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October 12, 2012

The Honorable Troy Fraser, Co-Chair
Environmental Flows Advisory Group
Texas Senate
P.O. Box 12068 - Capitol Station
Austin, TX 78711

The Honorable Allan Ritter, Co-Chair
Environmental Flows Advisory Group
Texas House of Representatives
P.O. Box 2910
Austin, TX 78768-2910

Re: Texas Parks and Wildlife Department Staff Perspectives on Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Area Expert Science Team (BBEST) Report and Recommendations

Dear Chairman Fraser and Chairman Ritter:

As you know, the Basin and Bay Area Expert Science Teams (BBEST) for the Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Area Expert Science Team (BBEST) Report and Recommendations recently submitted their environmental flow regime recommendation report. The Texas Environmental Flows Science Advisory Committee (SAC) has reviewed the BBEST report with the intent to provide comments to assist the Environmental Flows Advisory Group as it considers the regime recommendations.

As the agency charged with the responsibility to protect the state's fish and wildlife resources, Texas Parks and Wildlife Department (TPWD) is in a unique position to have data and scientific expertise to support the challenges of determining the environmental needs of Texas rivers, streams, estuaries, and bays. TPWD has been involved in the development of technical guidance documents and tools for the SAC and has provided assistance to the BBESTs in crafting environmental flow regime recommendations. Based on staff expertise, involvement, and commitment to the success of SB 3 efforts, TPWD reviewed and compiled comments on the BBEST report.

I have attached the comments and respectfully request that you consider them. These comments are intended to assist the Environmental Flows Advisory Group, the Texas Commission on Environmental Quality, and the Basin and Bay Area Stakeholder Committee and Expert Science Team for the Rio Grande, Rio Grande Estuary, and the Lower Laguna Madre Basin and Bay Area.

Commissioners

T. Dan Friedkin
Chairman
Houston

Ralph H. Duggins
Vice-Chairman
Fort Worth

Antonio Falcon, M.D.
Rio Grande City

Karen J. Hixon
San Antonio

Dan Allen Hughes, Jr.
Beeville

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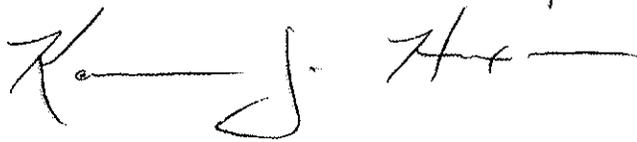
Lee M. Bass
Chairman-Emeritus
Fort Worth

Carter P. Smith
Executive Director

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The Honorable Allan Ritter
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I look forward to continuing to work with you and others as we strive to ensure that the needs of the state's fish and wildlife resources are considered and addressed across the state. Thank you for your consideration of this matter. Should you have any questions, please contact Cindy Loeffler at 512-389-8715.

Sincerely,

A handwritten signature in black ink, appearing to read "Karen J. Hixon". The signature is fluid and cursive, with the first name "Karen" being the most prominent.

Karen J. Hixon
Member

KJH:CL

Attachments

cc: Environmental Flows Advisory Group Members
Ms. Elizabeth Fazio, Environmental Flows Advisory Group
Science Advisory Committee Members
Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay
Area Stakeholder Committee and Expert Science Team members
Mr. Todd Chenoweth, TCEQ
Mr. Cory Horan, TCEQ
Dr. Ruben Solis, TWDB



Date: October 12, 2012

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Carter P. Smith
Executive Director

To: Commissioner Karen Hixon
Executive Director Carter Smith
Deputy Executive Director Ross Melinchuk

From: John Botros, Inland Fisheries Division
Colette Barron Bradsby, Legal Division
David Bradsby, Water Resources Branch
Dakus Geeslin, Water Resources Branch
Lynne Hamlin, Water Resources Branch
Nathan Kuhn, Coastal Fisheries Division
Wen Lee, Coastal Fisheries Division
Cindy Loeffler, Water Resources Branch
Kevin Mayes, Inland Fisheries Division
Ken Saunders, Inland Fisheries Division
Angela Schrifft, Coastal Fisheries Division

Re: TPWD Review and Comments on the Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Area Expert Science Team (BBEST) Report and Recommendations

Senate Bill 3, Article 1 (SB 3), as passed by the 80th Texas Legislature in 2007, created a statewide process for identifying and protecting environmental flow needs. As part of this process, a Basin and Bay Area Stakeholder Committee (BBASC) was formed for the Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Area to address the charges of SB 3 and develop environmental flow recommendations for the river basins and bays associated with the Rio Grande. One of the first actions of the BBASC was to appoint a Basin and Bay Area Expert Science Team (BBEST). SB 3 directs each BBEST to develop an environmental flow regime recommendation:

...through a collaborative process designed to achieve a consensus. In developing the analyses and recommendations, the science team must consider all reasonably available science, without regard to the need for the water for other uses, and the science team's recommendations must be based solely on the best science available.

