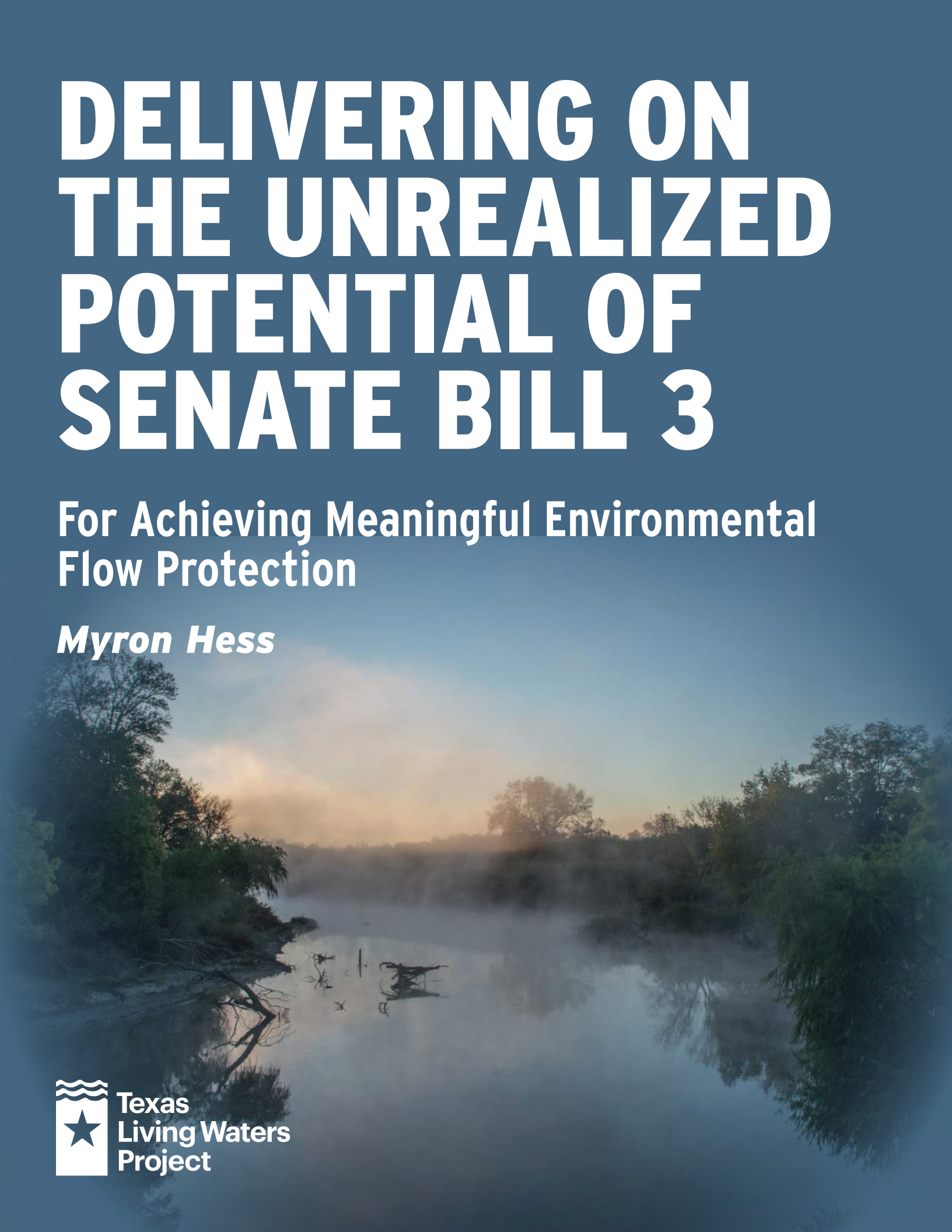
DELIVERING ON THE UNREALIZED POTENTIAL OF SENATE BILL 3

For Achieving Meaningful Environmental Flow Protection

Myron Hess



Texas Living Waters Project

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Myron Hess has been involved in all phases of the Senate Bill 3 process, including negotiations on bill language, serving on a bay and basin stakeholder committee, commenting on proposed TCEQ flow standards, and participating in individual permit proceedings where the standards are applied.

