

WORK PLAN

SCIENCE ADVISORY COMMITTEE

STUDY COMMISSION ON WATER FOR ENVIRONMENTAL FLOWS

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I. Introduction

A. Legislative Authority

Recognizing the importance that the ecological soundness of the State's riverine, bay, and estuarine systems and riparian lands has on the economy, health, and well-being of the State, the Texas Legislature enacted Senate Bill 1639 during the 78th Legislative Session which established the Study Commission on Water for Environmental Flows (Study Commission). In passing this legislation, the Legislature also has recognized that the waters of the State are held in trust for the public, and that the right to use State water may be appropriated only as expressly authorized by State law; that the Legislature has expressly required the Texas Commission on Environmental Quality (TCEQ), while balancing all other interests, to consider and provide for the freshwater inflows necessary to maintain the viability of the State's bay and estuary systems in the TCEQ's regular granting of permits for the use of State waters; that the Legislature has not expressly authorized granting water rights exclusively for instream flows dedicated to environmental needs or inflows to the State's bay and estuaries or other similar beneficial uses; and that greater pressures and demands are being placed on the water resources of the State which makes it of paramount importance to reexamine the process for ensuring that these important priorities are effectively addressed in clear delegations of authority to the TCEQ.

Senate Bill 1639 expressly prohibits the TCEQ from issuing new permits for instream flows dedicated to environmental needs or bay and estuary inflows. However, amendments can be made to existing permits or certificates of adjudication to add a use for instream flows dedicated to environmental needs or bay and estuary inflows.

To advise and assist the Study Commission, Senate Bill 1639 directs the Study Commission to appoint a Science Advisory Committee (SAC) of no fewer than five and no more than nine members representing a variety of areas of relevant technical expertise. The Work Plan presented herein provides the framework for the activities and studies that are to be undertaken by the SAC in support of the Study Commission.

B. Study Commission on Water for Environmental Flows

The Study Commission is composed of 15 members, 12 of which have been appointed as follows: two members by the Governor; five members by the Lieutenant Governor; and five members by the Speaker of the House. The three additional members include the presiding officers of the TCEQ, the Texas Water Development Board (TWDB) and the Texas Parks and Wildlife Department (TPWD), or their designees. The appointments of the Lieutenant Governor and the Speaker of the House include one representative of a river authority or municipal water supply entity and one member that represents an entity that is distinguished by its efforts in resource protection.

Senate Bill 1639 requires the Study Commission to conduct public hearings and study public policy implications for balancing the demands on the water resources of the State resulting from a growing population with the requirements of the riverine, bay and estuarine systems, including granting permits for instream flows dedicated to environmental needs or bay

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and estuary inflows, use of the Texas Water Trust, and any other issues that the Study Commission determines have importance and relevance to the protection of adequate environmental flows. In evaluating the options for providing adequate environmental flows, the Study Commission is required to take notice of the strong public policy imperative that exists in this State recognizing that environmental flows are important to the biological health of our parks, game preserves, and bay and estuary systems and are high priorities in the permitting process. The legislation also requires the Study Commission to specifically address ways that the ecological soundness of these systems will be ensured in the water allocation process.

A report from the Study Commission on their work is due by December 1, 2004. The report is to include summaries of any hearings or studies conducted and any proposed draft legislation recommended by the Study Commission. The Study Commission expires on September 1, 2005.

The Study Commission members are listed in Table 1.

C. Science Advisory Committee

As noted above, Senate Bill 1639 requires the Study Commission to appoint a Science Advisory Committee to serve as impartial scientific advisors and reviewers for the Study Commission. The Study Commission appointed the Science Advisory Committee at its February 18, 2004 public hearing.

