

## **Technical Study Summaries: Lower San Antonio River Biological Data**

### **Fish Population Changes in Three Western Gulf Slope Drainages (2008)**

*By Timothy Bonner and Dennis T. Runyan*

Fifty-seven fish species (Table 1) have been reported in the main stem of the San Antonio River based upon 73 collections (earliest report was 1950).

Three native fish species – gizzard shad, burrhead chub, and longear sunfish – increased in abundance between 1950 and 2006.

One native species - the pugnose minnow –significantly declined in abundance.

Seventeen species showed stable populations and 35 showed indeterminable changes.

Only four non-native species were reported in the earliest records; whereas, now there are 17.

Full report: [http://www.twdb.state.tx.us/RWPG/rpgm\\_rpts/2005483033\\_fish.pdf](http://www.twdb.state.tx.us/RWPG/rpgm_rpts/2005483033_fish.pdf)

### **Lower San Antonio River Instream Flow Study – Fish Collection Summary Report (2006)**

The San Antonio River Authority, Texas Parks and Wildlife Department, Texas Commission on Environmental Quality, and Texas Water Development Board collected baseline data for the lower San Antonio River and lower Cibolo Creek from March through October 2006 and June 2008.

The primary focus of this study was the characterization of fish populations (see Current columns in Table 1) at each sampling site (Table 2) and their association with river habitats to help understand current conditions and guide future research.

Full report:

[http://www.twdb.state.tx.us/RWPG/rpgm\\_rpts/2005483562\\_InstreamFlows.pdf](http://www.twdb.state.tx.us/RWPG/rpgm_rpts/2005483562_InstreamFlows.pdf)

### **Distributional Survey and Habitat Utilization of Freshwater Mussels (2007)**

*By Alexander Y. Karatayev and Lyubov E. Burlakova*

Only two live species were found in Cibolo Creek – threeridge and yellow sandshell.

In addition to these two species, golden orb and Tampico pearly mussel were also found in the San Antonio River.

Of these species, the golden orb is the most significant find as the American Fisheries Society considers this species of special concern because of a suspected decline in their population.

Full report:

[http://www.twdb.state.tx.us/RWPG/rpgm\\_rpts/0604830631FreshwaterMussels.pdf](http://www.twdb.state.tx.us/RWPG/rpgm_rpts/0604830631FreshwaterMussels.pdf)

Table 1. Historical and current fish occurrences for the lower San Antonio River and lower Cibolo Creek. Status refers to native (N) or introduced (I).

Species	Common Name	Status	San Antonio River		Cibolo Creek	
			Historical	Current	Historical	Current
<i>Atractosteus spatula</i>	alligator gar	N	X	X		
<i>Lepisosteus oculatus</i>	spotted gar	N	X	X	X	X
<i>Lepisosteus osseus</i>	longnose gar	N	X	X	X	X
<i>Anguilla rostrata</i>	American eel	N			X	
<i>Dorosoma cepedianum</i>	gizzard shad	N	X	X	X	
<i>Dorosoma petenense</i>	threadfin shad	N	X	X	X	X
<i>Campostoma anomalum</i>	central stoneroller	N	X		X	
<i>Cyprinella lutrensis</i>	red shiner	N	X	X	X	X
<i>Cyprinella venusta</i>	blacktail shiner	N	X	X	X	
<i>Cyprinus carpio</i>	common carp	I	X	X	X	X
<i>Macrhybopsis marconis</i>	burrhead chub	N	X	X	X	X
<i>Notemigonus crysoleucas</i>	golden shiner	I			X	
<i>Notropis amabilis</i>	Texas shiner	N	X		X	
<i>Notropis buchanani</i>	ghost shiner	N	X	X	X	X
<i>Notropis stramineus</i>	sand shiner	N	X		X	
<i>Notropis texanus</i>	weed shiner	N			X	
<i>Notropis volucellus</i>	mimic shiner	N	X	X	X	X
<i>Opsopoeodus emiliae</i>	pugnose minnow	N	X	X	X	
<i>Pimephales promelas</i>	fathead minnow	I	X		X	
<i>Pimephales vigilax</i>	bullhead minnow	N	X	X	X	X
<i>Carpiodes carpio</i>	river carpsucker	N	X			
<i>Ictiobus bubalus</i>	smallmouth buffalo	N	X	X		
<i>Ictiobus niger</i>	black buffalo	N	X			
<i>Moxostoma congestum</i>	gray redbreast	N	X	X	X	X
<i>Astyanax mexicanus</i>	Mexican tetra	I	X	X	X	X
<i>Ameiurus melas</i>	black bullhead	N	X		X	
<i>Ameiurus natalis</i>	yellow bullhead	N	X		X	
<i>Hypostomus plecostomus</i>	suckermouth catfish	I	X	X		
<i>Ictalurus furcatus</i>	blue catfish	N	X	X	X	X
<i>Ictalurus punctatus</i>	channel catfish	N	X	X	X	X
<i>Noturus gyrinus</i>	tadpole madtom	N	X	X	X	X
<i>Noturus nocturnus</i>	freckled madtom	I	X		X	
<i>Pterygoplichthys multiradiatus</i>	sailfin catfish	I	X			
<i>Pylodictis olivaris</i>	flathead catfish	N	X	X	X	X
<i>Mugil cephalus</i>	striped mullet	N	X	X		

