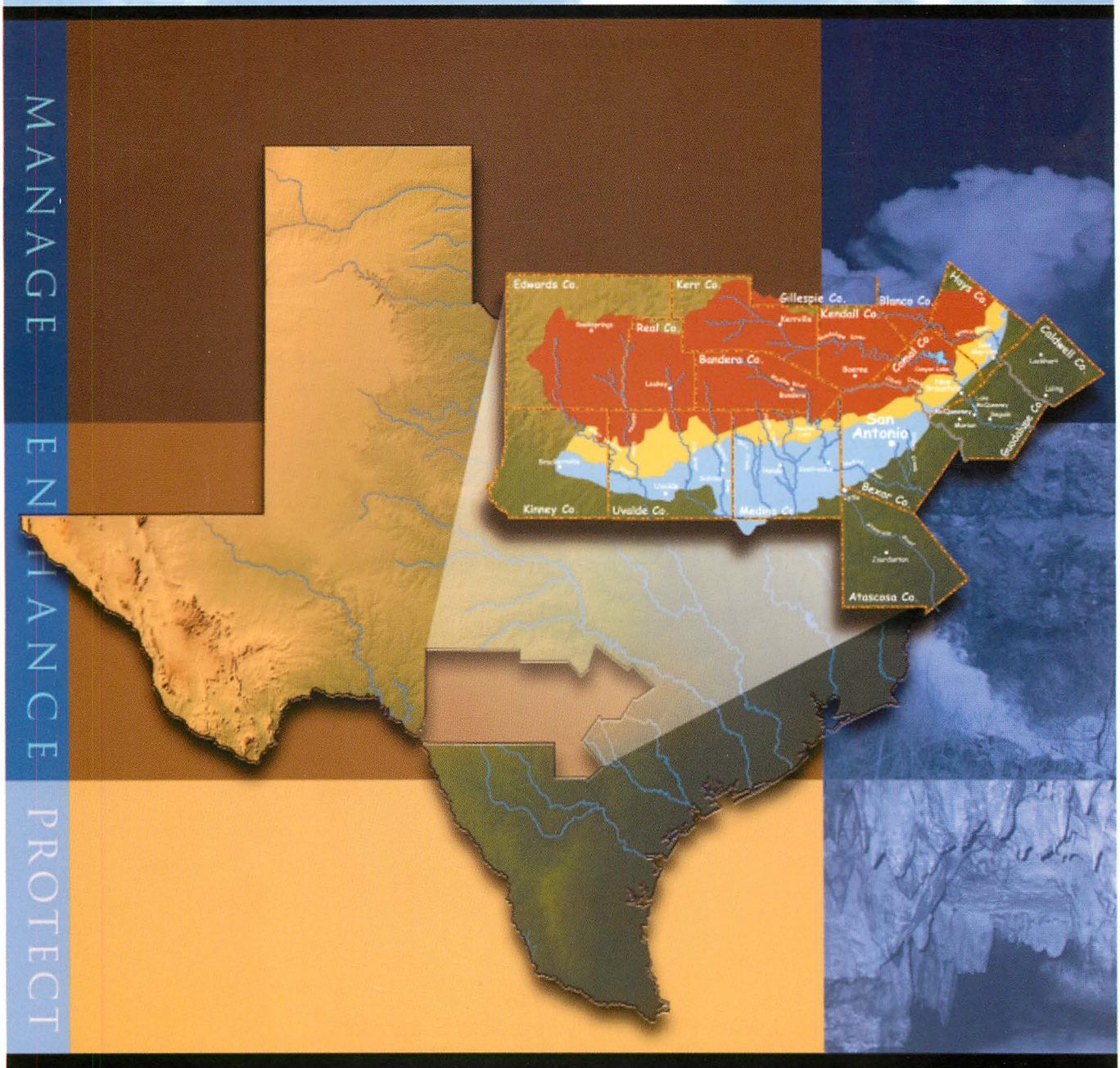
Edwards Aquifer Authority Hydrologic Data Summary for 2007



October 2008

Report No. 08-03

EDWARDS AQUIFER
AUTHORITY

2007 Hydrologic Data Summary

Each year, the Edwards Aquifer Authority (Authority) publishes a comprehensive Hydrologic Data Report offering an extensive compilation of data on the Edwards Aquifer, including information on groundwater levels, precipitation, groundwater recharge and discharge, and water quality. This Hydrologic Data Summary is an abbreviated version of the more exhaustive Hydrologic Data Report and serves as a supplement to that report. The full Hydrologic Data Report is available as a PDF on the Authority's website at: **www.edwardsaquifer.org.**

Compiled by:
J. Mark Hamilton, Hydrogeology Supervisor
Roland Ruiz, Assistant General Manager,
Communications & External Affairs
Elizabeth Smith, Community & Public Relations Coordinator
and
Geary M. Schindel, Chief Technical Officer

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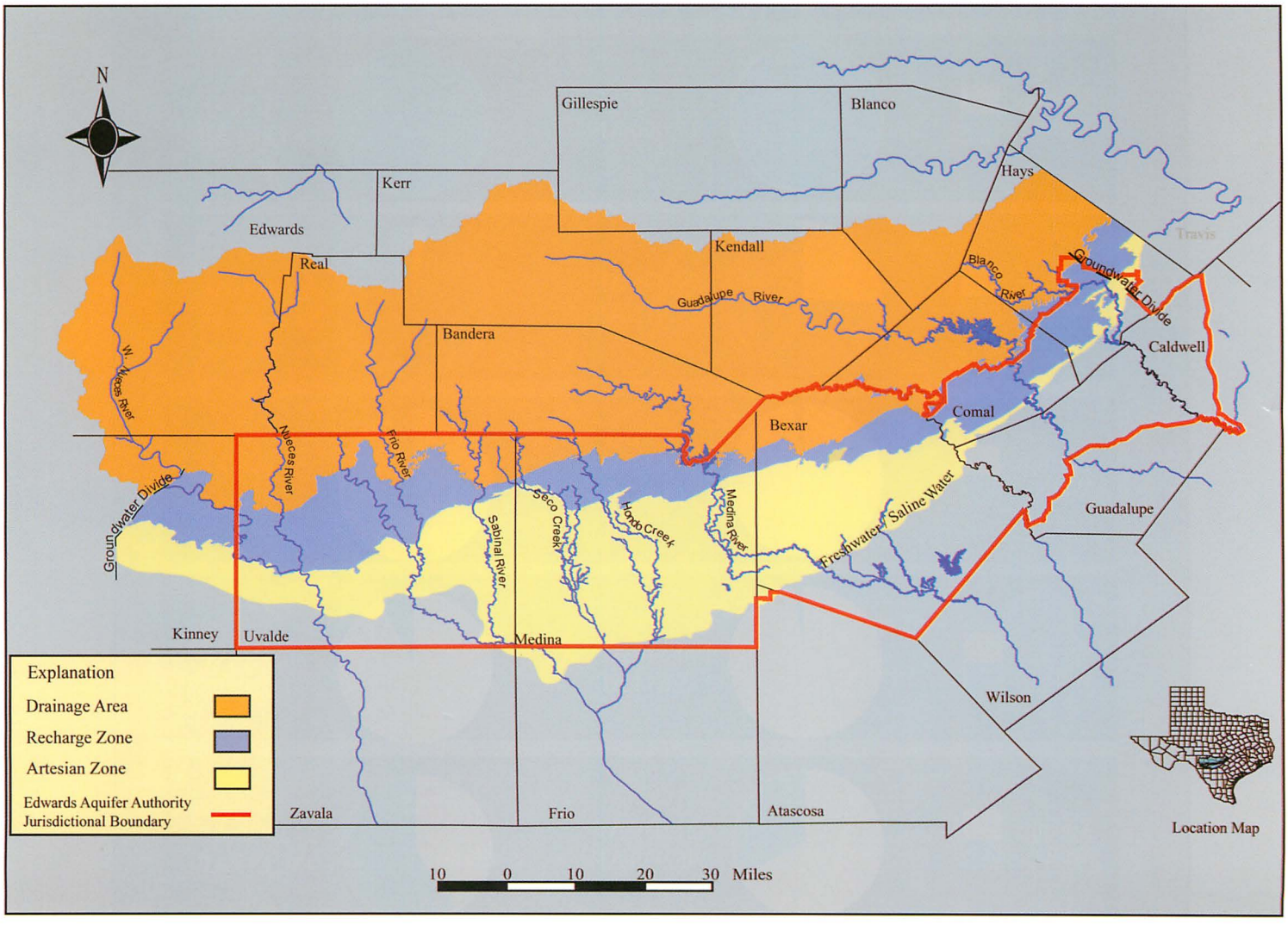
The Edwards Aquifer