In a unique approach, the BBASC appointed two independent BBESTs, one each for the lower and upper basin, due in part to concerns about the basin's

large geographic area, varied climatic and hydrologic conditions, international and interstate considerations, and unique water right system. The two BBESTs submitted a consolidated final report on July 27, 2012 documenting their science-based recommendations for an environmental flow regime for the applicable river and bay systems.

Throughout the process, the Rio Grande BBESTs actively engaged resource agency staff and others. TPWD was able to assist the BBESTs with developing instream habitat suitability curves for aquatic species, spatial modeling of the Lower Laguna Madre bay system, and by providing reports about fish and wildlife resources. The BBESTs fostered participation by TPWD and others and used best available science to generate environmental flow regime recommendations for each part of the basin.

Having worked on numerous instream flow and freshwater inflow recommendations over many years, TPWD is familiar with the uncertainty embedded in such efforts, cognizant of the challenges faced by the BBESTs, appreciative of the efforts expended by the members, and grateful for the many opportunities to provide input throughout the process. The BBESTs had approximately 14 months and a limited budget for outside services to meet the SB 3 charge. The difficulty of the challenge cannot be overstated and the progress of the BBEST is commendable. The Rio Grande teams learned and benefitted from the experiences of previous BBESTs and extended the state of the science in many respects. That said, it is widely recognized that the science of environmental flows is not an exact one, and the BBESTs did not have the time, data, directive, or budget to perform a definitive analysis.

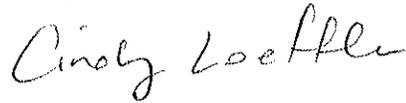
This memorandum contains general and specific comments regarding the work and recommendations of the upper and lower Rio Grande BBESTs. These comments are intended to assist the Environmental Flows Advisory Group, the Texas Commission on Environmental Quality, and the Basin and Bay Area Stakeholders Committee for the Texas Rio Grande system in reviewing the BBESTs' recommendations.

Overall, the Rio Grande BBESTs met their charge and provided a suite of environmental flow recommendations adequate to support a sound ecological environment. TPWD plans to remain involved with the important work of developing environmental flow standards and looks forward to providing technical assistance and guidance to the Rio Grande science teams and stakeholders as requested in the future. Since the work of the BBESTs does not end with the publication of a BBEST report, TPWD also looks forward to

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assisting the Rio Grande BBESTs and the BBASC with the development of a focused and prioritized Adaptive Management Work Plan that addresses gaps and issues raised by the BBEST report.

Sincerely,

A handwritten signature in cursive script that reads "Cindy Loeffler". The signature is written in black ink and is positioned below the word "Sincerely,".

Cindy Loeffler, Chief
Water Resources Branch

UPPER RIO GRANDE BBEST REPORT – TPWD REVIEW

TPWD commends the Upper Rio Grande (URG) BBEST for its commitment and efforts in gathering best available science, performing numerous scientific analyses, and developing flow recommendations for their study area in a very complex river system. TPWD recommends including study areas not included in this effort in the adaptive management process for future environmental flow consideration. The BBEST appropriately identified data gaps and recommended analyses and studies in the adaptive management section.

Study Area

The Rio Grande BBASC identified the Upper Rio Grande (URG) BBEST study area as the Rio Grande upstream of Amistad Reservoir and downstream of Fort Quitman, including the Pecos and Devils river basins. This decision by the BBASC eliminated from consideration over 100 river miles upstream of Fort Quitman to the New Mexico border and well over 200 river miles between Amistad and Falcon reservoirs, totally more than one-fourth of the river miles along the international border between the United States and Mexico.

Recognizing the BBASC study area delineation precluded the BBEST from gathering information and making flow recommendation for much of the Rio Grande, neither BBEST group identified the omitted sections of river for future studies or flow recommendations through adaptive management. At a minimum the report should acknowledge that these two stretches of river were excluded from the process, and the segments should be considered in future environmental flow efforts in the Rio Grande.

