Arizona Department of Water Resources

FACT SHEET

Statewide Automated Ground Water Monitoring
Field Services Section
Hydrology Division

Statewide Automated Ground Water Monitoring Program

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Visit us on the web at:
www.azwater.gov

GROUND WATER MONITORING GOALS

Ground water is Arizona's most precious resource

ADWR is tasked with providing stewardship of the State's precious and limited ground water resources through active management and enforcement of the Arizona Groundwater Code. The explosive growth in many rural areas of the state, coupled with impacts of the ongoing drought, have significantly increased the interest of Arizona's communities in water supplies. Although ADWR has much information regarding our state's water supplies, there are a number of areas in which information is limited. To address this issue, the ADWR received, for FY 07, an appropriation of $500,000 to establish automated ground water monitoring sites in areas of the state where data are lacking and to improve our understanding of the water supplies in these areas. Access to such information by local communities is intended to allow for more effective planning for current and future water needs as well as provide critical information to manage and mitigate drought impacts.

Ongoing water level monitoring currently being conducted by the Department includes collection of ground water elevation data from statewide index wells and, more recently, through automated ground water monitoring sites. These water levels allow the Department to track changes in the aquifer and to better relate the changes to ground water pumpage and recharge. These data tie together other equally important hydrologic monitoring information such as precipitation, snowfall, steam flow, and water use. This information is needed to assist with interpretations of water level fluctuations observed in monitoring wells. This gives the ADWR the ability to construct timely and accurate water budgets and monitor hydrologic behavior throughout the state.

WHAT ARE AUTOMATED GROUND WATER LEVEL DATA?

Methods for ground water level data collection include conventional techniques, such as an electric sounder or steel tape that take a discrete measurement, or automated ground water monitoring devices that record water levels on a predefined frequency on a continuous basis. Both methods of collection have their place in a statewide monitoring network. Economics and the degree of water level fluctuations in particular aquifer systems are driving factors in choosing the method of data collection.

Automated remote monitoring

OVERVIEW OF SITE SELECTION PROCESS

There is a need to develop a network of automated ground water monitoring sites located throughout the state. ADWR hopes to add 20 to 25 new automated monitoring sites per year, for the first five years. The selection of well locations for use in the automated ground water monitoring program include the following hydrologic and demographic considerations:

Well Selection Criteria

1. Aquifer Penetration - hydrogeologic units screened and well depth.
2. Well Use - non-equipped, unpumped wells needed.
3. Well Location - away from large aquifer stresses, such as nearby wells or recharge sites.
4. Long Term Use - potential to use over the long term, well doesn't dry up, and well access/ permission to monitor.

Location Criteria:

1. Land Growth Areas - declines and rises in water level, and acquisition of baseline data prior to development.
2. Subsidence - ongoing or potential subsidence leading to infrastructure damage.
3. River/Stream Channel Proximity - flood recharge, ground water discharge, riparian issues, and water right issues.
4. Land Use - ongoing or potential developments, sensitive areas, and Water Settlement agreements.
5. Superfund, RCRA, LUST, CERCLA Site Proximity - potential for contaminant migration and pumping of poor quality ground water.
6. Drought - areas affected by drought conditions

Performing manual water level measurement to confirm accuracy of automated water level device

What Makes a Good Well for Monitoring?

1. Unused well with no pump
2. Well that is not affected by large nearby pumping wells.
3. Well with a potential for use over the long term.

If you have a well and would like to volunteer it for use in this program, utilization would involve installation of a small pressure transducer in the well casing with a data collection device and battery in a secured enclosure at the top of the well. Data from the transducer site will be collected daily by satellite telemetry and backed up by quarterly field visits by Department staff and posted on our website for public use.

Typical Automated Ground Water Monitoring Site

Utilization of an automated monitoring device in a well involves installing a small pressure transducer or shaft encoder down the well casing and installing a data collection device and battery at the top of the well. These systems measure water levels four times daily and store the data electronically. The download of the data on a quarterly period is necessary to provide quality assurance such as equipment checks, transducer calibrations and adjustments, and software updates. Some of the systems are even equipped with satellite telemetry systems for near real-time measurements.