The Balcones Fault Zone Edwards Aquifer (the Edwards Aquifer) is one of the most permeable and productive aquifers in the United States and serves as the primary source of water for approximately 1.7 million people in south-central Texas. In 1993, the Texas Legislature created the Authority to act as a special regional water management district in charge of managing, enhancing, and protecting the San Antonio segment of the Edwards Aquifer which extends approximately 180 miles from the groundwater divide east of Bracketville in Kinney County to the groundwater divide near Kyle in Hays County. The Authority is governed by a 17-member board of directors, with voting members elected to represent 15 districts across the Authority's region and two non-voting members appointed by other entities. The Authority's jurisdictional area, outlined in red on the map below, includes all or parts of eight counties. Its directors represent agricultural, industrial, domestic, municipal, spring, and downstream user groups.

The entire Edwards Aquifer system measures approximately 8,800 square miles and consists of three interconnected components - the drainage area (orange), the recharge zone (blue), and the artesian zone (yellow) - each shown in the map below. Rain and surface water from the drainage area drain towards the environmentally sensitive recharge zone where the water actually enters the aquifer. It then travels underground to the artesian zone and ultimately discharges through wells or springs such as Comal Springs in Comal County or San Marcos Springs in Hays County.

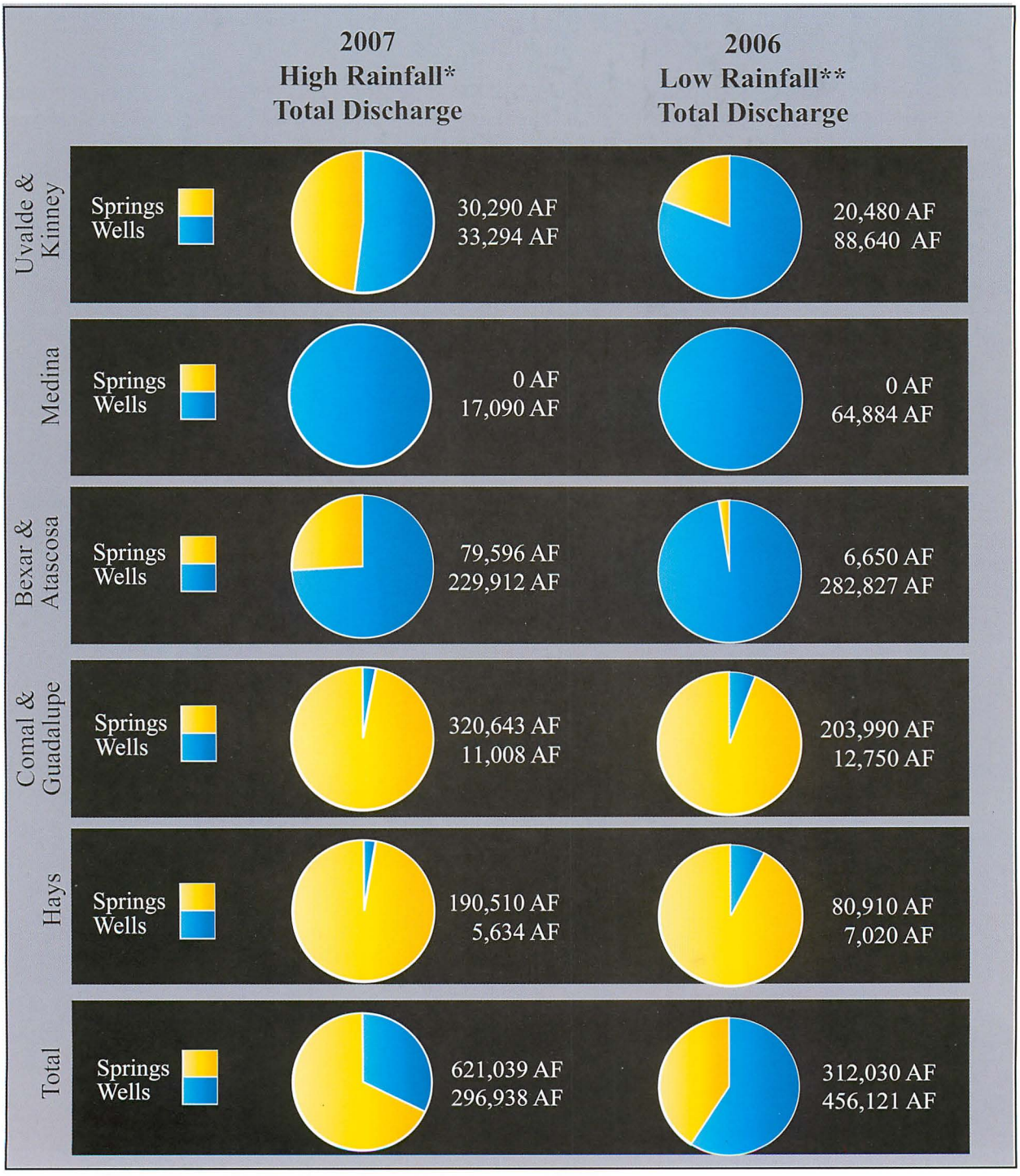


2007 Groundwater Discharge

Springs and Wells

Groundwater discharges from the Edwards Aquifer two ways: from springs as springflow or from wells. In 2007, the total amount of water discharged from the aquifer was estimated at 917,977 acre-feet (one acre-foot equals 325,851 gallons, the amount of water it takes to fill a football field one foot deep). Of this total, the amount of water discharged from springs was estimated at 621,039 acre-feet while the total amount of water discharged from wells was estimated at 296,938 acre-feet.

