

The Sabine–Neches Bay and Basin Environmental Flows Science Advisory Team (BBEST) requests submission of Statements of Qualifications (SOQs) from interested applicants leading to the possible award of a contract for state fiscal year 2009 to support the Sabine–Neches BBEST. Work will include compilation and summarization of published literature, agency reports, and other sources of information on the distribution, abundance, and ecological characteristics of biological components and ecological processes, such as geomorphological and sediment dynamics, in the aquatic and riparian ecosystems of the Sabine and Neches river basins and Sabine Lake. Of particular interest are reports that reveal trends in the distribution and abundance of species in the region and studies that reveal basic life history characteristics (spawning periods, environmental factors affecting recruitment, habitat use by life stages, etc.) for key species including their behavioral and demographic responses to flow variation. Some of the relevant literature already has been compiled for the BBEST and is available at the following website:

<http://www.sratx.org/BBEST/Library.html> (the documents available here are mostly relevant to the lower Sabine River and Sabine Lake).

The contractor will identify and provide additional reports and publications relevant to biological responses and status of biological components to flow variation in the Sabine and Neches basins and Sabine Lake. Further, the contractor will summarize information for several common species, threatened species, or particularly flow-sensitive species that inhabit aquatic or riparian habitats. The contractor will consult BBEST members for guidance on focal species throughout the contracted period. The format of these summarizations will be similar to that used by the Cypress Bayou/Caddo Lake Environmental Flows work group which can be viewed in the document available at the following website:

<http://wfsc.tamu.edu/winemiller/lab/PDFs/TAMU%20Caddo%20summary%20rpt.pdf>

The contractor should coordinate with the Texas Water Development Board (TWDB) to ensure that the literature review utilizes the literature review being conducted under a TWDB contract with Dr. Matthew McBroom, Stephen F. Austin State University, entitled “State of the Current Knowledge of the Angelina-Neches River Basin Area, Texas Instream Flow Program”.

Attendance at BBEST monthly meetings should be anticipated. Reports on work progress and draft results shall be distributed to BBEST members electronically. The total amount of the contract awarded shall not exceed \$50,000.

SOQs shall be limited to 15 pages or less not including resumes of proposed team members. Statements of Qualifications will be accepted until 5 PM March 26, 2009 by Dr. Barney N. Austin, Director, Surface Water Resources Division, Texas Water Development Board, 1700 N. Congress Ave., Austin, TX 78711. SOQs will then be scored by BBEST to rank the submittals. Interviews of up to three of the top-ranked submissions may be requested. At the discretion of BBEST, a selection may be made based on the submittals without conducting interviews or viewing presentations. The goal of the BBEST is to have a firm under contract to begin performing the work by April 15, 2009.



**Scope of Work  
Preparation of Literature Reviews and Summary Report**

**Ecological Information to Support Environmental Flow Recommendations  
for the Sabine–Neches BBEST**

The focus of the work will be on the Sabine and Neches river basins and Sabine Lake (estuary). The contractor will focus on fishes, mussels, wetland vegetation and other significant biological elements that may include sensitive or threatened taxa; floodplain ecosystems associated with mainstem and tributary rivers (e.g., connected backwaters, oxbow lakes, perched wetlands); basic hydrology and geomorphology; and physical and chemical characteristics of the Sabine and Neches Rivers and the Sabine-Neches Estuary.