Additional Criteria

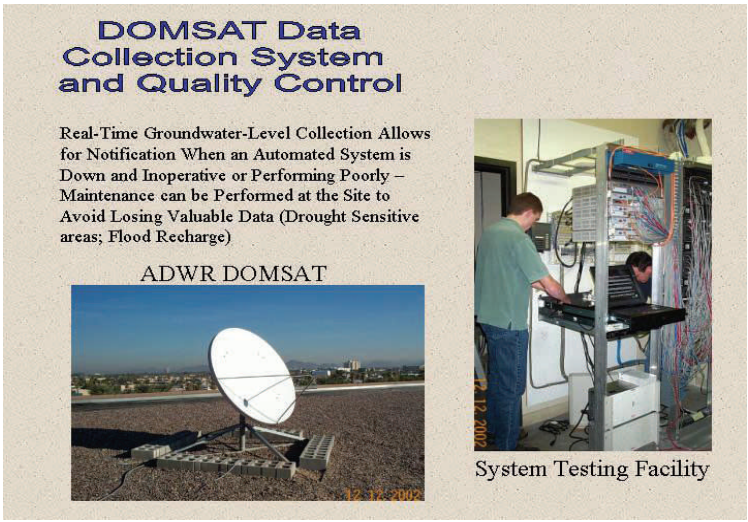
The Department needs your assistance with obtaining good sites for monitoring statewide ground water levels using automated devices. We need well owners to volunteer unequipped wells in order to develop a network of automated ground water monitoring sites. This well network will be geographically located throughout the state to better understand water levels within ground water basins.

"ADWR hopes to add 20 to 25 new sites per year to meet the needs of statewide groundwater monitoring"

Real-Time Data and Public Access

For many of the automated sites in the Active Management Areas, data are collected daily by satellite telemetry. The data are relayed through the Geostationary Operational Environmental Satellite (GOES) system to a Domestic Satellite (DOMSAT) and are processed in near real-time, quality controlled, and then posted on the ADWR website for public use.

Data are backed up or downloaded to a field computer quarterly during maintenance visits by Department field staff for verification and quality control purposes. The Ground Water Site Inventory (GWSI) database used for storing these data is under modification to improve its ability to deal with the automatic updates and the increased volume of information.



What Are the Data Used For?

Long-term continuous ground water monitoring can provide significant data used to understand the need to protect aquifers during periods of significant land use change, drought, and rapid development. Without long-term continuous ground water monitoring, effects or trends within the aquifer can be overlooked and cumulative changes in the aquifer misunderstood or not evident for years. Determining the appropriate frequency of measurements is key when attempting to understand the behavior and thus predictive ability of an aquifer system. If water levels in a particular aquifer do not vary significantly due to climatic or water use changes, then water level measurements can be performed on most wells without the installation of expensive automated devices.

Data collected are used to make water level change maps, short reports on the hydrology of ground water basins (ADWR's Hydrologic Map Series) and to generate hydrographs of wells showing changes in water levels over time. The hydrograph presented below shows a combination of climatic and near-by well pumpage variations, as well as regional aquifer trends in water levels. The recharge events, are observed in the transducer data, however, they are often missed when evaluating the sounder/steel tape data alone. These variations in water levels can then be used to make estimates of aquifer parameters when combined with climatic and geologic data. The data are also input into an ADWR-maintained database that contains information on ground water levels statewide. These water level measurements provide water resource managers data needed to make informed decisions regarding the future of one of Arizona's most valuable resources, ground water.

GWSI Transducer/Shaft Encoder Hydrograph AK Peacock Well

Local ID	Site ID	ADWR Reg. No.	Latitude	Longitude	Water Uses	Well Depth	Drill Date	Case Dia.	Latest Sounder	Depth to Water	WL Alt. above Mean Sea Level
A-04-01 34BDD2	333844112144501	622789	33° 38' 45.3''	112° 14' 45.4''	UNUSED	938		20	02/15/2006	403.53	811.47

GWSI is ADWR's technical database of well locations, construction data, and water levels.
Wednesday, March 29, 2006