Table 1. Continued.

Species	Common Name	Status	San Antonio River		Cibolo Creek	
			Historical	Current	Historical	Current
<i>Menidia beryllina</i>	inland silverside	N	X	X		
<i>Gambusia affinis</i>	western mosquitofish	N	X	X	X	X
<i>Poecilia formosa</i>	Amazon molly	I	X	X	X	X
<i>Poecilia latipinna</i>	sailfin molly	I	X	X	X	X
<i>Xiphophorus helleri</i>	green swordtail	I	X			
<i>Fundulus notatus</i>	blackstripe topminnow	N	X		X	
<i>Morone chrysops</i>	white bass	I		X		
<i>Lepomis auritus</i>	redbreast sunfish	I	X		X	
<i>Lepomis cyanellus</i>	green sunfish	N	X	X	X	X
<i>Lepomis gulosus</i>	warmouth	N	X	X	X	X
<i>Lepomis humilis</i>	orangespotted sunfish	I	X	X		
<i>Lepomis macrochirus</i>	bluegill	N	X	X	X	X
<i>Lepomis marginatus</i>	dollar sunfish	I	X			
<i>Lepomis megalotis</i>	longear sunfish	N	X	X	X	X
<i>Lepomis microlophus</i>	redear sunfish	N	X		X	
<i>Lepomis miniatus</i>	redspotted sunfish	N	X		X	
<i>Micropterus dolomieu</i>	smallmouth bass	I	X		X	
<i>Micropterus punctulatus</i>	spotted bass	N	X	X	X	X
<i>Micropterus salmoides</i>	largemouth bass	N	X	X	X	X
<i>Micropterus treculi</i>	Guadalupe bass	N	X			
<i>Pomoxis annularis</i>	white crappie	N	X	X	X	
<i>Etheostoma spectabile</i>	orangethroat darter	N			X	
<i>Percina carbonaria</i>	Texas logperch	N	X	X	X	X
<i>Percina shumardi</i>	river darter	N		X	X	X
<i>Aplodinotus grunniens</i>	freshwater drum	N		X		
<i>Cichlasoma cyanoguttatum</i>	Rio Grande cichlid	I	X	X	X	X
<i>Oreochromis aureus</i>	blue tilapia	I	X	X		
<i>Oreochromis mossambica</i>	Mozambique tilapia	I	X			
<i>Tilapia zilli</i>	redbelly tilapia	I	X			
<i>Trinectes maculatus</i>	hogchoker	N		X		

Table 2. Current baseline instream flow sampling location sites and location descriptions.

