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THE WATER SOURCE

A QUARTERLY PUBLICATION OF THE EDWARDS UNDERGROUND WATER DISTRICT

November 1995

Wood Students Soak Up Water Wisdom

Three years ago, teachers at Wood Middle School in the Northeast Independent School District found themselves in a position familiar to many educators — making the transition to “team” teaching. That summer, three of the school’s seventh grade teachers attended a workshop hosted by the Edwards Underground Water District (EUWD). Their attendance spawned an interdisciplinary unit on the Edwards Aquifer which is viewed as the most successful unit presented by the grade level today. It includes 12 teachers and every discipline in the team: Math, English, Science, Social Studies (Texas History), and an advisory period.

Jean Hopkins, head of the Science Department, was one of the teachers who came to the workshop. “We were looking for something we could do across the board that had some commonality to it. The topic of the Edwards Aquifer stood out because science and history could do this, and we knew it could mesh with other subjects.”

Cinde Thomas-Jimenez, EUWD Education Coordinator, agrees. “The aquifer is an ideal topic to address in an interdisciplinary team unit because all the pieces fit: current events for social studies; geology and biology for science; recharge, precipitation, water levels, and conservation figures for math; and addressing all the

information through research and writing assignments for language arts.”

Thus began a unit which has grown every year. Students are literally saturated for one week, five classes a day, on the Edwards Aquifer. During the advisory period, students are given a daily dilemma which encourages problem solving. The unit concludes with a grade-wide debate on managing aquifer use.

“This is truly active learning,” states Norm Goldberg, one of the Texas History teachers. “The kids are participating in every event. When they go through it the whole day in school, and then see it on the news that evening, it’s real. It’s not just something in a textbook.”

Cindy Marthes, an English teacher, points out that the writing aspect really pulls students in and makes them think about it. The team emphasizes creative writing during the unit, and students also enter the EUWD’s Blue Thumb Essay Contest which is held each spring. The contest asks how our water supply can be protected from contamination. According to Sid Seidenberger, also in the English Department, that is where he could see science and English pulled together. “When I read the essays, I could see how the students drew from everything they had learned ... it all came together.”

Janice Williams, Texas History teacher, indicates that the unit provides a unique opportunity to pull local geography, current events and natural resources together in a relevant way. “From a Texas History class point of view, we have a real hook in this neighborhood.” She points out to her students that when they go out Loop 1604 to Rolling Oaks Mall and cross Cibolo Creek, they are just south of where the creek recharges the aquifer. Or when they take Loop 1604 over to Hwy. 281, they are on the recharge zone. Or when they go to Fiesta Texas, they are on the recharge zone. It all of a sudden becomes real. “They can tie into it in a very personal way. They even understand how Balcones Heights got its name.”

When discussing the debate, all the teachers become excited. Goldberg broke his classes into groups and challenged students with a role-playing assignment. One group was farmers, one was city residents, and one was environmentalists. All the major users were represented. Students had to look at different aspects of who should have the water, develop a plan stating why their group should have the water, and determine what resources had to be shared. Each group had to make a formal presentation to a “water board” composed of fellow students. The “water board” then

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Water Quality in the Edwards Aquifer

John Waugh, M.S. Geology
EUWD Hydrologist II

"Water, which so many townspeople never think about, having an obedient spring in the kitchen, is really among the most fragile of life's necessities."

H.V. Morton, *The Waters of Rome*

Archaeologists have discovered evidence of human presence dating back 10,000 years in and around the natural springs which flow from the Edwards Aquifer. Settlers were drawn to this area primarily because of the quality of plentiful water, thus water quality in the Edwards Aquifer has always been a critical issue in South Texas. Official monitoring of water quality began in the 20th century as development in the region accelerated. Records from water quality sampling in San Antonio date back to the 1930's.

One of the primary responsibilities of the Edwards Underground Water District (District), as stated in its enabling act, is "conserving, protecting, and recharging" the Edwards Aquifer. This refers to both the quality as well as quantity of a valuable resource that over 1.4 million of us depend upon for our sole source of safe, clean drinking water. The District, in cooperation with other agencies, has been collecting and reporting data from wells, springs, and rivers across the aquifer region for over 30 years.

The United States Environmental Protection Agency (EPA) has established standards for safe drinking water which specify the maximum concentrations of various naturally occurring constituents, as well as maximum concentrations of various natural and man-made pollutants. Although water from the Edwards Aquifer surpasses these drinking water standards, the possibility of aquifer contamination from various sources must be prevented through continued monitoring, as well as through education.

In South Texas, water begins its journey to our houses as rainfall in the hill country, which is located above the Edwards Aquifer recharge zone. Runoff from the hills enters the streams and rivers which carry the water over the recharge zone — the area where fractured and faulted Edwards limestone is exposed on the surface. Water in the streambeds enters the aquifer through these fractures, as well as through the many sinkholes and caverns which dot the recharge zone. It eventually moves through the aquifer to springs and wells where it is discharged and used for various purposes. Throughout this journey, pollutants can enter the water at many points and could potentially cause contamination to portions of our water supply. Regardless of the quantity of water available in the Edwards Aquifer, if it were to become contaminated, we would be severely challenged to overcome a potentially dangerous situation.