Climate greatly influences the distribution of discharge between springs and wells. In heavy rainfall years, springs tend to discharge more than wells, while in dry years well discharge increases. The graphic on this page summarizes the amount of water discharged by type in each county across the region and compares 2007 (a very wet year) with 2006 (a very dry year). Springflow discharge is shown in yellow and well discharge is shown in blue.

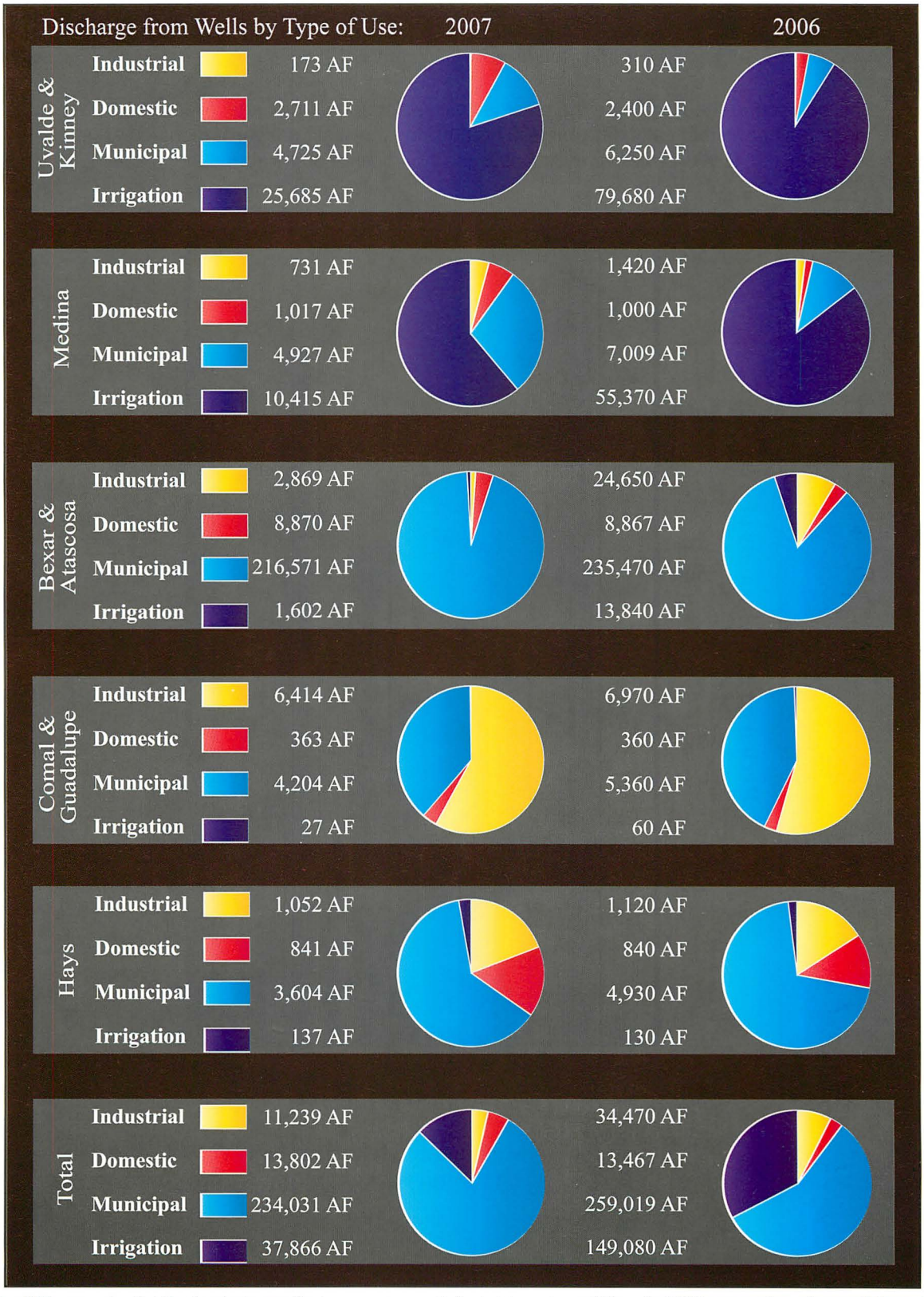


* High—total amount of rainfall measured at the SA International Airport in 2007 was 47.25"

** Low—total amount of rainfall measured at the SA International Airport in 2006 was 21.34"

2007 Groundwater Discharge
By Use

The Authority categorizes groundwater discharged from wells as either "reported" (requiring a permit to withdraw) or "non-reported" (not requiring a permit to withdraw) use. Examples of reported uses are: wells that supply municipal, irrigation, or industrial uses. Examples of non-reported uses are wells that supply single-family dwellings, sustain livestock, or serve a federal facility such as a military base. In calendar year 2007, discharge from wells, including both reported and non-reported use, totaled 296,938 acre-feet.



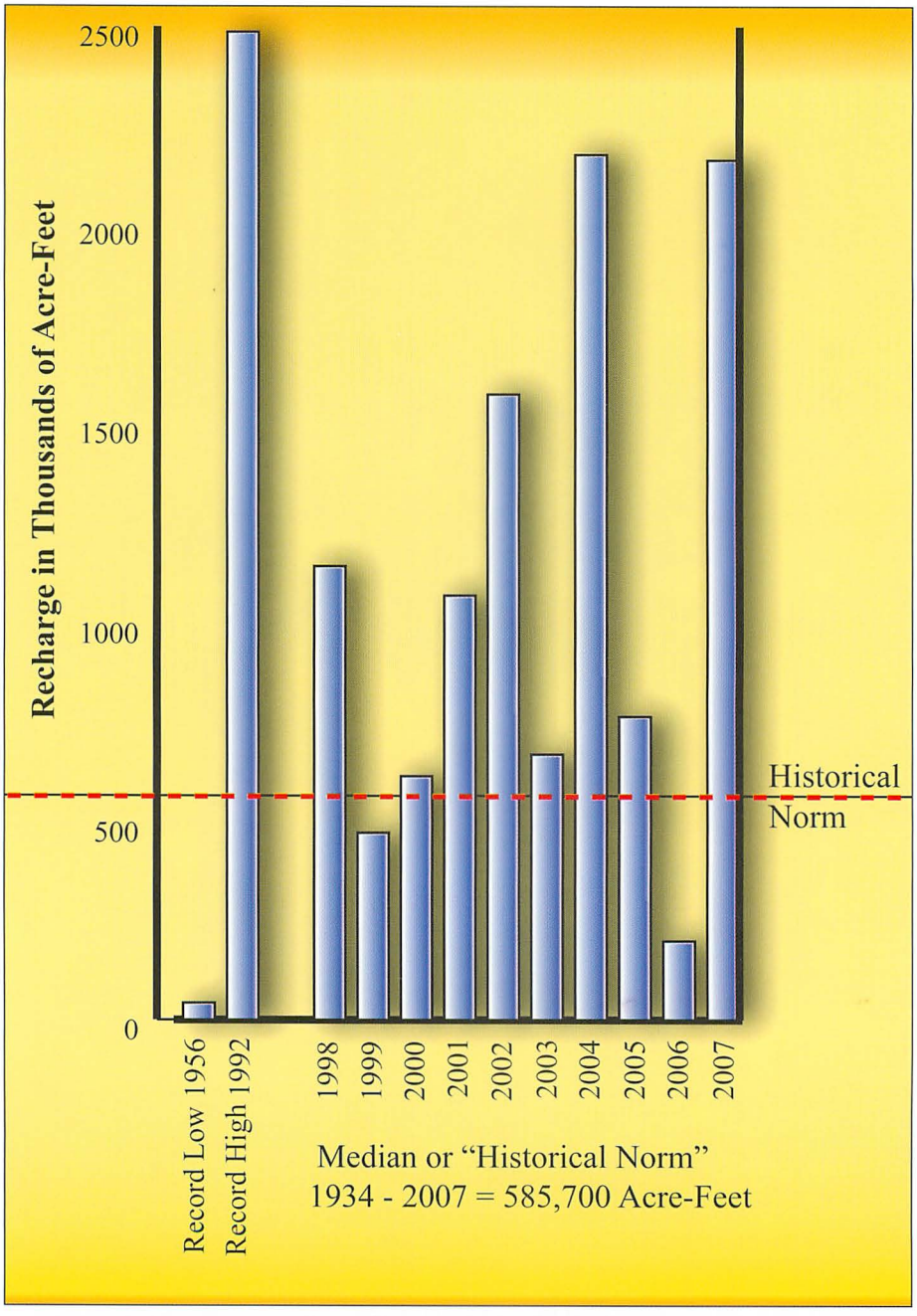
Note: the differences in distribution between the two years are attributed to wet conditions in 2007 versus drought conditions in 2006.

