

## **Technical Study Summaries: Lower Sabine River Connectivity Data**

Connectivity with-in the study area and to areas outside the study area will be important for our study of the Lower Sabine River sub-basin. Connectivity with-in the study area includes connectivity along the river channel and between the main channel and floodplain. Connectivity with areas outside the study area includes connectivity with upstream and downstream segments, tributaries, and groundwater. Several studies related to both connectivity with-in the study area and with areas outside the study area are ongoing or have been completed and are described below.

### **Results of streamflow gain-loss studies in Texas, with emphasis on gains from and losses to major and minor aquifers (2002)**

*By R.M. Slade, J.T. Bentley, and D. Michaud, US Geological Survey*

A gain-loss study conducted in 1963 and summarized in this report found interaction between groundwater and surface water in the Lower Sabine River sub-basin was relatively small. For more information, please see the Hydrology and Hydraulics Summary.

Full report: <http://pubs.usgs.gov/of/2002/ofr02-068/>

### **Freshwater inflow recommendation for the Sabine Lake Estuary of Texas and Louisiana (2005)**

*By Texas Parks and Wildlife Department and Texas Water Development Board*

The Sabine River is an important source of freshwater inflow for the Sabine Lake Estuary (Sabine-Neches Estuary). This study determined that an annual freshwater inflow of between 7.1 million and 11.6 million acre-feet of water is required each year to maintain the biological health and productivity of the estuary. An annual inflow of 9.6 million acre-feet was found to support optimal fish abundance. Seasonal timing of inflows is important and recommendations were provided as total volumes of flow for each month of the year. These recommendations were developed based on a state methodology that has been applied to all of Texas' major estuaries.

Full report:

[http://midgewater.twdb.state.tx.us/bays\\_estuaries/Publications/Freshwater%20Inflow%20Recommendation%20for%20the%20Sabine%20Estuary%20of%20Texas%20and%20Louisiana%20-%202005.pdf](http://midgewater.twdb.state.tx.us/bays_estuaries/Publications/Freshwater%20Inflow%20Recommendation%20for%20the%20Sabine%20Estuary%20of%20Texas%20and%20Louisiana%20-%202005.pdf)

### **Toledo Bend Project initiates Federal Energy Regulatory Commission license renewal (2008)**

*By Sabine River Authorities of Louisiana and Texas*

Some of the studies completed or proposed as part of the relicensing process may be of interest to the instream flow study of the Lower Sabine River. The river authorities of both states have initiated the process to renew the hydroelectric generation license for Toledo Bend Reservoir. The original license, granted by the Federal Energy Regulatory Commission in 1963, will expire in September of 2013.

For more information about the FERC relicensing process for Toledo Bend, please visit:

<http://www.tbjpo.org/PublicRelicensing/default.aspx>

### **Lower Sabine River bottomland connectivity study (2008)**

*By Devine Tarbell & Associates, Inc.*

Although focused on the effects of hydropower operations, this study provides several products of interest. Bottomland and floodplain areas along the river from Toledo Bend Reservoir to the Interstate-10 Bridge in Orange County, TX were identified. Those areas were then classified and characterized by vegetation species and community. These products provide a starting point for further studies of riparian areas along the Lower Sabine River.

Because it was focused on hydropower operations, this study assessed the amount of connectivity between main channel and floodplain areas provided by flows of 7,000 to 14,000 cfs. Due to hydropower operation of Toledo Bend Reservoir, flows in the Lower Sabine River peaking at these magnitudes are typical during the late spring, summer, and fall. These flows were found to be too small to exceed the banks of the main channel and it appears that much larger overbank flows during the late winter and early spring (before hydroelectric operations begin) are required to provide connectivity between the main channel and floodplain areas.

Full report:

[http://www.tbpjo.org/PublicRelicensing/documents/TB\\_PAD/TB\\_PAD\\_Appendix\\_C\\_Lower\\_Sabine\\_Riv\\_Bottomland\\_Stdy.pdf](http://www.tbpjo.org/PublicRelicensing/documents/TB_PAD/TB_PAD_Appendix_C_Lower_Sabine_Riv_Bottomland_Stdy.pdf)

### **Preliminary analysis of riparian area survey methodology (2009)**

*By H. Williams, Stephen F. Austin State University*

This study was established to evaluate the proposed methodology described in the TIFP Technical Overview for determining the extent, hydrologic requirements, and connectivity of riparian areas. For more information about this study, please see the Biological Summary.

### **Developing large woody debris budgets for Texas Rivers (2010)**

*By M.W. McBroom, Stephen F. Austin State University*

Large woody debris (LWD) is an important component of instream habitat, providing habitat structure and food sources for aquatic organisms. The amount of LWD in a river is dependant on the connectivity between main channel and riparian areas. This study is developing a LWD budget for the Lower Sabine River in order to better understand LWD dynamics. The objectives of this project are to quantify LWD loading for representative sections of the river; track recruitment, transformation, and movement of LWD under a variety of flow conditions; and streamline the methodology for application on other Texas Rivers.

## Indicators: Lower Sabine River Connectivity

### Connectivity Objectives

- Maintain/improve hydrologic connectivity needed to sustain floodplain and wetlands area (i.e. bottomland hardwoods, swamps, emergent marsh, oxbows, yazoos)
- Ensure that studies are not conducted in a vacuum that ignores other needs such as bays and estuaries

### Connectivity Indicators

Category	Indicator	Explanation
Riparian zone	Total area inundated	The amount of out of channel area inundated by an overbank flow of a particular magnitude.
	Habitat area inundated	The amount of habitat area of a particular type that is inundated by a particular magnitude of overbank flow.
Lateral connectivity	Connection to river (frequency, duration, and timing)	Periodic connectivity of the river with oxbow lakes, backwaters, and other floodplain habitats is important to maintain the health of these areas and the organisms that depend on them.
Freshwater inflows to estuary	Volume of flow (monthly and yearly totals) at USGS gage #08030500, Sabine River at Ruliff, TX	Freshwater inflow requirements for the Sabine Lake Estuary have been studied by other state programs. Recommendations have been made in the form of yearly and monthly volumes of freshwater inflow. The Sabine River is an important source of inflow for Sabine Lake. Determining the total volume of flow (yearly and monthly) provided at this gage will allow evaluation of the impact of instream flow recommendations on estuary freshwater inflows.