When not working on legal and policy issues related to water quantity and quality, Myron likes to head outdoors in search of a bird, whale, crayfish, praying mantis, or just a cool plant. He also enjoys exploring Texas streams and springs, listening to singer-songwriters, traveling, and learning about new developments in science. Myron traces his love of the outdoors to his childhood days on a farm in north Texas. His fascination with nature led him to major in wildlife and fisheries sciences at Texas A&M University and his time as a teacher and school administrator with responsibility for middle-school boarding students redirected him to law school at the University of Texas.

The Texas Living Waters Project is a collaboration of conservation groups working to ensure Texas has the water it needs for thriving communities and abundant fish and wildlife. Coalition partners for the project include the National Wildlife Federation, Sierra Club Lone Star Chapter, Galveston Bay Foundation, and Hill Country Alliance.

Cover Image: The Trinity River flows through the Great Trinity Forest in southeast Dallas on its way to the Gulf of Mexico.

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Kayaks and canoes head off on the annual 250-mile Texas Water Safari from San Marcos to the Gulf of Mexico. Billed as the 'World's Toughest Boat Race,' the safari is characterized by multiple difficult portages over dams and other impediments, reflecting some of the many alterations to the flow patterns of the Guadalupe Basin. Photo: Russell Wilde.

Executive Summary

Texas is a state with a wealth of natural beauty, including a remarkable bounty of flowing streams and rivers and productive bays and estuaries along the coast. The health of those streams, rivers, and estuaries is at serious risk from flow depletion in the absence of effective flow protections. Recognizing that risk, the Texas Legislature, in 2007, enacted potentially far-reaching legislation (Senate Bill 3) providing for protection of environmental flows in Texas rivers and streams (instream flows) and into bays and estuaries (freshwater inflows). Some 14 years later, it is time to take stock of how well the state has done in implementing SB 3.

Water flowing in Texas streams and rivers is owned by the people of Texas. Perpetual water rights are granted allowing water to be impounded and diverted and put to various uses. In many places, the volume of rights granted exceeds the amount of water that is available during dry periods. With only rare exceptions, the oldest rights, some of which date back to the late 1800s, have the first claim to water during times of shortage. Most rights granted before 1985 do not include protections for environmental flows to maintain water quality, fish and wildlife habitat, and recreational use in the state's streams, rivers, and coastal bays and estuaries.

SB 3 established, among other things, a process for adopting environmental flow standards to inform flow-protection provisions for new water rights and affirmative strategies designed to help convert some existing perpetual water rights to flow protection purposes. SB 3 also directed that, where available, unappropriated water—state-owned surface water