1. Conduct a literature review of sources that appear useful in informing environmental flow recommendations for inflows within the basins. This review will include, but is not limited to, informational sources already compiled and available at –  
<http://www.sratx.org/BBEST/Library.html>
2. Consult BBEST members to identify representative indicator species among fishes and other aquatic organisms, the riparian systems, and the estuary. These indicator species will be organisms that appear to be dependent upon specific environmental conditions for one or more aspects of their life cycle needs, and should include fish from the following three groups: game fish; endangered/threatened fish (Texas and Louisiana); and flow-sensitive fish.
3. Obtain and review all prioritized information sources with regard to indicator species. Summarize information provided in each priority information source. When summarizing pertinent information about species requirements and flow-dependent ecological processes, organize this information using the following components of flow: subsistence flows, base flows, high pulse flows, and overbank flows (see Figure 1).
4. Coordinate with the Texas Water Development Board (TWDB) to ensure that the literature review utilizes the literature review being conducted under a TWDB contract with Dr. Matthew McBroom, Stephen F. Austin State University, entitled “State of the Current Knowledge of the Angelina-Neches River Basin Area, Texas Instream Flow Program”.
5. Develop an integrated summary report containing available information related to the development of ecological flow recommendations. This summary report will, at a minimum, address each of the questions posed in Appendix A. In addition, the summary report will include: (a) key findings about linkages between specific ecological flow components and biotic tolerances or dependencies; (b) graphical models or flow charts illustrating connections between flow components, life cycles of representative indicator species, and key ecological processes. Contractor and the BBEST will work together to determine the format requirements of this document, but an example of a similar document can be obtained at –  
<http://wfsc.tamu.edu/winemiller/lab/PDFs/TAMU%20Caddo%20summary%20rpt.pdf>
6. Distribute the final drafts of the literature review and summary report, in electronic format, to all BBEST members no later than August 7, 2009.

Questions may be addressed to:

Dr. Kirk Winemiller, Texas A&M University  
979-845-4096  
[k-winemiller@tamu.edu](mailto:k-winemiller@tamu.edu)

## **Appendix A**

### **Issues to be Addressed in Summary Report**

#### **Geomorphology**

1. Have any topographical surveys been conducted of the Sabine and Neches River channels, floodplains, or the Sabine-Neches Estuary? (including any surveying for bridges, roads, floodplain mapping, etc)
2. Is the sediment input to each segment in equilibrium with the capacity of the channel to transport it through the segment? Are there detectable trends in the elevation of the river bed or lake bottom, indicating degradation or aggradation?
3. Has the river's longitudinal profile changed over time?
4. Has the channel or floodplain width changed over time?
5. Has the size distribution of streambed sediments changed over time?
6. Has the availability of instream physical habitats changed over time? (e.g., changes in availability of pools or riffles)
7. Are lateral channel migration or bar formation important ecologically? (e.g., to support riparian plant communities).
8. Has human activity and land use significantly altered the stream channel and floodplain morphology and processes?

Suggested approaches:

- Plot the Sabine and Neches River's present-day longitudinal profile from topographic maps, LIDAR, or field survey information
- Characterize historical changes in longitudinal river slope, if adequate data are available (e.g., at multiple river flow monitoring station locations).
- Review historical aerial photographs and maps to assess changes in river planform and floodplain over time
- Assess changes in channel cross-sectional shape, if data are available (e.g., at stream gauges)
- If adequate data are available, estimate flows necessary to entrain river sediments (to maintain desired streambed composition or move sediment downstream to the Sabine-Neches Estuary).
- If adequate data are available, estimate channel forming flows necessary to maintain desired channel geometry.
- If adequate data are available, estimate channel migration flows needed to sustain floodplain development and riparian ecosystem.

#### **Water Quality**

1. Summarize available water quality data for the Sabine and Neches Rivers and the Sabine-Neches Estuary.
2. How do water quality conditions (consulting BBEST members to identify specific representative parameters) vary spatially in the rivers and in the estuary?

3. What is known about water quality problems in the rivers and estuary? Are there any identified water quality problems in the estuary related to river inflows? Are any of the designated uses for the rivers and estuary impaired? If so, has a TMDL study been done, and what are its results?
4. What is known about daily, seasonal, annual fluctuations in key parameters such as dissolved oxygen and temperature in the rivers and the Sabine-Neches Estuary?
5. How do human activities in the Sabine and Neches River Basins and Estuary affect water chemistry, temperature, or dissolved oxygen?
6. What water quality components are of greatest concern to the indicator organisms, their life stages, and riverine processes (e.g., dissolved oxygen, suspended sediment, temperature, chemical elements, nutrients)? Are species distributions or abundances thought to be affected by anthropogenic activities?
7. Describe role of woody debris as a component of the aquatic ecosystem.
8. Are any invasive plant species an issue of concern?

