

REGIONAL ROSTER

CITIES
Alamo Heights Live Oak
Balcones Heights Lytle
Castle Hills Natalia
Castroville New Braunfels
Converse Olmos Park
Devine Sabinal
Elmendorf San Antonio
Helotes San Marcos
Hollywood Park Schertz
Hondo Somerset
Kirby Shavano Park
Kyle Terrell Hills
LaCoste Universal City
Leon Valley Uvalde
Windcrest

COUNTIES
Bexar Hays
Comal Medina
Uvalde

WATER PURVEYORS

Atascosa Rural Water Supply
Bexar Metropolitan Water District
Concord Public Utility District
East Medina Water Supply Corp.
Forest Glen Utility Co.
Gardendale Rural Water Supply
Helotes WC & ID #17
Hill Country Water Works Co.
Lackland City Water Co.
Lackland Heights WC & ID #16
Live Oak Public Utility Dept.
San Antonio City Water Board
Serene Hills Subdivision
Timber Creek Utility Dist.
West Medina Water Supply Corp.
Yancey Rural Water Supply

RIVER AUTHORITIES

Bexar-Medina-Atascosa Water
Control & Improvement District
Cibolo Creek Municipal Authority
Guadalupe Blanco River Authority
Nueces River Authority
San Antonio River Authority

SOIL & WATER CONSERVATION DISTRICTS

Alamo
Comal, Hays, Guadalupe
Medina
Nueces, Frio, Sabinal

MILITARY BASES

Fort Sam Houston
Kelly AFB
Lackland AFB
Brooks AFB
Randolph AFB

AGRICULTURAL EXTENSION AGENTS

Bexar County
Comal County
Hays County
Medina County
Uvalde County

SOIL CONSERVATION SERVICE

Bexar County
Comal County
Hays County
Medina County
Uvalde County

UNIVERSITIES

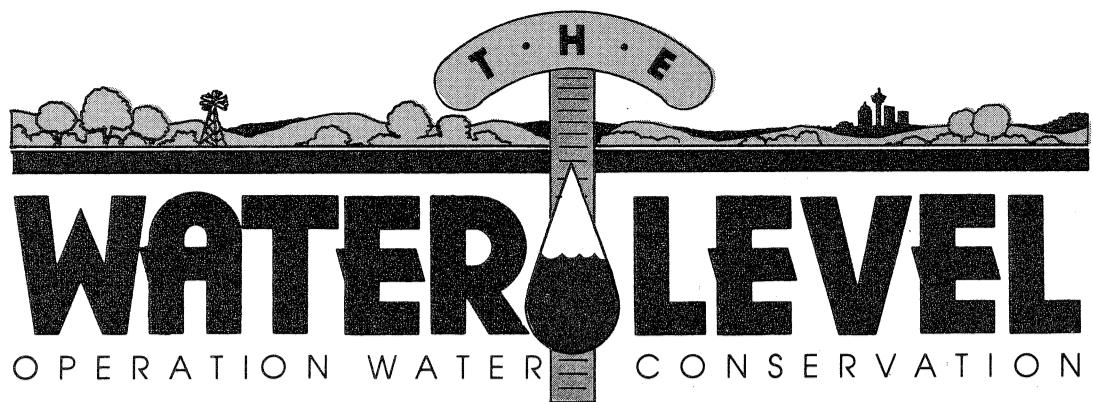
Incarnate Word College
Our Lady of the Lake University
Mary's University
St. Phillip's College
San Antonio College
Southwest Texas State University
Trinity University
UT Health Science Center
UTSA

CHAMBERS OF COMMERCE

Castroville
Greater Devine
Greater Randolph
Greater San Antonio
Hondo
Mexican American
New Braunfels
North San Antonio
San Marcos
Southside
Universal City
Uvalde

MISCELLANEOUS

Alamo Area Council of
Governments
National Weather Service
Texas Dept. of Agriculture
Texas Dept. of Health
Texas Dept. of Parks & Wildlife
Texas Dept. of Water Resources
Texas Public Utility Commission
U.S. Corps of Engineers
U.S. Geological Survey



December, 1985

Volume 2, No. 3

AQUIFER STATUS

Water elevations at the Edwards Aquifer Index Well J-17 (AY-68-37-203) at Fort Sam Houston have risen to 674.5 feet above mean sea level as of December 10, 1985. This is the highest that the water elevation has been at the index well since mid 1982. San Pedro springs which have a land surface elevation of approximately 662 feet above mean sea level have been flowing since mid-October and flowed earlier this year in March, April, June, and July. San Antonio springs which have a land surface elevation between 665 and 670 feet have begun to flow this month (the 5 foot range in elevation is due to the varied elevations of the spring outlets). San Antonio springs last flowed in April of 1983.

Recent rains in the drainage and recharge areas of the Edward Aquifer are expected to cause the index well water elevation to continue to rise slowly upward in the weeks ahead. Although the water elevations and storage of water within the aquifer have significantly increased relative to the elevations in the summer of 1984, everyone is strongly urged to continue conservation efforts to protect the quality and quantity of water within the aquifer.

WATER RECLAMATION

On October 14, 1985, Directors and guests of the Edwards Underground Water District were treated to a sample of drinking water processed at the newest water reclamation facility in Texas. El Paso's Fred Hervey Water Reclamation Plant takes untreated residential sewage and processes it to drinking water standards. The reclaimed water is then used to recharge the Hueco Bolson Aquifer in the El Paso area.

The Hueco Bolson Aquifer contains large quantities of high quality fresh water, very similar to the Edwards Aquifer here in South-central Texas. Presently the Hueco Bolson Aquifer provides 65% of El Paso's water supply. However, water is being used from the aquifer at a rate that is 20 times faster than the natural rate of recharge.

The Fred Hervey Water Reclamation Plant treats sewage to drinking water standards using the most modern technology to monitor and remove virtually all pollutants that have been added by man. The plant is capable of processing 10 million gallons of wastewater per day from the predominately residential northeast area of El Paso. This represents a perpetual water supply for 50,000 people.

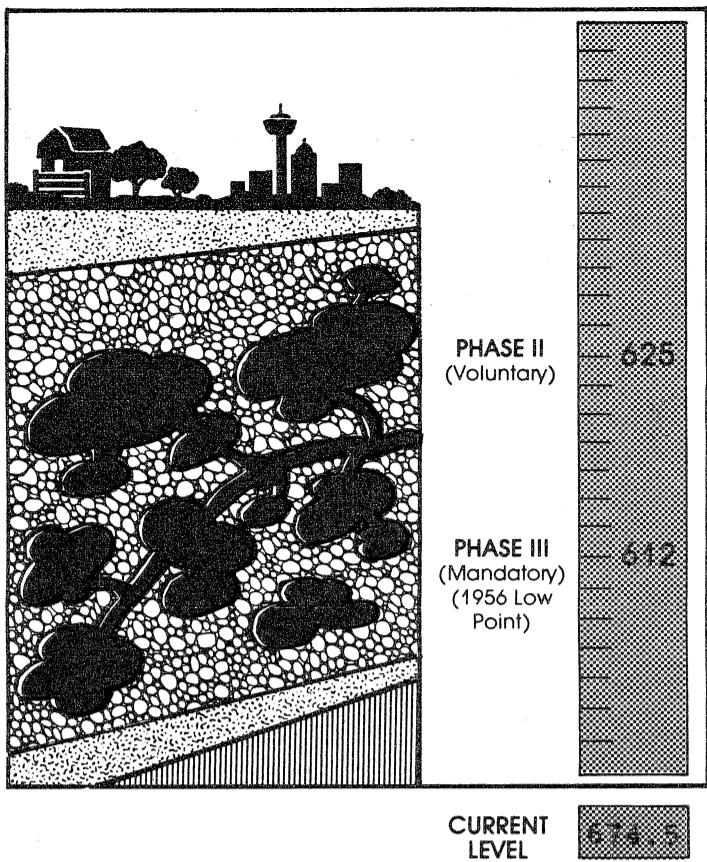
The sewage is treated through a 10 step process that removes suspended solids, bacteria, viruses, heavy metals, and dissolved organic and inorganic pollutants. The treated water is held for 8 hours in storage basins where additional analysis is performed before being released into 800 foot deep injection (recharge) wells in the Hueco Bolson aquifer. It is estimated that the reclaimed water will take 2 years to travel through the aquifer to water supply wells for reuse.

The Board of the Edwards Underground Water District, charged with protecting, conserving, and preserving the Edwards Aquifer, undertook this tour as part of information gathering efforts related to the regional water resources study's preliminary indications that indirect and direct reuse of water and wastewater will be an important element in this region's future water resource planning.

Operation Water Conservation
P.O. Box 15830
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WINTER WATER CONSERVATION

When Arctic fronts push temperatures in South-central Texas to below freezing, water use dramatically increases with respect to the non-freezing seasonal usage. For example, in January and February of 1985 when day and night-time temperatures were below 30 degrees Fahrenheit, daily water pumpage by the San Antonio City Water Board increased approximately 10% (10-12 million gallons per day) with respect to the average monthly pumpages.

Much of this extra consumption by area residents is used for the prevention of costly repairs from water pipes freezing and splitting. Leaving a water faucet running slowly is not the only method to prevent plumbing damage in cold weather.

A more efficient method with respect to both water and energy use is to wrap exposed water pipes in garages, attics, crawl spaces, and outdoors with insulation. Not only does the insulation of water pipes help eliminate the hazard of pipe freezing, but it also makes plumbing systems more responsive by reducing the amount of time and water wasted in waiting for hot and cold water year around. There are many types of pipe wrap insulation available at area home improvement centers.

LOUIS KOENIG DONATES TO EUWD TECHNICAL LIBRARY

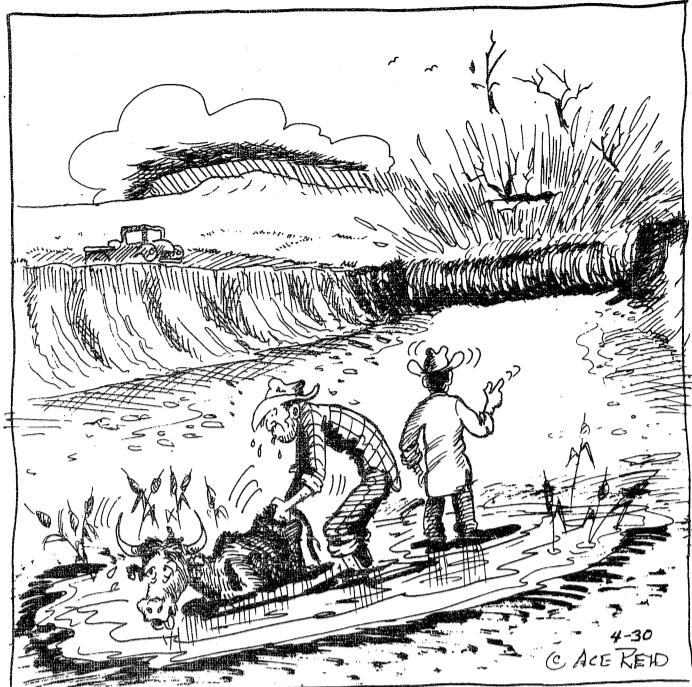
Dr. Louis Koenig, who recently retired from a highly distinguished career in the contract research and consulting business graciously donated a portion of his technical library to the EUWD. Dr. Koenig's career spans the period 1936 to the present. During which time he held such notable positions as Assistant Director of Research at the Stanford Research Institute, Vice-President of Southwest Research Institute, and finally as President of his own firm, Louis Koenig Research.

Dr. Koenig's vita can be found in Who's Who in the World, Who's Who in America, Who's Who in Engineering, Who's Who in Finance and Industry, American Men of Science, and the Chemical Who's Who. In addition Dr. Koenig received the "best paper of the year" award from three different national professional organizations for papers on different subjects for 1960-75.

The selections obtained from Dr. Koenig's library will be incorporated and maintained in the Edwards Underground Water District's technical library. The District's library is available for use by the public.

COW POKES

By Ace Reid



"You just think there ain't nothin' worse than pullin' an old cow out of a boghole!"

FALL XERISCAPE SEMINAR

Approximately 400 people turned out for the Xeriscape workshop at the San Antonio Garden Center on October 26th. The half day seminar provided area gardeners with information on regional water resources, water conservation, xeriscape concepts, efficient irrigation practices (xerigation), xeriscape planting materials, and xeriscape design. After the presentations the San Antonio Mens's Garden Club hosted a Xeriscape plant sale and the staff of the San Antonio Botanical Center lead tours of the South-central Texas Xeriscape demonstration garden.

REGIONAL WATER CONSERVATION

The San Marcos Chamber Beautification Committee is organizing efforts to build a Xeriscape demonstration garden in San Marcos. The demonstration garden will be located at the old San Marcos National Fish Hatchery building that has been recently relocated on the San Marcos river.

