



This is a story in graphs and pictures of what's been happening at the confluence of San Antonio Creek with the Ventura River. The big floods of 2005 shifted the Ventura River about 500 ft. to the east, to its present position alongside the bike-path, and carved a large pool just downstream of the confluence. The pool, and indeed the whole situation at the confluence, only came to the attention of SBCK during the dry-season of 2008 when this location was included in the UCSB algal study. Since that time we've been monitoring the pool's condition as it serves as a focus for recreation (typically 6 ft. deep with easy access by bike-path and road), for wildlife, and as refuge for stranded fish during drought year dry-seasons when the river, both above and below, and lower S. Antonio Creek, go completely dry.

Each of the final pages feature a graph showing average monthly flow in the Ventura River (measured at Foster Park, about 2 miles below the confluence), and the depth-to-groundwater for either or both of the two wells shown in the above Google image: well 33M03, adjacent to lower S. Antonio Creek at roughly the same location as the former SBCK sampling site known as VR07 (at the Old Creek Road ford, about a half mile upstream of the confluence); and well 05B01, alongside the river a little over a half a mile downstream. Surrounding each graph are dated images of the confluence pool, from Google Earth on page 3, from SBCK monitoring visits on pages 4 & 5.

All of these data should be well correlated since winter rainfall either recharges or fails to recharge groundwater throughout the watershed, and groundwater levels then determine both river flow (the use of average monthly flow moderates the influence of flows associated with individual storms) and the measurement of water depth in wells. And it's solely local groundwater conditions that determine the depth of water in the confluence pool once river and creek inflows have ceased. And indeed, as you can see from the graphs, all these data are well matched.

On page 3, the dotted lines represent the date of each Google image. Things to note are the rapid growth in riparian vegetation since 2006, and appearances when both river and creek ran dry (Oct. 2007 and Dec. 2013). Differences in the pool on these dates show the importance of even small decreases in the groundwater table (about 3 ft. at 33M03, 8 ft. at 05B01, when comparing 2007 with 2013—both dry years). I used to think that most of the dry-season flow seen at the confluence came from surfacing groundwater flowing down from the north below the Ventura channel. And that we would periodically see this same groundwater source surfacing in the last few hundred ft. of S. Antonio.

I no longer do so. Rather it's flow from the northeast, from groundwaters underlying lower S. Antonio that sustain the water-table at the confluence. This can be seen in the differences between the two wells: the water levels in 33M03 being both more consistent (more resistant to large decreases) and lying closer to the surface. What I haven't shown is the extreme water-level fluctuations of wells in the vicinity of the Santa Ana Bridge (50 ft. or more) and that 05B01 represents a more subdued version of what happens further up the Ventura (groundwater flows from S. Antonio appreciably augment the water-table below the confluence). Similarly, the large seasonal water-table fluctuations from Santa Ana south, particularly during very dry years, lead me to believe the County's assumption of little or no groundwater contribution from Lake Casitas. I once thought otherwise.

On pages 4 & 5 the arrows point to the approximate groundwater depth for each of the wells shown. For convenience, I've used a line to connect sequential depth-to-water measurements, but the true unmeasured depths remain unknown and, especially in dry periods, do not follow this line. The arrow points represent my best guess as to actual depth. That the depth measurements for 05B01 provide a slightly better fit with the pool photos may indicate some continuing contribution by Ventura River groundwater at the confluence.



Once river and creek flows into the confluence pool stop, water depth in the pool reflects fluctuations in the local groundwater elevation. These variations in depth do not just vary from month-to-month, but change from day-to-day (and possibly hourly). Both the overall seasonal drop in depth, and the day-to-day variation, result from groundwater pumping of wells in the general vicinity. The green algal-band in photo on the left shows a recent (much less than 24 hour) decrease. We know it's recent because algae doesn't stay green for many hours once it's left high and dry. You can see the same phenomena if you look closely in the October 2009 and September 2014 photos.

My last photo is from Sept. 2014 and the pool looks in fair condition, thanks to the rains we had back in March. These rains restored flow in both the river and S. Antonio and raised the water-table at 33M03 by about 12 ft. It remains to be seen what will happen next year.



August 2006



October 2007



April 2011



August 2012



April 2013



December 2013









