

RIPARIAN RECOVERY NETWORK NEWS

Riparian: wetlands zone along waterways



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Life is hectic this time of year. But rather than skip an issue, this month we are sharing an article that appears in Hays Humm, the Hays County Master Naturalist (MN) newsletter which just won a statewide award for the BEST newsletter across all of the Texas MN chapters. The article highlights the importance of karst and in the process reminds us once more of the interconnectedness of our ground and surface water. Enjoy a good read and have a Merry Christmas and a Happy New Year!

You can find more information on water as well as other topics of interest at the new MN website at <http://www.beautifulhayscounty.org/water/>.



KARST
**The Role of Water In Shaping
 The Hill Country**

*Article by Tom Jones
 Photos by Tom Jones & Marcus Gary*

The Wimberley area is the destination for many visitors and residents attracted by the numerous hills, deep valleys and multiple water features throughout the area. The region surrounding Wimberley is locally referred to as the "Wimberley Valley". This western corner of Hays County covers a large slice of the Texas Hill Country that includes the Blanco River and Cypress Creek watersheds. These long valleys are separated on each side by elevated ridges that have been carved into an incredible assortment of hills of every shape and size. In this article, the focus is on the role of water in forming the Karst landscape of the Wimberley Valley.



Honeycomb limestone

Karst is a topography or terrain formed by rainfall entering into and dissolving the abundant limestone formations. Common characteristics of karst terrain include underground features such as sinkholes and caves. It also has created vast underground drainage systems within aquifers that allow ground water to easily enter and move through the rock layers. Good examples of this type of karst feature can be seen from the abundant examples of honeycomb limestone used to landscape yards and many entrance gates. It can have a big impact on rivers and creeks by reducing stream flow in some areas while increasing the flow via springs in other stretches. The Blanco River and Cypress Creek have many good examples of how karst impacts water flow. Karst also plays a key role in forming the Texas Hill Country look.

HOW KARST WORKS - Sinkholes, caves and honeycomb limestone are karst features formed by rainfall slowly dissolving the limestone layers. As rain falls through the atmosphere it picks up carbon dioxide (CO₂) and becomes acidic. Typically rainfall has a pH of 5.5 which is slightly acidic, similar to the pH of sparkling waters. For comparison, tap water has a neutral pH of 7 and Pepsi's pH is 2. Over thousands or millions of years, rainwater has continued to fall on and enter into the land surface via the numerous faults and fissures. The acidic water slowly dissolved the limestone causing the cracks to enlarge and the faults to widen.



Blanco River at low water crossing downstream of Fischer Store Rd. bridge. This is an example of the river changing course to follow a fault. Note weathered cliffs along fault trace, a common feature in the Hill Country. Photo location shown on Fig. 1.

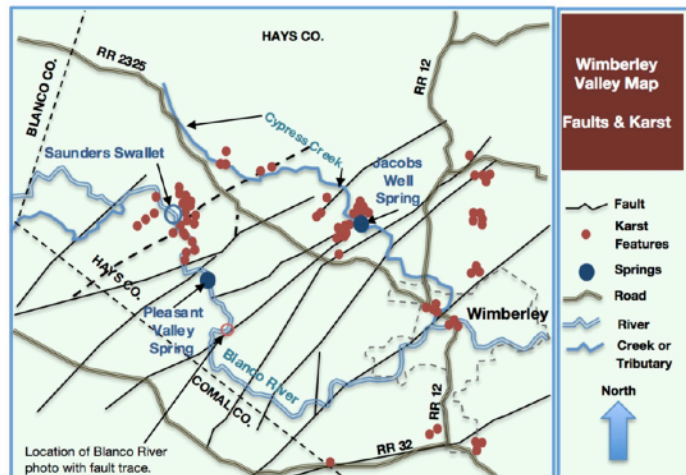


Figure 1 - Map of faults and karst in the Wimberley Valley -reference: Hydrogeologic Atlas of the Hill Country Trinity Aquifer, Wierman, Broun & Hunt, July 2010

Figure 1 is a map of the Wimberley Valley. The deep valleys formed by the erosive action of the Blanco River and Cypress Creek are roughly parallel and extend from Wimberley to the northwest. The alignment of both of these watersheds parallels the alignment of fractures in this area. The watershed ridges or divides are the high hills and meadows that trend in the same direction. Ranch Road 2325 follows the ridge from Wimberley northwest toward Blanco, offering overviews of these expansive valleys. The other important feature shown on the map is the high concentration of faults that stretch across the valley bisecting both rivers and hills. The overall effect of these faults and the network of fractures or cracks they created is to effectively break the landscape into many large blocks. Rainfall enters these cracks, dissolves the limestone helping to smooth and shape the terrain into the hills that we see today. Figure 1 also shows the approximate locations of where karst features are observed at the surface. It is not surprising that the karst features occur near the rivers and the fractures.

