

**Addendum to Texas Instream Flow Studies of Interest
to Senate Bill 3 Basin and Bay Expert Science Teams
Prepared for the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholder
Committee and Expert Science Team**

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16. Appendix I, Bibliographical Table, *Ecological Condition of the Sabine-Neches Estuary*, TCB | AECOM (now AECOM), March 2005, Updated April 2006, Prepared for the Sabine River Authority of Texas and the Lower Neches Valley Authority.

<ftp://ftp.sratx.org/pub/EcoConditionsReport/>

Extensive bibliography developed to document baseline studies conducted in the Sabine-Neches Estuary. The *Ecological Condition of the Sabine-Neches Estuary* serves as the definitive compendium of research studies, investigations, modeling efforts, future projects, and historical conditions of Sabine Lake and the Sabine-Neches Estuary.

17. Literature Cited, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation.

http://www.tbpjo.org/PublicRelicensing/documents/TB_PAD.htm

The PAD provides FERC and interested parties with substantial existing information relevant to the Project; including Project background, relicensing process and schedule, operations, engineering, environmental and natural resources, recreation, cultural resources, and socioeconomics.

18. Sabine River Basin Planning Issues, Unpublished, Sabine River Authority of Texas.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_018.pdf

The map of the Sabine River Basin depicts many of the water-related planning issues within the Basin. These include but are not limited to environmental flows, marsh restoration, water quality, water supply, and permitting.

19. Texas Instream Flow Program, Lower Sabine Study Design Workgroup: Goal, Objectives and Indicators. DRAFT January 15, 2009. Center for Public Policy Dispute Resolution, The University of Texas School of Law.

Compilation of the work accomplished by the Lower Sabine Priority Instream Flow Study Design Group that includes study Goal, Objectives, and Indicators.

<http://www.twdb.state.tx.us/InstreamFlows/sabineriverbasin.html>

20. Fact sheet for Preliminary Investigation for a Lower Sabine River Saltwater Barrier, April 2008, Prepared by TCB Inc. (now AECOM) for the Sabine River Authority of Texas.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_020.pdf

Saltwater intrusion has altered the tidal landscape of the lower Sabine River Basin and will continue to make an impact if a solution is not implemented.

21. Sabine Lake Conference

<ftp://ftp.sratx.org/pub/BBEST/Library/SabineLakeConferenceSept1996/>

The Sabine Lake Conference is an attempt to establish an environmental a baseline for Sabine Lake and surrounding uplands and wetlands in Texas and Louisiana.

22. *Freshwater Inflows to Texas Bays and Estuaries*, William L. Longley, 1994.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_022.pdf

In response to the TEXAS WATER CODE 16.058(a), the TWDB and the TPWD have prepared a report on the effects of freshwater inflows on Texas bays and estuaries

23.1 Wildlife and Botanical Resources, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_023-WildlifeandBotanical.pdf

The Project area in eastern Texas and western Louisiana occupies the Level III U.S. Environmental Protection Agency (USEPA) Ecoregion known as the South Central Plains (Griffith et al. 2004).

23.2 Water Resources, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_023-WaterResources.pdf

The Sabine River originates in Texas northeast of Dallas and flows towards Logansport, Louisiana, then south to Sabine Lake (Freese and Nichols 1999). The total drainage area of the Sabine River Basin is 9,756 square miles.

23.3 Fish and Aquatic Resources, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_023-FishandAquatics.pdf

This section contains a description of the fisheries and other aquatic resources of the Project including the reservoir and regulated river reach downstream.

24.1 A SEDIMENT BUDGET FOR GALVESTON BAY, Jonathan D. Phillips

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-SedimentBudgetGalv.Bay.pdf

The purpose here is to develop an estimated budget of sediment inputs to the Galveston Bay system. There is an emphasis on fluvial sources, but other sources are also considered.

24.2 ANTECEDENT ALLUVIAL MORPHOLOGY AND SEA-LEVEL CONTROLS ON FORM-PROCESS TRANSITION ZONES IN THE LOWER TRINITY RIVER, TEXAS, J. D. PHILLIPS and M. C. SLATTERY, 2003.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-AntecedantAlluvialMorphology2003.pdf

Alluvial coastal plain rivers are not considered to be greatly affected by geological controls, at least in the form of the structural and lithological variations that are typically important in fluvial geomorphology in other settings.