On October 16th, the Beautification Committee sponsored a Xeriscape workshop to raise funds for the project. Mrs. Frances Emery, a Hays County Director of the Edwards Underground Water District presented the committee with a \$3000.00 donation from the District.

Xeriscape is the use of appropriate landscape practices which compliment the climate and water resources of South-central Texas. Water conserving efforts through Xeriscaping not only reduce landscape water requirements, but also reduce landscape maintenance and reduce the summer seasonal demand upon the Edwards Aquifer.

OPERATION WATER CONSERVATION

A four-phase regional water conservation program.

Co-chaired by the City of San Antonio and the Edwards Underground Water District.

To submit items for the newsletter or to obtain information on active membership, contact OWC coordinator at 222-2204 or P.O. Box 15830, San Antonio, TX 78212.



WATER IS A PRECIOUS RESOURCE

WATER LEVEL

A Water Conservation Publication of the Edwards Underground Water District

JUNE 1986

Volume 3; No. 1

WATER CONSERVATION

Residents of south-central Texas must always remember that the same skies which bring torrential rains will also bring back the blistering summer sun that will undoubtedly parch the area. Adding to the unpredictability of the weather and a growing population there is always a potential for water quality and supply problems in the Edwards Aquifer during periods of below average rainfall.

Water conservation must be viewed by all water users as efficient and effective use of water. Water conservation can be practiced in both rural and urban areas and is the most essential component of good water management policy.

Water saving methods in agriculture can be complicated, impractical and expensive. To the farmer, managing the farm cost effectively is as important to him as managing a small business is to the business owner. So if saving water involves a change in production methods, it must be weighed against the farmer's cost of production. Presently the Edwards Underground Water District is funding two water conservation research projects at the Texas Agricultural Experiment Station in Uvalde. These projects are to determine the benefits of certain agricultural practices. Some of the benefits of water conservation being studied are energy savings, increased profits, and improved crop yield and quality. Agricultural water use accounts for approximately 30% of the annual water pumped from the Edwards Aquifer.

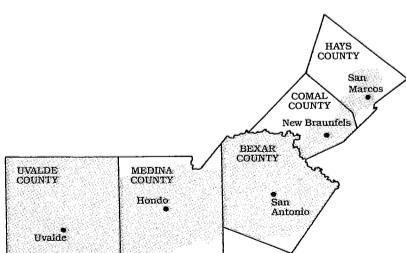
Urban water conservation includes residential, industrial, commercial, and municipal use of water. Urban water use accounts for approximately 70% of the water pumped from the Edwards Aquifer. The Edwards Underground Water District has an ongoing conservation program that is designed to educate and motivate area residents on wise water use. The District's urban water conservation program involves the development and distribution of water conserving literature and guides, a school education program, a landscape water conservation program and distribution of water saving kits for use inside the home.

Throughout the year, the Edwards Underground Water District encourages all water users to use water wisely. By adopting water efficient habits not only do we protect the quality and quantity of water in the Edwards Aquifer, but we also extend the life of the groundwater resource and any future water resources.

Edwards Underground Water District

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CURRENT AQUIFER STATUS

The rainfall throughout the Edwards Aquifer region in the last portion of May and in June has had a significant effect on the water elevation at the Edwards Aquifer index well located at Fort Sam Houston. As of Tuesday, June 10, 1986, the water elevation at the index well was recorded at 676.2 feet above mean sea level (AMSL). Since June 1, 1986, the water elevation has risen 11.6 ft. The historical average water elevation for June at the index well is 665.1 ft AMSL. The index well was last recorded at this elevation 2 years before the 1984 drought in June of 1982.

WATER EDUCATION WORKSHOPS

Five water awareness training workshops for area elementary school teachers were held between September 1985 and April 1986. The purpose of the workshops was to introduce teachers to the concepts of water education correlated to elementary science and social studies curricula.

Dr. Charles Pascoe, associate professor of Theatre Arts and director of children's theatre at Southwest Texas State University, introduced the educators to teaching techniques using creative dramatics. Dr. Pascoe involved the teachers in staged dramatic and theatric activities which create a water awareness ethic related to the water cycle and water conservation.

Teachers that attended the workshops received six hours of advanced academic training from the Texas Education Agency in addition to a large packet of water education materials for use in their classrooms.

Presently more workshops are being planned for the 1986-87 school year. If you would like to attend one or have the workshop at your school, please contact David Tillman at the EUWD for additional information.

GROUNDWATER: A Definition of the Resource

Groundwater is water that has accumulated and been stored beneath the surface of the Earth. Despite popular opinion, the Edwards Aquifer does not consist of huge underground lakes and rivers in which groundwater is stored. Aquifers may consist of unconsolidated alluvium material such as sands and gravels, or as dissolved or fractured openings in igneous, metamorphic, or sedimentary geologic structures. The Edwards Aquifer is a sedimentary limestone aquifer. It accumulates and stores water in openings, cavities, and fractures that exist in a layer of limestone beneath the earth's surface.

Groundwater has many advantages over water stored in surface reservoirs, such as Canyon Lake. It does not evaporate because it is not exposed to the atmosphere. Groundwater storage does not preempt land surfaces that are needed for other beneficial purposes. And aquifers are natural in occurrence and cost nothing to construct.

Although the earth's supply of groundwater is considered immense, it makes up only 0.6% of the total water supply on this planet. Groundwater hydrologist estimate that groundwater accounts for about 90% of the world's drinkable water. The Edwards Aquifer is the sole source of water for the city of San Antonio, and primary source for Uvalde, Medina, Comal, Hays and Bexar Counties.

WILL THERE BE ENOUGH WATER?

Until now, the Edwards Aquifer has been able to keep pace with the increasing water demands, years of below average rainfall and a rapid economic development. Few of us realize that the Edwards Aquifer is our sole source of water and the quality of water in it is much better than recognized water quality standards. Presently the population and activities which draw water from the Edwards Aquifer annually consume slightly less than the average amount of water that is recharged. As the regional population increases, we will be using more water than is being annually recharged to the aquifer, and water elevations throughout the Edwards Aquifer will begin to fall. This will result in higher water cost to farmers and ranchers, springs will cease flowing in New Braunfels and San Marcos, and possible deterioration in groundwater quality throughout the Edwards Aquifer.

In the recently completed "Regional Water Study", water resource planners suggest that there can be enough water to meet the growing regional demand without adverse impacts to the natural springs and water users that rely upon the Edwards Aquifer. Their suggested approach is called "conjunctive use" and would make use of a combination of the following water sources -- water conservation, water reclamation, and the development of surface water. Individually, each of these proposed water sources do not represent enough water to solve the regional water puzzle, but collectively they represent enough water to supply projected water demands through the year 2040.

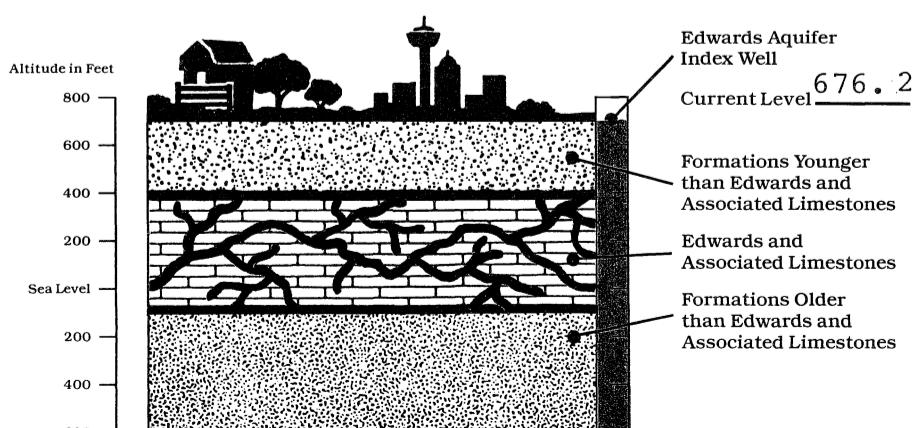
Copies of the three volume "Regional Water Study" are available for \$37.00 from the EUWD.

"AN INCH-A-WEEK"

Since more than 40% of residential water use is applied to lawn watering, proper watering techniques can save a significant amount of water. Lawn care specialists agree that watering one inch per week, either by natural rainfall or by sprinkler irrigation, is a sufficient amount of moisture to ensure a healthly green lawn. They also recommend soaking in an inch of water in a single watering period once a week in the early morning, instead of sprinkling lightly each day. This practice reduces the amount of water that is lost to evaporation and helps maintain a deep rooted drought tolerant grass.

An inch of water can be measured by placing any straight walled container, such as a tuna can or cake pan, in the yard and observing the amount of time it takes the container to accumulate one inch. Each subsequent watering need only be timed for that duration.

Other lawn watering practices that conserve water are not to water on windy days, positioning sprinklers to maximize lawn watering efficiency and minimize street and sidewalk area being watered. Weekly watering times can also be adjusted to account for the previous week's rainfall. A free lawn sprinkler watering gage and watering guide is available by contacting the EUWD.



WATER LEVEL

AUGUST 1986

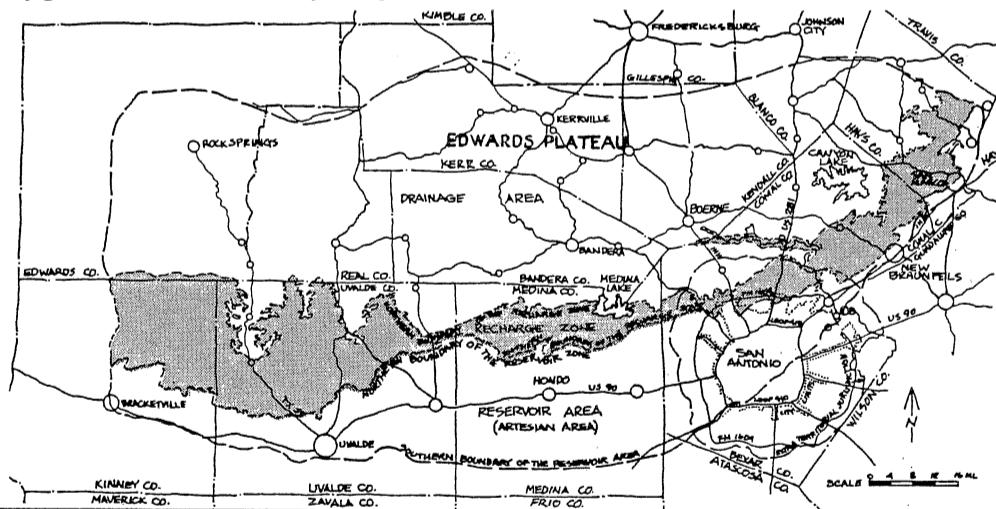
Volume 3; Number 2

A Water Conservation Publication of the Edwards Underground Water District

THE EDWARDS AQUIFER (BALCONES FAULT ZONE)

The Edwards Aquifer is the water bearing layer beneath the earth's surface comprised of porous honeycombed and fractured Edwards and associated limestones formation. The porous limestone permits the movement and storage of large quantities of water and is characterized by relatively rapid recharge. Water in the aquifer is confined and stored under artesian pressure between two relatively impermeable geologic formations. In places where there has been extensive faulting or where wells have been drilled into the Edwards and associated limestones water will rise above the confining formation because of the artesian pressure. Flowing artesian wells and springs exit where there is sufficient artesian pressure within the aquifer to force the water above the land surface. The Edwards Aquifer is one of, if not the most productive aquifer in the United States. Some wells drilled into the Edwards Aquifer have been hydrologically tested, discharging at a rate of 17,500 gallons per minute (approx. 325,000 gallons = 1 acre foot, 1 acre foot is approx. the area of a football field covered with 1 foot of water).

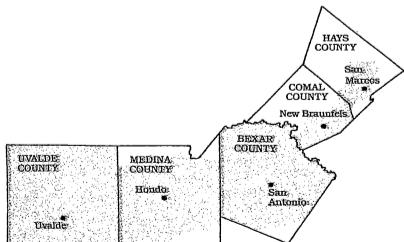
The Edwards Aquifer is divided into different pools or "reservoir areas" of fresh water. These divisions are the result of groundwater divides that are believed to separate the water bearing limestones into hydro-geologic units. The largest and most productive reservoir area is the San Antonio pool extending from Kinney County on the west to Hays County on the East. The "northern boundary" of the San Antonio Pool is the surface outcrop of the Edwards and associated limestones (the Balcones fault zone) that form the recharge zone. The "southern boundary of the reservoir area" is the fresh-saline water interface or "Bad Water Line or Saline Zone". The saline water is characterized by having more than 1000 milligrams per liter of dissolved solids, it may be low in dissolved oxygen and contain hydrogen sulfide which may give it a rotten egg odor.