2007 Recharge

Rainfall recharges the aquifer, so with above-average rainfall occurring in 2007, recharge to the San Antonio Segment of the Balcones Fault Zone Aquifer was above average, as seen in the graph below. Recharge estimates for 2007 totaled 2,162,300 acre-feet.

By comparison, for the period of record (1934-2007), the median annual recharge to the aquifer was 585,700 acre-feet. As such, calendar year 2007 was significantly above the median value for recharge. The record-high recharge value of 2,486,000 acre-feet occurred in 1992. In contrast, the record low value of 43,700 acre-feet occurred during the drought of record in 1956.

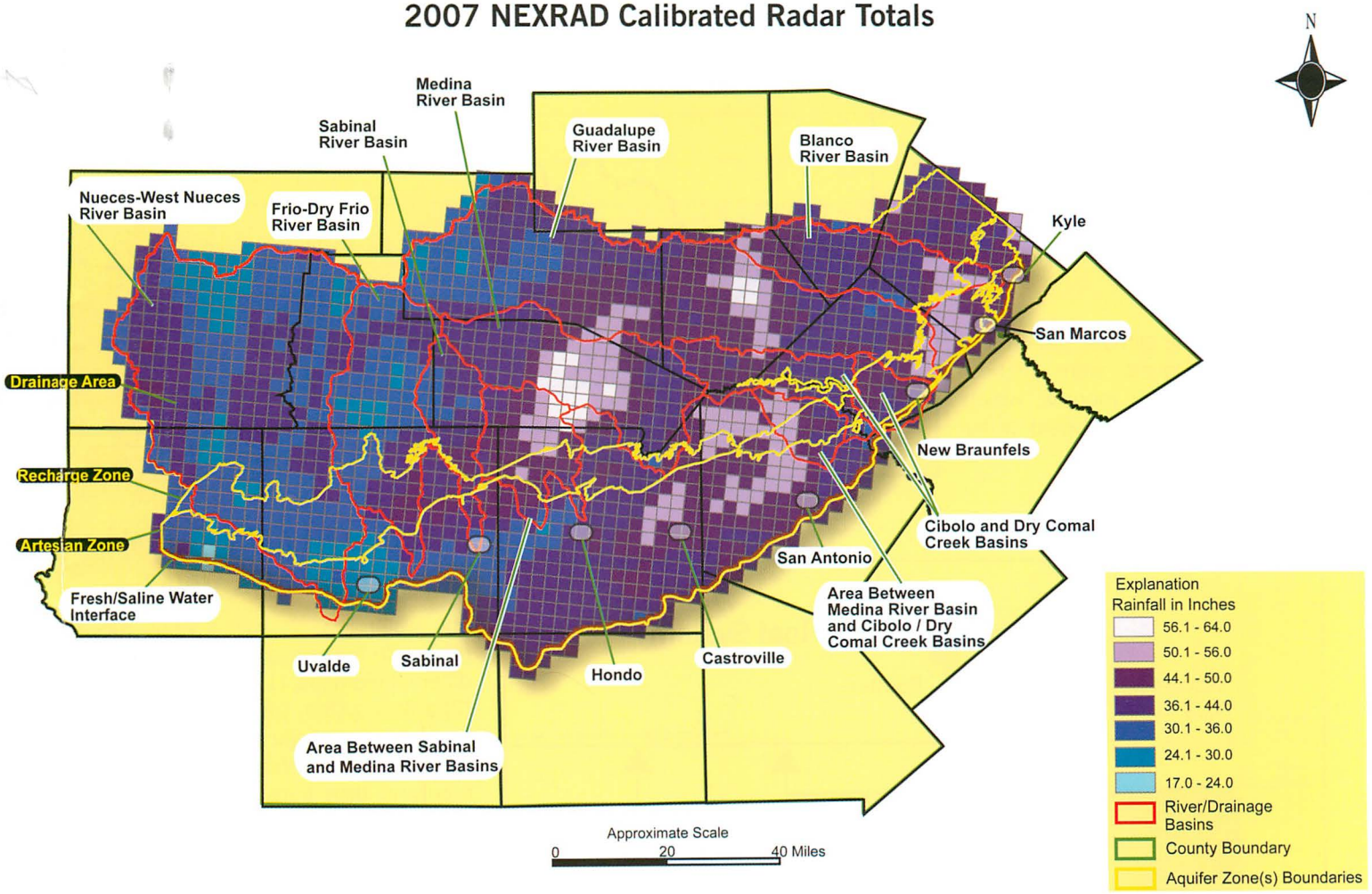
Also included in the graph, are the recorded values for annual recharge over the most recent 10-year period. The graph shows that calendar year 2007 represents the second highest recharge value over the most recent 10-year period (1998-2007), a result that is clearly indicative of the abundant rainfall that fell across the region in 2007.