The Science Advisory Committee is composed of the following members:

Member	Entity
Dr. Robert J. Brandes, Chairman	R.J. Brandes Company
Dr. B.L. Harris	Texas Water Resource Institute
Dr. Larry M. Hauck	TIAER, Tarleton State University
Clay J. Landry	WestWater Research, LLC
Dr. Mitchell L. Mathis	Houston Advanced Research Center
Dr. Paul A. Montagna	Marine Science Institute, University of Texas
Dwight K. Shellman, Jr.	Caddo Lake Institute
Jeff Taylor	City of Houston
Dr. George H. Ward, Jr.	Center for Research in Water Resources, University of Texas at Austin

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TABLE 1
STUDY COMMISSION MEMBERS

Member	Appointed by
Senator Kenneth Armbrister, Co-Presiding Officer	Lieutenant Governor
Representative Robert R. Puente, Co-Presiding Officer	Speaker of the House
Senator Jeff Wentworth	Lieutenant Governor
Senator Todd Staples	Lieutenant Governor
Representative William A. "Bill" Callegari	Speaker of the House
Representative Charlie Geren	Speaker of the House
Jerry Clark, General Manager, Sabine River Authority	Governor
W.E. "Bill" West, General Manager, Guadalupe-Blanco River Authority	Governor
Joseph J. Beal, P.E., General Manager Lower Colorado River Authority	Lieutenant Governor
Andrew Sansom, Executive Director International Institute for Sustainable Water Resources Texas State University	Lieutenant Governor
Dr. Ben F. Vaughan IV, Assistant Professor Department of Business Texas Lutheran University	Speaker of the House
David Herndon, Attorney-at-Law	Speaker of the House
Kathleen Hartnett White, Chairman Texas Commission on Environmental Quality	
E.G. Rod Pittman, Chairman Texas Water Development Board	
Joseph B.C. Fitzsimons, Chairman Texas Parks and Wildlife Department	

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D. Science Advisory Committee Charge

The Study Commission has established a charge for the Science Advisory Committee that is comprised of several elements intended to develop and provide technical information for the Study Commission to support its work pursuant to the requirements of Senate Bill 1639. The specific elements of the charge for the SAC are listed below:

1. Provide a description of the current hydrologic conditions, streamflow patterns across the state in major river basins, and freshwater inflow patterns for major bay and estuary systems along the coast, relative to historical and existing environmental flows.
2. Evaluate the analytical tools and/or procedures that are used or available to assess the requirements for preservation, maintenance, or enhancement of aquatic resources and riparian habitat.
3. Identify ecological parameters or ecosystem characteristics to be considered in determining environmental flow needs for the State's surface water resources and identification of implementation options.
4. Provide any other technical information the Science Advisory Committee feels would be beneficial to the Study Commission on Water for Environmental Flows.

II. Scope of Work

In response to its charge as set forth by the Study Commission, the SAC, has established a Scope of Work that addresses specific technical areas for which information relevant to the environmental flow issue is to be compiled, reviewed and analyzed. A summary of this information will be prepared by the SAC and then submitted as the SAC's report to the Study Commission. Following is brief discussion and description of each of the study elements comprising the proposed Scope of Work.

A. Surface Water Management in Texas

The basic concepts of how surface water is managed and accounted for in the State will be addressed and described. This will include an understanding of the prior appropriation doctrine and other water rights systems in place in the State today, the allocation procedures utilized during periods of water shortage among existing water rights, the concept of firm yield with respect to a single reservoir or a system of reservoirs or a direct stream diversion, water availability as it relates to existing and proposed water rights and existing water availability models, water rights permitting procedures and provisions for environmental flows, and water rights enforcement. The TCEQ will assist with the development of this information.

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B. Current State Agency Roles

The TCEQ, TWDB and TPWD have various responsibilities pursuant to the investigation, definition and maintenance of appropriate levels of environmental flows for the State's riverine, bay and estuarine systems, and these agencies' roles will be reviewed and described. Each of these agencies will provide information to the SAC describing specific programs and responsibilities relative to environmental flows.

C. General Hydrologic Conditions

Flows in rivers and streams and freshwater inflows to the State's bays and estuaries vary considerably across the State in response to rainfall patterns, evaporation rates, phreatophyte water consumption, watershed runoff characteristics, diversions and return flows by water users, reservoir storage, groundwater recharge and springflows, and other factors. It is important to understand the historical and currently-existing trends in flow conditions as part of the overall effort to effectively address the need for maintaining certain levels of environmental flows. Baseline information describing the general time-space variation of surface water hydrology in the State will be assembled and summarized. Various types of flow conditions will be illustrated for specific river basins and bay and estuary systems across the State. The TCEQ, TWDB and TPWD all have summary information available relative to the general hydrologic conditions in the State that will be useful for addressing this task.