24.3 *Avulsion regimes in southeast Texas Rivers*, Jonathan D. Phillips, March6, 2008.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-AvulsionRegimes.pdf

Avulsions – relatively abrupt changes in course, or establishment of new anabranches – are a key but poorly understood process in alluvial rivers.

24.4 *Quantifying downstream impacts of impoundment on flow regime and channel planform, lower Trinity River, Texas*, Jessica L. Wellmeyer, Michael C. Slattery, Jonathan D. Phillips, September17, 2004.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-QuantifyingDownstreamImpactsOfImpouondmentOnFlowRegimeAndChannelPlatformLowerTrinityRiver.pdf

The vast majority of US waterways are now affected by river engineering works, such as dams, canals, and artificial levees.

24.5 Sediment monitoring in Galveston Bay – Final Phase, Michael C. Slattery and Jonathan D. Phillips, June 2007.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-SedimentMonitoringInGalvestonBay-FinalPhase.pdf

This report addresses the fifth year of a corporative research study that seeks to document the effects of the Lake Livingston dam on downstream sedimentation processes, in particular the delivery of sediment to the lower Trinity River and the Trinity Bay estuary and, ultimately, Galveston bay.

24.6 *Toledo Bend Reservoir and Geomorphic Response in the Lower Sabine River*, Jonathan D. Phillips, 2002.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_024-ToledoBendReservoirAndGeomorphicResponseIntheLowerSabineRiver.pdf

Downstream geomorphic responses of stream channels to dams are complex, variable, and difficult to predict, apparently because the effects of local geological, hydrological, and operational details confound and complicate efforts to apply models and generalizations to individual streams.

25.1 *Assessment of Hydrologic Alteration Software*, Eric S. Hersh, CRWR.

ftp://ftp.sratx.org/pub/BBEST_025-AssessmentofHydrologicAlterationSoftware.pdf

Research currently being conducted at CRWR focuses on assessing the applicability of hydrologic analysis tools such as The Nature Conservancy's Indicators of Hydrologic Alteration (IHA) and the United States Geological Survey's National Hydrologic Assessment Tool (NATHAT) for use in the Texas Instream Flow Program (TIFP).

25.2 *New Tools to Assess Hydrologic Alteration in Texas*, Eric S. Hersh, May 18, 2006. Power Point Presentation

ftp://ftp.sratx.org/pub/BBEST_025-NewToolstoAssess.pdf

25.3 *How Much Water Does A river Need?*, Brian D. Richter, Jeffery Bumgartner, Robert Wigington, and David P. Braun.

ftp://ftp.sratx.org/pub/BBEST_025_HowMuchWaterRiverNeeds.pdf

This paper introduces a new approach for setting streamflow-based river ecosystem management targets and this method is called the "Range of Variability approach" (RVA).

25.4 *A Method for Assessing Hydrologic Alteration within Ecosystems*, Brian D. Richter, Jeffery V. Bumgartner, Jennifer Powell, and David P. Braun, 1996.

ftp://ftp.sratx.org/pub/BBEST_025-AssessingHydrologicAlterationWithinEcosystem.pdf

A goal of ecosystem management is to sustain ecosystem integrity by protecting native biodiversity and the ecological (and evolutionary) processes that create and maintain the diversity.

25.5 *A Spatial Assessment of Hydrologic Alteration Within A River Network*, Brian D. Richter, Jeffery V. Bumgartner, Jennifer Powell, and David P. Braun, 1998.

ftp://ftp.sratx.org/pub/BBEST_025-AssessmentHydrologicAlterationRiverNetwork.pdf

The structure and persistence of native biotic communities within river ecosystems is strongly influenced by both spatial and temporal variation in environmental conditions (Poff and Ward, 1989; Stanford et al., 1996).

26. *FRESHWATER INFLOW RECOMMENDATION FOR THE SABINE LAKE ESTUARY OF TEXAS AND LOUISIANA*, Nathan L. Kuhn and Grace Chen, Texas Parks and Wildlife Department, March 15, 2005.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_026.pdf

Freshwater inflows provide a key source of nutrients and sediments, and also create the salinity gradient within the bay system, which is the defining characteristic of an estuary.

