name before speaking
- This meeting will be recorded
Webinar Participants:

To eliminate the feedback problems we have previously experienced and hopefully better enable remote participation in committee meetings, we ask that you follow these instructions:

1) **Have WebEx call your phone line to enable audio participation via phone.**

2) **Make certain that your desktop or laptop microphone is MUTED.**
   
   *If you speak via phone and your computer’s microphone is unmuted, the two compete with one another.*

2) **Ensure that your phone is on mute when you are not speaking.**

*Please message Zack Richards through the chat box if you encounter problems and we will do our best to assist. We would also be happy to set up an appointment to troubleshoot issues with you outside of a committee meeting. We sincerely value your input and want to enable smooth, successful remote participation.*
Welcome and Introductions

Co-Chair Gail Griffin
Co-Chair Jamie Kelley
Discussion Topic: Groundwater Data

Presentation on Groundwater Data
Carol Ward, ADWR
Committee Goals

a) To achieve a baseline understanding of Arizona groundwater in Non-Active Management Areas.

b) To identify and develop voluntary alternatives to address groundwater issues by planning area while protecting individual property rights.

c) To make recommendations to the full Council for Best Management Practices at the local level.

d) The further discussion and recommendation of issues that may be brought forward.
1. Address questions raised to date
   • What data does ADWR collect?
   • For what purposes are the data used?
   • What data is needed / what data is missing?
   • What well information does ADWR collect?
   • What information does ADWR have by planning area?
   • What are some of the challenges / complexities in utilizing the ADWR data?

2. Respond to additional questions

3. Facilitate discussion, exploration, understanding of data related issues
Outside the AMAs and INAs

20% of state’s population is outside the AMAs and INAs—nearly 1.5 million people and growing rapidly.

31 out of 46 basins rely on groundwater for more than 75% of their total water use (green).

Some communities are entirely reliant on groundwater supplies.

Agricultural production increasing.

Ongoing drought.

Source: Arizona Water Map, WRRC, University of Arizona
Arizona Water Use By Source (2017)

- **36%** Colorado River
- **3%** Reclaimed Water
- **21%** In-State Rivers
- **40%** Groundwater

Source: ADWR, 2018
“Estimates of total groundwater in the state range as high as 900 million acre-feet – a seemingly endless supply.

But estimates of total groundwater say nothing about how much water is really available, which depends on location, depth and quality.

Arizona’s groundwater accumulated during hundreds of thousands of years before humans had the technology to pump it, and Arizona has historically pumped more water from the ground than nature can recharge through rain and snowmelt.”

Groundwater Level Data

**Index Lines**

Approximately 1,800 index wells statewide

Visited by trained ADWR Field Services staff annually, semiannually, or quarterly

Data from these wells are recorded and uploaded into the Groundwater Site Inventory (GWSI) database under an ‘Index Book’ designation

Index wells provide a consistent water level history from selected wells

Manually measured using electric sounders or steel tapes that take discrete water level measurements
Automated well sites

Statewide network of roughly 130 automated groundwater monitoring sites

Typical sites measure water levels four times daily and store the data electronically

Field staff retrieve the data quarterly and maintain the transducers

Data may also be collected from wells equipped with satellite telemetry systems, processed, quality controlled, and posted to the Department’s website for public use in near real time
Automated well sites

Continuous groundwater monitoring provides understanding of the impacts to aquifers seasonally and during periods of land use changes, drought, and development.

Enables identification of effects or trends within the aquifer or cumulative changes that could be misunderstood or might not be evident for years.

Enables better relation of changes in water levels to natural recharge (such as recharge from flood flows) and incidental recharge (such as agricultural recharge).
Basin Sweeps

An intensive effort to measure as many wells as possible over several weeks in order to provide a comprehensive picture of the groundwater system within an AMA, specific basin, or sub-basin

Resulting water level data support a number of water management and hydrology programs and are available to cities, consultants, other agencies, and the public

Basin sweeps of the AMAs are scheduled to be completed about every five years. Other basins are completed as needed and as resources allow
Groundwater Level Data

Reported Data

Annual Reports – designated providers are asked to provide groundwater levels annually on their reports

Recharge – water levels are required as part of the permit and annual reports for recharge facilities

Community Water Systems – are asked to provide water levels, if known, on their 5-year System Water Plan

Drillers Reports – Drillers are required to report depth to water at time of drilling
Groundwater Data - Uses