Suggested approaches:

- Characterize trends in water temperature, including seasonal and diurnal fluctuations in the Sabine and Neches River Basins and the Sabine-Neches Estuary.
- Characterize trends in dissolved oxygen in water, including seasonal and diurnal fluctuations in the Sabine and Neches River Basins and the Sabine-Neches Estuary.
- Identify known contaminants in lentic and lotic waters of the Sabine and Neches Rivers and the Sabine-Neches Estuary.

### **Freshwater and Estuarine Ecology**

1. Summarize biological data that have been collected for the Sabine and Neches Rivers and the Sabine-Neches Estuary. Who collected these data, over what time frame, how often, and by what methodology?
2. Has the abundance or distribution of certain species changed over time? Are these changes thought to be linked to changes in river flow? Are data available to document these trends and linkages?
3. What species (fishes, reptiles, birds, mammals, invertebrates, aquatic plants) are of greatest concern from either ecological, socioeconomic or recreational standpoints?
4. What is known about the linkages between flow variations and life histories of freshwater and estuarine indicator species? What times of year are most critical for indicator species, their life stages, and species assemblages?
5. Can the flow needs of certain indicator species in the Sabine and Neches Rivers and the Sabine-Neches Estuary be used to represent the flow needs of assemblages of organisms (e.g., fish, crustacean or mussel assemblages)?
6. If the instream flow regime has been altered by human influences, are necessary flow conditions still properly sequenced to enable successful life cycle completion for indicator species?

7. Which habitats are most limiting, and what is the importance of drought, flooding and intermediate flow conditions for developing and maintaining these habitats?
8. Are aquatic floodplain habitats critical for maintaining fish populations in rivers? Are marginal wetland habitats critical for maintaining fish populations in the estuary?
9. Is the aquatic ecosystem dependent upon material subsidies (e.g., detritus, nutrients) that are brought into the river from the floodplain during floods and into the estuary from the rivers?
10. What specific instream flows are required by certain species during particular periods (e.g., seasonal) in order to facilitate movements within the riverscape?

Suggested approaches:

- If necessary data are available for the Sabine and Neches Rivers and the Sabine-Neches Estuary, define life history stages for representative aquatic plants, invertebrates, and resident or anadromous fishes, along with any known relationships to flow components and their seasonality. Specific life history aspects to consider include adult foraging, survival, and gonadal development; spawning migration and activity; egg, larval, and juvenile development; juvenile growth and survival. If needed data is unavailable, identify data gaps for future study reference.
- Define relationships between flow components and maintenance or access to critical habitats for completion of life history stages for key species in the Sabine and Neches Rivers and the Sabine-Neches Estuary.
- Describe ways in which flow components in the Sabine and Neches Rivers and the Sabine-Neches Estuary influence aquatic primary productivity, decomposition processes, and nutrient dynamics.

### **Riparian Ecology**

1. Have the riparian plant communities or distributions of riparian plant or animal species been surveyed or characterized? Have they changed over time?
2. What is known about relationships between river flows, alluvial water table levels, floodplain inundation patterns, and the influence of these hydrologic conditions on riparian plants or animals in the Sabine and Neches Rivers and the Sabine-Neches Estuary?
3. Which riparian plants or animals in the Sabine and Neches Rivers and the Sabine-Neches Estuary depend upon physical habitat conditions that are shaped by river flows? Is lateral channel migration or bar formation important in forming these physical habitats?

Suggested approaches:

- Using appropriate data for the Sabine and Neches Rivers and the Sabine-Neches Estuary, define life history stages for representative riparian obligate

flora and fauna species, along with known relationships to flow components and the seasons in which they occur.

- Define relationships between flow components and maintenance of habitat or access of organisms to riparian habitat.
- Describe relationships between flow components and vulnerability to disturbances such as fire or introduced species invasions.
- Describe ways in which flow components will influence primary productivity, decomposition processes, and nutrient dynamics.
- Identify areas where riparian ecology information and data specific to the Sabine and Neches Rivers and the Sabine-Neches Estuary are sparse or unavailable for future study reference.

## **Appendix B**

### **Work Schedule**

---

Compilation of information sources	15 April– 15 June 2009
Complete review of priority information sources	15 June 2009
Complete draft summary report	1 August 2009
Distribute final summary report	7 August 2009
Participate in BBEST monthly meetings	To be scheduled as needed

Figure 1