27. *Extraction, Analysis and Summary of Fish Community Data from the Sabine River System (Louisiana, Texas)*, Bart, Henry L., Jr., July 8, 2008.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_027.pdf

Data from periodic fish surveys of the Sabine River covering a 60 year time period were extracted from the fish collection database of the Tulane University Museum of Natural History.

28. PRELIMINARY ISSUES, PROJECT EFFECTS, AND STUDIES LIST, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST_028.pdf

In preparing this PAD for the Toledo Bend Project, the Authorities identified, reviewed, and analyzed a wealth of existing and relevant information concerning the existing Project conditions and environment.

29. Appendix C, LOWER SABINE RIVER BOTTOMLAND SURVEY STUDY, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST_029.pdf

One of the primary goals of the study was to determine the zone of Project operational influence on the Sabine River downstream of Toledo Bend.

30. Environmental Flows in the Cypress River Basin, Trinity and San Jacinto Rivers and Galveston Bay Stakeholders Committee, November 13, 2008. Power Point Presentation

ftp://ftp.sratx.org/pub/BBEST_030-Environmental Flows in the Cypress River Basin.pdf

31. Matagorda Bay Inflow Criteria (Colorado River), Prepared for Lower Colorado River Authority and San Antonio Water System, October 10, 2008.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_031.pdf

The Matagorda Bay Health Evaluation (MBHE) team has developed substantial modeling and data analysis, which can be employed to assess the relationship between causative factors and resulting bay condition.

32. Lower Basin Sabine Tidal Study, Prepared by the Sabine River Authority In Cooperation with the Texas Commission on Environmental Quality (TCEQ) Under the Authorization of the Texas Clean Rivers Act, February 2006 - February 2007.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_032.pdf

The Lower Sabine Tidal Study (LSTS) assessed flow and other physicochemical data from the lower Sabine River of the Sabine-Neches Estuary system.

33. Downstream Aquatic Resources Study Plan, Toledo Bend Relicensing, FERC Project No. 2305, Pre-Application Document (PAD), September 2008, Toledo Bend Project Joint Operation. PAD Section

ftp://ftp.sratx.org/pub/BBEST_033.pdf

The goal of this study is to evaluate the existence and magnitude of Project operational effects on the aquatic resources, if any, primarily fish and mussels, immediately downstream of the Toledo Bend Dam.

34. Baseline Fish Collections, Lower Sabine River Priority Instream Flow Study, February 2007.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_034.pdf

The goal of the biological study documented by this report was to conduct new collections to fill information gaps concerning fish assemblages identified during reconnaissance.

35. Assessment of Hydrologic Alteration Software, Eric S. Hersh, B. S. and David R. Maidment, PhD, October 2006.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_035.pdf

The purpose of this project was to assess the applicability of hydrologic analysis tools such as the IHA and the HAT for use in the Texas Instream Flow Program and to evaluate the flow regime in six priority subbasins.

36. Use of Hydrologic Data in the Development of Instream Flow Recommendations for the Environmental Flows Allocation Process (SB3-SAC Hydrology Methods Strawman 2-9-2009). DRAFT

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_036-002092009.pdf

This document provides an overview of how hydrologic data may be used in the identification of instream flow recommendations as part of SB 3 efforts. Includes information on the proposed HEFR model.

37. HEFR Technical Workshop, February, 24, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_037.pdf

To share a working understanding and solicit constructive feedback on the Hydrology-Based Environmental Flow Regime (HEFR) methodology technical details.

38. Water Availability Models

http://www.tceq.state.tx.us/permitting/water_supply/water_rights/wam.html

A water availability model is a computer-based simulation predicting the amount of water that would be in a river or stream under a specified set of conditions.

39. Water Availability in the Neches River Basin

http://www.tceq.state.tx.us/permitting/water_supply/water_rights/wamnechesupdate.html

40. Fish Database

<ftp://ftp.sratx.org/pub/BBEST/Databases/>

41. Geographic Scope of Instream Flow Recommendations, TCEQ, Draft December 19, 2008.

ftp://ftp.sratx.org/pub/BBEST_041.pdf

The purpose of this paper is to address issues related to the geographic scope of instream flow recommendations for Senate Bill 3 (SB3) process.