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AQUIFER STATUS

Since the last issue of the "WATER LEVEL" on June 11, 1986 the water elevation at the index well peaked at 679.5 ft AMSL on June 22 from recharge associated with June 1986 record rainfall. Hot seasonal temperatures and below average rainfall have increased the water demand upon the Edwards Aquifer causing the index well water elevation to steadily decrease. On August 13, 1986 the Edwards Aquifer index well water elevation was recorded at 652.9 feet above mean sea level (AMSL). The average index well water elevation for August is 657.9 ft AMSL. The 26.6 foot water elevation decline between June 22 and August 13 is not unusual nor is it a record, however the Edwards Underground Water District encourages area residents to become more conscious of their water use habits and the need to conserve water during these hot, dry periods.

TURFGRASS WATER CONSERVATION

Lawn watering accounts for more than 40 percent of residential water use. Knowing how much to water and when to apply this water is important for the homeowner who wants to maintain an attractive lawn. Surveys show that a majority of homeowners overwater their lawns and may apply the water inefficiently.

The Edwards Underground Water District recommends that during the summer months lawns in South-central Texas need one inch per week either by natural rainfall or sprinkler irrigation to maintain sufficient soil moisture to ensure a healthy green lawn. The District also recommends soaking in the inch of water in a single watering period once a week in the early morning, instead of sprinkling lightly each day. This practice reduces the amount of water that is lost to evaporation and helps maintain a deep, rooted drought tolerant lawn.

Along with reducing summer water bills, homeowners can reduce the amount of time needed to maintain their lawns by adopting water conserving practices. By using water efficiently in the yard, homeowners can conserve water, save time, and save money on water and maintenance costs of their lawns.

XERISCAPE SLIDE/TAPE PRESENTATION

The South-central Texas Xeriscape committee has a 20 minute slide/tape presentation available for use in community programs. The program introduces the Xeriscape concept as a comprehensive approach to water efficient landscaping. The slide show outlines the steps involved in creating an attractive Xeriscape and water conserving landscaping tips.

The Edwards Underground Water District, Bexar County Extension Office, and San Antonio Men's Garden Club speaker's bureau will be handling requests for this presentation. For more information and program scheduling contact the District at 222-2204 or 1(800)292-1047.

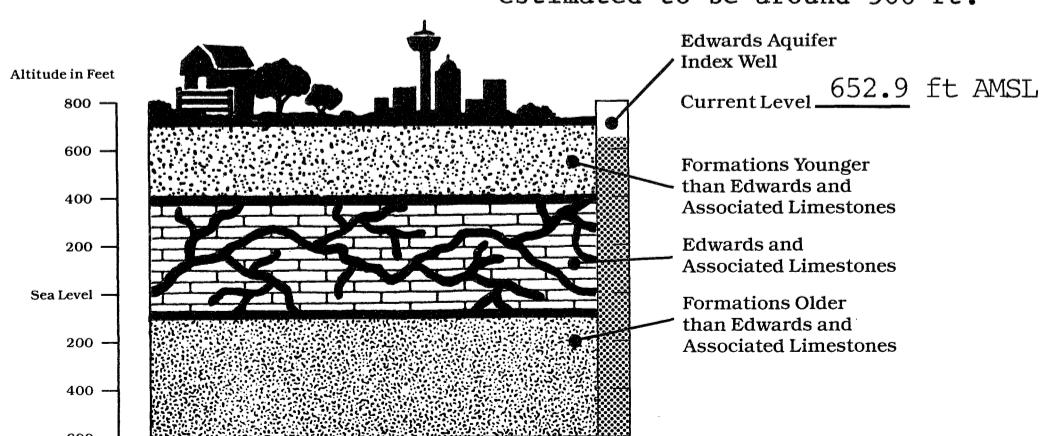
TEXAS XERISCAPE CONFERENCE

The first annual Texas Xeriscape Conference will be held in San Antonio, November 6-7, 1986 at the Marriott North located at 611 NW Loop 410. The two-day conference will cover the Xeriscape principles as they apply to Texas. Educational sessions will address the following topics: soils and mulches, plant materials and turfgrasses, maintenance, water management, and water conservation programs for public and private water agencies.

The conference is co-sponsored by the South-central Texas Xersicape Committee and City of Austin, Resource Management Department. Cost of the two-day conference is \$65.00 and registration is limited. Call the Edwards Underground Water District for a Texas Xeriscape Conference brochure at 222-2204 or 1(800)292-1047.

THE EDWARDS AND ASSOCIATED LIMESTONES

The Edwards and associated limestones is a geologic formation consisting of the Georgetown, Edwards, and Comanche Peak Limestones of the Cretaceous geologic period (63 to 138 million years ago). The Edwards and associated limestones are dense and hard, but on weathering the rock becomes honeycombed and cavernous allowing it to store and produce great quantities of water. The exact thickness of the Edwards and associated limestones is not known throughout the extent of the formation, but its average thickness is estimated to be around 500 ft.



WATER LEVEL

A Water Conservation Publication of the Edwards Underground Water District

October, 1986

Volume 3, Number 3

THE EDWARDS AQUIFER RECHARGE ZONE

Water enters the Edwards Aquifer in an area known as the recharge zone. The recharge zone of the San Antonio pool of the Edwards Aquifer is located between the "drainage and reservoir (artesian) areas". The recharge zone extends from central Kinney County on the west to north-central Hays County on the east. Its width varies between two miles where IH 10 crosses it in northern Bexar County to over 20 miles wide in central Uvalde County. The recharge zone occurs where the porous Edwards and associated limestones are exposed at the land surface.

The porosity of the exposed Edwards and associated limestones allow for seepage to occur in streams that cross the recharge zone and the direct infiltration by rainfall. Seepage and infiltration are the mechanisms by which the Edwards Aquifer recharges. Most of the flow in the rivers and streams which cross the recharge zone seeps into the Edwards Aquifer. Below the recharge zone most streams are dry or flow intermittently. The amount of water that a stream can recharge is dependent upon many factors. Significant factors which control recharge are rainfall, the amount of water flowing in the stream, the duration of flow, the length of exposed Edwards and associated limestones in the stream bed, the gradient of the stream, and the degree of faulting and fracturing in that area of the recharge zone.

The amount of water that recharges the aquifer is estimated by calculating the difference between the quantity of water flowing onto the recharge zone, the quantity of water flowing off and the estimate of rainfall in the recharge zone. To determine these flows, a network of continuous recording stream gages have been located above and below the recharge zone. Analyses of the stream flow data indicate that approximately 67 percent of the average annual recharge occurs in Kinney, Uvalde, and Medina counties; approximately 11 percent occurs in Bexar County; and Comal and Hays counties contribute approximately 22 percent.

Geographical and hydrological relationships between the "drainage area", "recharge zone" and "reservoir (artesian) area" cause the Edwards Aquifer to recharge very quickly. These relationships also make the Edwards Aquifer environmentally sensitive to contamination and pollution. Once water enters the recharge zone either in a stream or as rainfall, this water literally flows directly into the Edwards Aquifer and becomes part of the regional water supply. Because of this relationship, residential, commercial, industrial, recreational, and agricultural activities on the recharge zone are monitored and regulated to protect the quality of water in the Edwards Aquifer.

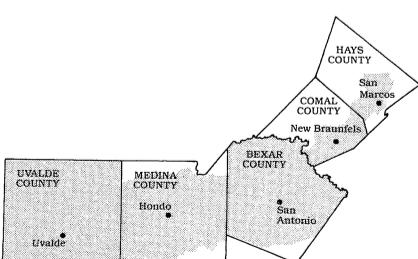
For persons interested in knowing more about where the recharge zone occurs, the District maintains 1:24000 United States Geological Survey topographical map sheets which show the recharge zone. Copies of these maps can be obtained by contacting the District.

Edwards Underground Water District

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CURRENT AQUIFER STATUS

On October 17, the water elevation at the Edwards Aquifer index well (AY-68-37-203) was recorded at 671.6 feet above mean sea level (AMSL). Since October 1, recharge to the aquifer has raised the water elevation 11.8 feet. The historical average (1934 - 1984) for October is 662.2 feet AMSL.

"BULLETIN 43-44"

"Bulletin 43-44" reports hydrologic data for the Edwards Aquifer for 1983 and 1984, and summarizes the period of record 1934-1984. Of particular interest are the recharge and discharge figures for 1984, when water elevations and spring flows approached record lows.

In 1984, there was an estimated 197,900 acre-feet of water recharged to the Edwards Aquifer. This makes 1984, the ninth lowest year for recharge in 51 years of record. Annual recharge to the Edwards Aquifer ranges from a high of 1,711,200 acre-feet in 1958 to a low of 43,700 acre-feet in 1956. The average annual recharge for 1934-1984 is calculated to be 596,700 acre-feet.

The 1984 calculated annual discharge from wells and springs was 702,300 acre-feet. The water discharged (pumped) from wells was calculated to be a record high of 529,800 acre-feet. Water discharged from springs in 1984 was 172,500 acre-feet. The annual discharge from wells and springs ranges from a maximum of 960,600 acre-feet in 1977 to a minimum of 388,800 acre-feet in 1955.

Analyses of water samples from 158 wells and 3 springs in the Edwards Aquifer show that Edwards Aquifer water directly from a well is of greater quality than established standards for public water systems.

Copies of "Bulletin 43-44" have been distributed to public and depository libraries throughout the District. For information on where a copy can be reviewed in your area, contact the District office.

EDUCATION EXHIBIT

The District now has two education exhibits entitled "The Aquifer That Shaped South-central Texas". The exhibits highlight the significance that the Edwards Aquifer has had on south-central Texas, water management alternatives available to preserve that quality and quantity of water in the Edwards Aquifer, and contains a water conservation test.

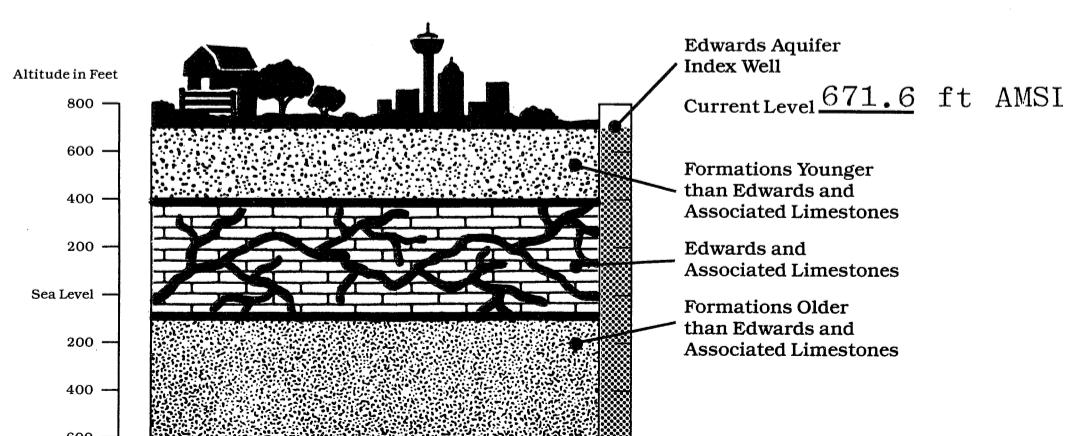
The exhibit is attractive, free standing in a number of configurations, and does not require an attendant. Both exhibits are available for display in public places. For more information or to schedule the exhibit in your office or school, contact David Tillman at the District office.

RECHARGE

Recharge refers to the process of adding water to an aquifer. Practically all groundwater (water in aquifers) originates as surface water (water on the land's surface). Principal sources of recharge include rainfall, streamflow, lakes, and reservoirs.

WATER LEVEL

The "Water Level" is distributed free as a public education service of the Edwards Underground Water District. If you have any comments or suggestions for future articles please let us know. Additionally, if you do not wish to receive the "Water Level" please contact the District at (512) 222-2204 or 1(800)292-1047.



WATER LEVEL

December, 1986

Volume 3, Number 4

A Water Conservation Publication of the Edwards Underground Water District

SPRING DISCHARGE FROM THE EDWARDS AQUIFER

Water leaves or is discharged from the Edwards Aquifer in three ways (1) pumped from a well (2) artesian flow from a well or (3) natural spring flow. Five major springs; Leona in Uvalde County, San Antonio and San Pedro in Bexar County, Comal in Comal County, and San Marcos in Hays County discharge from the San Antonio Pool of the Edwards Aquifer. San Marcos and Comal Springs are the largest, accounting for about 90% of total spring flow from the aquifer. For the period 1934-1984, average annual springflow from the aquifer is estimated to be 355,100 acre-feet. Average annual recharge to the aquifer in the same period is estimated to be 596,700 acre-feet. Therefore for the period 1934-1984 approximately 60% of the water recharged to the Edwards Aquifer is discharged as springflow, the remaining 40% of the average annual recharge is consumed by agricultural, industrial, and municipal demands.