<b>Site No.</b>	<b>Location Description</b>	<b>County</b>
19110	San Antonio River at Loop 1604	Bexar
19100	San Antonio River at Floresville City Park	Wilson
19090	San Antonio River at Conquista Crossing downstream of FM 791	Karnes
19080	Cibolo Creek at FM 539	Wilson
19070	Cibolo Creek at FM 537	Wilson
19060	Cibolo Creek at FM 389	Karnes
19050	San Antonio River at SH 72	Karnes
19040	San Antonio River at Riverdale Crossing	Goliad
19030	San Antonio River eight miles downstream of Goliad State Park	Goliad
19020	San Antonio River at Hwy 77	Refugio
19010	San Antonio River at confluence with Guadalupe River	Refugio

## Potential Biological Indicators: Lower San Antonio River

### Biological Objectives

Determine and maintain flows necessary to support:

- native species and biological communities known to occur in the river and riparian zones
- key aquatic habitats

Category	Indicator	Explanation
<i>Instream Biological Communities</i>	Native Richness	Richness, or the number of species or taxa, is a measure of community health, can be applied at a variety of scales (reach to basin to statewide), and can be related to modifications in flow. May also use proportions such as the proportion of native to non-native species.
	Relative Abundance	The number of organisms of a particular species as a percentage of the total community
	Fish	<p>Fish are useful indicators because:</p> <ul style="list-style-type: none"> <li>• they occupy a range of habitats and have a variety of life histories that are generally known;</li> <li>• their position at various levels of the aquatic food chain provides an integrative view of the watershed;</li> <li>• they are useful for examining both direct toxicity and stressful conditions by looking at indicators such as missing species or depressed growth and reproduction;</li> <li>• they are valued by the public.</li> </ul> <p>There are many species of fish in the river and all of them cannot be studied individually. Those that may warrant study include:</p> <ul style="list-style-type: none"> <li>• Flow sensitive species</li> <li>• Sport fishes</li> <li>• Prey species</li> <li>• Imperiled species</li> <li>• Intolerant species</li> </ul>
	Other Aquatic Organisms	<p>Benthic invertebrates, river prawn*, mussels, river and riparian plants, other vertebrates may be appropriate as indicators.</p> <p>* identified in second meeting</p>

Category	Indicator	Explanation
<i>Instream Habitat</i>	Habitat Quality and Quantity for Key Species	Involves relating suitable habitat (microhabitat) and flow for key species. Habitat attributes may include current velocity, depth, substrate and cover; other attributes may be important for some species.
	Mesohabitat Area and Diversity	This indicator stems from the knowledge that diverse habitats support diverse communities. Mesohabitat analysis provides a quantifiable relationship between larger scale habitat (e.g. riffles, runs, pools) area and flow; habitat diversity can be derived from same data. Uses biological data for all species in a community (e.g., fish species) to define the attributes of each mesohabitat.
<i>Riparian Habitat</i>	<u>Vegetation</u> <ul style="list-style-type: none"> <li>• Age class distribution of riparian plant species</li> <li>• Riparian species richness and diversity</li> <li>• Density</li> <li>• % Canopy cover</li> </ul>	These are key components in assessing the diversity, health, and functionality of riparian habitat and ensuring that adequate riparian species are present for recruitment and maintenance of the ecosystem. Riparian plants typically must maintain contact with the water table, so their presence and diversity is an important indicator of soil moisture (water table) characteristics. The listed vegetation parameters can be correlated with important riparian functions, such as streambank stabilization, temperature dynamics, and nutrient cycling.
	<u>Soils</u> <ul style="list-style-type: none"> <li>• Riparian soil types</li> </ul>	In the absence of riparian vegetative indicators, soil characteristics identified by the soil survey database can be used to determine past or present hydrologic influence and hence historical riparian area extent.
	<u>Hydrology</u> <ul style="list-style-type: none"> <li>• Gradient of inundation, base flow levels</li> </ul>	Periodic occurrence of flood (overbanking) flows, associated channel dynamics and the preservation of base flows capable of sustaining high floodplain water tables are essential to maintaining the health of riparian ecosystems. Ground water depths can be sampled at each study reach and coupled with surface water data to produce a probability of inundation curve. Overbanking flow requirements can be modeled.