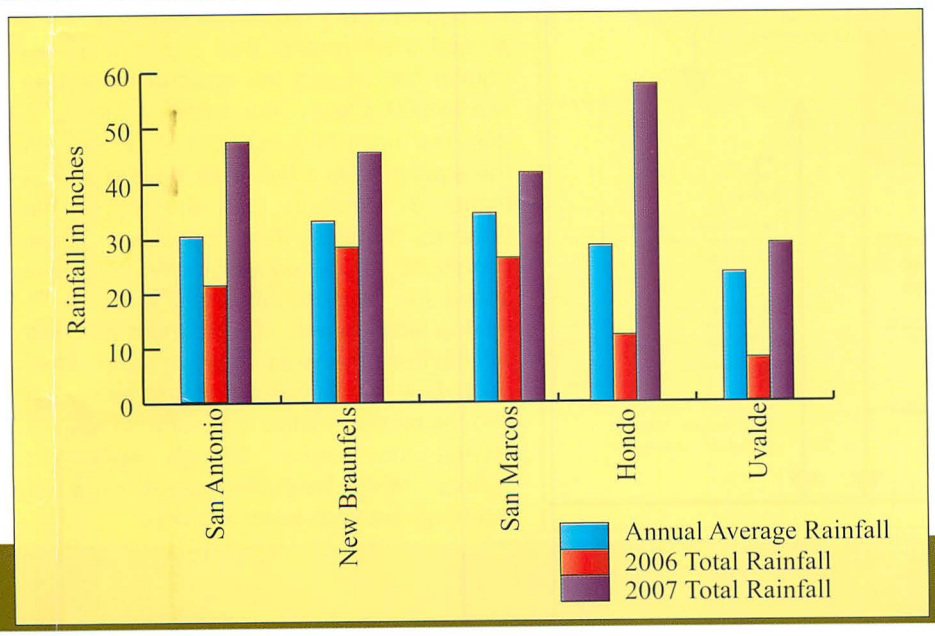


2007 Precipitation

In calendar year 2007, the Authority's real-time network consisted of 52 operational automated rain gauges. Measurements from these gauges were used to calibrate NEXRAD Radar data such that rainfall for the region is estimated on a grid with each cell equal to 16 km^2 in area. These data are in turn used to estimate recharge to the Edwards Aquifer. Across the region, NEXRAD totals ranged from a low of approximately 20 inches of rainfall in parts of Kinney County to a high of just over 63 inches in east central Bandera County.

2007 NEXRAD Calibrated Radar Totals





Selected 2006 and 2007 Rainfall Totals Compared to Annual Averages and Below-Average Rainfall in 2006

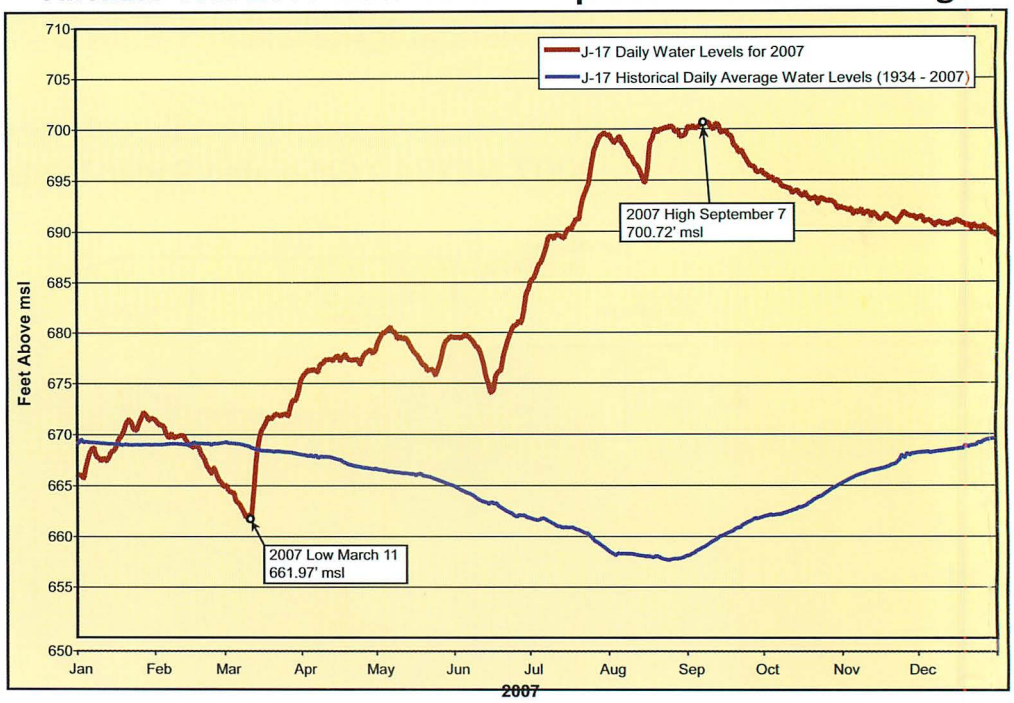
The graph to the left demonstrates the abundance of rainfall in 2007 compared to 2006. The amount of rain received for 2007 is shown in purple, for 2006 is shown in red, and the historical average is shown in blue.

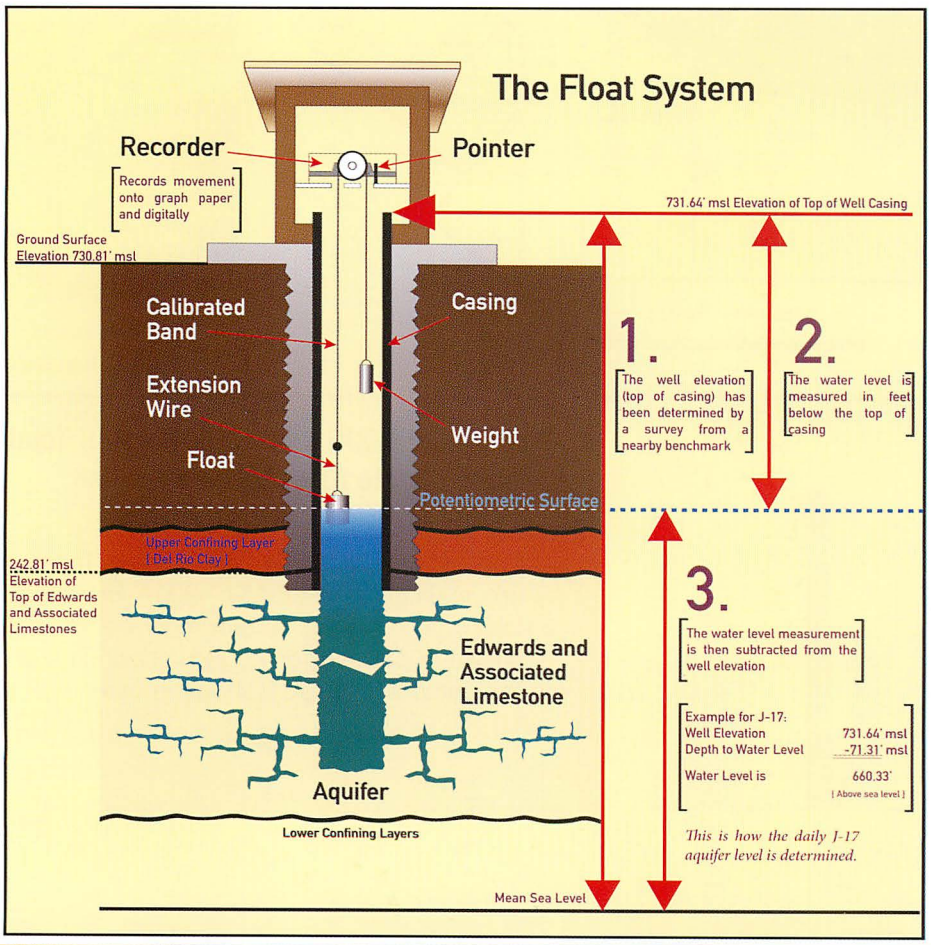
2007 Groundwater Levels

Calendar year 2007 was characterized by abundant rainfall for much of the year, unlike calendar years 2005 and 2006, which were below- normal rainfall years. As such, aquifer levels in 2007 were significantly above average for the majority of the year as demonstrated by the graph of the Bexar County Index Well (J-17) at right. Water levels at J-17 for 2007 are reflected by the red line, while the average water level at J-17 for the period of record (1934-2007) is represented by the blue line.