Sound Ecological Environment (SEE) Flow Regime Development

The BBEST identified the “Parks” reach of the Rio Grande from La Linda, Mexico upstream to the confluence with the Rio Conchos and the upper Pecos upstream of the Independence Creek confluence as not being sound. For the “Parks” reach the BBEST “make variable recommendations to improve or at minimum to not degrade the environment in these reaches.” Flows needed to improve this reach are not clearly identified in the report.

The BBEST appropriately identifies adaptive management tasks that will facilitate flow recommendations adequate to support a sound ecological environment in the URG river basin.

The BBEST identified the upper Pecos River as “unsound and unable to sustain a SEE” and flow recommendations are made to maintain existing

conditions and lays out adaptive management steps to develop future flow recommendations in Section 5.2.12.

Unique Issues

The URG study area unique issues are outlined in Section 2.8, however it is not clear in the report if an effort was made to recommend flow regimes to address or alleviate any of these specific issues that may contribute to less than sound conditions.

The issue of non-native riparian vegetation, salt cedar and giant cane, was identified as a future research and monitoring need in the adaptive management section.

Adaptive Management

Future efforts to coordinate with other ongoing activities and studies in the basin should be emphasized in order to maximize efficient use of resources and accomplish shared goals amongst programs.

Specific Comments and Notations

- 1) P. 2-27 The report states: “The most practical way to determine a subsistence flow for the Upper Pecos is to begin releases from Red Bluff Reservoir and monitor the water at Iraan. Once the flows have sufficient DO then this will be the subsistence flows.”

TPWD staff cautions that using dissolved oxygen (DO) alone may not be a sufficient indicator to use for identifying subsistence flows. Other factors such as habitat and water temperature should be considered.

- 2) Gage Period of Record. P. 3-5 Rio Grande below Rio Conchos near Presidio indicates a period of record of 1931 – Current. The same gage on P. 3-17 indicates a period of record of 1901-1914 and 1931-1967. The period of record for this gage is inconsistent within the report. This gage is not listed on the USGS Realtime Streamflow table as being an active gage.
- 3) P. 3-26. The “enoughness” threshold is an appropriate and scientifically defensible approach for recommending base and subsistence flow regimes for species of conservation concern. The threshold has been previously used by the Nueces BBEST in developing flow regime recommendations.
- 4) Flow Recommendations on the Rio Grande, Section 4. The BBEST did not recommend overbank flows on the Rio Grande mainstem due

to detrimental effects to channel geomorphology. TPWD recommends including some level of flow recommendation or protective condition for flows between 10,500 and 35,000 cfs. This would allow flows greater than 10,500 cfs and approaching the channel resetting flow level to remain in the river, providing the key ecological functions of high flow pulses, as opposed to potentially being diverted.

- 5) Flow Recommendations on the Rio Grande at Johnson's Ranch, Section 4. The BBEST did not recommend subsistence flows during the winter season. No explanation was offered for this decision. TPWD suggests that some level of subsistence flow be recommended during the winter season at this location for maintenance of water quality standards and minimal habitat connectivity.
- 6) Flow Recommendations on the Rio Grande at Foster's Weir, Section 4. The BBEST did not recommend lower level high flow pulses flows during the winter season. No explanation was offered for this decision. TPWD suggests that some level of high flow pulses be recommended during the winter season at this location. At a minimum base flows should be extended into these blank cells. This recommendation would identify high flow pulses that are necessary during the winter for sediment transport and facilitate BBASC flow recommendation decision making.
- 7) Flow Recommendations on Alamito, Independence, and Terlingua Creeks, Pecos and Devils River, Section 4. Each of these has a blank cell or no flow recommendation for high flow pulses in the winter season. This recommendation would identify high flow pulses that are necessary during the winter for sediment transport and facilitate BBASC flow recommendation decision making.
- 8) Flow Recommendations on Pecos River near Brotherton Ranch, Section 4. The BBEST did not recommend any high flow pulses or overbank flows. Although explanations for the exclusions of these flows were offered, in order to provide the BBASC with decision making tools, some attempt at recommending these flows should be made.