The major reason for monitoring water quality in the Edwards Aquifer is to maintain the excellent overall quality of water in the aquifer through the analysis of results from the annual monitoring of a network of wells, springs and rivers. Other reasons include:

- monitoring possible changes in water quality which may be attributed to increased development in sensitive portions of the aquifer area
- investigating reports of possible contamination of the aquifer, including both groundwater and surface water sampling, and providing this information to assist in remediation
- long-term monitoring of possible water quality changes along the freshwater/saline-water interface as aquifer levels fluctuate.

The District maintains a network of over 140 wells, as illustrated on the map, which are sampled on an annual or rotational (every two to three years) basis. These wells are a mixture of municipal,

agricultural, industrial, domestic, and livestock wells that have been sampled, in some cases, for over 30 years. Many of these wells are located on or close to the recharge zone to monitor for possible changes in water quality related to further development activities in this sensitive area.

Historical data is maintained and updated in the District's water quality database. Samples from wells and springs are analyzed for 78 constituents, including field parameters (ex. pH), inorganic constituents (such as calcium), nutrients (ex. nitrates), trace metals (ex. arsenic), pesticides, herbicides, and volatile organic compounds (such as industrial solvents).

If evidence of contamination is detected in a well during the annual monitoring program, and analysis of the data warrants further investigation, additional sampling may be performed to verify the problem and determine corrective action.

The District has also constructed and is continuously monitoring a second network of 19 transect wells across the freshwater/saline-water interface of the Edwards Aquifer. This interface marks the southern limit of the freshwater portion of the aquifer, and is defined by a water quality parameter known as the total dissolved solids (TDS) concentration. This parameter is a measure of the concentration of various salts which occur in water. The freshwater/saline-water interface is defined by TDS values greater than 1,000 milligrams per liter (mg/l) of water. The network of 19 wells which monitor the interface is sampled monthly or quarterly by District water quality staff for field parameters and inorganic compounds. This sampling is done primarily to monitor for possible changes in the position of this water quality boundary as water levels in the aquifer fluctuate during wet and dry periods.

The District's surface water monitoring network currently consists of seven sites on streams and rivers in the recharge and catchment areas of Uvalde,

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Water Quality *(continued)*

Medina and Bandera counties. This network provides data concerning the quality of water in streams and rivers about to enter the Edwards Aquifer through the recharge zone. These sites are sampled three times per year for the same parameters and constituents as the groundwater samples, as well as for biochemical oxygen demand (BOD), and for bacteria (fecal coliform and fecal streptococcus) concentrations.

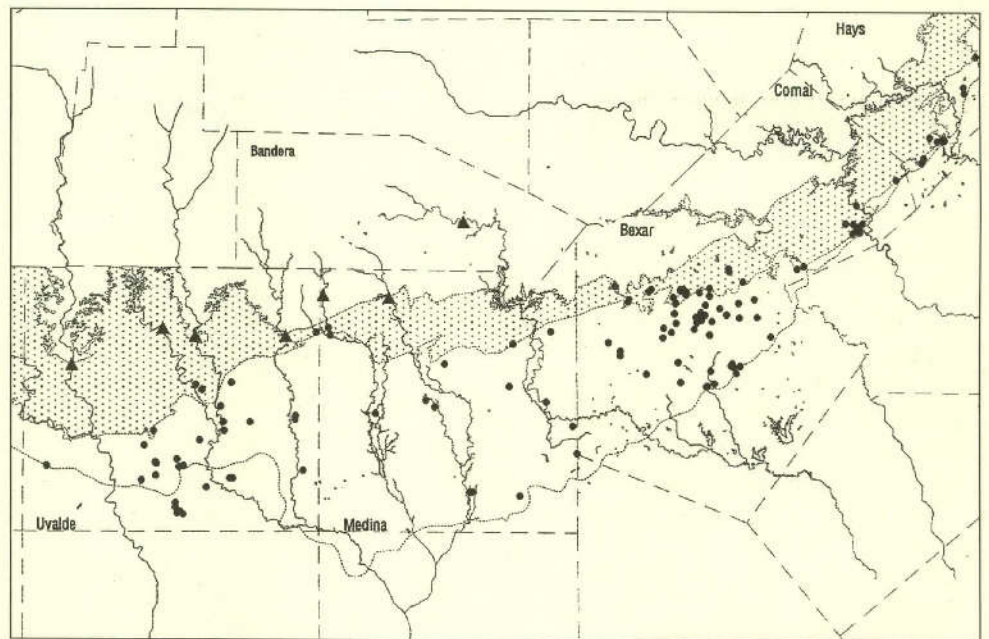
All the field data and laboratory analyses from the annual water quality monitoring program are entered into the District's digital database for reporting and analysis. The information in the water quality database is available for use by District hydrologists and other scientists in conducting water quality research, as well as for use as a comparative tool and for baseline data.