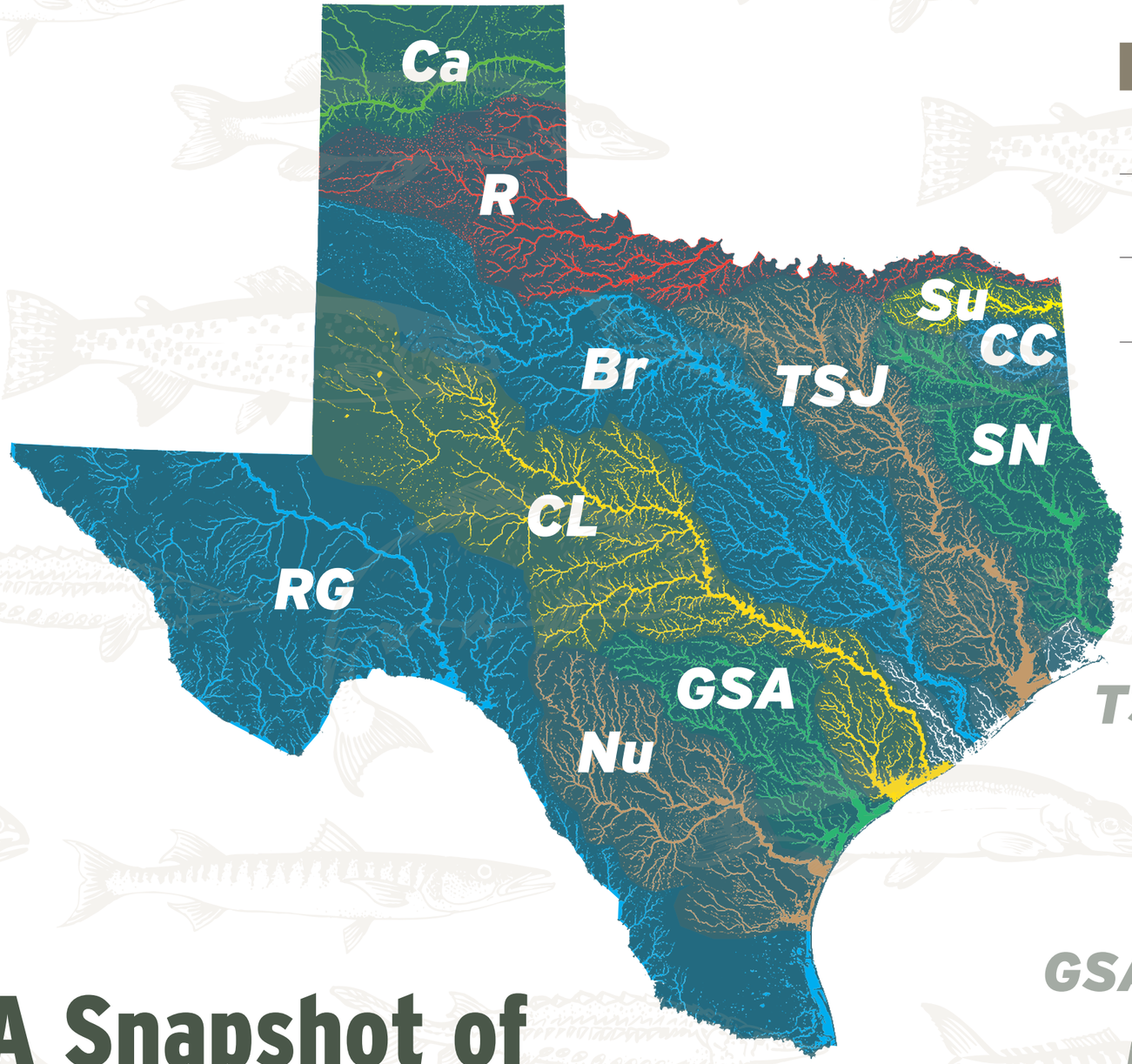
that has not previously been authorized for diversion and consumption for another use—should be set-aside, in the maximum amounts reasonable, for flow protection and not be available for issuance of permits for competing uses. That legislation directed an extensive science and stakeholder input process to provide input to the Texas Commission on Environmental Quality (TCEQ), the agency charged with implementing most of those efforts, and mandated a comprehensive adaptive management process to ensure periodic reconsideration and, as appropriate, adjustment of those flow-protection efforts.

The first environmental flow standards were adopted in 2011 and the 10-year review period for those initial standards provided for in SB 3 is now upon us. In anticipation of that review process and the consideration of potential revisions to those standards, this report provides an overview of the environmental flow provisions of SB 3, takes a hard look at how it has been implemented, and offers recommendations for steps to be taken by TCEQ and by the Texas Legislature to address shortcomings in implementation and seize the unrealized potential of that legislative effort.

Initial flow standards have been adopted for most river basins in Texas, but those efforts have stalled. The adopted standards, while generally improving upon flow-protection approaches used since 1985, fall far short of protecting the levels of flow scientists identified as being adequate to protect a sound ecological environment. TCEQ has not established any set-asides of unappropriated water for flow protection. The process for identification and implementation of affirmative strategies has received scant attention. Although the shortcomings are disappointing, the adaptive management process provides significant opportunity to improve upon those efforts. For example, permits issued since SB 3 became effective include a reopener provision allowing for limited increases in flow protection levels.

Key recommendations for actions by TCEQ include adopting set-asides, which the agency previously declined to do, where unappropriated flow is available; revising flow standards applicable to new permits to be more protective and more consistent with science-based recommendations; and establishing comprehensive strategy targets for prioritizing efforts to implement voluntary flow protection efforts. Recommendations requiring legislative action include launching a new effort to develop proposals for improving water rights management and for facilitating voluntary conversions of existing rights to flow protection; revitalizing the stakeholder and scientific input processes informing flow protection efforts; and incorporating into the state's water planning process consideration of affirmative strategies for helping to meet environmental flow needs.

Swimmers enjoy the spring-fed waters of 'The Quince' swimming hole on the Nueces River. The westernmost Hill Country river, the Nueces feeds into a once highly productive delta and bay on the Gulf Coast. Already experiencing greatly reduced freshwater inflows from the Nueces River, the flow standards adopted by TCEQ authorize even further depletion from new permits (see Figure 4 on page 36). Photo: Kenny Braun.



