Technical Study Summaries: Lower San Antonio River
Hydrologic Data

Median flows in Lower San Antonio River have increased over 60 years

The amount of water flowing in the Lower San Antonio River during median flow conditions has increased over the past 60 years, according to data collected from a gage maintained by the US Geological Survey. As shown in the figure below, the median flow of the river at Goliad, TX has increased for each day of the year when comparing values from the time periods 1940-1969 and 1970-2007. The hydrologic character of the basin can be analyzed using similar techniques and data from a network of USGS gages within the Lower San Antonio River system. The relative location of gages currently maintained by the USGS is shown in the map below. A list of current and historical gages of interest to this is study is also provided.

Figure 1. Median of daily discharge values for USGS gage #08188500, San Antonio River at Goliad.

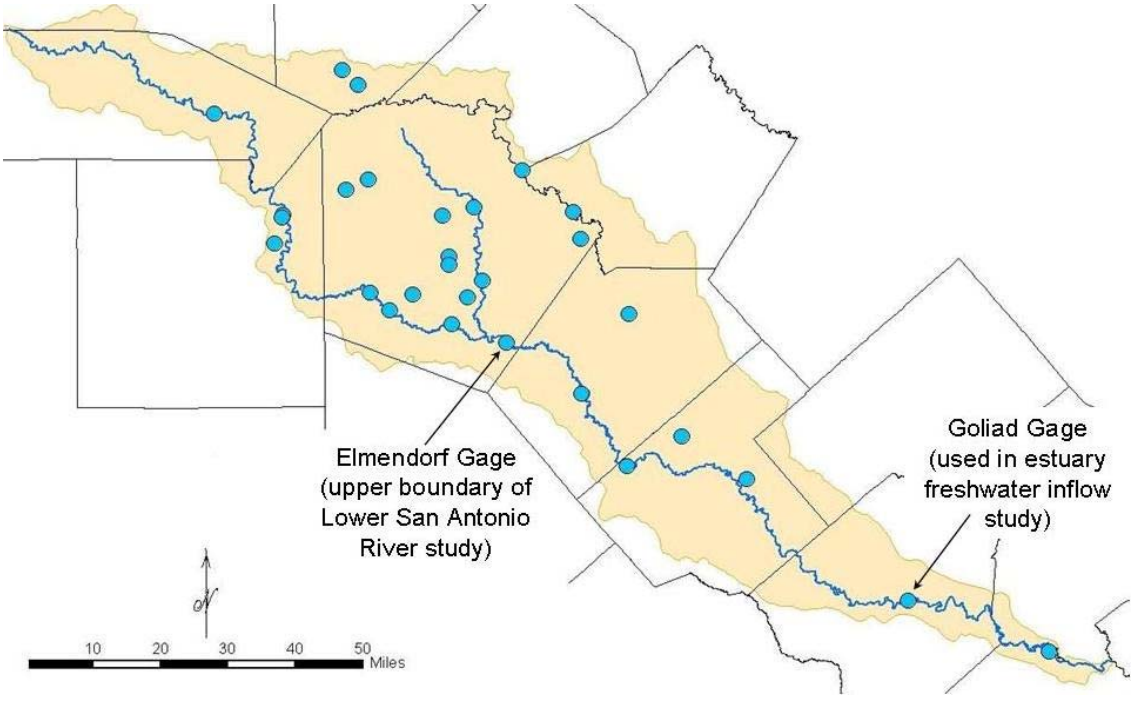

Figure 2. Relative location of current USGS stream gages in the San Antonio River Basin.

Table 1. Historical and Current USGS Gages of Interest in the Lower San Antonio River Sub-basin.

Gage #	Gage Name	Earliest Record	Latest Record	Median Flow (cfs)	Drainage Area (mi^2)
08181800	San Antonio Rv nr Elmendorf , TX	1962	Present	326	1,743
08182500	Calaveras Ck nr Elmendorf, TX	1954	1971		77.2
08183200	San Antonio Rv nr Floresville, TX	2006	Present		1,964
08183000	San Antonio Rv at Calaveras, TX	1918	1925		1,786
08183500	San Antonio Rv nr Falls City, TX	1925	Present	262	2,113
08183890	Cibolo Ck at CNC nr Boerne, TX	2005	Present		56.3
08183900	Cibolo Ck nr Boerne, TX	1962	1997		68.4
08184000	Cibolo Ck nr Bulverde, TX	1946	1965		198
08185000	Cibolo Ck at Selma, TX	1946	Present	27.9	274
08185065	Cibolo Ck nr Saint Hedwig, TX	2005	Present		306
08185100	Martinez Ck nr Saint Hedwig	2005	Present		81.1
08185500	Cibolo Ck at Sutherland Springs, TX	1924-29, 2005	Present		665
08186000	Cibolo Ck nr Falls City, TX	1930	Present	29	827
08186500	Ecleto Ck nr Runge, TX	1962	Present	0.48	239
08187500	Escondido Ck at Kenedy, TX	1954	1973		72.4
08188500	San Antonio Rv at Goliad, TX	1924	Present	358	3,921
08188570	San Antonio Rv nr McFaddin, TX	2005	Present		4,134