LOWER RIO GRANDE BBEST REPORT – TPWD REVIEW

TPWD commends the Lower RG (LRG) BBEST for its diligent work and determination in preparing environmental flow analyses and recommendations for their study area. The LRG BBEST accomplished a very difficult task in a

limited amount of time. The BBEST met its charge in developing environmental flow recommendations for the Rio Grande estuary and Lower Laguna Madre bay systems. For other areas, TPWD recommends generating a linkage between hydrologic flow regimes and the BBEST's ecological soundness criteria as evaluations and discussions move forward. The LRG BBEST report consists of twelve sections including a suggestion for future activities to be conducted within the context of adaptive management.

Geographic Scope

The BBASC precluded the BBESTs from gathering information and making flow recommendations for much of the Rio Grande River, and the BBESTs failed to identify omitted sections of the river basin for future study through adaptive management. In the context of adaptive management, TPWD recommends generating SB 3 environmental flow analyses and recommendations for the geographical extent of the river basin as defined under SB 3.

Preamble and Sound Ecological Environment

This section explains the SB 3 process and the BBEST charge and provides a summary of the BBEST findings. The BBEST adopted a modified and broader version of the SB 3 SAC's definition of a sound ecological environment (SEE). The BBEST defined a SEE such that it limited the evaluation of a sound environment to a recent time period. This definition precluded evaluation of past ecological environments or consideration of naturally determined hydrologic conditions. The BBEST determined that a SEE is one that maintains native species, is sustainable, and is a current condition. The current condition of the LRG basin is one that exists as a result of severe alteration of the basin's hydrology, among other things. As such, TPWD staff submits that the BBEST's definition of a SEE more appropriately describes a stable equilibrium which should not be confused with ecological soundness. The BBEST applied the SEE criteria to several geographic regions in the study area including the Lower Laguna Madre estuary, tidal and above tidal portions of the Rio Grande and Arroyo Colorado, Resaca watersheds, and coastal sub basins; and then concluded that a range of ecological soundness currently exists in the study area. The BBEST developed quantitative recommendations for the Lower Laguna Madre and Rio Grande estuaries, and for other areas the BBEST developed qualitative indicators of a SEE. The BBEST's qualitative indicators of a SEE do not provide a link to a hydrologic flow regime and therefore the BBEST leaves significant room for interpretation in the report. Appropriately, the need to describe relationships between flow and ecological health has been included as a high priority in the adaptive management section of the report. TPWD recommends analyzing the linkage between hydrologic flow regimes and the

BBEST's ecological soundness criteria as evaluations and discussions move forward.

Hydrology

The LRG BBEST coordinated with subcontractors to compile available water resources data and to develop a general water balance model of the LRG study area based on data from the 1999 to 2008 time period. Withdrawals from the Rio Grande and their general locations within the lower basin were of primary interest to the BBEST. The water balance model allowed the BBEST to statistically characterize inflows to the Lower Laguna Madre estuary by season, and to also estimate a "natural flows" condition in the lower basin. "Natural flows" in the BBEST model are defined as present day hydrology but without agricultural or municipal diversions from the Rio Grande to the Arroyo Colorado. When reviewing the water balance model results it is important not to confuse "natural flows" produced by the BBEST's water balance model with "natural flows" produced by TCEQ's water availability model (WAM). WAM-developed natural flows *do not* include the substantial impact of dams and other man-made structures on basin hydrology whereas those impacts *are* included in the BBEST's modeled version of "natural flows."

TPWD agrees with the BBEST assessment that the general water balance model has limitations due to the lack of available data and other factors. However, the model serves as a useful foundation for future work and identifies where improvements are needed concerning the quantification and tracking of water use data in the lower Rio Grande basin which may be addressed in the context of adaptive management.

Rio Grande Estuary Freshwater Inflow Analyses

Overall, TPWD supports the LRG BBEST's environmental flow recommendations for the Rio Grande estuary. TPWD agrees that the Rio Grande estuarine ecosystem and associated marshes support important nurseries and habitat for certain aquatic species and wildlife. An important function of the lower river is to provide lower salinity habitat for post-larval and juvenile marine species to complete their lifecycles, and as such it is important to maintain the Rio Grande's connection with the Gulf of Mexico. The BBEST report provides a thorough discussion of the hydrologic history of freshwater inflows to the estuary, provides an excellent review of the lower Rio Grande's flora and fauna, and describes changes in the native fish community over time. The LRG BBEST noted that extensive modifications to the basin make it highly unlikely the estuarine ecosystem can return to a naturally determined historical state.