D. General Aquatic Ecosystem Conditions

The general nature and structure of the aquatic ecosystems that comprise the riverine and bay and estuarine systems across the State and the dependence of these ecosystems on various levels of streamflow or freshwater inflow will be addressed and described. Generally what types of important organisms exist within the different ecosystems and their life stages and interactions within the food web will be discussed. The importance of other naturally-occurring factors such as nutrients, salinity and sediment also will be considered. Information from the TPWD and the TWDB and from other sources will be used in this effort.

E. Environmental Flow Tools and Procedures

The State agencies have been engaged in studies of the requirements for environmental flows since the late 1960s, particularly with regard to freshwater inflows to the bays and estuaries. Various tools and procedures for estimating different levels of environmental flows necessary to achieve various levels of protection for environmental resources have been developed and applied for both riverine systems and bay and estuary systems across the State. These methodologies and their results will be reviewed and discussed with the TPWD, TWDB and TCEQ, and they will be summarized and described relative to those applicable for addressing instream flow requirements for rivers and streams and those applicable for addressing freshwater inflow requirements for bays and estuaries. This effort will include consideration of results from investigations undertaken by entities other than the State agencies, and it will include a general review of the proposed instream flow program that the three State agencies have devised in response to the legislative requirements contained in Senate Bill 2 directing the agencies to ".....conduct studies and analyses to determine appropriate methodologies for determining flow conditions in the state's rivers and streams necessary to support a sound

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ecological environment". All three State agencies will assist the SAC with this assessment by providing information relative to the various methodologies for establishing both instream flows for rivers and streams and freshwater inflows to the bays and estuaries.

1. Instream Flow Methodologies

The review and analysis of instream flow methodologies will necessarily include consideration of the Lyons Method and the Consensus Planning Criteria, both of which are currently used by the State agencies for estimating required levels of environmental flows in streams and rivers across the State. The Lyons Method has been applied primarily by the TCEQ for purposes of establishing minimum environmental flow levels associated with new surface water appropriations. The TWDB has required that the Consensus Planning Criteria be used, as a minimum, to establish environmental flow restrictions (instream flows and bay and estuary freshwater inflows) for all proposed water development projects considered in the Senate Bill 1 regional planning process or requiring State funding support. Examples of the application of the Lyons Method and the Consensus Planning Criteria will be examined. Also, as noted above, this effort will include a general review of the proposed instream flow program that the State agencies are pursuing in response to the requirements of Senate Bill 2 (which also now is being reviewed by the National Academy of Sciences). Fundamental to this review will be consideration of the scientific basis for these methodologies and their appropriateness for representing statewide conditions.

2. Bay and Estuary Methodologies

The TWDB and the TPWD have jointly investigated freshwater inflow needs for all of the major bays and estuaries on the Texas coast. Complex and comprehensive computer modeling procedures have been developed and employed to relate the response of certain estuarine criteria and conditions to various levels of freshwater inflow and to analyze the impact of and the need for different levels and patterns of freshwater inflow. These methodologies will be reviewed and examined in general terms, particularly with regard to their scientific foundation and soundness. The application of these methodologies to certain bays and estuaries and the results in terms of the indicated requirements for freshwater inflows will be examined.

F. Environmental Flow Criteria

The important ecological parameters and/or ecosystem characteristics that should be considered in determining environmental flow needs for the State's surface water resources will be addressed. This will include identification and discussion of critical ecological relationships involving flow that occur under the widely varying hydrologic and climatic conditions across the State and consideration of the significance of flow and other indicators for maintaining sound ecological environments in riverine systems and the bays and estuaries. An important aspect of this effort will be the consideration of the economic and social implications of providing different levels of environmental flows to achieve certain levels of environmental protection, e.g., preservation, maintenance, enhancement, etc. The role of uncertainty and associated risks due to such factors as insufficient data and unverified modeling in the overall environmental flow process and acceptable margins of error also will be considered.

