

**TO:** Board Members

**THROUGH:** Kevin Patteson, Executive Administrator  
Robert E. Mace, Ph.D., P.G., Deputy Executive Administrator, Water Science and Conservation  
Les Trobman, General Counsel

**FROM:** Ruben S. Solis, Director, Surface Water Resources Division

**DATE:** December 1, 2015

**SUBJECT:** Studies of Environmental Flows in the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Area

## **ACTION REQUESTED**

Authorize the Executive Administrator to a) negotiate and execute a contract in a total amount not to exceed \$60,000 with the U.S. Geological Survey; and b) publish a Request for Qualifications for up to four studies of environmental flows in the Colorado and Lavaca rivers and Matagorda and Lavaca bays basin and bay area.

## **BACKGROUND**

Senate Bill 3 (80<sup>th</sup> Texas Legislature, 2007) created a stakeholder-driven process for identifying and quantifying flows needed to maintain sound rivers and estuaries in Texas. The process led to the adoption of flow standards between 2011 and 2014 by the Texas Commission on Environmental Quality for seven major basin and bay areas in Texas. The Senate Bill 3 process contains an adaptive management component which calls for continued studies to validate and refine the environmental flow analyses, recommendations, and standards, and to identify strategies to achieve those standards. The Colorado, Lavaca Basin and Bay Area Stakeholder Committee submitted its work plan for adaptive management to the Environmental Flows Advisory Group in June 2012. This work plan contains recommended studies and activities that, if implemented, will provide additional information for future rulemaking by the Texas Commission on Environmental Quality.

In 2013, the 83<sup>rd</sup> Texas Legislature appropriated funds to the Texas Water Development Board (TWDB) for the continued study of environmental flows. In 2014, the Board approved the use of this funding to implement 15 priority work plan studies in five basin and bay areas, including two studies conducted in the Colorado, Lavaca basin that were completed this year (Attachment

### **Our Mission** : **Board Members**

To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas :

- Bech Bruun, Chairman | Kathleen Jackson, Member
- Kevin Patteson, Executive Administrator

A). These studies provided the stakeholder committees with information to better define flow-ecology relationships and to identify and evaluate strategies to help meet environmental flow standards.

### **KEY ISSUES**

The 84<sup>th</sup> Texas Legislature appropriated funds to the TWDB in its baseline budget for the Fiscal Year 2016-2017 biennium in support of Strategy A.1.1 Environmental Information for the purpose of the collection and analysis of environmental flow information to support a sound ecological environment in the state's streams, rivers, bays and estuaries. To support this strategy, TWDB staff sought input from Senate Bill 3 stakeholder committees by requesting that they submit for consideration a prioritized list of studies from work plans developed for their basins. These studies support Strategy A.1.1 by providing both monitoring and analyses of environmental flows information to address priority questions identified in their basins. The Colorado, Lavaca Basin and Bay Area Stakeholder Committee created a subcommittee to identify specific projects from their work plan to be recommended for funding. The full stakeholder committee approved the subcommittee's recommendations on October 27, 2015, and requested that the TWDB fund these projects. Staff is prepared to provide technical support and to administer the contracting of these funds for the priority projects identified by the Colorado, Lavaca Basin and Bay Area Stakeholder Committee.

In summary, the Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests up to five projects covering a range of topics to be funded for a *total amount not to exceed* \$300,000. The stakeholder committee requests the following studies:

- (a) Ecological indicators and habitat characterization in Colorado and Lavaca river basins (\$160,000);
- (b) Evaluate trends in rainfall-runoff relationship in Upper Colorado River Basin (\$20,000);
- (c) Evaluate the variability of sediment and nutrient loading into Matagorda Bay (\$60,000);  
and
- (d) Improve simulation of groundwater/surface water interaction in the Groundwater Management Area 12 groundwater availability model (\$60,000).

Funding for the following study is contingent on the availability of funds remaining after final contract negotiations have been completed for the four studies listed above:

- (e) Baseline characterization of marsh habitats north of East Matagorda Bay (\$35,000).

For more detailed descriptions of all requested studies, please see *Attachment B: Project Descriptions for Proposed Fiscal Year 2016-2017 Studies for the Colorado, Lavaca Basin and Bay Area Stakeholder Committee*.

### **Contracting**

The Executive Administrator requests authorization to negotiate and execute contracts with government agencies and universities with whom TWDB has the authority to directly contract through interagency contract, which have subject matter expertise, and in which contracts can be negotiated to represent a cost-savings to the State by eliminating reimbursement for overhead

costs. This includes study (c) with the United States Geological Survey. Upon receiving authorization, the Executive Administrator will initiate the vendor selection process by publishing the RFQ for the remaining studies, (a), (b), and (d) for up to \$240,000. Review and final selection of a qualified firm will be presented for Board consideration at a future Board meeting. Following negotiations, if the contracted amount for any individual study is less than the amount indicated above, the Executive Administrator requests authorization to amend the remaining contract amounts and/or to initiate a vendor selection process by publishing an RFQ for study (e) such that the total of all contracts does not exceed \$300,000. Study (e) will be considered only if it can be fully funded from remaining funds.

