

and Riparian Restoration Project

The New Mexico State Land Office has recently installed a piezometer at Bluewater Creek, Cibola County in an effort to measure groundwater fluctuations in and around a mass planting of cottonwood and willow. In March 2009, The WildEarth Guardians were awarded EPA funding to mitigate high surface water temperatures at Bluewater Creek by providing needed shade. An important step in evaluating riparian plantings is to perform regular groundwater observations so that overall health and rate of growth can be a measure of the ability of the watershed to provide suitable growing conditions. Long term groundwater measurements can provide important information for future expansion of riparian enhancements. Instrumentation used to measure water levels also records groundwater temperature. This information may be used to model changes in riparian temperature at the planting site. Additional surface water and bank temperatures are being measured approximately 2 miles upstream and at the planting site to help understand the inflow versus planting site characteristics. In addition to the increased tree canopy, habitat and recreational value were added to New Mexico State Trust lands adjacent and upstream from Bluewater Reservoir.

The traditional approach to measuring groundwater levels is to construct a borehole designed to measure groundwater conditions at a single point within the alluvial (streamside) aquifer. In this case, the borehole pipe materials were ordered from one tool company. A pressure transducer/water level logger was installed in the pipe to collect water level data at defined timed intervals and store the data digitally into long-term memory. By operating in a continuous 24/7 monitoring mode, users can accurately observe changes in groundwater levels and responses to floods, droughts and possibly plant use. The level loggers are programmed using a field laptop computer and an optical reader. The selected level logger can record groundwater levels and water temperature every .5 seconds to once every 99 hours or to an event based option. The instrument is synchronized to the laptop clock and the battery life is estimated to run 10 years. Since barometric pressure affects water levels in pipe, a second level logger (barologger) was mounted above ground to measure barometric pressure and that data is used to compensate pressure gradients inside the borehole pipe so true groundwater level readings are achieved. Barologgers also measure ambient air temperature.

Once the well point and pipe are assembled, the pipe is pounded in the ground with a simple post pounder. You must make sure the well point is sufficiently deep enough that groundwater fluctuations do not go below the well point and transducer or you will lose the ability to measure groundwater levels. A fitted galvanized cap on a short pipe extension with coupler is used with the post pounder to drive the piezometer pipe into the ground. As the pipe is driven into the ground, additional pipe extensions can be attached for the desired depth of the piezometer. The transducer is suspended from a threaded cap by a wire cable to the bottom of the well point. An oversized cap was used in this particular case and a lock was attached for security. Occasionally the pipe will fill with clay fines from long-term groundwater movement. A simple inertial pump can remedy this problem, please see link below.

crest gauge, if mounted properly in the stream. Crest gauges are used to measure the water level of the stream at all times. This information can be used to compare to groundwater fluctuations which is important if the field specialist is determining the hydraulic conductivity of the soil and rock adjacent to the stream. It helps determine the degree of permeability and if there is a real connection from surface water to groundwater in the vicinity of riparian plantings. A crest gauge can also take the guess work out of determining bank full width.

The transducer software allows immediate viewing of the data in graph or chart form, or simple downloading for future examination. It also allows easy export into a spreadsheet or database for further processing.

In an effort to help the readers understand and see the needed equipment for a simple piezometer, these links are provided.

Wellpoint:

<http://www.grainger.com/Grainger/wwg/search.shtml?searchQuery=5YM69&op=search&Ntt=5YM69&N=0&sst=All>

Pipe couplers:

<http://www.grainger.com/Grainger/wwg/search.shtml?searchQuery=5YM76&op=search&Ntt=5YM76&N=0&sst=All>

Pipe:

<http://www.grainger.com/Grainger/wwg/search.shtml?searchQuery=6P911&op=search&Ntt=6P911&N=0&sst=All>

Pipe cap:

<http://www.grainger.com/Grainger/items/6JK15?Pid=search>

Transducer:

<http://www.solinst.com/Prod/3001/3001.html>

Transducer guide:

<http://www.solinst.com/Prod/3001/LevelloggerInstructions.html>

Inertial pump:

<http://www.solinst.com/Prod/404/404d2.html>



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Bluewater Creek Restoration Project Groundwater Level and Temperature