A Snapshot of SB 3 Implementation 14 Years into the Process

IMPLEMENTATION STATUS OF KEY SB 3 DIRECTIVES

Key SB 3 Directive	Implementation Status as of 2021
Development and Adoption of Environmental Flow Standards	**~ Partial.** Flow standards adopted for most areas. Standards less protective than needed.
Set-Asides State-owned surface water not previously authorized for other use should be set-aside for flow protection.	**✗ No action.**
Affirmative Strategies Strategies to help convert some existing perpetual water rights to flow protection purposes.	**✗ Limited to no action.** Some strategy targets established for inflows to some bays. No significant action to implement strategies.
Adaptive Management Process Periodic reconsideration and adjustment of flow-protection efforts on a 10 year cycle.	**~ Reviews of flow standards to begin no later than 2021.** Review process, which is undefined and unfunded, has not begun.

BAY AND BASIN PROCESS IMPLEMENTATION

✓ = fully implemented ✓ = partially implemented ✓— = limited implementation ✗ = no action

SN SABINE-NECHES RIVER BASIN AND SABINE LAKE
Adopted: 2011 — Review Due: 2021
✗ Ongoing BBASC* meetings ✗ Strategy targets ✗ Set Asides ✓— Protection level

TSJ TRINITY-SAN JACINTO RIVER BASIN AND GALVESTON BAY
Adopted: 2011 — Review Due: 2021
✓ Ongoing BBASC meetings ✗ Strategy targets ✗ Set Asides ✓— Protection level

Br BRAZOS RIVER BASIN AND ASSOCIATED ESTUARY SYSTEM
Adopted: 2014 — Review Due: 2024
✓ Ongoing BBASC meetings ✗ Strategy targets ✗ Set Asides ✓ Protection level

CL COLORADO-LAVACA RIVER BASIN, MATAGORDA AND LAVACA BAYS
Adopted: 2012 — Review Due: 2022
✓ Ongoing BBASC meetings ✓ Strategy targets ✗ Set Asides ✓ Protection level

GSA GUADALUPE, SAN ANTONIO, MISSION, AND ARANSAS BASINS AND MISSION, COPANO, ARANSAS, AND SAN ANTONIO BAYS
Adopted: 2012 — Review Due: 2022
✓ Ongoing BBASC meetings ✓ Strategy targets ✗ Set Asides ✓ Protection level

Nu NUECES RIVER BASIN AND CORPUS CHRISTI AND BAFFIN BAYS
Adopted: 2014 — Review Due: 2024
✓ Ongoing BBASC meetings ✓ Strategy targets ✗ Set Asides ✓— Protection level

RG LOWER LAGUNA MADRE ESTUARY AND RIO GRANDE RIVER BASIN AND ASSOCIATED ESTUARY SYSTEM
Adopted: 2014 — Review Due: 2024
✗ Ongoing BBASC meetings ✗ Strategy targets ✗ Set Asides ✓ Protection level

Ca R Su CC CANADIAN, RED, SULPHUR, CYPRESS CREEK RIVER BASINS AND VARIOUS COASTAL BASINS
No BBASC named and no flow standards yet adopted for these basins.

2011 2015 2019 2023

*Bay and Basin Area Stakeholder Committees (BBASC) were charged by SB 3 to appoint science teams, develop flow standards and strategies, and develop plans for periodic review of all components at least once every 10 years. See "The Players and Assigned Roles:" on page 19 for further details.

Key Terms

Acre-feet: Acre-feet or an acre-foot is a measurement commonly used in water rights permitting. The term reflects the heavy irrigation focus of early water rights. An acre-foot represents the amount of water, 325,851 gallons, that would cover an acre of land to a depth of one foot.

Affirmative strategies: Approaches to be identified under S.B. 3 through which water previously authorized for other uses, including water from return flows, would be committed to a flow-protection purpose to help meet instream flow and/or freshwater inflow needs.

Appropriation: In general terms, an appropriation refers to the legal process for obtaining a right authorizing a person to divert, store, or take surface water flowing in a watercourse. Under Texas law, water that has been appropriated for consumptive use cannot be appropriated a second time unless the first appropriation has been canceled. "Unappropriated water" refers to state-owned surface water not already appropriated.

Base flows: A component of instream flows above the subsistence flow component, usually with multiple levels representing a continuum of flow conditions supporting good water quality and healthy-to-thriving levels of aquatic life. Base-flow levels often are referred to as dry-, average-, or wet-condition flows, recognizing that during dry conditions a lower level of flow is expected and that during wetter conditions higher flow levels play a critical role in supporting a sound ecological environment.