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G. Environmental Flow Implementation Strategies

The various options and strategies for implementing environmental flow programs in Texas will be addressed. Existing procedures for protecting environmental flows such as reservations in new and amended appropriations of surface water and the use of the Water Trust will be considered. Proposals for new approaches for providing for environmental flows in Texas also will be examined and reviewed, as well as other programs being utilized outside the State.

H. Summary Report

The work undertaken by the SAC and its findings will be summarized in a written report. Each of the elements of the Scope of Work will be addressed in the report, and relevant information will be provided using tables and charts as appropriate. The report will be provided to the Study Commission in draft form. Following review and comment by the Study Commission, the report will be finalized. The proposed outline for the report is presented in Table 2.

III. Schedule

The following schedule for the SAC's activities has been developed subject to the approval and acceptance of the Study Commission.

February 18, 2004	Science Advisory Committee Appointed
April 29, 2004	SAC Organizational Meeting
May 21, 2004	Workshop Presentations by State Agencies and Adoption of Work Plan
June 11, 2004	Workshop Presentations on Implementation Options and Other Environmental Flow Issues
Between June 11, 2004 and July 31, 2004	Additional SAC Meetings (scheduled as necessary)
August 16, 2004	Draft Report to SAC Members for Review
August 27, 2004	Review Comments on Draft Report from SAC Members
September 15, 2004	Adopt Final Draft Report and Submit to Study Commission
October 1, 2004	Review Comments on Final Draft Report from Study Commission
October 15, 2004	Submit Final Report to Study Commission

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**TABLE 2
REPORT OUTLINE FOR SCIENCE ADVISORY COMMITTEE**

- I. Introduction
 - A. Legislative Authority
 - B. Study Commission on Water for Environmental Flows
 - C. Science Advisory Committee
 - 1. Charge
 - 2. Scope of Work
- II. Surface Water Management in Texas
 - A. Water Rights System
 - B. Firm Yield Operations
 - C. Water Availability
 - D. Water Rights Permitting
 - 1. Process and Procedures
 - 2. Provisions for Environmental Flows
 - E. Water Rights Enforcement
- III. Hydrologic Conditions
 - A. Climatic Patterns
 - B. Streamflow Variations
 - C. Bay and Estuary Inflows
 - D. Droughts
 - E. Unappropriated Water
- IV. Aquatic Ecosystem Conditions
 - A. Rivers and Streams
 - 1. Ecological Concepts
 - 2. Key Environmental Parameters
 - 3. Statewide Conditions and Variations
 - B. Bays and Estuaries
 - 1. Ecological Concepts
 - 2. Key Environmental Parameters
 - 3. Statewide Conditions and Variations
- V. Environmental Flows
 - A. Rivers and Streams
 - 1. Role of Environmental Flows
 - 2. Habitat Relationships
 - 3. Environmental Indicators
 - 4. Environmental Flow Criteria

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- B. Bays and Estuaries
 - 1. Role of Environmental Flows
 - 2. Habitat Relationships
 - 3. Environmental Indicators
 - 4. Environmental Flow Criteria
 - C. Economic and Social Considerations
- VI. Available Environmental Flow Assessment Tools
- A. Information Needs
 - B. Role of Scientific Process
 - C. Uncertainty and Risk
 - D. Rivers and Streams
 - 1. State Analytical Methodologies
 - 2. State Evaluation Procedures
 - 3. Methods Used Outside of Texas
 - 4. Senate Bill 2 Proposed Program
 - E. Bays and Estuaries
 - 1. State Analytical Methodologies
 - 2. State Evaluation Procedures
 - 3. Methods Used Outside of Texas
- VII. Implementation Strategies
- A. State Environmental Flow Programs
 - B. Other Environmental Flow Programs
 - C. Infrastructure Requirements for Implementation
- VIII. Summary of Findings