**RECOMMENDATION**

The Executive Administrator recommends approval of this item.

This recommendation has been reviewed by legal counsel and is in compliance with applicable statutes and Board rules.

Attachment A: Fiscal Year 2014-2015 Work Plan Studies

Attachment B: Project Descriptions for Proposed Fiscal Year 2016-2017 Studies for the Colorado, Lavaca Basin and Bay Area Stakeholder Committee

**ATTACHMENT A**

**FISCAL YEAR 2014-2015 SENATE BILL 3 WORK PLAN STUDIES**

<b>Study Description</b>	<b>Contractor</b>	<b>Amount</b>
<b>Trinity, San Jacinto Basin and Bay Area</b>		
Defining bioindicators for freshwater inflow needs studies	Texas A&M University at Galveston	\$105,500
Determination of freshwater inflow volume from the Trinity River into Trinity Bay	United States Geological Survey	\$95,000
Trinity River evaluation of adopted Senate Bill 3 environmental flow standards	Trinity River Authority	\$112,000
<b>Brazos Basin and Bay Area</b>		
Brazos basin environmental flow standard validation and integration of river flows and Brazos basin estuary response	BIO-WEST, Inc.	\$312,500
<b>Colorado, Lavaca Basin and Bay Area</b>		
Studies to evaluate achievement of freshwater inflow standards and ecological response	Anchor QEA	\$250,000
Evaluation of potential strategies to help provide needed instream flows or freshwater inflows to support an ecologically sound stream or estuary	Meadows Center for the Environment	\$62,500
<b>Guadalupe, San Antonio Basin and Bay Area</b>		
Texas instream flow program studies	San Antonio River Authority	\$200,000
Lower basin/estuarine inflow studies	University of Texas – Center for Research in Water Resources	\$200,000
<i>Rangia</i> clam investigations	San Antonio River Authority	\$150,000
Key estuarine faunal species studies	University of Texas Marine Science Institute	\$150,000
Strategy options for meeting attainment frequencies for the estuaries	San Antonio Bay Partnership	\$50,000
<b>Nueces Basin and Bay Area</b>		
Re-examination of the 2001 Agreed Order monthly targets and safe yield versus current demand evaluations	HDR, Inc.	\$45,000
Improve salinity modeling methods for determining environmental inflow regimes for Nueces Delta and Bay using a 3-D hydrodynamic model	University of Texas – Center for Research in Water Resources	\$80,000
Explore land modifications to Nueces Bay and Nueces Delta	Naismith Engineering	\$95,000
Nueces watershed pre- and post-reservoir nutrient budgets	HDR, Inc.	\$92,500

## ATTACHMENT B

### PROJECT DESCRIPTIONS FOR PROPOSED FISCAL YEAR 2016-2017 STUDIES FOR THE COLORADO, LAVACA BASIN AND BAY AREA STAKEHOLDER COMMITTEE

#### **Ecological Indicators and Habitat Characterization in the Colorado and Lavaca River Basins**

The Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests a qualified contractor to conduct ecological sampling/monitoring and analysis to help verify environmental flow standards for key areas in the Colorado and Lavaca river basins. Funding for the project is anticipated to be \$160,000. Proposals should be designed to sample at least five sites which have environmental flow standards, with two located in the Colorado River Basin upstream of the Highland Lakes, two located in the Lavaca River Basin, and one located on a major tributary of the Colorado River downstream of the Highland Lakes. For those locations, environmental flow standards generally were developed without the benefit of site-specific studies and with little sampling data. For each site, the study design should include (a) an identification of appropriate ecological indicators, for both instream and riparian habitats, to determine a healthy flow regime; (b) sampling for each indicator at a range of flow levels; and (c) characterization of the extent of instream habitat types (riffle, run, pool) over a range of flows. The study design should provide information that will help to inform a review of the adequacy of adopted environmental flow standards to support a sound ecological environment and to monitor ecological health. Proposals also should include a provision for periodic updates to the Colorado, Lavaca Basin and Bay Area Stakeholder Committee with opportunities for input. A recommendation to describe the relationship between key biological species and habitats and instream flow regimes is included in the Colorado, Lavaca basin and bay area work plan (Task 2) and has been identified as a priority study by the stakeholder committee.