As a result of the climatic patterns in 2007, water levels were highest during the summer months, which historically exhibit the lowest water levels.

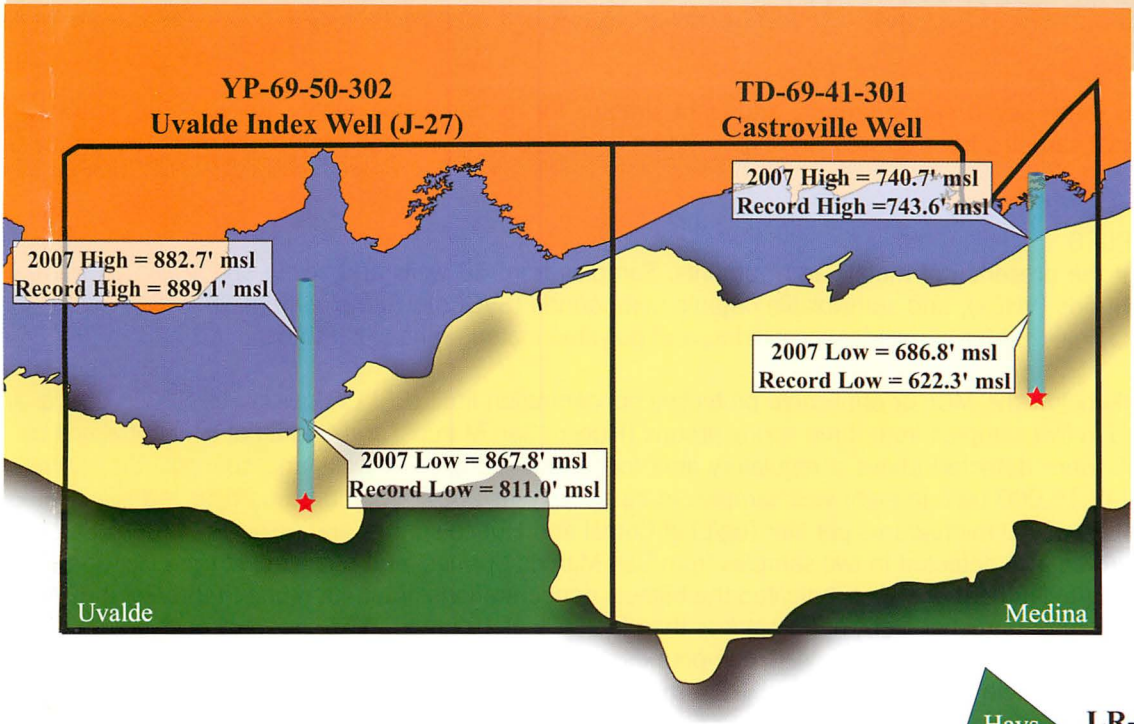
Bexar County Index Well AY 68-37-203 (J-17)
Calendar Year 2007 Water Level Compared to Historical Average





