Ring's Reflections

by Bob Ring

Tucson's Waterworld

For the last three thousand years, Tucson's waterways (rivers, streams, creeks, etc.) ran freely much of the time and were a reliable source of water for everyday use and for irrigation farming. The beneficiaries of this plentiful water included the predecessors of the Hohokam, the Hohokam and their descendents, early Spanish, Mexican and American settlers, and finally Tucson residents. But, in the last 100 years, that reliable water source has disappeared, leaving mostly dry streambeds. What happened and how was Tucson's water resource renewed?

Waterways

The Santa Cruz River and the waterways that drain into it were the primary source of water for Tucson. Those waterways included Sabino Creek, out of the Santa Catalina Mountains; Agua Caliente Creek and Tanque Verde Creek, out of the Rincons; and Pantano Creek, fed from Agua Verde and Rincon Creeks, southeast of Tucson – all flowed into the Rillito River which in turn drained into the Santa Cruz River. Cañada del Oro Creek, out of the Santa Catalinas, drained directly into the Santa Cruz River.

According to the book, *Arizona's Changing Rivers: How People Have Affected the Rivers*, the Santa Cruz River once was active all year round from it headwaters in the San Rafael Valley, southeast of Patagonia, south to Mexico, and then turning north to about Tubac, often as a series of marshes (cienegas), rather than a flowing river. From Tubac the river went underground, surfaced near San Xavier del Bac mission, and from there alternated between above ground and underground until surfacing at a dependable water hole at the north end of the Tucson Mountains. To the north, the river apparently "ended in the desert" prior to reaching the Gila River, except during floods. Springs between San Xavier and the Rillito River created marshes and added to the flow just west of Tucson.

In 1881, with Tucson's population around 7,000 people, the Tucson Water Company began delivering piped water from the Santa Cruz River into town. Until 1887, Tucson residents could purchase river water for a penny a gallon from vendors who transported it in bags draped over burros' backs. After that, water was sold by the bucket or barrel and delivered door-to-door in wagons.

The decline of the Santa Cruz River as a water source for Tucson began in 1887. Samuel Hughes (prominent in the incorporation of the City of Tucson and establishment of public education) attempted to increase the water supply to his fields north of St. Mary's Road. Interfering with an existing network of irrigation canals, he built a new, deep ditch to tap the subsurface flow of the river.

Large floods during the next four years caused this ditch and others to rapidly erode – both downward and laterally. Gravity irrigation with surface water was no longer possible. However, by using wells to draw water from underground river flow and cement-lined canals, agriculture continued in the Tucson urban area.

During this same period irrigation farming was also being conducted along the Rillito River at places like the Mormon settlement of Binghampton and at Old Fort Lowell.

Groundwater

Thankfully, there was another source of water besides rivers to provide for Tucson's growing needs – underground water. Beneath the Tucson Valley, formed in the same Basin and Range geological events that created Tucson's mountain ranges and the subsequent erosion from those mountains, lies a tremendous mass of porous sediments filled with water deposited during long ago glacial periods and over thousands of years, from seepage of rain and snowmelt runoff. This body of water-filled sediments (aquifer) extends from very near the surface of the Tucson Valley in some places, down to 1,200 feet deep – and in the 1890s probably contained an incredible 20-"plus" cubic miles of water.

Tucson began pumping that groundwater in the 1890s when the Tucson Water Company constructed 20-foot deep wells all over the Tucson metropolitan area. As more and more water was pumped out of the ground, the underground flow of the Santa Cruz and Rillito Rivers essentially "dried up," bringing an end to irrigation farming along the rivers by the 1930s.

In 1940, with Tucson's population at nearly 37,000 people, Tucson began increasing its groundwater pumping and for decades, groundwater was our only water source. We pumped groundwater faster than nature could replace it (natural recharge from rain and snow melt), causing the water table in some places to drop more than 200 feet. Groundwater pumping also caused the land in some places to sink and drew off water from riparian areas.

By 1970 Tucson's population had exploded to more than 260,000 people. Unless we wanted to mine underground water down to the last drop, something else had to be done!

Central Arizona Project

That "something else" was truly amazing! In 1938 Parker Dam was completed as one of a series of dams to help control and regulate the once unruly Colorado River. Parker Dam's primary purpose was to provide reservoir storage for water to be diverted to the states of California, Arizona, Nevada, Utah, Colorado, Wyoming, New Mexico and to Mexico.

For four decades lawmakers argued about how to allocate Colorado River water among its claimants, how to manage this critical resource, and the priorities for use of the water

in the various states. Arizona got its act together in the late 1960s and early 1970s with, as the *Arizona Republic* reported, "probably the state's most celebrated bipartisan achievement of the 20th century," which led to the approval of the Central Arizona Project (CAP) to divert water from the Colorado River from Lake Havasu City into central and southern Arizona.

Construction of the project, the largest and most expensive aqueduct system ever built in the United States, began in 1973. Over a period of 20 years, workers built a 336-mile diversion canal, from the Colorado River to just southwest of Tucson, and in 1992 officials "turned on the faucet" to start providing Tucson with water to supplement our limited groundwater.

In 2001, after resolving some CAP water-quality problems, Tucson began blending CAP water and underground water before delivering it to users.

Today and the Future

Today, with the population of Tucson exceeding 520,000 and growing steadily, we are operating under the Tucson Water Department's Long Range Water Plan 2000-2050.

We have stopped pumping most of the wells where the water table has dropped significantly and where the loss of riparian areas and sinking of the land has been most damaging. As a result, the water table has begun to rise slightly in some areas. The goal is to "limit our pumping to no more than the rate of natural replenishment [so] we can still use this resource without causing environmental damage."