42. Review of Desk-top Methods for Establishing Environmental Flows in Texas Rivers and Streams

ftp://ftp.sratx.org/pub/BBEST_042.pdf

The TCEQ, TWDB and the TPWD should engage as soon as possible the services of qualified professionals to review currently available instream environmental flow assessment tools and to develop one or more desk-top methodologies specifically applicable to Texas river and stream conditions.

43. THOUGHTS ON INFLOWS AND ADAPTIVE BAY MANAGEMENT, Presentation to the Science Advisory Committee, Paul Jensen, January 7, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_043.pdf

44. An Overview of the Hydrology- Based Environmental Flow Regime (HEFR) Method Presentation to Trinity-San Jacinto BBEST, February 11, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_044.pdf

45. Instream Flows vs. Freshwater Inflows, Presentation to Science Advisory Committee, Texas Parks & Wildlife Department and Texas Water Development Board, February 4, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_045.pdf

46. Geographic Scope of Instream Flow Recommendations, Texas Commission on Environmental Quality, January 7, 2009

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_046.pdf

Power Point Presentation Prepared For:
Texas Environmental Flows Science Advisory Committee

47. Hydrologic Investigation of the Louisiana Chenier Plain, Louisiana Department of Natural Resources, October 2002.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_047.pdf

We believe that providing a better understanding of the hydrology of the Louisiana Chenier Plain is essential to implementing successful ecosystem-scale wetland restoration projects.

48. Percent Inflows into Sabine Lake, Prepared by TCB Inc. (now AECOM) for the Sabine River Authority of Texas, March 2005.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_048.pdf

Schematic of the percent inflows into Sabine Lake

49. Engineering Committee ,Gaging Subcommittee , Gaging Network Evaluation Subcommittee Report, October 27, 2006.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_049.pdf

Prior to the June 3, 2005, Sabine River Compact Administration (SRCA) Meeting, the Gaging Subcommittee of the Engineering Committee organized a subcommittee to evaluate the gaging network and make recommendations for any changes to the gages.

50. Black Bayou Hydrologic Restoration (CS-27), Louisiana Coastal Wetlands Conservation and Restoration Task Force, January 2002.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_050.pdf

The purposes of the Black Bayou Hydrologic Restoration project are to (1) restore coastal marsh habitat, and (2) slow the conversion of wetlands to shallow, open water in the project area.

51. Sabine National Wildlife Refuge Erosion Protection (CS-18), Louisiana Coastal Wetlands Conservation and Restoration Task Force, October 2002.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_051.pdf

A 5.5 mile-long, continuous, free-standing rock dike was built along the east bank of the Burton-Sutton Canal and forms the western boundary of Pool 3.

52. East Sabine Lake Hydrologic Restoration (CS-32), Louisiana Coastal Wetlands Conservation and Restoration Task Force, April 2007 (rev.).

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_052.pdf

The lower salinity marshes are converting to shallow, open water due to elevated salinity events and subsidence. Navigation channels provide a direct route for salt water to infiltrate the marsh, disrupt the natural water circulation, and allow rapid runoff of freshwater.

53. Brown Lake Hydrologic Restoration (CS-09), Louisiana Coastal Wetlands Conservation and Restoration Task Force, October 2003.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_053.pdf

Saltwater intrusion from the Calcasieu Ship Channel and increased tidal amplitudes have caused 90 % of the marsh in this system to be lost.

54. Imagery of Bessie Heights Marsh 1995 and 2004, SRA-TX, January 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_054.pdf

Imagery of Bessie Heights Marsh from 1995 and 2004

55. *Louisiana's Comprehensive Master Plan for a Sustainable Coast*, Coastal Protection and Restoration Authority of Louisiana, April 30, 2007.

<http://www.lacpra.org/index.cfm?md=pagebuilder&tmp=home&nid=24&pnid=0&pid=28&fmid=0&catid=0&elid=0>

The Master Plan presents a series of recommended hurricane protection and coastal restoration measures. Maps and explanations about the measures, as well as a management strategy for implementing them are also provided.

