

Groundwater Monitoring in the Sonoran Desert Network

PROTOCOL SUMMARY

Importance

In the desert, water is the limiting resource that most often defines the range of potential life forms on the surface. Groundwater monitoring provides a window to a hidden but vital desert water resource. The knowledge gained by groundwater monitoring has direct application in the planning, protection, management, and development of groundwater resources both within and surrounding national park lands. Sonoran Desert Network (SODN) groundwater monitoring is designed to provide data for tracking long-term depth-to-groundwater and water-table elevation. These data are essential to guide interpretation, use, and protection of groundwater resources.

The limited water resources of the Sonoran Desert are vulnerable to impacts from numerous factors, including climate change, increased human consumption, and effects related to changes in land use and watershed health. Depending on the setting, groundwater change can occur almost instantaneously or may unfold over decades or centuries. Because all life requires water to survive, understanding groundwater is basic to understanding the sustainability of present and future ecosystem function and health.

The water cycle integrates groundwater with surface water, climate, and vegetation. Despite longstanding perceptions of groundwater and surface waters as separate entities, the connection between these resources is nowhere more pronounced than in the arid southwest. In the desert, life-supporting surface waters vital to wildlife and its habitat exist on a fragile cusp linking surface and subsurface waters, and can disappear with minimal perturbation to the delicate balance that makes them possible.

Monitoring Goals

The goals of SODN groundwater monitoring are to provide resource managers with the information needed to:

- Quantify status and trends of National Park Service (NPS) groundwater resources within local and regional contexts
- Understand present and future threats to groundwater resources and the surface waters they support



Groundwater monitoring, Coronado National Memorial.

- Support interpretation of surface monitoring data
- Identify best management practices for resource planning, protection, and sustainability
- Provide for data archiving, integration with data from outside sources, and facilitate access by other users

These goals will be achieved by monitoring depth-to-groundwater and water-table elevation at designated monitoring locations, interpreting local and regional conditions relating to groundwater quantity, and providing for integration of NPS groundwater data with data from other sources.

Methods

To monitor groundwater, we record manual point-in-time measurements and continuous water level time-series. The water table is accessed via wells; to date, only previously existing wells have been monitored, making monitoring sites pre-selected. Data collection for this protocol is conducted by both network and park staff, depending on available personnel and logistical efficiencies. Groundwater data collection is performed in accordance with guidelines for inclusion of data in a long-term national groundwater monitoring network.

Collection of water quality data is also included in this protocol as a lower priority, with a long-term goal of collecting and documenting basic water quality and isotope data at least once for each well in the program.

Products, Scope, and Schedule

For each park, an annual summary report documenting effort and initial findings for the previous water year (October–September) is produced in April of each year. Comprehensive status and trends reports are produced after five years of data collection and provide a more detailed assessment of groundwater status and trends. Groundwater data and interpretation are also communicated through individual contacts with park staff relative to specific issues.

Protocol Status

Completion of the draft groundwater monitoring protocol and standard operating procedures is projected for June 2010. A database and supporting documentation that meets NPS and FGDC standards are under development.

Protocol Implementation

Groundwater monitoring has been implemented at Chiricahua National Monument, Coronado National Memorial, Fort Bowie National Historic Site, Organ Pipe Cactus National Monument, and Tumacácori National Historical Park. Installation of monitoring equipment is imminent at Saguaro National Park.

Protocol Contact

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Left: Preparing for groundwater monitoring, Coronado National Memorial. Right: Groundwater monitoring equipment.