The history of South-central Texas can undisputedly be linked to the flow of water from the Edwards Aquifer at the major springs. Archeologist have dated artifacts found near San Marcos to over 13,000 years old. Early Spanish explorers were also attracted to the springs fed by the Edwards Aquifer. These springs became major stops on the El Camino Real, the king's road that connected the 18th century settlements of colonial Texas. A Spanish mission was built at Comal Springs in New Braunfels. In San Antonio, a string of missions developed acequias, which were aqueducts that channeled water from the spring fed San Antonio River and San Pedro Creek to households and to water livestock and crops.

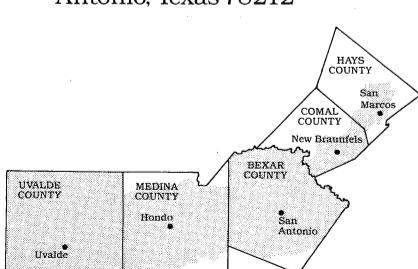
Springflow from the Edwards Aquifer has been decreasing since the first well was drilled into the aquifer. For the period 1934-present, San Antonio and San Pedro Springs (Bexar County) flowed nearly continuously until approximately 1945. Comal Springs (Comal County) stopped flowing in 1956 from water elevation declines due to the 1950's drought. San Marcos Springs (Hays County) has not stopped flowing. During recorded drought conditions, San Marcos Springs has provided the base flow to the Guadalupe River. Springs stop flowing when the local water elevation is decreased to below the land surface elevation. The water elevation is decreased by well pumping and lack of recharge (rainfall) due to periodic droughts. Periodic droughts have the effect of increasing well withdrawals for irrigation (municipal and agricultural), thus compounding the effect on water elevations.

As the Edwards Aquifer Region continues to develop and water demands from the aquifer increase, the future for the springs becomes uncertain. Springflow from the aquifer has not only influenced history of South-central Texas, but also sustains the aquatic and riparian environments and recreational, municipal, agricultural, and industrial activities from the spring outlets to the Gulf of Mexico. Water conservation by the average citizen can be effective in protecting the environments and water uses associated with the springs. Throughout the year, the Edwards Underground Water District encourages all water users to use water wisely. By adopting water efficient practices not only do we protect the quality and quantity of water in the Edwards Aquifer, but we also protect the springs and the environments and activities that they sustain from their outlets to the Edwards Aquifer to the Gulf of Mexico.

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CURRENT WATER ELEVATION STATUS

On December 11, the water elevation at the Edwards Aquifer Bexar County index well (AY-68-37-203) was recorded at 675.4 feet above mean sea level (AMSL). The water elevations at the index well and throughout the aquifer have held steady throughout the past month. The historical average (1934-1984) water elevation for the Bexar County index well for December is 666.4 feet AMSL.

XERISCAPE CONFERENCE

Texas First Annual Xericape conference was a great success. The conference was held November 6-7, 1986 at the San Antonio Marriott North. Nearly 225 professionals representing the landscape architecture and contracting, nursery, irrigation and water industries throughout Texas and across the United States attended the conference. The conference was co-sponsored by the South-central Texas Xeriscape Committee which includes the Edwards Underground Water District, City of San Antonio, San Antonio River Authority and Bexar County Extension Office, and the City of Austin Resource Management Department.

"THE BALCONES ESCARPMENT"

"THE BALCONES ESCARPMENT" edited by Patrick L. Abbott, Department of Geological Sciences, San Diego State University and C.M. Woodruff, Jr., Consulting Geologist, Austin, TX was published for the Geological Society of America's annual meeting in San Antonio, November 9-14, 1986. The book contains 19 original papers describing how the Balcones Escarpment influenced the geology, hydrology, ecology and social development of Central Texas. This collection of papers is of particular interest for people desiring to know how the Balcones escarpment influenced the natural history of central Texas. The book may be obtained for \$18.00 (includes postage) through:

Patrick L. Abbott
Department of Geological Sciences
San Diego State University
San Diego, California 92182

"The Balcones Escarpment" is also available in the Edwards Underground Water District technical library for use at the District offices, 1615 N. St. Marys, San Antonio, TX 78215.

XERISCAPE AWARD

The South-central Texas Xeriscape Committee presented Mrs. Fay Sinkin, Bexar County Director of the Edwards Underground Water District an appreciation award at the First Annual Texas Xeriscape Conference for being instrumental in bringing Xeriscape to South-central Texas.

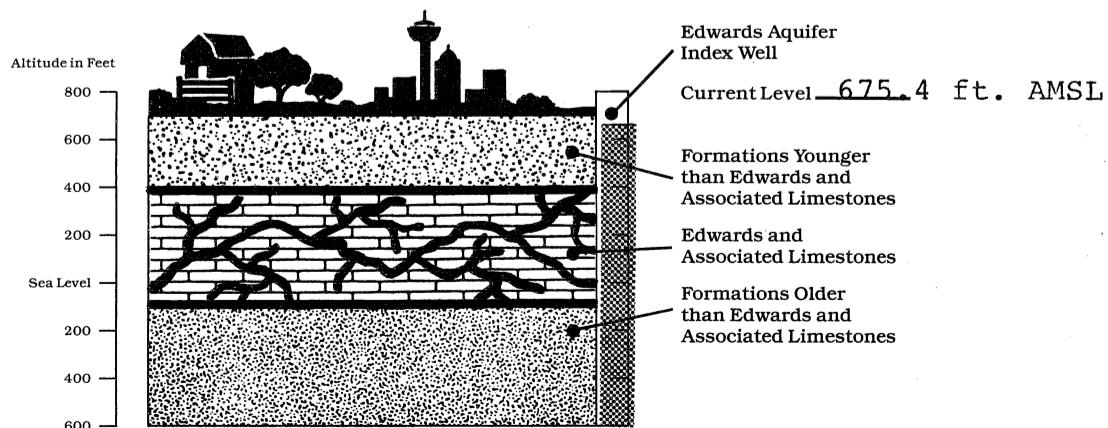
In the fall of 1983, Mrs. Sinkin brought Xericape to the attention of the Water Conservation Committee of the Edwards Underground Water District Board of Directors, committee reviewed the concept and directed District staff to initiate a similar water conservation program. District staff organized a landscape water conservation task force with staff members from the Edwards Underground Water District the City of San Antonio, San Antonio River Authority, and Texas Agricultural Extension Service. This task force oversaw the construction of the first xeriscape demonstration garden in Texas, located outside of the San Antonio Botanical Center. At completion of the demonstration garden the landscape water conservation task force became the South-central Texas Xeriscape Committee.

The South-central Texas Xeriscape Committee has since published a brochure describing the xeriscape demonstration garden, produced a slide show, sponsored a homeowner xeriscape seminar and landscape contest, and co-sponsored a conference for Texas water, landscape, nursery and irrigation professionals.

WELL WATER ELEVATIONS

Water elevations in wells fluctuate mainly in response to changes in ground water storage in the aquifer. When recharge to the aquifer is greater than discharge, water elevations rise and springflows increase; when discharge is greater than recharge, water elevations decrease, and springflow decreases. In general, water elevations throughout the Edwards Aquifer have the same general response to climatic extremes, recharge, and discharge stresses.

On going groundwater studies indicate that about 3 million acre-feet of water is stored in the Edwards Aquifer between the record low and record high water elevation at the Edwards Aquifer (Bexar County) index well AY-68-37-203. It is estimated that water elevations changes of one foot represent changes in storage in the Edwards Aquifer of approximately 35,700 acre-feet.



WATER LEVEL

February 1987

A Water Conservation Publication of the Edwards Underground Water District Volume 4, Edition 1

RECHARGE DAMS

Recharge to the Edwards Aquifer has been increased in past years by the construction of recharge dams. These dams are constructed to retard the flood waters over the recharge zone and allow that water to seep (recharge) into the aquifer through the porous Edwards limestones that are exposed at the land surface. Therefore, recharge dams prevent excessive and sometimes damaging runoff from flowing beyond the recharge zone.

Medina Dam and Lake on the Medina River were constructed as part of an irrigation project in 1913. The dam was constructed near the northern boundary of the recharge zone in Medina County where the porous Edwards limestones are exposed. As a result of the location of this dam, water in the lake leaks into the Aquifer. The average annual rate of recharge from Medina Lake is estimated to be 59,900 acre feet (1934 - 1984).

Since the 1950's many small recharge dams have been built for the specific purpose of enhancing recharge to the Edwards Aquifer. During the 1950's the residents of Uvalde County funded the construction of several small dams on streams crossing the recharge zone to enhance local recharge.

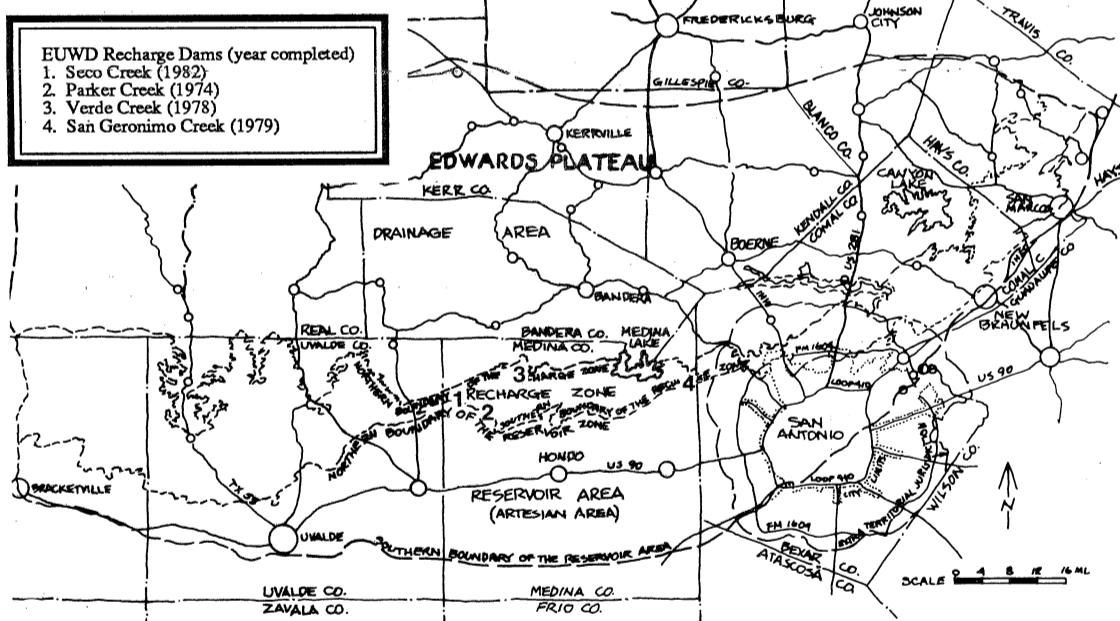
The Edwards Underground Water District has extended Uvalde county's idea and built four (4) recharge dams. These dams include: Seco Creek, northwest of D'Hanis; Parker Creek, north of D'Hanis; Verde Creek, north of Hondo; and San Geronimo Creek, northwest of San Antonio. The site selection process for locating these dams has been to locate streams which have rapid recharge and excessive flood flow. Recharge totals from these dams in 1986 was estimated to be 3,649 acre feet.

In addition to the dams built by the Edwards Underground Water District, twenty-nine flood control dams have been built by the Soil Conservation Service and the San Antonio River Authority in Comal, Hays, Medina, and Uvalde Counties. These dams were built primarily to prevent flooding. These dams are located on the Upper San Marcos River and York Creek in Hays County, the Comal River in Comal County, and Salado Creek in Bexar County.

Numerous other recharge enhancement projects have been proposed by the Edwards Underground Water District and other agencies to enhance the recharge of the Edwards Aquifer. One such project would be a storage-release dam. A storage-release dam could be constructed in the Aquifer drainage area. Flood waters would be retained by the dam and slowly released to recharge the Aquifer during dry periods.

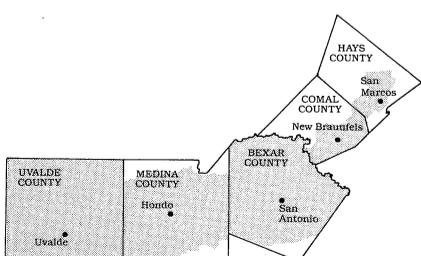
Overall recharge to the aquifer can be enhanced by the construction of flood control structures which manage streamflow through the recharge zone. However the efficiency of these structures are limited by the amount of rainfall that occurs in the drainage and recharge areas of the Aquifer. While

(continued on next page)



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we can enhance the aquifer's ability to recharge we have no guarantees that rainfall will occur to produce the needed runoff. Adding to the unpredictability of the weather, the population and water demands of the aquifer region are increasing.