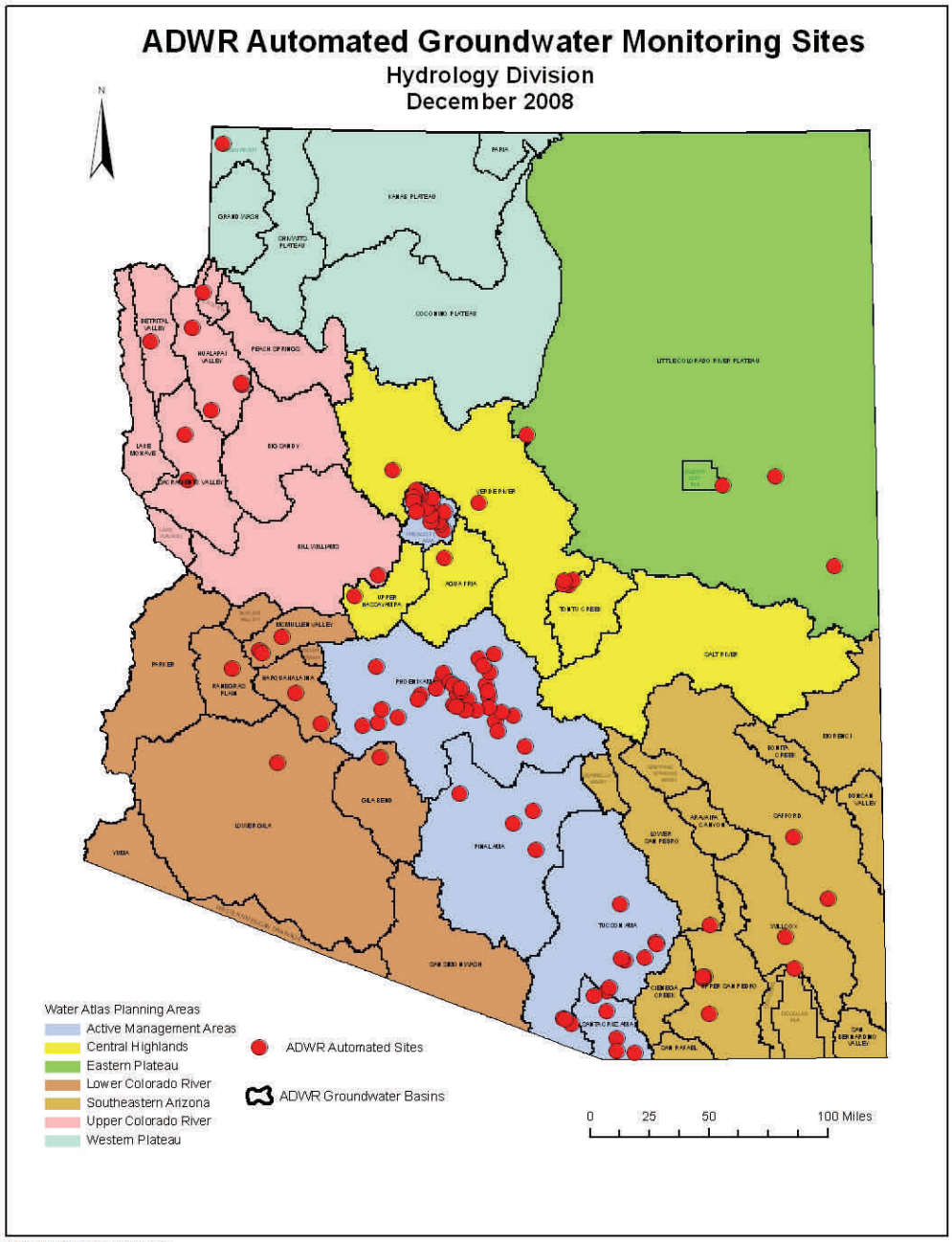
After collection and processing, data are "posted on the ADWR website for public use."

ADWR

Downloading data from automated ground water monitoring site

"...water level measurements provide ... data needed to make informed decisions regarding the future of one of Arizona's most valuable resources, ground water."

Well shelter containing automated water level measuring equipment



North American Datum 1983 HARN
1:3,118,077

Current Statewide Status

The current ADWR statewide automated ground water monitoring network is shown above and includes several types of devices: 7 shaft encoders; 69 real-time GOES equipped pressure transducers (data are collected daily by satellite (telemetry)); and 35 non-GOES equipped pressure transducers.
To view a current map showing all of ADWR's automated groundwater monitoring sites please visit: https://gisweb.azwater.gov/waterresourcedata/GWSI.aspx