Categories of reports available on the Hydrology E-Library
- Bulletins
- Fact Sheets
- Groundwater Monitoring Reports (GMR)
- Hydrologic Map Series (HMS)
- Hydrologic Monitoring Reports (HMR)
- Land Subsidence Monitoring Reports (LSMR)
- Land Subsidence Maps (LSM)
- Miscellaneous Publications
- Open-File Reports (OFR)
- Professional Papers
- Water Level Change Map Series (WLCMS)
- Story Maps

Uses of groundwater data collected by ADWR
- Resource management (especially critical in drought)
- Preparation of groundwater models (Input and calibration)
- Map construction (depth to water, flow direction, water levels)
- Reporting hydrologic conditions throughout the state
- Development of annual water budgets
- Determining assured water supply
- Growth and development planning (urban and rural)
- Locating areas of concern and monitor groundwater mining
- Develop hydrographs and water level trends
InSAR

Utilized by the Department since 2002 to monitor more than 50,000 square miles for land subsidence

Staff identified more than 3,400 square miles of land subsidence in 2019

Subsidence maps are updated annually for use by hydrologists, geologists, water managers & public
Gravity Projects

Gravity data collection is measuring the acceleration due to gravity at a very small scale ($10^{-6}$).

Enables modeling of the depth-to-bedrock for groundwater basins, which assists in estimating how much groundwater is available:

- Completed for Hualapai Valley, Sacramento Valley, and Detrital Valley groundwater basins

Also used to measure the change in mass of water in the subsurface in order to estimate the change in aquifer storage between gravity measurements (resource intensive):

- Completed for the Pinal AMA since 1999
- Completed for the PHX AMA since 2002
- One small project for the Willcox Basin
Subsidence Data

**GNSS**

Global Navigation Satellite System data

Staff record survey-grade elevation data annually on existing survey monuments (or constructed monuments) and compare it with previous measurements to better understand both historical subsidence as well as current subsidence.
Planning Areas were identified for the purpose of developing short-term and long-term strategies to meet projected water supply imbalances as part of the 2014 Strategic Vision.

Data are more commonly organized by basin or sub-basin, but Planning Area is possible.

Developed updated water use estimates for six planning areas:

- Cochise
- West Basins
- Northwest Basins
- Gila Bend
- Lower Gila
- Upper Hassayampa / Agua Fria
USGS collects and estimates annual water use withdrawals for irrigation, municipal, mining, thermoelectric power, and drainage uses by basin.

When metered groundwater withdrawal data are not available, total irrigation withdrawal is typically estimated based on crop acreage, consumptive water requirement rates for crops, and irrigation system efficiency.

ADWR funds field verification of a select number of basins each year to improve estimates – boots on the ground.
Municipal withdrawals are the water withdrawn by public and private water suppliers and self-supplied domestic users.

Data are obtained from the water suppliers.

Self-supplied domestic water withdrawals are estimated from the self-supplied domestic population and per-capita water use.

Water withdrawal data for mining, thermoelectric power, industrial, livestock, and aquaculture are obtained directly from water users if possible.
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<th>Category</th>
<th>AMA/INA ≤ 35 GPM</th>
<th>AMA/INA &gt;35 GPM</th>
<th>Non-AMA/INA ≤ 35 GPM</th>
<th>Non-AMA/INA &gt;35 GPM</th>
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<td>withdrawals</td>
<td>withdrawals</td>
<td>(can estimate)</td>
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Groundwater discharge data - regional scale baseflow or springflow

Aquifer data, particularly for multiple aquifer systems, that differentiates aquifers (e.g. perched aquifer from a regional aquifer or confined from water table aquifers.

More frequent data collection in regional aquifers subject to regional scale changes; installation of transducers, monthly sampling,

Aquifer test data

Additional index wells in certain areas

More data generally – always helpful
Wells 35

Statewide registration of wells began in 1945 with the Arizona State Land Department (ASLD).

By June 20, 1968, all new wells, regardless of pumping capacity or location, were required to file a Notice of Intent to Drill (NOI).

The database, along with the original paperwork, is referred to as the 35-file because of the 35-prefix number to wells during the 1970’s.

Prior to the 35-series numbering system, the cadastral location was used to identify wells.