Throughout the year, all water users are encouraged to use water wisely. By adopting water efficient habits not only do we protect the quality and quantity of water in the Aquifer, but we also extend the life of groundwater and any future water resources.

POSTER CONTEST

The Edwards Underground Water District will be conducting its annual poster contest for elementary school children, during the month of May. The Edwards Underground Water District will be focusing attention on the Edwards Aquifer with "WATER AWARENESS MONTH". The poster contest is open to all elementary school students and classrooms. The District encourages all eligible students to enter this contest.

Teachers Please Note!

The rules are as follows:

1. Contestants must be attending elementary school and reside within the counties of Bexar, Comal, Hays, Medina, or Uvalde.
2. Create ANY Edwards Aquifer and/or water related poster.
3. All posters must include a title or explanatory caption.
4. Posters should be no larger than 12" by 15" and completed in four colors or less.
5. All posters must be individual projects and include the student's name, school, school district, grade, teacher's name and school telephone.
6. All posters must be received at the District office or postmarked on or before April 3, 1987.

Submit all entries to:

Edwards Underground Water District
attn: David Tillman
1615 N. St. Mary's
P.O. Box 15830
San Antonio, TX 78212

7. All posters become the property of the Edwards Underground Water District.

AWARDS

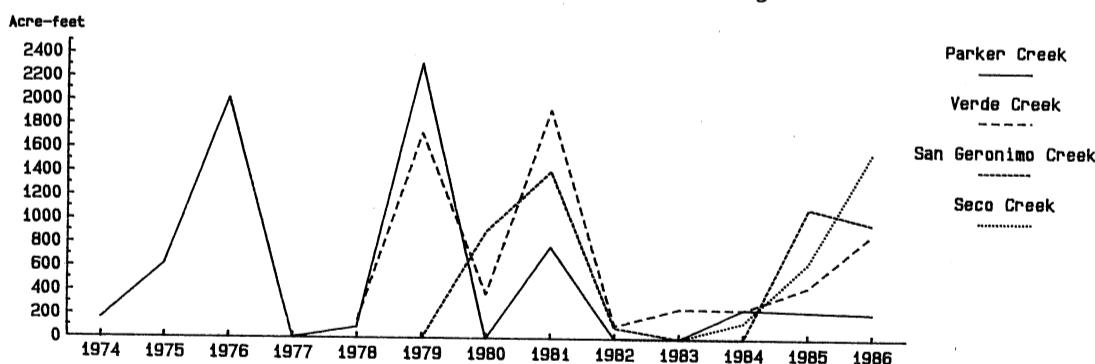
The GRAND PRIZE POSTER will be used as the official poster for "WATER AWARENESS MONTH" (May 1 - 31, 1987). First, Second, Third, and Fourth Place entries will be awarded for each participating school district. All entries will receive special recognition.

Teachers should you decide to have your students enter this contest, please become familiar with the rules and especially the dates and deadlines.

Any student or elementary school teacher interested in having their classroom enter the contest can obtain additional information from the Edwards Underground Water District at (512) 222-2204 or toll free at 1(800) 292-1047. Also available are a wide variety of educational resource materials and classroom presentations.

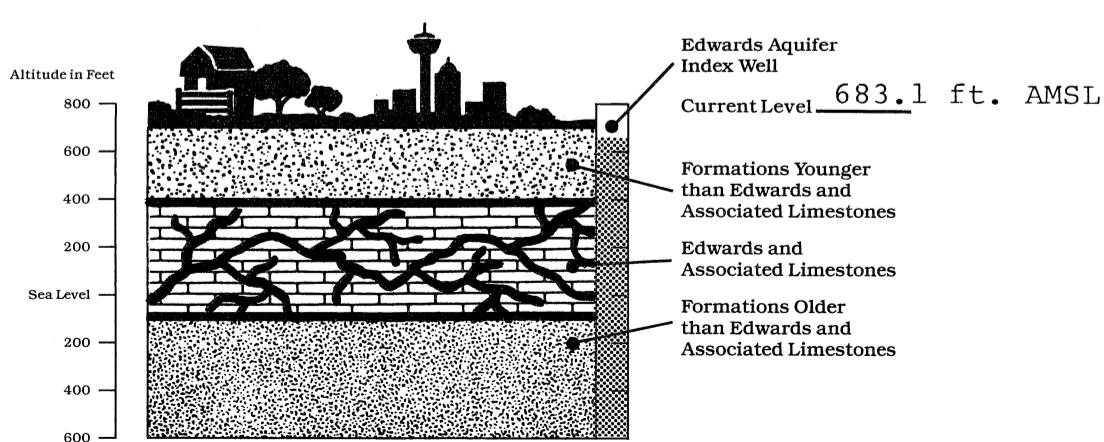
EDWARDS UNDERGROUND WATER DISTRICT

RECHARGE PROJECTS: Estimated Annual Recharge

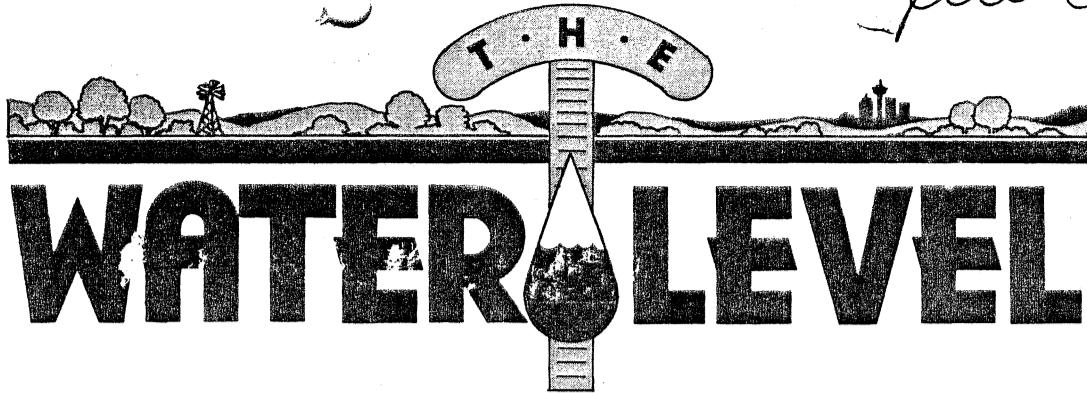


Aquifer Status

On February 17, 1987 the water elevation at the Edwards Aquifer Bexar County index well (AY-68-37-203) was recorded at 683.1 feet above mean sea level (AMSL) and has remained steady at this level since December 1986. The historical February average water elevation (1932-1987) for the Bexar County index well is 667.8 feet AMSL.



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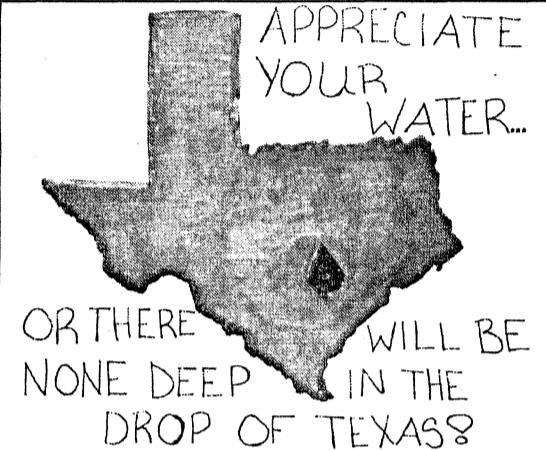


May 1987

A Water Conservation Publication of the Edwards Underground Water District

Vol. 4 ?
Volume 3, No. 2

WATER AWARENESS MONTH May 1987



Angel Gleason
5th Grade, Locke Hill Elementary School
Northside Independent School District

Edwards Underground
Water District

"Conserve Water — Protect the Edwards Aquifer"

Grand prize design by 5th grader
Angel Gleason, Locke Hill Elementary School
North Side Independent School District

Water Awareness Month

Since the time of the cave man, to the Indians, to the western settlers, man has made his home and community in places where there was an abundant supply of fresh water. In Texas, water flowing from springs of the Edwards Aquifer attracted man up to 12,000 years ago at the spring sites. Because water is the most precious natural resource we have, the Edwards Underground Water District has designated the month of **May 1987** as **Water Awareness Month** in the cities and counties within the District.

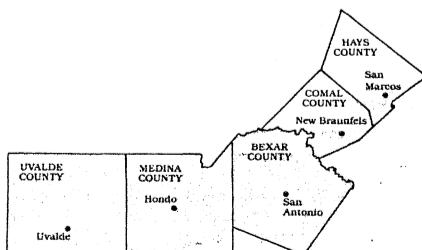
The Edwards Aquifer is not a limitless supply of water. It is affected by rainfall and the amount of water we use. It is every person's responsibility to use water wisely so that our community can prosper today and in the future, without damaging the Edwards Aquifer. The District sponsors activities throughout the year to make residents more aware of water conservation practices and the Edwards Aquifer.

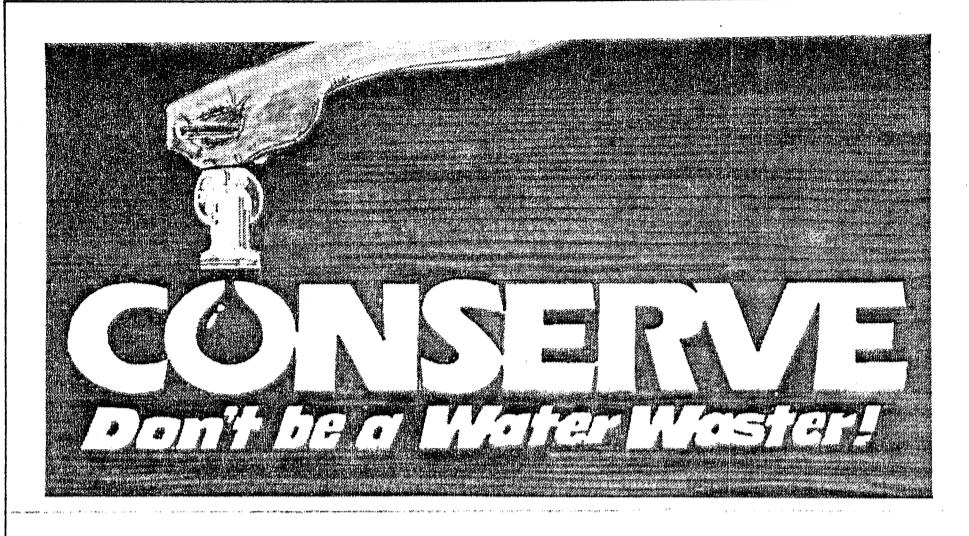
In anticipation of Water Awareness Month, the District sponsored a poster contest for elementary school children throughout the District. Angel Gleason, a fifth grader from Locke Hill Elementary School in the Northside Independent School District has been selected for the grand prize award. Her winning poster design has been reproduced as the official poster during Water Awareness Month and is being distributed throughout the District. Awards of merit were given to all students who participated in the contest.

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Water Awareness Month Activities

Bexar County

Xeriscape will be featured at the **1987 San Antonio Builders Association Parade of Homes**, May 16-25, 1987 at the Fairways of Sonterra in Stone Oak. An extensive exhibit has been developed by the District, and the American Society of Landscape Architects (ASLA), Texas Turf Irrigation Association (TTIA), Texas Association of Landscape Contractors (TALC). The exhibit incorporates many of the homes in the Parade to demonstrate the Xeriscape principles.

In addition to the home xeriscapes, the District has organized an education exhibit in the middle of the Parade. This exhibit will feature Xeriscape, the Edwards Aquifer, exhibits by ASLA, TALC, and TTIA, and performances in the Gazebo by the San Antonio Brass Quintet. District and representatives from ASLA, TALC, and TTIA will be available during the Parade to answer questions about the Edwards Aquifer and Xeriscape.

Saturday, May 23, 1987 will be Xeriscape day at the Parade. During the Xeriscape day there will be seminars at the Xeriscape exhibit tent on the seven xeriscape principles by the District, ASLA, TTIA, and TALC. There will also be **free** Texas Wildflower seeds while the supply lasts.

Comal County

District participation with the New Braunfels Independent School District, Lower Colorado River Authority, and New Braunfels Utilities in the Good Cents home being built by the New Braunfels High School building trades class. In this project the District is coordinating with the School District the installation of a

Xeriscape demonstration landscape. Upon completion the Good Cents Home will be used as a demonstration model for one year by the District, Lower Colorado River Authority, and New Braunfels Utilities water and energy conservation.