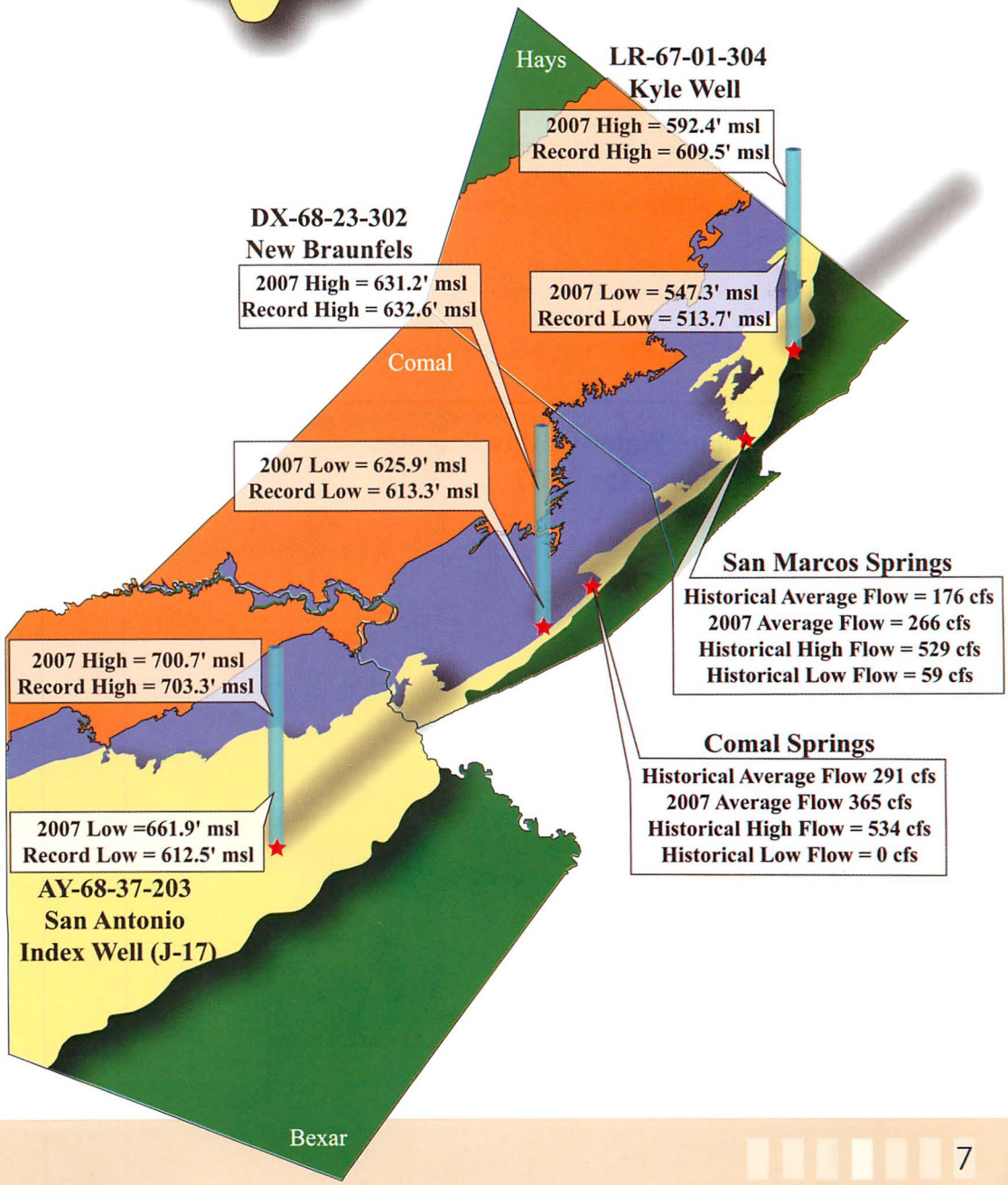
How J-17 Water Level Measuring Works

The water level in well J-17 is measured relative to mean sea level (msl) using three different methods: (1) a pressure transducer, (2) a float system (pictured left), and (3) an air pressure gauging system. These systems record the height that water rises in the well bore and then transmit the data electronically to the Authority's offices for monitoring and reporting to the public. The elevation of water in the well, called the potentiometric surface, is created by artesian pressure in the aquifer. For example, a reading of 660.3 at well J-17 means that pressure in the aquifer has caused the water in the well to rise to 660.3 feet above mean sea level. It does not mean there is 660.3 feet of water in the aquifer. Since the water level in J-17 is higher in elevation than the top of the Edwards Aquifer, this Indicates artesian conditions. If the potentiometric surface is above the land surface, this would be a flowing artesian well. The groundwater levels will fluctuate (move up or down), depending upon how much water is being recharged into the aquifer relative to how much water is leaving the aquifer through wells and springs. Water levels decrease when water discharge exceeds water recharge.



Water Levels-Uvalde and Medina Counties

The graphic at left summarizes the water levels in the two western most counties of the Authority's jurisdictional area. The high and low values for calendar year 2007 and the record high and low values are shown.



Water Levels-Bexar, Comal, and Hays Counties

Water levels for selected wells in Bexar, Comal, and Hays counties are shown in the graphic to the right. The high and low value for calendar year 2007, and the record high and low value for the period of record is shown for each well.

In addition, springflows for the two largest springs in the Authority's jurisdictional area are shown. The average historical flows, and calendar year 2007 average flows are shown for Comal and San Marcos springs. The flow quantity is shown in cubic feet per second (cfs). One cfs equals 448.83 gallons per minute.

2007 Water Quality

In 2007, the Authority sampled 76 wells, seven spring groups, and eight streams for routine water quality analyses. In addition, the Authority analyzed over 3,000 special samples from 90 wells in response to a large debris fire located on the recharge zone in the City of Helotes.

ROUTINE WATER QUALITY SAMPLES

Routine samples were analyzed for the presence of metals and nutrients. Samples from 48 wells and seven spring groups were also analyzed for volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Samples from 38 wells, seven spring groups, and eight streams were also analyzed for herbicides, pesticides, and polychlorinated biphenyls (PCBs).

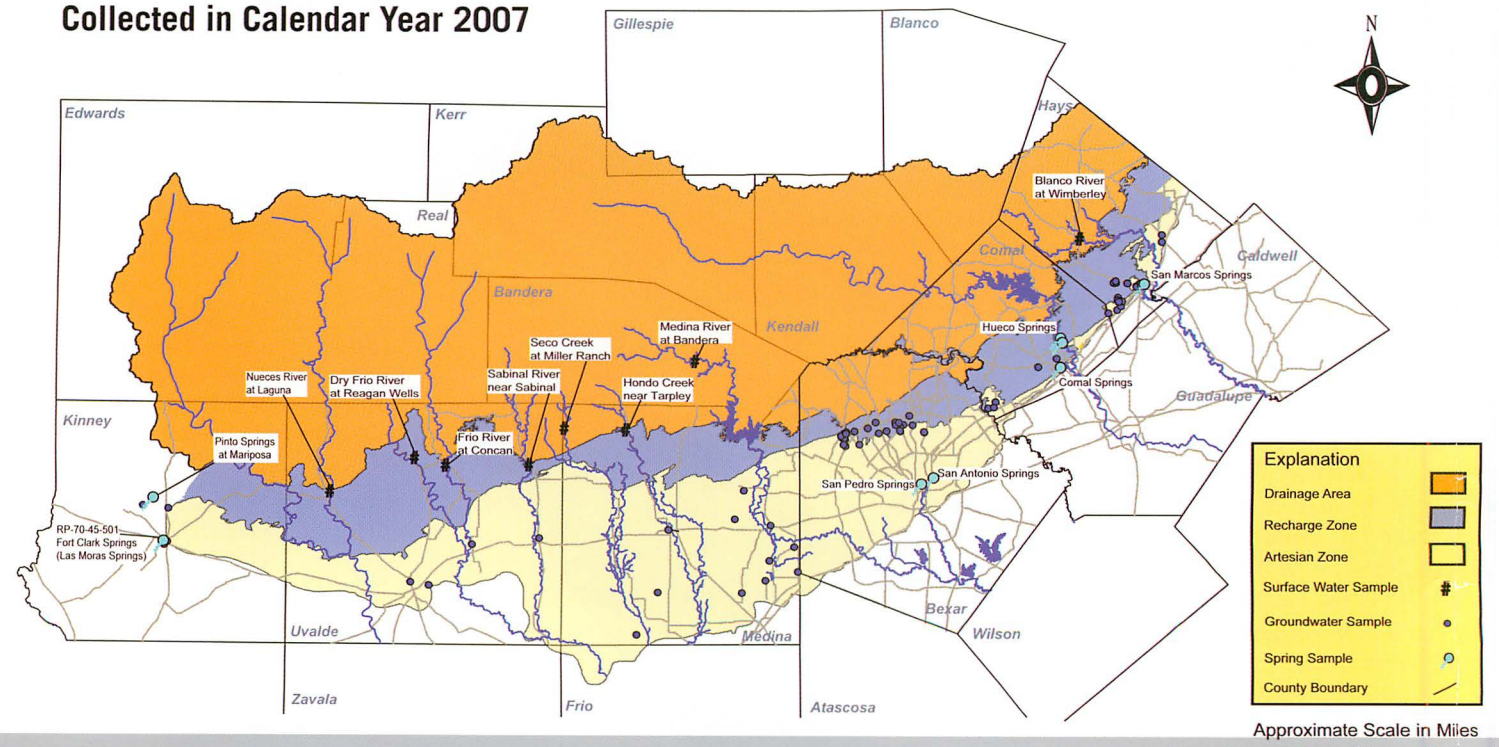
All VOC detections were significantly below the MCL or applicable protective concentration limit (PCL) values. The SVOCs phenol and 2-methylnaphthalene were detected in five samples from three spring groups (Hueco, San Marcos, and Comal) at concentrations below their regulatory limits. Some metals were detected above a regulatory limit for routine samples in wells and springs. Strontium was detected above the regulatory limit of 15,000 ug/L in eight well samples in calendar year 2007. Mercury was detected slightly above the maximum contaminant level (MCL) of 2.0 micrograms per liter (ug/L) at Comal and Hueco springs and below the MCL at San Pedro and San Marcos springs. Antimony was also detected in two samples from San Marcos Springs, and one sample from Hondo Creek at concentrations below the MCL of 6 ug/L. Nutrient analyses indicated the highest concentrations of nitrate-nitrite in three of the 76 wells analyzed with concentrations above 5 milligrams per liter (mg/L) but less than the MCL of 10 mg/L. While one well analyses indicated a nitrate-nitrite concentration of 10.50 mg/L. Detections of VOC compounds were limited to spring sample locations (Hueco, San Marcos, and Comal) and include: 1,3,5-trimethylbenzene, toluene, 1,2,4-trimethylbenzene, m,p-xylene, and naphthalene.