#### **Evaluate Trends in Runoff/Rainfall Relationship in Upper Colorado River Basin**

The Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests a qualified contractor to undertake a desktop analysis of changes in the relationship between rainfall and stream flow at key locations in the Colorado River Basin upstream of the Highland Lakes. Funding for the project is anticipated to be \$20,000. Proposals should be designed to survey entities (such as state agencies, universities, river authorities, groundwater conservation districts, and other large water suppliers in the area) regarding past or ongoing efforts to assess the relationship between rainfall and stream flow in the upper Colorado River basin. In addition to providing for the assessment of those efforts, proposals should include the development or selection of an appropriate desktop methodology for assessing and quantifying to the extent possible changes in the relationship between rainfall and runoff that avoids duplication with other efforts. Proposals should include applying that methodology to specific locations to quantify the trend and identify possible causes for any detected trends. Proposals also should include a provision for periodic updates to the Colorado, Lavaca Basin and Bay Area Stakeholder Committee with opportunities for input. A recommendation to evaluate the relationship between rainfall and stream flows in the upper Colorado Basin is included in the Colorado, Lavaca basin and bay area work plan (Task 9) and has been identified as a priority study by the stakeholder committee.

#### **Evaluate the Variability of Sediment and Nutrient Loading into Matagorda Bay**

The Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests the United States Geological Survey or other qualified contractor to continue analysis of the concentration of

sediment and nutrients in freshwater inflows to Matagorda Bay from the Colorado River. Funding for the project is anticipated to be \$60,000. The United States Geological Survey has been working, with funding support from TWDB, to develop predictive relationships of sediment and nutrient loadings from the Colorado River using surrogate models based on *in situ* field measurements. Additional funding is needed to continue moving toward the ultimate goal of obtaining a quantitative relationship that will allow for the continuous measurement of river discharge and sediment and nutrient loadings using an automated index velocity meter (an acoustic Doppler current profiler). Funding is requested to support the installation of an index velocity meter at a fixed location in the lower reaches of the river and to fund additional sediment and nutrient data collection in order to quantify the relationship between data recorded by the velocity meter and sediment and nutrient loadings to the bay. Funding of this project with the United States Geological Survey likely will allow additional federal matching funds to further extend the scope of work for this project. A recommendation to improve estimates of freshwater inflows and to quantify sediment and nutrient loading to Matagorda Bay is included in the Colorado, Lavaca basin and bay area work plan (Tasks 11, 12, and 16) and has been identified as a priority study by the stakeholder committee.

**Improve Simulation of Groundwater/Surface Water Interaction in the Groundwater Management Area-12 Groundwater Availability Model** - The Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests a qualified contractor to improve the capability of the groundwater availability model (GAM) for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers to simulate groundwater-surface water interaction along the Colorado River and the tributaries of the Colorado River within Groundwater Management Area 12. Funding for the project is anticipated to be \$60,000. This project aims to add at least one model layer to represent the Colorado alluvium as a shallow groundwater flow system and to reduce grid cell spacing in the model to 0.25 miles for the grid cells representing the Colorado River and the tributaries of the Colorado River. Each grid cell will be defined to uniquely represent a specific hydrostratigraphic unit and its associated aquifer properties. This project also will review literature on hydrogeological studies of the Colorado alluvium order to estimate transmissive and storage properties of the alluvium and will provide a comprehensive work plan for measuring surface water-groundwater interactions at specific locations in this river basin in order to provide data for use in the calibration or validation of the groundwater availability models. A recommendation to determine the physical and hydrologic connections between surface water and groundwater is included in the Colorado, Lavaca basin and bay area work plan (Tasks 3 and 6) and has been identified as a priority study by the stakeholder committee.

*If sufficient funding remains after negotiating the contracts for the above listed studies, TWDB will either identify a cooperator with whom to contract directly or will work through the request for qualifications process to identify a qualified contractor for the following study.*

**Baseline Characterization of Marsh Habitats North of East Matagorda Bay** - The Colorado, Lavaca Basin and Bay Area Stakeholder Committee requests a qualified contractor to undertake baseline biological and habitat characterization of marsh habitats located north of the Gulf Intracoastal Waterway adjacent to East Matagorda Bay. Funding for the project is anticipated to be \$35,000. The marsh habitats of particular interest are the Little Boggy and the Big Boggy/Lake Austin marshes. Proposals should be designed to collect baseline data to characterize the marsh habitats, relative to salinity levels and freshwater inflow within the marsh. A recommendation to describe the relationship between the physical, chemical, and biological

structure of fringing marshes with respect to freshwater inflow is included in the Colorado, Lavaca basin and bay area work plan (Task 12) and has been identified as a priority study by the stakeholder committee.

## **References**

Colorado, Lavaca BBASC. 2012. *Draft Work Plan: Submission to the Environmental Flows Advisory Group and the Texas Commission on Environmental Quality*. Prepared by the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Area Stakeholder Committee, June 2012, Austin, Texas, 45 p.