Consistent with the BBEST decision to focus on current rather than historical conditions, the BBEST examined hydrology and satellite imagery collected when the river stopped flowing into the Gulf of Mexico for the purpose of defining flows needed to maintain the river's connection with the Gulf. TPWD supports the BBEST's methods and results. The BBEST recommendation consists of a minimum flow of 60 cubic feet per second (cfs) to be maintained at all times to help keep the mouth of the river open and also to maintain a salinity transition zone. The recommendation further advises two tiers of daily average flows that could be renamed as pulse flows: a daily average flow of 175 cfs once per two months and a higher once-per-year average daily flow of 880 cfs.

Lower Laguna Madre Freshwater Inflow Analyses

Overall, TPWD supports the LRG BBEST recommendations for the Lower Laguna Madre (Laguna). The BBEST consulted SAC guidance, reviewed previous freshwater inflow studies for the Laguna, and ultimately selected marine seagrasses as the focal indicator species. The BBEST concluded the Laguna will be a sound environment with substantially less inflow and nutrient loading than it currently receives. Although no fish or shellfish were selected as focal species, the BBEST, with assistance from TPWD's Coastal Fisheries Division staff, evaluated the status and trends of fish and shellfish in the Laguna using TPWD's Coastal Fisheries Resource Monitoring Program database of fishery samples collected from 1982 through 2010. With a few exceptions, the results indicated a relatively stable abundance of species that are considered native in current conditions. The exceptions include a decline in the abundance of blue crabs which appears to be part of a larger coast-wide phenomenon, and locally fluctuating populations of Southern Flounder. The causes of these trends are not yet understood.

The BBEST determined there is a trend toward unsound ecological conditions in the Laguna for reasons that include: 1) observed changes in the quantity and composition of seagrasses; 2) an increase in the frequency of harmful algal blooms; and 3) a decline or fluctuation in the abundance of certain species. The BBEST utilized results from the TxBLEND hydrodynamic model to evaluate salinity in the Laguna in relation to inflows. The results were used to quantitatively inform BBEST decisions about inflow regimes that favor or impact the sustained growth of seagrasses. Generally, the BBEST concluded that wet conditions negatively affect seagrasses due to their intolerance of sustained periods of low salinity, and moderate inflow pulses that occur under dry conditions produce relatively higher nutrient loadings due to larger proportions of municipal and agricultural return flows. The BBEST recommendations consist of a dry season inflow recommendation covering October to March, and a wet season inflow recommendation covering April to September. For each season the 25th and 75th percentile of flows, as calculated

by the BBEST's water balance "natural flows" condition, define the upper and lower range of the recommendation in acre feet per month. An additional recommendation limits exceedance of the upper and lower threshold in terms of daily average flow (in cubic feet per second) to less than 45 days during the season. TPWD supports these BBEST recommendations.

Specific Comments:

- 1) TPWD staff noted several occurrences where in different parts of the report a year was placed in more than one inflow category. For example, 1997 is identified as a high inflow or wet year on page 9-28, and an average inflow year page 9-19. Also on page 9-28 the years 1998 and 2006 are identified as average inflow years whereas on page 9-18, 1998 is a wet year and 2006 is a dry year. Staff understands the inconsistencies could have resulted from differences associated with annual inflow versus combined monthly or seasonal inflows; however the written discussion, figures, and maps describing inflow categories should be reviewed for consistency and clarified for stakeholders as discussions move forward.
- 2) Page 9-18, "Wet Years were categorized based on the occurrence of several (2-3) monthly flows per year above 100,000 ac-ft..." Based on Figures 9.3.4 and 9.3.5, TPWD staff found several "wet" years (1984, 1988, 1991, 1993, 2004, 2007) having just one month where monthly flows exceeded 100,000 acre feet. It should be clarified whether the BBEST intended to categorize "wet" years based on 1 to 3 monthly flows per year above 100,000 ac-ft.
- 3) Figures 9.3.4 and 9.3.5 show peak monthly inflow pulses during 1991 and 2002 occurred in April and November which is inconsistent with the discussion on page 9-28 (last paragraph) where peak flows are said to have occurred either one month later (May) or one month earlier (October).
- 4) Figure 9.3.6 (page 9-23) does not have the flow record for years 1991-1993 as reported in the first paragraph on page 9-19.
- 5) In reference to Section 9.5.2 Inflow Regimes and Seagrass Responses, TPWD suggests chronological clustering of inflows with biotic and abiotic variables could be used as a statistical check to evaluate when during the past 30 to 40 years a shift occurred. The results can be evaluated using Whittaker's index of association.