SPECIAL SAMPLES

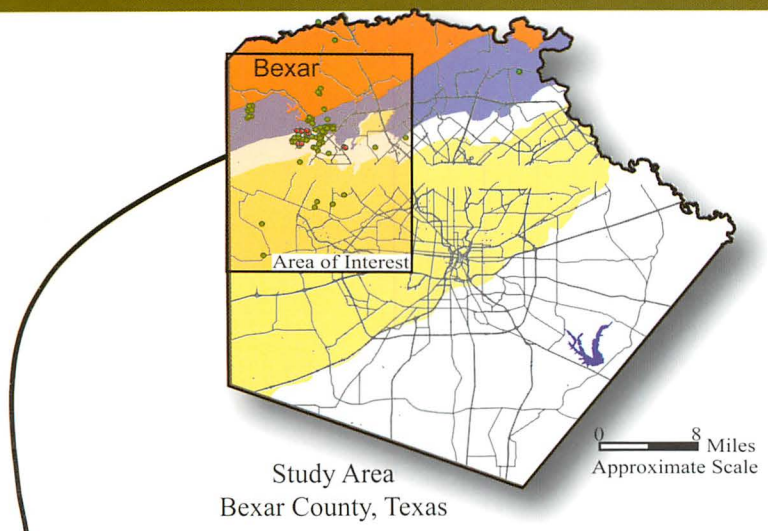
More than 3,000 special samples were analyzed for organic acids (fluorescence) in 90 wells in response to the Helotes debris fire. Fluorescence was tested in water samples using the Authority's Perkin Elmer LS-50B Luminescence Spectrometer (there are currently no standards for fluorescence). The detection of fluorescence indicates the presence of compounds such as organic acids associated with runoff water from fire fighting activities. Eleven of the 90 wells tested indicated the presence of fluorescence.

The events surrounding the Helotes debris fire provide a reminder of the sensitivity of the Edwards Aquifer to surface contamination. The Edwards Aquifer, like most karst aquifer systems, does not filter surface waters that enter the system. Surface contaminants enter and travel quickly through the aquifer system from the recharge zone—as seen with the Helotes debris fire. The Authority will continue monitoring significant events that affect water quality in the Edwards Aquifer as part of an ongoing water quality monitoring effort.

Locations of Routine Water Quality Samples Collected in Calendar Year 2007

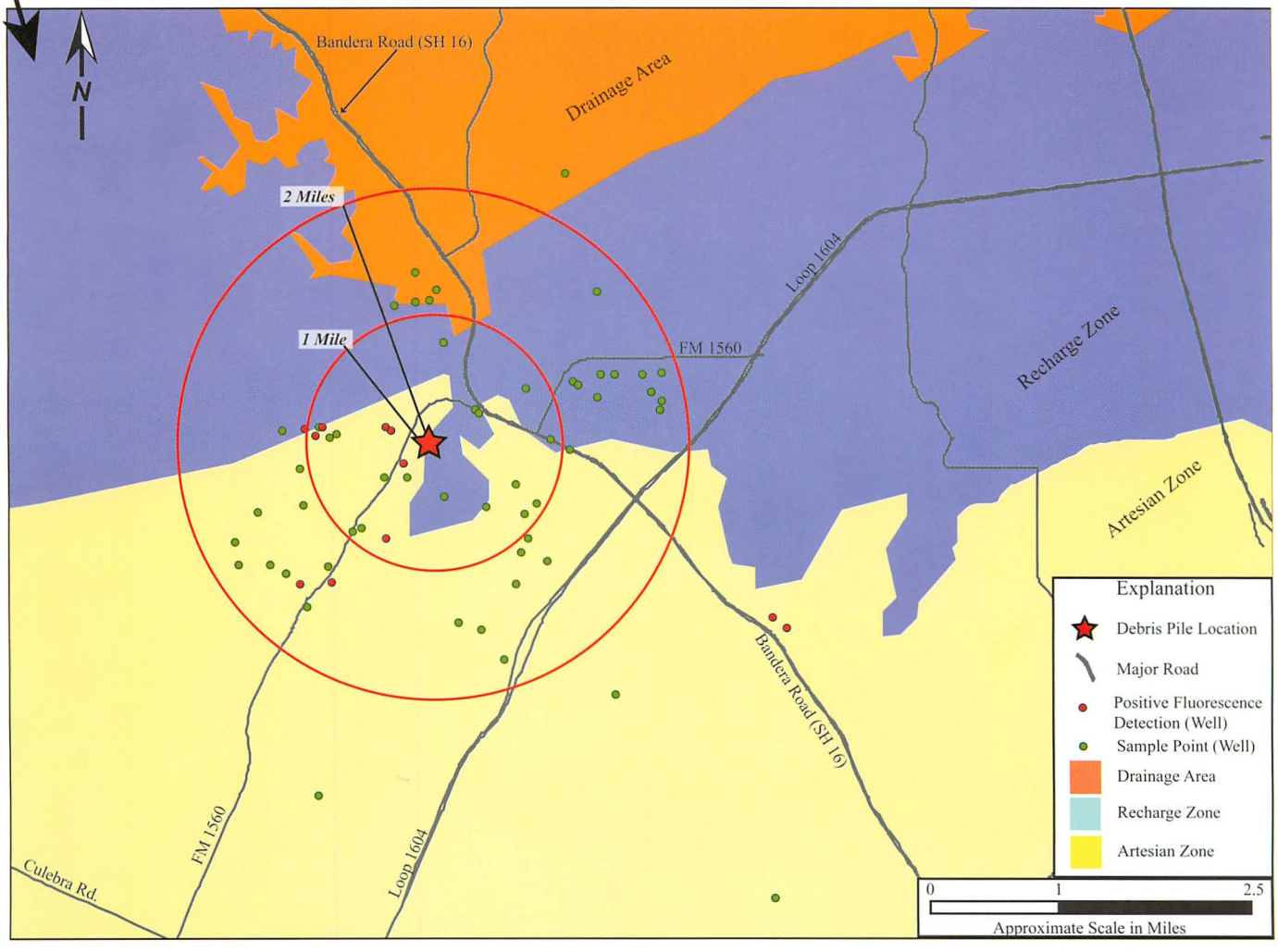


General Location of Special Samples 2007



Special samples related to the Helotes debris fire collected in 2007 were located in the northwest part of Bexar County as shown in the general location map at left.

Detailed Locations of Special Water Quality Samples Collected in 2007 in Response to the Helotes Debris Fire



For additional information regarding the data collection activities summarized herein, consult the Authority's website at www.edwardsaquifer.org/pages/reports.htm. Click on Hydrogeologic Data Reports. The entire report is available for download as a PDF file.

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AUTHORITY

1615 N. St. Mary's Street | San Antonio, TX 78215
p:(210) 222-2204 f:(210) 222-9869 email:info@edwardsaquifer.org