Cubic feet-per-second (cfs): A common unit of measurement of flow in streams and rivers that plays a major role in how instream flow requirements are quantified. One cfs is equal to about 449 gallons per minute or slightly less than 2 acre-feet per day.

Environmental flow standards: Criteria adopted by the TCEQ through a rulemaking process after consideration of recommendations from BBESTs and BBASCs and of other factors. Flow standards define the flow protections, for instream flows and freshwater inflows, to be implemented for new appropriations of surface water through the state's water rights permitting process. Although SB 3 also provides that flow standards should include targets for implementation of affirmative strategies to restore inadequate flow levels, the adopted standards rarely do so.

Freshwater inflows: Fresh water flowing from streams and rivers into coastal waters where it delivers critical nutrients and sediments and, by mixing with higher salinity water, produces a critical gradient of salinity. Like instream flows, needed levels of freshwater inflow vary by season and by year, reflecting changes in rainfall. Instream flows, if protected all the way to the coast, become freshwater inflows.

Instream flows: Flows within streams and rivers that provide crucial habitat for fish and wildlife, maintain water quality, support aquatic and riparian vegetation, and maintain the shape and structure of the stream channel. Different levels of flows, often referred to as subsistence, base, and pulse flows, play key roles at different times.

Measurement point: The point, which almost always will be a flow gage maintained by the U.S. Geological Survey and a local partner, where compliance with applicable environmental flow standards is assessed for a new water right required to comply with those standards.

Pass-through requirements: A type of environmental flow protection requirement included in a permit that requires a certain amount of flow from upstream to be passed-through a reservoir or to be passed-by a diversion point and allowed to flow downstream.

Priority: Most surface water rights in Texas operate on a priority basis with each right given a priority date based on when the right was recorded or recognized. During times of shortage, the water right with the oldest, or most senior, priority date has the first claim to the water. Some smaller rights, primarily for domestic and livestock use, operate outside of the priority system. In addition, water rights in the middle and lower Rio Grande basins operate on a court-created system based on type of use.

Pulse flows: Periods of short duration, high flows occurring in response to rainfall events that play important functions such as resetting water quality after extended periods of subsistence flows, maintaining river channel condition and structure, distributing plant seeds, and cueing reproduction in certain aquatic species.

Return flows: Water that is diverted pursuant to a water right but not consumed and that is returned to the stream, usually after treatment to help maintain water quality. In Texas, with only the very rare exception when a permit is issued with specific quantified return-flow requirements or when a right is non-consumptive, water right holders are authorized to fully consume the water diverted, meaning that no water is required to be returned to the stream.

Set-asides: A component of flow protection provided for by S.B. 3 through which unappropriated water—state-owned water not already authorized for use under water rights—would be designated for flow protection and made unavailable for permitting for other uses. Set asides, which the Legislature designated as the alternative to issuing new water rights for flow protection, are to have an assigned priority and to be managed in a similar manner to water rights for other uses.

Sound ecological environment: Although used in SB 3 to define the desired ecological condition to be maintained, the term was not defined by the Legislature. Various definitions in TCEQ flow standards and in scientific documents generally refer, although with variations, to an ecological environment with a diversity of fish and aquatic life characteristic of the natural system that maintains healthy natural processes and major habitat types, along with good water quality.

State-owned surface water: Absent special circumstances, all water flowing in a watercourse.

Strategy targets: Components of environmental flow standards that, instead of defining flow protection requirements applied to new permits, identify the levels of instream flows and/or freshwater inflows sufficient to support a sound ecological environment at various locations. Strategy targets help inform when, where, and to what extent affirmative strategies may be needed in order to maintain a sound ecological environment, but are not used in reviewing or developing new permits for other uses.

Subsistence flows: A component of instream flows that represents flow levels during very dry periods that are adequate, for short periods of time, to maintain acceptable water quality and to maintain populations of aquatic life sufficient to allow recovery to robust numbers when flow levels increase to more normal amounts.

Water Availability Model or WAM: The state's models for the various river and coastal basins that account for water expected to be available as flow and for use, based on an assumed recurrence of historical weather conditions and authorized allocations for use. Different "runs" of the model are used to represent varying levels of use, such as current use levels and full permitted use.

Water right: An authorization to impound, use, or divert state-owned water.