In an effort to conserve water, Tucson is recharging groundwater supplies by running some of the CAP water into local rivers to seep into the aquifer.

Tucson is also using increasing amounts of reclaimed water (treated wastewater) for irrigation, dust control, and industrial uses.

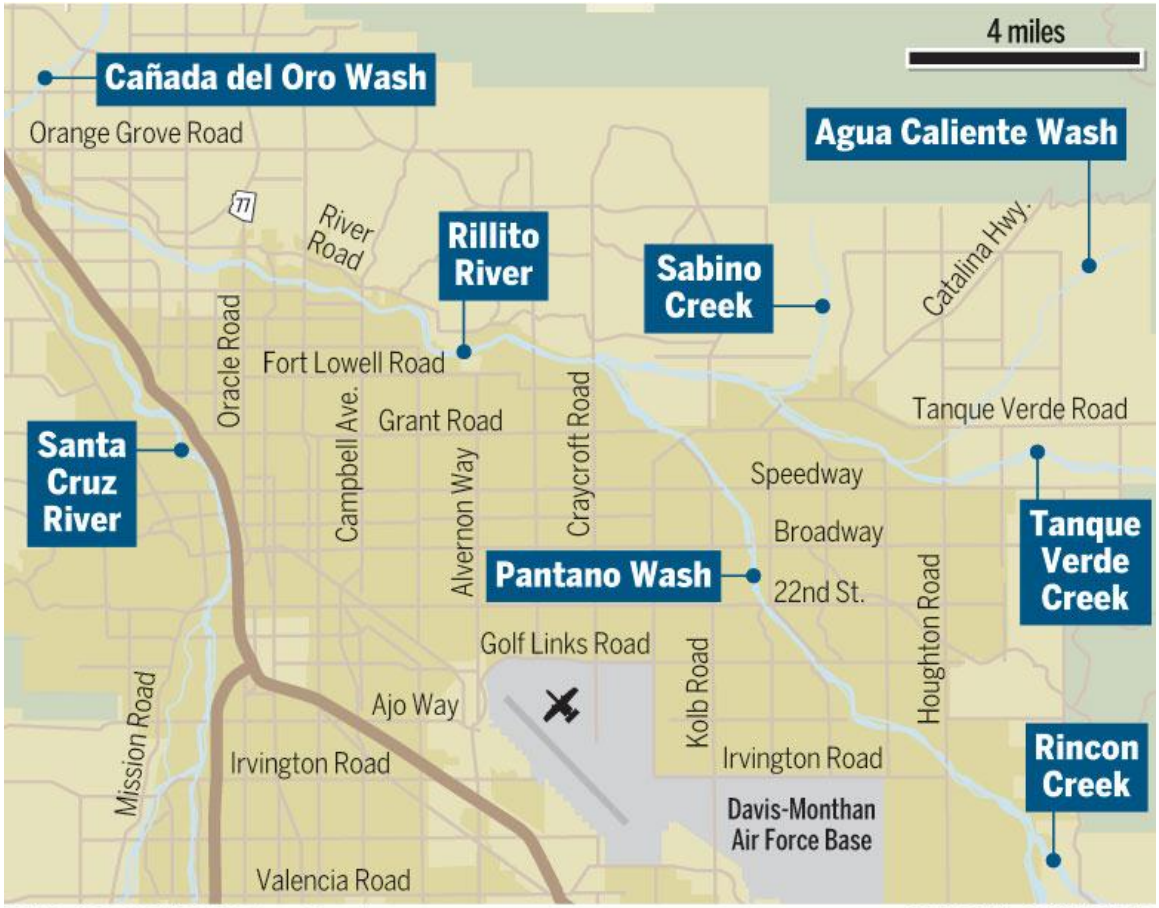
As we look ahead to meeting future water demands, we are naturally concerned about possible significant effects of climate change and prolonged draughts. In a front page story in the *Arizona Daily Star* on July 29th, Tony Davis, writes about how southern Arizona streams are drying up. Riparian and recreation areas are suffering! Even the mighty Colorado River, the source of our CAP water, is reporting near record lows this summer.

So Tucson faces real water challenges for the future. Can we conserve enough water to make a difference? Could we transport groundwater from less populated areas into Tucson? Could we cover the CAP canal to prevent water losses from evaporation – perhaps with solar panels as some have suggested? Are artificial snowmaking and cloud seeding applicable to increase fresh water runoff to the Colorado River? Could we desalinate deep-aquifer brackish groundwater or ocean water?

The answers to these questions may determine the future of Tucson.

Note: My recent columns on the Rillito-River settlements of Binghampton (May 3rd) and Old Fort Lowell (May 10th), and my column on Tucson mountain ranges and the formation of the Tucson Valley (August 9th) are posted on this Web site, under *Arizona Daily Star* newspaper columns.

Sources: *Arizona's Changing Rivers: How People Have Changed the Rivers* (Tellman, et. al., 1997); "Cienega Creek, other S. AZ. Streams, increasingly dry" (*Arizona Daily Star*, Tony Davis, July 29, 2012); "Seeking Freshwater for Tucson" (*Desert Leaf*, Craig S. Baker, July/August 2012); *Water for Tucson's Future: Long Range Water Plan 2000-2005*; "Water Supply and Demand in Tucson" (*Tucson Citizen*, Johnathan DuHamel, June 21, 2009); "What's happened to GOP since Goldwater" (*Arizona Republic*, Dan Nowicki, January, 1, 2009).



8/23/12 SOURCE: Pima County ARIZONA DAILY STAR

This 336-mile canal of the Central Arizona Project brings water to Tucson from the Colorado River (Courtesy of Wikimedia Commons)