The 36,375 well records in the 35-file were transferred from the ASLD to ADWR when the agency was formed.
Wells 55

On or before June 12, 1982, existing wells had to be registered with the Department, along with the registration number it was previously registered under. All new wells from that point forward were to be registered with the Department. Any changes to ownership must be reported. Open wells must be reported. All of this information has been recorded in the ADWR State Well Registry Database, otherwise known as Wells 55.

Data categories include: Well Info, Imaged Record, Map, Pump Data

Actual Data (if provided) includes:
- Well Type,
- Well Depth
- Casing Depth
- Casing Diameter
- Drill Date
- Application Date
- Water Level
- Pump Capacity
- Pump data
- Completion Report
- Log Received
- UTM X & UTM Y
Applicant Supplied – All data is applicant (owner/lessee) provided through the well registration and well abandonment processes: the NOI to Drill and the NOI to Abandon a Well

Not Necessarily as Built – the NOI to Drill is a proposed plan, so the information may not reflect the actual construction or the abandonment conditions of a well.

• The driller’s report and well log must be reviewed to obtain details pertaining to actual well construction, the geologic materials encountered during drilling, and the exact well location

Multiple Entries – There may be more than one entry for a given well; an estimated 130,000 of approximately 160,000 records are valid

• The landowner, well owner, and/or well lessee may have all registered the same well
• It was once policy to assign a new registration number for a deepening or modification to the original well
GWSI (Groundwater Site Inventory)

Created by the United States Geological Survey (USGS) specifically as a repository for water level data. Acquired by ADWR from the USGS by in 1983.

GWSI is ADWR's main repository for state-wide groundwater data. Contains groundwater level, well discharge, location, construction, and some water quality data for wells. Also included are spring, surface flow, gravity, and GPS data points.

The data are collected by personnel from ADWR's Hydrology Division's Field Services Section, the U.S. Geological Survey, and other co-operating agencies.

The information in GWSI is constantly being updated by ongoing field investigations and through a state-wide network of water level and water quality monitoring sites.

There are approximately 43,000 wells within GWSI. Once the collected data are entered into GWSI, they undergo a series of quality checks to ensure accuracy. These records are verified and trustworthy.
A “Well Registration Number” data field in GWSI establishes a link to the WELLs 55 database for previously matched wells.

**Approximately half of the records in GWSI are registered, or matched, with the records in the Wells 55 database.**

There is a plan for matching the remaining GWSI records to the Wells 55 records, but it’s a matter of resources and priorities.

Wells found within the GWSI database may also be listed within other databases such as the WELLs 35 or the ADEQ database and may or may not be matched at this time.

To access the GWSI database and view a current map showing all ADWR’s index well monitoring sites, visit https://gisweb3.azwater.gov/gwsi
Information Included in GWSI

Well Construction and Finish Data, Driller’s Name, and Completion Date
Bore Hole Data
Well Casing Data
Well Casing Perforation Data
Flowing Discharge Data – for flowing wells and springs
Instantaneous Pumped Discharges from Wells
Well Lift (Pump) Data
Well Log Data
Well Ownership Data
Other Well Identification Data Remarks Pertinent Notes about Site

Personnel Who Inventoried Site
Name of Spring and other Data Pertaining to the Spring (if Site is a Spring)
Historic Water Level Measurements
Water Quality Data
Well Measurement Height and Location Point TRS Oracle View with Local Id Broken into Quadrant, Township, and Range – used for queries based on township and range
Sites General Location Data, Well Depth, Well Altitude, and Water Use Data
Online data submittal portal that facilitates annual reporting by designated water providers, Community Water Systems, and permitted recharge facilities. Reported water level data are added to the GWSI database.

The system is also used to accept water level data and related hydrologic data that are not required to be reported to ADWR.

The portal is the result of input provided by 70 individuals and organizations regarding their own water level data needs and water level data collection activities.

The application only supports GWSI wells, but non-GWSI wells can apply to participate.

http://www.azwater.gov/WLPortal/Login.aspx
Are there questions that we could ask of the existing data that would tell us what we need to know?

Are there better ways to examine the existing data?

If we can’t find the answers in the data we have, what data do we need to obtain? What options are available to obtain it?

Are answers to the questions necessary in order to begin discussions that could result in meaningful progress?
Refining and Prioritizing Discussion Topics

Co-Chair Kelly
ADWR
Update: Best Management Practices

ADWR
Next Steps

Committee Participants
Next Meeting

Potential Dates: April 10th & May 1st
Closing Remarks

Co-Chairs