Image: Distributaries of the Rio Grande flow into Laguna Madre near Port Mansfield.

1 Introduction

Flow Protection Prior to Adoption of SB 3

Although the environment was the first user of water in rivers and streams and flowing into coastal bays and estuaries,[1] environmental use of water has been, and continues to be, near the end of the line—and at the tail-end of the priority system—in terms of protection in water rights management in Texas. It was not until 1985 that environmental considerations began to be routinely assessed as part of the state's water rights permitting process and that any type of flow protection provisions began to be regularly included in water right permits. As reflected in Figure 1, by that time, perpetual rights authorizing diversion and consumption of the bulk of the reliably available surface water had already been authorized and, subject to very few exceptions, without any mechanism to protect environmental flows. Because those pre-1985 rights, shown in black in Figure 1, have the most senior priority, they have the first claim on the available water during periods of shortage, which will leave the state's fish and wildlife high and dry if proactive steps are not taken soon.

A new era in environmental flow protection began in Texas in 2007 with the enactment of Senate Bill 3 (SB 3),[2] which is the focus of this paper. SB 3 provides for the adoption of an initial set of environmental flow standards—an exercise that has been completed to varying degrees for most river basins—and for an adaptive management process with periodic consideration of revised flow standards, generally on a ten-year cycle. SB 3 also calls for the ongoing implementation of affirmative strategies to help meet environmental flow needs. The time for consideration of the first cycle of flow standard revisions and for serious attention to implementation of strategies is upon us—somewhat overdue in some basins—but the process for accomplishing those critical outcomes remains largely undefined.

Even for the small amount of water rights that are shown in green in Figure 1, environmental flow provisions included in permits prior to 2011, when the first flow standards were adopted pursuant to SB 3, usually were quite limited in scope. Generally, those pre-SB 3 permit conditions only required that some minimum amount of flow be allowed to pass downstream of a diversion point or dam, commonly failing to address the importance of protecting an overall flow regime and, particularly, the protection of periodic high flow events, often referred to as pulse flows, and freshwater inflows to bays and estuaries.

The role of the various components of an overall flow regime is summarized in Part 3 (page 26). Instream flow refers to the roles and benefits provided by water flowing in a stream or river. Freshwater inflows, also referred to in the Water Code as beneficial inflows, refers to fresh water flowing from rivers and streams into coastal areas where it delivers essential nutrients and sediments and mixes with salty water from the Gulf of Mexico to produce an essential gradient of salinity conditions. That transition between fresh and salt water is known as an estuary. Estuaries represent some of the most productive habitats on the planet[3] and Texas is blessed with a variety of estuaries, including Galveston Bay which is the 7th largest estuary in the U.S.

The Impetus for Adoption of SB 3

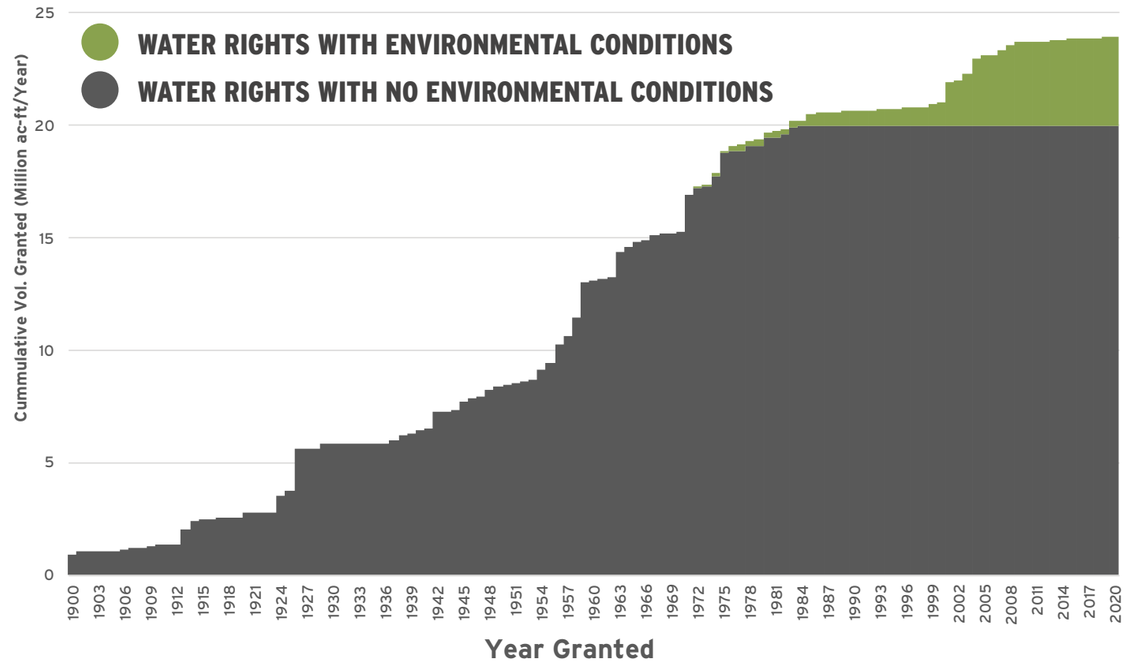
In 2007, acting largely in response to bold action by the San Marcos River Foundation (SMRF) and other entities filing applications seeking to appropriate large quantities of unappropriated state-owned water for the recognized