Simulation of streamflow and estimation of streamflow constituent loads in the San Antonio River watershed, Bexar County, Texas, 1997-2001 (2002)
By D.J. Ockerman and K.C. McNamara

This study identified the sources of water that contribute to flow at the USGS gage on the San Antonio River near Elmendorf, TX. The largest contributor was found to be stormwater runoff from Bexar County (33 percent). Inflow from the Medina River upstream of Bexar County (22%), wastewater discharge (20%), and groundwater inflow (18%) were also important sources.

This study provides insight about the hydrologic connection between upper and lower portions of the San Antonio River basin. The Elmendorf gage is located at the upper boundary of our study of the Lower San Antonio River sub-basin.

Full report: http://pubs.usgs.gov/wri/wri03-4030/

Surface water – groundwater interaction in the Lower San Antonio River watershed (ongoing)
By US Geological Survey

Studies of the interaction of surface water and groundwater in the lower San Antonio River basin are ongoing. Streamflow surveys were conducted in 2006 and 2007 and preliminary conclusions are:

Cibolo Creek from IH-10 to confluence with San Antonio River: Above Sutherland Springs, Cibolo Creek receives inflow from Martinez Creek, which is dominated by wastewater discharges during base flow conditions. At Sutherland Springs, groundwater is also a source of inflow. No significant gains or losses were found downsteam of Sutherland Springs.

San Antonio River from Elmendorf to confluence with Cibolo Creek: It is likely that this reach does not experience substantial gains or losses as a result of surface water/groundwater interaction.

San Antonio River below Cibolo Creek: This reach exhibited consistent gains in streamflow with the likely source being inflow from groundwater.

Indicators: Lower San Antonio River
Hydrology / Hydraulics

Hydrology Objectives

- Develop a flow regime that sustains ecological processes throughout the system
    - Determine components of the flow regime and their characteristics (frequency, timing, duration, rate of change, magnitude) that support study objectives from other disciplines
    - Determine the natural variability of flow component characteristics
    - Evaluate water losses and gains throughout the system

Hydrologic Indicators

Category	Indicator	Explanation
Flow regime components	Overbank flows (frequency, timing, duration, rate of change, and magnitude)	Infrequent, high magnitude flow events that enter the floodplain. • Maintenance of riparian areas • Transport of sediment and nutrients • Allow fish and other biota to utilize floodplain habitat during and after floods • Riparian and floodplain connectivity to the river channel
	High pulse flows (frequency, timing, duration, rate of change, and magnitude)	Short duration, high magnitude within channel flow events • Maintain physical habitat features along the river channel • Provide longitudinal connectivity along the river corridor for many species (e.g., migratory fish) • Provide lateral connectivity (e.g., connections to oxbow lakes)
	Base habitat flows (timing, range of magnitudes)	Range of average or "normal" flow conditions • Provide instream habitat quantity and quality needed to maintain the diversity of biological communities • Maintain water quality conditions • Recharge groundwater • Provides for recreational or other uses
	Subsistence flows (frequency, timing, duration, rate of change, and magnitude)	Low flows maintained during times of very dry conditions • Maintain water quality standards • Prevent loss of aquatic organisms
Natural variability	Natural	Determination of the natural variability of the above indicators, based on the older portions of gage records, presumably less impacted by human activity. The exact time period may vary by site.
	Current	Variability of the above indicators based on the last 20-25 years of gage records.
Losses/gains	Gain or loss in section of river	Difference in the amount of water entering and leaving a specific section of the river channel. Sources of gains include inflow from tributaries, alluvial and deeper aquifers, and discharges to the river. Sources of losses include evaporation, evapo-transpiration from riparian areas, diversions, and recharge of alluvial and deeper aquifers. Indicator may be influenced by shallow groundwater surface elevation and hydraulic head of deeper aquifers.