56. Segement Map of the Sabine Basin and a List of fixed Monitoring Stations, SRA-TX.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_056.pdf

57. Sabine-Neches Estuary and Lower Tidal Sabine River: A System in Transition- Appendix, Compiled by SRA_TX, February 2008.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_057.pdf

Appendix of many resources associated with the Sabine-Neches Estuary system and the lower tidal Sabine River.

58. Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Expert Science Team (BBEST) Thoughts on what is Carried by Inflows and Bay Adaptive Management, Paul Jensen, February 20, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_058.pdf

Under SB 3 one of the key missions of the Environmental Flow Science Advisory Committee (SAC) is to advise the Bay Basin Committees on the science of bay inflow needs.

59. THOUGHTS ON BAY INFLOWS AND ADAPTIVE BAY MANAGEMENT, Paul Jensen, February 20, 2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_059.pdf

Presentation to Sabine and Neches Rivers and Sabine Lake Basin and Bay Expert Science Team (BBEST)
60. Texas Instream Flow Program Website

<http://www.twdb.state.tx.us/InstreamFlows/index.html>

61. Texas Instream Flow Lower Sabine Basin Website

<http://www.twdb.state.tx.us/InstreamFlows/sabineriverbasin.html>

62. Texas Instream Flow Studies: Technical Overview, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas Water Development Board, May 2008.

http://www.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/R369_InstreamFlows.pdf

The purpose of the program is to perform scientific and engineering studies to determine flow conditions necessary for supporting a sound ecological environment in the river basins of Texas. This document identifies a process for developing and conducting those studies.

63. Freshwater Flow Needs in the Neches River below B.A. Steinhagen Lake, Werner, USFWS, 1982.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_063.pdf

This report represents the Fish and Wildlife Service's (FWS) examination of the freshwater flows required to meet habitat needs of the resident fish and recreational demands that occur in the Neches River below B.A. Steinhagen Lake.

64. Instream Flow Needs for the Sabine River Below Toledo Bend, Werner, USFWS, 1982.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_064.pdf

The lower Sabine River is drained by an undammed stretch of the Sabine River (156.5 miles) which separates Texas and Louisiana between Toledo Bend and Sabine Lake (Figure 1).

65. Appendix B Evaluation of Impacts of Recommended Water Management Strategies on Stream Flows in the East Texas Region, 2006.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_065.pdf

Freese and Nichols investigated the change on streamflow patterns in East Texas Region due to the implementation of the proposed surface water strategies in the 2006 regional water plans.

66. Using Water Availability Models to Assess Alterations in Instream Flows, Joseph F Trungale, Kevin B. Mayes, Randall E. Moss, Leroy J. Kleinsasser, October 2003.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_066.pdf

The Texas Parks and Wildlife Department (TPWD) is the state agency with primary responsibility for protecting the state's fish and wildlife resources.

67. Summary Report Supporting the Development of Flow Recommendations for the Stretch of Big Cypress Creek below Lake O' the Pines Dam, Kirk O. Winemiller, Anne Chin, Stephen E. Davis, Daniel L. Roelke, Luz Maria Romero, and Bradford P. Wilcox, April 2005.

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

The purpose of this Summary Report is to synthesize available data and literature in order to arm workshop participants with sufficient information to develop ecologically based flow recommendations for the Big Cypress Creek or Bayou, below Lake O' the Pines Dam (Appendix A).

68. Sabine and Neches River Basin Environmental Flows Science Team Outline of Activities — 2009, Presented by Dr. Kirk Winemiller, 2/20/2009.

ftp://ftp.sratx.org/pub/BBEST/Library/BBEST_068.pdf

Outline of Activities — 2009

69. Texas Freshwater Fishes, Text by Carla Hassan-Williams and Timothy H. Bonner, Photographs by Chad Thomas. Texas State University-San Marcos Biology Department / Aquatic Station

<http://www.bio.txstate.edu/~tbonner/txfishes/>

A listing of freshwater fishes in Texas, this site has links to fish databases for Neches and Sabine Rivers, respectively.