District water quality staff has undergone extensive training during the past few years to assure that accurate, reproducible data will be generated by the monitoring program. This training included courses in field sampling techniques, laboratory analysis, data preparation, and statistical analysis of results.

Last year, the District received a grant from the Texas Water Development Board and purchased a field laboratory trailer which is capable of conducting

extended sampling projects in remote areas of the aquifer region. This allows staff to sample and process bacteria samples in the field, and allows additional sampling of water entering the recharge zone from the streams and rivers originating in the hill country (Edwards Plateau). The additional sampling of rural areas will provide new data concerning water quality in the flowpaths leading toward the major springs in New Braunfels and San Marcos.

The District's water quality program is designed to monitor and protect the excellent quality of water that we receive from the Edwards Aquifer. The sensitivity of the aquifer to possible contamination makes it vital that this program be maintained, especially as South Texas undergoes rapid growth. Not only must we protect the quality of water for our current use, we must also insure that our children and grandchildren will be able to enjoy the pure, clear water from our Texas treasure. ■



- ▲ Surface Water Quality Network Site
- Water Quality Network Well
- ▨ Edwards Aquifer Recharge Zone
- - - Freshwater/Saline-Water Interface
- ~ Rivers
- - - County



WATER QUALITY MONITORING NETWORK

Wood Students *(continued)*

decided who got the water. The activity had the hallways buzzing, with the entire seventh grade talking about it.

Are students responding? Marthes mentioned that she had students go home and tell their parents not to use fertilizer. According to Goldberg, some of the preconceived notions he hears (which presumably come from parents) disappear as the students go through the unit. Then he hears how students are changing their parents' behavior. "I think we're introducing something that many of them will come back to as adults," says Williams. "When we're talking about conservation, it's not

uncommon for them to say they take 45 minute showers. They will tell me they had no idea that much water was coming through the shower."

To Williams, this is where the unit makes a difference. "I lived through the drought of the '50's, and we didn't understand how things worked. Today, I tell my students that they know so much more and they will be able to make good decisions when they become voting members of society."

Hopkins sums it up. "We reach 450 students a year. But it goes much further than that." Students share what they have

learned with their parents and other adults, thus going far beyond the community at Wood Middle School. Thomas-Jimenez agrees with Hopkins' assessment. "Students' interest and knowledge is carried into high school and on into adulthood. Hopefully, we will have generated a life-long interest in local events dealing with water and natural resources, as well as fostered a conservation ethic that will follow them the rest of their lives."

To find out more about the EUWD's summer teacher workshop series or education programs and materials, call the District at (210) 222-2204 or (800) 292-1047. ■

News Briefs

□ The Edwards Underground Water District's Board of Directors adopted rules at their regular meeting in August which requires all water wells within the District's boundaries to be registered. The Edwards Underground Water District covers parts of Bexar, Comal and Hays counties.

Well owners are required to supply information such as the size, depth, use and location of the well, and are subject to enforcement under the rules if they do not register. Those who have already registered their wells with the District do not have to do so again.

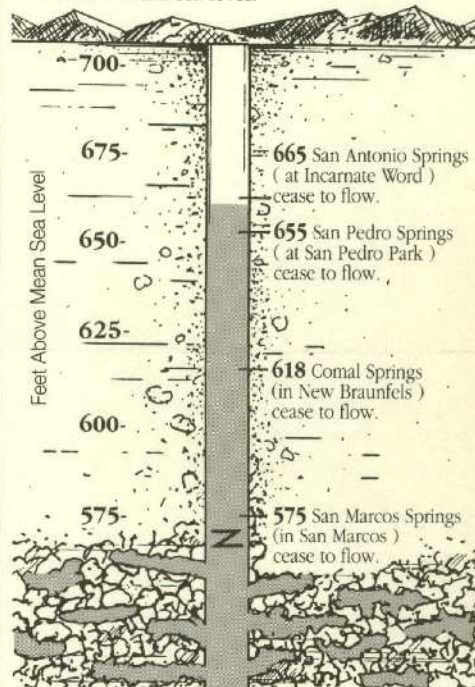
The Edwards Underground Water District's goal is to have accurate and complete records on how many wells are in the District, which includes the Edwards, Glen Rose, Cow Creek, and Carrizo-Wilcox aquifers. Copies of registration forms can be obtained at county courthouses, appraisal districts, city halls, main libraries and soil

conservation services in San Antonio, New Braunfels and San Marcos, as well as at the District's office at 1615 North St. Mary's in San Antonio. For more information, call 222-2204 or (800) 292-1047.

□ The Edwards Underground Water District has a speakers' bureau which is available to schools, civic and professional organizations. Topics can include the geology, hydrology and biology of the Edwards Aquifer, as well as water conservation or a general discussion on how the aquifer works. To schedule a presentation, contact the Office of Public Information at (210) 222-2204 or (800) 292-1047. ■

The Water Level

This reading reflects the daily high artesian water elevation at the Bexar County Edwards Aquifer Index Well. The bottom of the graph represents the depth of the well which is 143 feet below mean sea level.



Current Status: On October 31st, 1995 the elevation was recorded at 658.4. Average for October is 661.5.

THE WATER SOURCE

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