Hays County

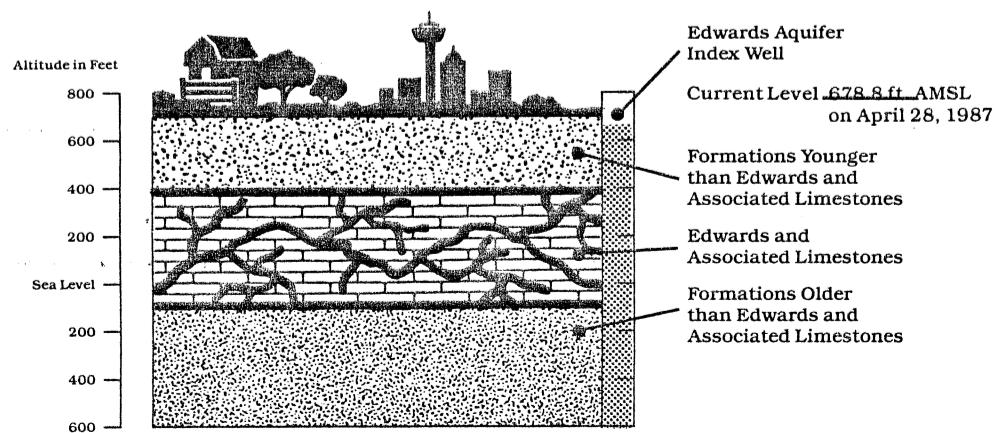
District participation with the Kyle Community Library in a landscape renovation in front of the library. In this project the District is coordinating with the library the installation of a Xeriscape demonstration landscape.

District Wide

The District and Education Service Center Region 20, are conducting 12 elementary science and social studies teacher training workshops on water education between May 2, and September 26, 1987 throughout the District. The purpose of the workshops is to introduce teachers to the concepts of water education, the Edwards Aquifer, and water conservation. Teachers that attend the workshops will receive 6 hours of advanced academic training from the Texas Education Agency. For more information contact: Ben Freeman, ESC Region 20 at 271-7611 ext. 368.

The South/Central Texas Xeriscape Brochure

Brochure has been reprinted. The brochure now includes a list of locally available Xeriscape and drought tolerant plants. The Xeriscape brochure is available at the San Antonio Botanical Center and from the District.



T · H · E WATER LEVEL

A Water Conservation Publication of the Edwards Underground Water District

June/July, 1987

Volume 4, Edition 3

High Water Levels

1987 will be remembered as a year of above average rainfall and record high water level conditions throughout the Edwards Aquifer area. The Bexar County index well (AY-68-37-203) on June 17, 1987 established a new record high water elevation of 699.2 ft. above mean sea level (AMSL). This level surpassed the old record of 696.5 ft. AMSL established on November 22, 1973. The period of record dates to 1934.

One result of the record high water elevations has been the identification and location of abandoned wells. The Edwards Underground Water District has provided technical assistance in the plugging of several abandoned wells in the San Antonio area as a result of high water levels. One well began flowing under a building and two others were discovered flowing from under sidewalks.

Springflow also increased significantly throughout the area establishing new record discharge rates at the major springs and identified many new ones.

Although the year is not yet over, indications are that the recharge estimates for 1987 may also set an all time record. Recharge calculations from the four dams constructed by the District have not been finalized but all structures were operating at capacity for several weeks during May, June, and July. Seco Creek Dam alone recharged at a rate of approximately 235 cubic feet per second (about 20 acre feet per hour) for a three week period during June alone, exceeding 10,000 acre feet of recharge.

Remember: One Inch Per Week

Lawn watering accounts for approximately 35-40% of residential water use. Knowing how much to water and when to apply this water is important for the water user who wants to maintain an attractive landscape. A majority of homeowners overwater their lawns and may apply the water inefficiently.

The Edwards Underground Water District recommends that during the summer months lawns in South/Central Texas need only one inch of water per week either by rainfall or by an irrigation system or technique to maintain a healthy green lawn.

To find out how long your irrigation system takes to apply one inch of water, simply do the following:

- ① Place a straight walled container such as a tuna can or cake pan in your yard under your sprinkler system.
- ② Turn on the sprinkler and a timer, and when the water depth in the container is one inch, turn the water off and record the time it took.
- ③ With hose end or automatic sprinklers, water each zone for the correct amount of time each week.

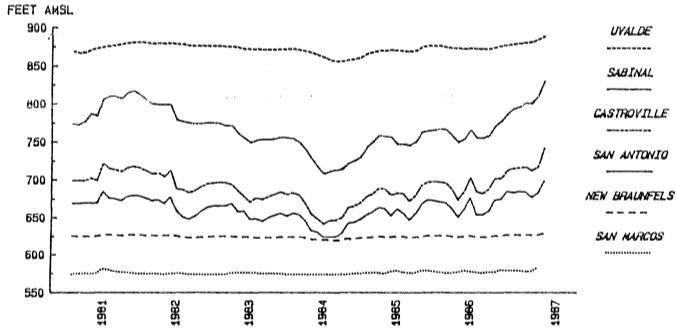
If runoff occurs, the water is being applied too rapidly for the soil to absorb it. This runoff can be avoided simply by dividing the time it takes into smaller periods.

Water lawns in the cool of the day, early morning water is best. And avoid peak evaporation time from 4-9 p.m.

Water only your lawns and plants. Water on sidewalks and streets is not only a waste but a traffic safety hazard. Don't water on windy days.

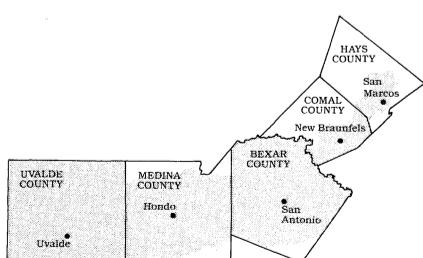
Edwards Aquifer Observation Wells

January 1981 thru June 1987



Edwards Underground Water District

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Attention Elementary Teachers

The Edwards Underground Water District in cooperation with Education Service Center Region 20, is sponsoring Math/Science Co-op workshops entitled "Elementary School Water Education."

The workshops include materials and handouts on the Edwards Aquifer as well as other water resources in Texas. The afternoon session is conducted by Dr. Charles Pascoe, Director of Childrens Theatre, SWTSU who has developed creative dramatic activities concerning water education. A wide variety of correlated brochures, workbooks, maps, student handouts, and teaching guides are distributed at the workshops. Each workshop is approved for 6 hours of Advanced Academic Training.

The following is a list of dates and locations for upcoming workshops:

September 12 New Braunfels Independent School District
September 19 Harlandale Independent School District
September 26 San Marcos Independent School District
October 3 Edgewood Independent School District
October 10 South San Antonio Independent School District
October 17 Bandera Independent School District

If you would like to register or need more information on any of these workshops please contact: Ben Freeman at the ESC Region 20 Math/Science Co-op, (512) 271-7611, extension 368.

New Publications

The Edwards Underground Water District announces two new publications dealing specifically with the Edwards Aquifer region as part of their on-going public education program.

A vivid color poster, **Water Resources of the Edwards Aquifer Region** and a booklet, **Suggested Design and Construction of Edwards Aquifer Wells** will enable residents of the District to educate themselves on the unique characteristics of the Edwards Aquifer.

The poster, **Water Resources of the Edwards Aquifer Region** describes the water related geographic features of the Edwards Aquifer region and includes a shaded relief map and a generalized geologic cross section of the Edwards Aquifer region, as well as informational graphs on population, water use, and recharge. The poster was developed as an educational tool for the District's water education program to present a comprehensive picture of the water resources in the Edwards Aquifer region for upper elementary and middle school earth science curricula.

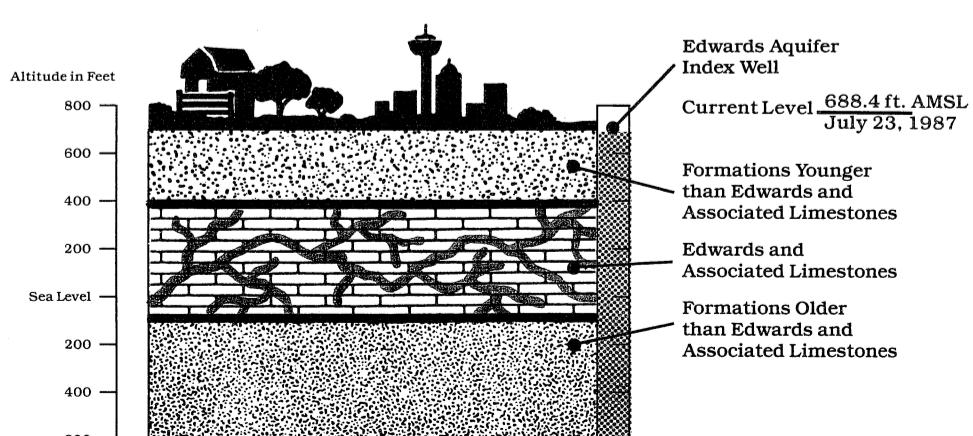
In addition, the booklet titled **Suggested Design and Construction of Edwards Aquifer Wells** was

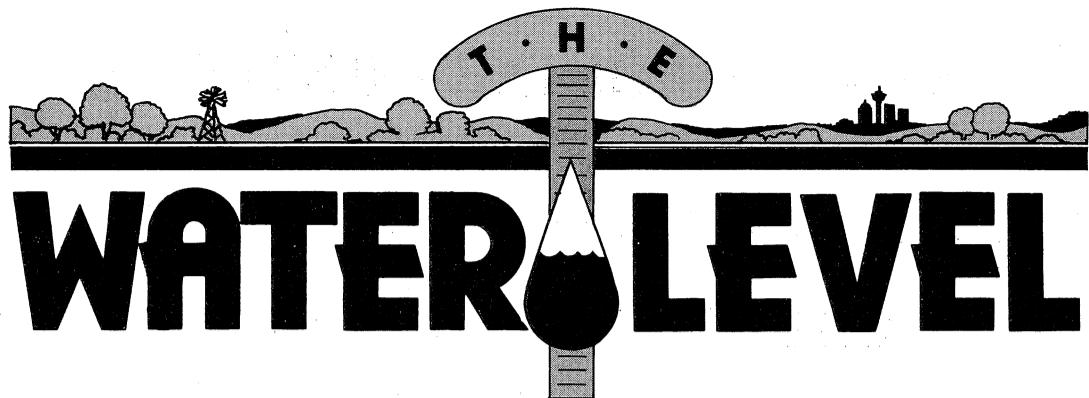


Water from June rains flow at record rates through the 10 feet wide by 15 feet high excavated channel from Seco Creek into the large sinkhole which drops 150 feet recharging into the Edwards Aquifer. Road crossing and gauge house is in background.

developed to inform those unfamiliar with the water well drilling profession about accepted and recommended drilling procedures, practices and construction specifications for domestic water wells in the Edwards Aquifer. It is intended to be used as a guidebook for individuals who are planning on having a water well drilled into the Edwards Aquifer. The unique nature of the Edwards and associated limestones which form the Edwards Aquifer make water well drilling and construction specialized and different from many other areas of the state. Inadequate water well drilling and construction practices in the Edwards Aquifer can lead to groundwater waste and/or pollution, the booklet serves as an educational resource tool in the District's ongoing water quality protection program.

The Edwards Underground Water District has developed these publications as well as other educational materials to promote this fundamental understanding of the Edwards Aquifer. Both publications are available from the Edwards Underground Water District at no charge. For copies call or write the District.





A Water Conservation Publication of the Edwards Underground Water District

January, 1988

WATER AWARENESS INFORMATION SERIES
NUMBER ONE

Volume 5, Edition 1

CHANGING YOUR INDOOR WATER USE HABITS

On the average, urban South Texans use about 163 gallons of water per day, 65% is used indoors and 35% is used outdoors.* Flushing the toilet accounts for the largest single use of water inside the home, followed by showers, washing machines, faucets, baths, toilet leakage, and dishwashers.

A conscientious water conservation effort can decrease your normal use without a drastic change of lifestyle. **Conserving water simply means the wise and intelligent use of a precious resource.**

The following is a list of easily adaptable habits and general information to help you lower your water use. Please don't be a WATER WASTER — CONSERVE.

IN THE BATHROOM:

Toilets consume the most water in the home, older model homes use approximately 4 to 6 gallons per flush. Toilets can be easily retrofitted with devices such as displacement bottles or bags and dams which can reduce water use by up to 1 gallon per flush. Do not use bricks which can disintegrate and cause plumbing problems. If you are in the market for a new fixture, look for models with water efficient features that can limit water use 3.5 to 1.5 gallons per flush. Avoid using the toilet as a wastebasket or ashtray. Extra flushes cause waste and some debris may cause damage to plumbing.

Most showers dispense between 5 and 7 gallons of water per minute. Water can be saved by turning off the shower while you lather up, turning on only to rinse. This practice may conserve up to 9 gallons of water. A flow restrictor may also be installed in the showerhead to reduce use by about 1.5 gallons per minute. If you are in the market for a new showerhead, look for models which are water conserving, limiting flow to 3 gallons per minute.