EXAMPLES OF KARST IN WIMBERLEY VALLEY

Pleasant Valley Springs (PVS) - PVS is the largest documented spring of the Hill Country Trinity Aquifer system and is located 5 miles from the well-known Jacob's Well Spring (JWS). If you drew a line connecting PVS and Jacobs Well Springs, the direction of this line is consistent with the many faults in this area. PVS is a perennial (flows continuously), artesian spring located in the bed of the Blanco River. The resulting water flow issues from multiple fractures along the riverbed. The total spring flow is over 4,000 gallons per minute and is a significant contribution to the Blanco River base flow. It should be noted that the surface elevations of PVS and JWS are very similar. The elevation of PVS is 921-923 ft-mean sea level (msl) as compared to Jacobs Well's elevation at 922 ft-msl. Both springs have a common source, which is the subsurface Cow Creek formation, the source of artesian flow to both of these springs.

Another prominent feature above PVS is known as Saunders Swallet or sinkhole. The sinkhole is located in the stream bed of the Blanco River causing water to be diverted to the subsurface aquifers, thus reducing the river flow. Some of this flow is returned to the surface via the fractures at PVS. This is a good



Pleasant Valley Spring - Kendall Yates, Research Assistant with the Edwards Aquifer Authority measuring the flows at PVS. In the background you can see the fracture associated with the spring on the rock outcrop.

example of how karst topography can impact the Blanco River flow. Figure 2 is a general cross-section illustrating the flow from Saunders Swallet to PVS.

Jacobs Well Spring - While springs issue from fractures at PVS, JWS has a karst conduit system (cave) extending 140 deep and over 5,000 ft horizontally. The cave formed along fractures with roughly the same orientation as those observed at PVS. Figure 3 and the JWS photos illustrate the subsurface karst topography of JWS. Some have suggested that PVS and JWS are connected from their common aquifer source, the Cow Creek Limestone. No definitive test has been conducted to verify a connection, but the data suggest this is a possibility.

JWS is slowly changing from a perennial to an intermittent spring due to droughts and increased groundwater pumping. PVS was observed to flow during recent droughts when JWS ceased flowing. Decreasing base flows in the Blanco River over the past few decades suggest that the PVS is also decreasing over time, and is impacted due to the combined effects of drought and groundwater pumping.

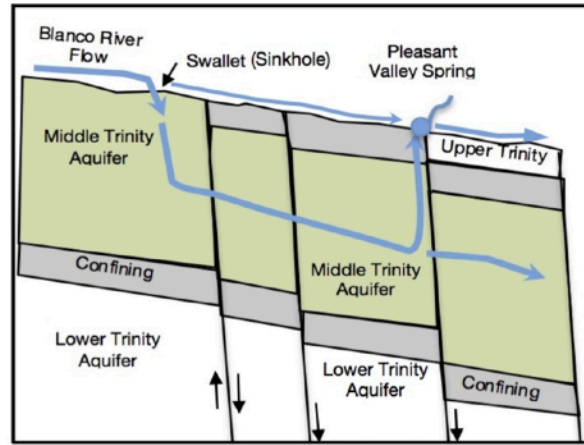


Figure 2 - PVS Cross-section illustrating water flow into Saunders Swallet (sinkhole) and returning to the surface at PVS.

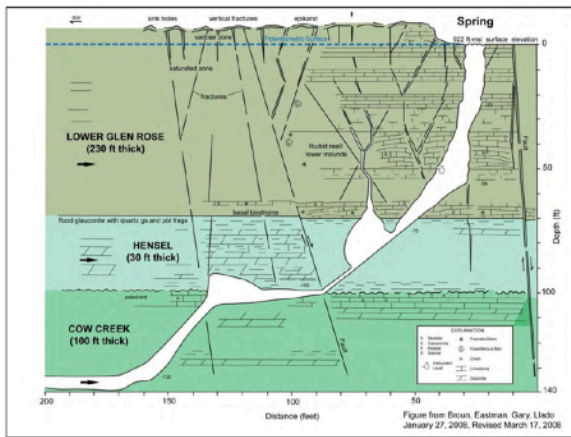


Figure 3 - Cross-section of Jacobs Well Spring: Subsurface cave created by water dissolving limestone along fracture system.



Jacobs Well Spring: Photograph showing the karst enlarged fracture routing groundwater to the surface. If you click on the photo to enlarge, you will be able to see the diver in the center of the photo shining a light. A good reference for the size of the cavern.

Jacobs Well Spring: Note the fracture extending from the cave opening. If you could trace a line downstream along the fracture, it would point to the Blue Hole.

The karst region in the Wimberley Valley does influence land use and water resources. Potential impacts include sinkhole collapse, increased groundwater contamination risk, and an unpredictable water supply. The honeycomb limestone is effective in quickly moving ground water through the aquifers which can result in reduced water availability for this region. Decreasing stream flows may also impact the ecology of the Hill Country. Karst gives this region its iconic Hill Country look and enables the numerous creeks and springs that attract people to live and visit the Wimberley Valley.



Merry Christmas to All

The Riparian Recovery Network News is a periodic Hays County Master Naturalist publication covering topics of interest to the Riparian Recovery Network community. Please share this newsletter with friends and neighbors who would enjoy information on restoring and enjoying their riparian zone. Send any questions you might have or ideas for future topics to riparian@haysmn.org. And, if you are not currently