Turn the water off while shaving and brushing teeth. Letting the water run while shaving and brushing teeth may waste up to 2 gallons of water. Flow restrictors and faucet aerators may also be installed on faucets to reduce use.

IN THE KITCHEN

Automatic dishwashers use the most water in the kitchen — often 13 to 16 gallons per load. Wash only full loads and when you can, scrape the dishes instead of rinsing before loading. If you are in the market for a new dishwasher, look for models that are water efficient using 10 to 7 gallons per load.

While waiting for tap water to turn run hot, catch the lukewarm water in a pan or bottle and use it to water plants.

Store a container of water in the refrigerator for drinking. Do not try to cool tap water by running it, that's was down the drain.

Do not wash dishes and vegetables with the sink running. A sink full of water will do just fine. Running the water while washing the dishes can waste up to 20 gallons.

IN THE LAUNDRY ROOM

Many washing machines use between 45 and 60 gallons of water per load. Save up for a full load and make your water work efficiently. If your washer has a variable load control, always adjust water levels to fit the size of the load. This is another appliance that if you are in the market for, look for models which are water efficient using requiring 30 to 45 gallons per cycle.

LOOK FOR LEAKS

Be a leak detective. Be on the lookout for hidden leaks at faucets and showerhead caused by parts that are worn out or misaligned.

Check for leaks and drips on faucets and pipes. A small leak can cost you thousands of gallons of water per month.

A leak of one drop per second can waste a gallon of water per day.

A slow drip can waste 62,000 gallons a year or 170 gallons per day, more than the daily use for a person.

A pipe with a one-sixteenth inch diameter hole at 60 pounds of pressure can leak 800 gallons of water per day or one acre foot of water per year. (An acre-foot of water is approximately 325,900 gallons of water, enough to fill a football field to a depth of one foot or to supply the water needs of a family of five for a year).

FREE WATER CONSERVATION KITS

The Edwards Underground Water District distributes water conservation kits to residents which live within the District. These kits consist of two shower flow restrictors, a one gallon toilet tank displacement bag, safe blue dye leak tablets that detect silent toilet leaks and brochures to save water.

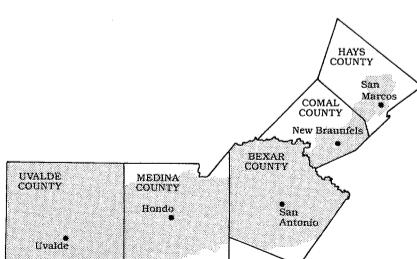
By installing one of these kits you can reduce your water use approximtely 8%. GET YOUR FREE KIT TODAY BY CONTACTING THE DISTRICT IN WRITING OR BY PHONE.

*Source: San Antonio City Water Board, *Water Statistics, 1986*, page 19a.

U.S. Department of Housing and Urban Development Office of Policy Development and Research, Building Technology Division. *Residential Water Conservation Projects: Summary Report*. June, 1984.

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Attn: Elementary School Teachers & Students
Poster Contest Announcement

ANNUAL POSTER CONTEST

The Edwards Underground Water District is holding its annual poster contest for elementary school children. The District encourages all eligible students to enter.

TEACHERS SHOULD YOU DECIDE TO HAVE YOUR STUDENTS ENTER THIS CONTEST, PLEASE BECOME FAMILIAR WITH THE RULES, ESPECIALLY THE DATES AND DEADLINES.

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2. Create a poster about the **IMPORTANCE OF WATER CONSERVATION**.
3. All posters must include a title or explanatory caption.
4. Each poster will be judged on neatness, arrangement and subject matter.
5. Finished posters should be no larger than 12" by 15".
6. All posters must be individual projects and include the student's name, school, school district, grade, teacher's name and school telephone.
7. Posters must be received at the District office in San Antonio no later than March 18, 1988.
8. All Posters become the property of the Edwards Underground Water District.

POSTER CONTEST AWARDS

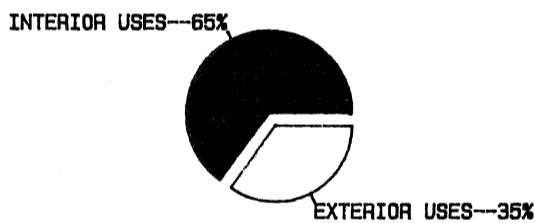
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SUBMIT ALL POSTER CONTEST ENTRIES TO:

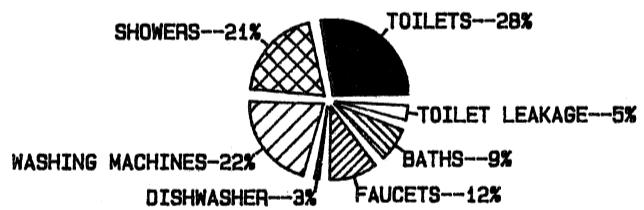
Edwards Underground Water District
Attn: David Tillman
1615 N. St. Mary's Street
P.O. Box 15830
San Antonio, TX 78212-9930

Any student who is interested in entering this contest can obtain additional information from the District at (512) 222-2204 or toll free a 1 (800) 292-1047. Also available are a wide variety of educational resource materials and classroom presentations.

AVERAGE DAILY WATER USE



RESIDENTIAL WATER USE
163 GALLONS PER PERSON PER DAY

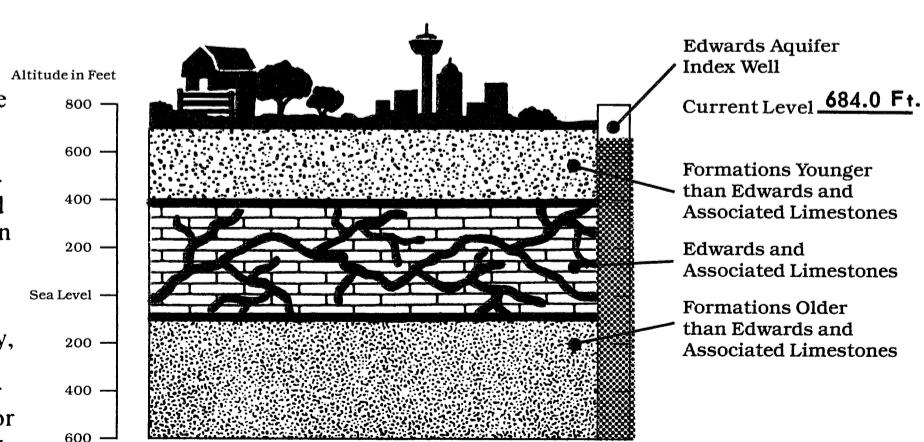


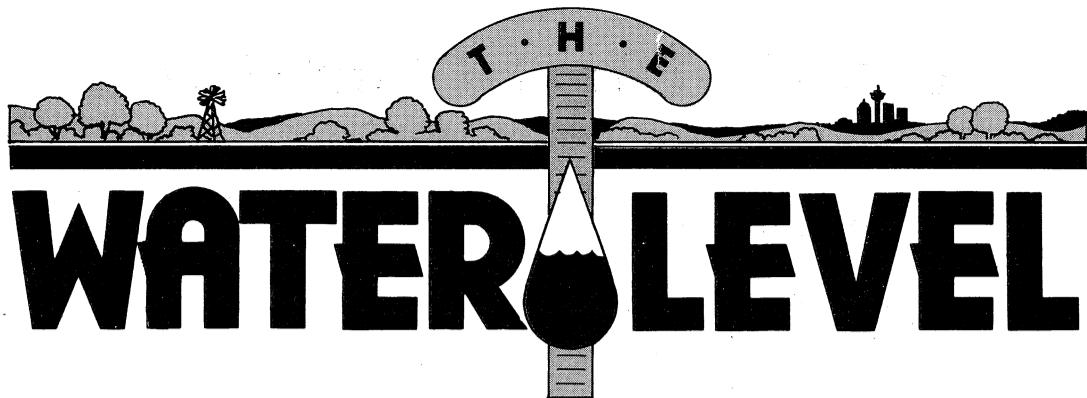
INTERIOR WATER USE
106 GALLONS PER PERSON PER DAY

Compiled by EUWD, 1988

Aquifer Status

On January 19, 1988 the water elevation at the Edwards Aquifer Bexar County index well (AY-68-37-203) was recorded at 684.0 feet above mean sea level (AMSL). The water elevation has remained steady at or near this level since July, 1987. The January historical average water elevation (1932-1988) for the Bexar County index well is 668.1 ft AMSL.





A Water Conservation Publication of the Edwards Underground Water District

January, 1988

WATER AWARENESS INFORMATION SERIES
NUMBER ONE

Volume 5, Edition 1

CHANGING YOUR INDOOR WATER USE HABITS

On the average, urban South Texans use about 163 gallons of water per day, 65% is used indoors and 35% is used outdoors.* Flushing the toilet accounts for the largest single use of water inside the home, followed by showers, washing machines, faucets, baths, toilet leakage, and dishwashers.

A conscientious water conservation effort can decrease your normal use without a drastic change of lifestyle. **Conserving water simply means the wise and intelligent use of a precious resource.**

The following is a list of easily adaptable habits and general information to help you lower your water use. Please don't be a WATER WASTER — CONSERVE.

IN THE BATHROOM:

Toilets consume the most water in the home, older model homes use approximately 4 to 6 gallons per flush. Toilets can be easily retrofitted with devices such as displacement bottles or bags and dams which can reduce water use by up to 1 gallon per flush. Do not use bricks which can disintegrate and cause plumbing problems. If you are in the market for a new fixture, look for models with water efficient features that can limit water use 3.5 to 1.5 gallons per flush. Avoid using the toilet as a wastebasket or ashtray. Extra flushes cause waste and some debris may cause damage to plumbing.

Most showers dispense between 5 and 7 gallons of water per minute. Water can be saved by turning off the shower while you lather up, turning on only to rinse. This practice may conserve up to 9 gallons of water. A flow restrictor may also be installed in the showerhead to reduce use by about 1.5 gallons per minute. If you are in the market for a new showerhead, look for models which are water conserving, limiting flow to 3 gallons per minute.

Turn the water off while shaving and brushing teeth. Letting the water run while shaving and brushing teeth may waste up to 2 gallons of water. Flow restrictors and faucet aerators may also be installed on faucets to reduce use.

IN THE KITCHEN

Automatic dishwashers use the most water in the kitchen — often 13 to 16 gallons per load. Wash only full loads and when you can, scrape the dishes instead of rinsing before loading. If you are in the market for a new dishwasher, look for models that are water efficient using 10 to 7 gallons per load.

While waiting for tap water to turn run hot, catch the lukewarm water in a pan or bottle and use it to water plants.

Store a container of water in the refrigerator for drinking. Do not try to cool tap water by running it, that's was down the drain.

Do not wash dishes and vegetables with the sink running. A sink full of water will do just fine. Running the water while washing the dishes can waste up to 20 gallons.

IN THE LAUNDRY ROOM

Many washing machines use between 45 and 60 gallons of water per load. Save up for a full load and make your water work efficiently. If your washer has a variable load control, always adjust water levels to fit the size of the load. This is another appliance that if you are in the market for, look for models which are water efficient using requiring 30 to 45 gallons per cycle.

LOOK FOR LEAKS

Be a leak detective. Be on the lookout for hidden leaks at faucets and showerhead caused by parts that are worn out or misaligned.

Check for leaks and drips on faucets and pipes. A small leak can cost you thousands of gallons of water per month.

A leak of one drop per second can waste a gallon of water per day.

A slow drip can waste 62,000 gallons a year or 170 gallons per day, more than the daily use for a person.

A pipe with a one-sixteenth inch diameter hole at 60 pounds of pressure can leak 800 gallons of water per day or one acre foot of water per year. (An acre-foot of water is approximately 325,900 gallons of water, enough to fill a football field to a depth of one foot or to supply the water needs of a family of five for a year).

FREE WATER CONSERVATION KITS

The Edwards Underground Water District distributes water conservation kits to residents which live within the District. These kits consist of two shower flow restrictors, a one gallon toilet tank displacement bag, safe blue dye leak tablets that detect silent toilet leaks and brochures to save water.

By installing one of these kits you can reduce your water use approximtely 8%. GET YOUR FREE KIT TODAY BY CONTACTING THE DISTRICT IN WRITING OR BY PHONE.

*Source: San Antonio City Water Board, *Water Statistics, 1986*, page 19a.

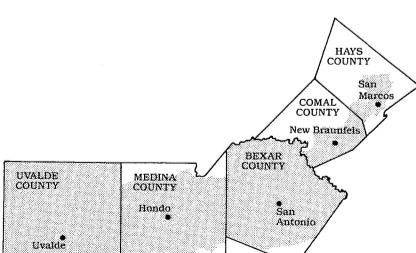
U.S. Department of Housing and Urban Development Office of Policy Development and Research, Building Technology Division. *Residential Water Conservation Projects: Summary Report*, June, 1984.

Edwards Underground Water District

1615 N. St. Mary's
P.O. Box 15830
Antonio, Texas 78212

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U.S. Postage
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Permit No. 771
San Antonio, TX 78205



Attn: Elementary School Teachers & Students
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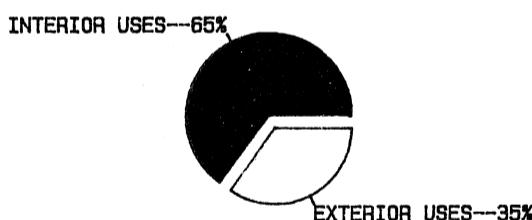
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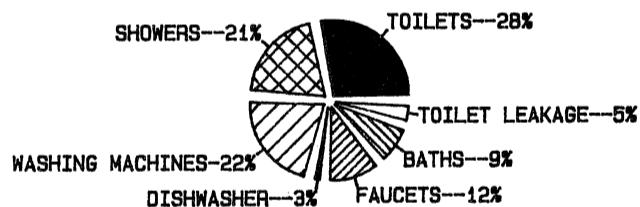
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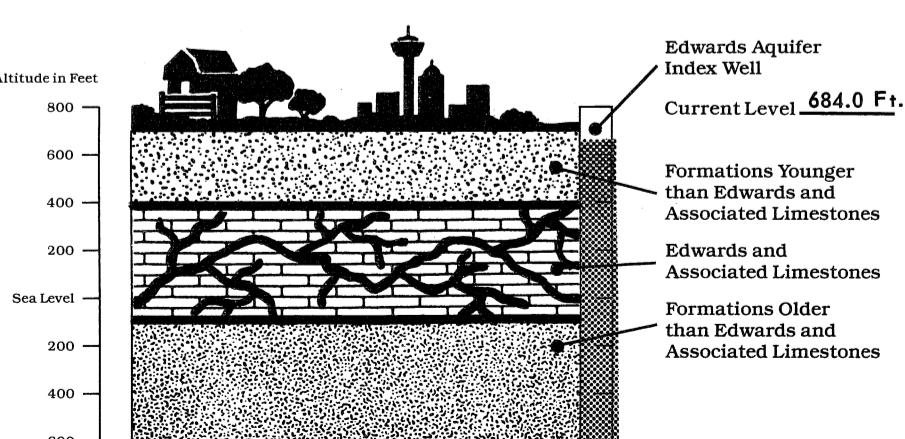


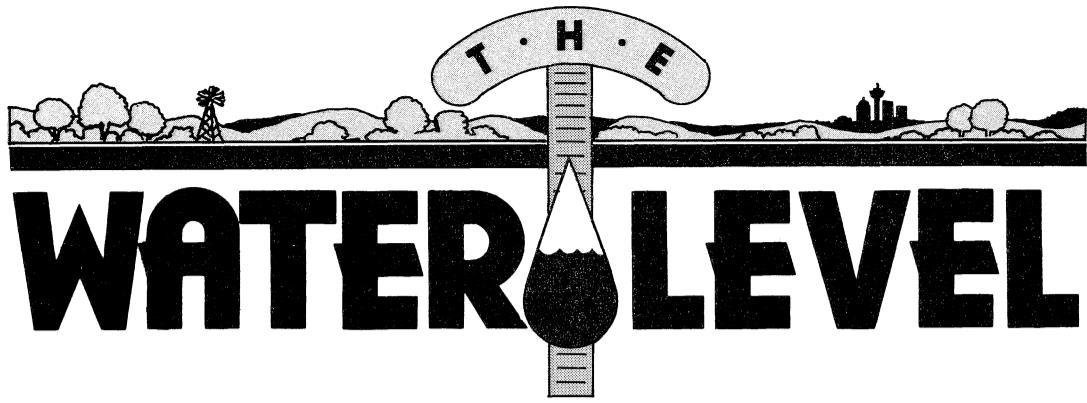
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A Water Conservation Publication of the Edwards Underground Water District

CONSERVATION EFFORTS MOVE OUTDOORS

XERISCAPE '89 KICKS OFF!

The South Central Texas Xeriscape Committee is pleased to present XERISCAPE '89, the 1989 Xeriscape of the Year Contest. (See entry form below.)

Xeriscape comes from the Greek word Xeros, meaning dry. It is the conservation of water and energy through creative landscaping. Although originally developed in Denver, Colorado this exciting and energy efficient approach to landscaping is rapidly receiving widespread popularity in south central Texas.

XERISCAPE '89 is designed to spotlight those landscapes that best demonstrate the total concept. The contest is open to all residents within the counties of Bexar, Comal and Hays who have home Xeriscapes that demonstrate all seven of the Xeriscape principles:

- Good planning and design
- Thorough soil preparation
- Limited lawn areas
- Use of mulches in shrub and flower beds

- Adapted, low water demand plants
- Effective and efficient watering methods
- Proper landscape maintenance

There will be 2 categories of winners, amateur residential and professional residential. All contest participants will receive a 50% discount coupon for one Xeriscape plant at the Compleat Garden, 5405 Broadway. First, second, and third place awards will be given in addition to an attractive Xeriscape yard sign designating the award winning Xeriscapes. Winners will also be presented with a 6" wall mountable plaque to be presented at the August meeting of the Edwards Underground Water District Board of Directors.

To enter, just fill out the entry form below and send back to the EUWD. A packet with contest rules, a questionnaire, and a discount coupon for a Xeriscape plant will be mailed to participating Xeriscapers.

NAME: _____

Address: _____

CITY: _____ ZIP: _____ DAY PHONE: _____

TO ENTER SEND ENTRY FORM TO:
EDWARDS UNDERGROUND WATER DISTRICT
1615 N. St. Mary's
P.O. Box 15830
San Antonio, Texas 78212

ENTRY FORMS MUST BE POSTMARKED BY MAY 31, 1989.

REMEMBER . . . **AN INCH A WEEK IS ALL THAT'S NEEDED**

It's a fact — lawn watering accounts for 35-40% of summer, residential water use. Knowing how much to water and when to water is essential to maintaining an attractive landscape.

To save you time and money the EUWD recommends that even during the hot summer months, lawns in south/central Texas need only one inch of water per week to ensure a healthy green lawn. This efficient watering method also encourages deeper, more drought resistant rooting of lawn and plants.

To determine how long your irrigation system takes to apply one inch of water just follow a few basic steps:

- Place a straight walled container such as a tuna can in your yard, under your sprinkler system.
- Turn on the sprinkler and set a timer. When the water in the container measures one inch, turn off the water and record the time it took.
- Subsequent waterings need only receive an "inch worth" of watering time.

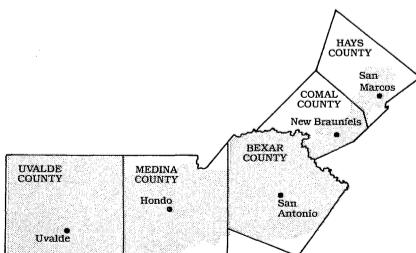
Other tips that will conserve water and save you money:

- Water only in the cool of the day — early morning is best! Avoid peak evaporation time from 10 a.m.-7 p.m.
- Water only your lawns and plants. Water on sidewalks and streets is not only a waste but also a traffic safety hazard.
- Don't water on *windy* days.
- Adjust automatic timers as needed to account for welcome rainfall.
- Xeriscape!

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*Permit No. 771
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ADDRESS CORRECTION REQUESTED
PLEASE FORWARD

If this is your idea of giving the lawn a good soaking, you're all wet.



Yard Tips: You can save water by watering your lawn in the early morning when it's cool; by watering just your lawn, not the sidewalks and driveway; and by monitoring your watering so you don't overwater.

CONSERVE
Don't be a WaterWaster!

FOR MORE INFORMATION CONCERNING WATER SAVING TIPS OR THE EDWARDS AQUIFER CALL OR WRITE
THE EDWARDS UNDERGROUND WATER DISTRICT (512) 222-2204 P.O. BOX 15830 SAN ANTONIO, TEXAS 78212

FIRST LEAK DETECTION SURVEY COMPLETED

As a part of the EUWD's new water leak detection program, "kicked off" in March of '89, the first survey of a public water utility has been completed in the City of Converse.

Water conservation is the objective of the leak detection program. Unidentified leaks in buried water pipes account for a significant amount of "lost" water.

Jim Shipley, EUWD Water Conservation Technician has surveyed approximately 54 miles of water main and 2600 individual water services. While no significant leaks were found, a number of smaller leaks were identified and placed on a priority list for repair by the City of Converse Water Department.

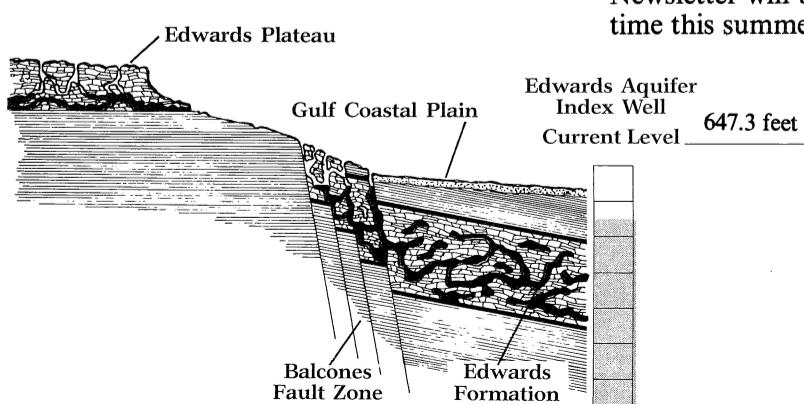
The leak detection service was made available to water utilities within the Edwards Underground Water District just 2 months ago and already 12 utilities have requested the service.

AQUIFER STATUS

On May 10 the water elevation at the Edwards Aquifer Index Well (AY68-37-203) was recorded at 647.3 feet above mean sea level (AMSL). The water level for May has not been this low since the mini-drought of 1984. The May Historical average water elevation (1932-1988) for the Bexar County Index Well is 665.7 ft. AMSL.

Altitude in Feet

1750
1500
1250
1000
750
500
250
sea level
-250
-500



SAN ANTONIO BEGINS WATER CONSERVATION PROGRAMS

As a direct result of the Interlocal Agreement between the Edwards Underground Water District and the City of San Antonio, several water conservation programs are now in the process of being implemented. A steering committee, headed by Steve Rabe, Water Conservation Planner of the Department of Water Resources of San Antonio, is coordinating the efforts of several city departments. This steering committee is made up of Edwards Underground Water District staff and representatives from the various city departments that are involved in the city-wide water conservation initiatives.

Three of the programs that are presently being implemented by this committee are, a car wash recovery system to be used in all police car washing facilities, retrofitting of water consumptive restroom facilities at Health department locations and Xeriscape demonstration projects at various Parks and Recreation locations. Other water saving projects are planned for upcoming months. These programs are a direct response by the EUWD and the City of San Antonio to the evergrowing need for water conservation by all the residents of the Edwards aquifer region.

SPRING IS IN THE AIR

Now that spring is here, the EUWD offers these simple reminders on conserving water. While spring cleaning in the house, sprucing up the yard and washing the family car, here are a few tips to

MAKE EVERY DROP COUNT!

In the House

- Toilets can waste lots of water. To see if yours is a water waster put a small amount of food coloring into the tank. If the color trickles into the bowl, there is a leak and repairs are needed.
- Water required to flush some toilets can be reduced. Placing a water displacement bag in the flush tank will save one quart of water per flush. Displacement bags can be obtained free from the EUWD. Note: **Displacement bags are good on pre-1980 toilets that use 5-6 gallons**
- When doing laundry, wait until you have a full load before washing items, or use a lower water level setting.
- Urge family members to take short showers instead of tub baths. Showers — especially those fitted with flow restrictors or low-volume heads — *can reduce flow up to 1.5 gallons per minute*.
- While showering, turn off water while you apply soap or shampoo.
- Don't allow water to "run" while you shave, brush teeth, etc.

- Use a pan of water to peel and clean vegetables and fruits rather than letting the sink tap run. *Letting the tap run wastes 2 gallons per minute!*

In the Yard:

- When washing the car, use a bucket of warm sudsy water to remove soil. Hose down **only as a final rinse**.
- Use a broom, not the hose to "sweep clean" the garage, sidewalks, and driveway.
- Retain moisture in the soil longer by "mulching" shrubs and other plants. Spread leaves, lawn clippings, chopped bark, or plastic around the plants. Mulching will also control weeds that compete with garden plants for water. Be careful to see that mulches allow water to soak into the soil.



Editor's Note: The Water Level Newsletter and the Summit Newsletter are in the process of being combined, revised and updated. Please be checking your mailbox for a new and different Edwards Underground Water District publication. A new District Newsletter will be unveiled some time this summer.