1 "Estuaries are ecosystems where freshwater from streams and rivers meets marine waters of coastal bays and mixing occurs." See freshwaterinflow.org/estuaries.

2 Actually, in 2007, the Legislature enacted both Senate Bill 3 (Act of May 28, 2007, 80th Leg., R.S. ch. 1430) and House Bill 3 (Act of June 15, 2007, 80th Leg., R.S. ch. 1351) which had virtually identical environmental flow protection components. The primary environmental flow protection components in SB 3 are found in Article 1. SB 3 also included many other provisions governing water management. In this paper, reference to SB 3 is used when discussing those 2007 environmental flow provisions.

3 See freshwaterinflow.org/estuaries.

Timeline of Texas Water Rights (1900-2020)



Only consumptive water rights included. National Wildlife Federation and Trungale Engineering & Science analysis of Texas Commission on Environmental Quality water right files.

Figure 1. Graphic developed by the National Wildlife Federation showing cumulative consumptive water rights, which are perpetual, issued through 2020. In most instances, the oldest rights have the first claim to available water during times of shortage.

beneficial use of environmental flow protection,[4] the Texas Legislature enacted SB 3. SB 3, following up on provisions enacted in 2003,[5] permanently prohibited the granting of new appropriations specifically for environmental flow protection and substituted a multi-pronged approach for achieving the protection of environmental flows. Instead of relying on new water rights for flow protection, as requested by SMRF and others, and on a continuation of case-by-case consideration of flow protections in permits for other uses, SB 3 established an extensive process for developing environmental flow standards, establishing environmental flow set-asides of unappropriated water, and pursuing affirmative strategies to help meet environmental flow needs. As provided in SB 3, environmental flow standards are intended to guide the inclusion of flow-protection provisions in new permits and to establish the targets for implementing affirmative strategies to help address the impacts of existing water rights granted without any flow protection provisions

4 The application by the San Marcos River Foundation, filed in 2000, sought an appropriation of up to 1.3 million acre-feet per year in the Guadalupe River Basin to protect instream flows and freshwater inflows. Essentials of Texas Water Resources, edited by Mary Sahs, (6th Edition Aug. 2020), Chap. 11 at p. 11-5. Various other entities, including the Caddo Lake Institute, the Galveston Bay Foundation and Galveston Bay Conservation and Preservation Association, and the Matagorda Bay Foundation, filed similar applications.

5 Subsection (d) of Section 11.0235 of the Water Code was added by Acts 2003, 78th Legislature, ch. 1242, §2.

or with inadequate protections.[6] Environmental flow set-asides, through which specific quantities of unappropriated water would be declared off-limits from permitting for other uses, were envisioned as providing a foundation for meeting environmental flow needs, on which protective permit provisions and affirmative strategies could build.

Why Effective Flow Protection Matters

Ensuring that adequate levels of environmental flow are protected is critical to the future of Texas and Texans. The Legislature acknowledged that reality noting that "[m]aintaining the biological soundness of the state's rivers, lakes, bays, and estuaries is of great importance to the public's economic health and general well-being."[7] Because of the legacy of those pre-1985 rights, set-asides and protective provisions included in new water right permits, even if exceptionally well implemented, would not be sufficient mechanisms for protecting environmental flows and the water quality, seafood production, tourism, recreational fishing, wildlife, ecological, and aesthetic values those flows support. Other, proactive steps, such as conversion of some existing rights to flow protection purposes and dedications of return flows[8] are needed to ensure adequate environmental flows. SB 3 expressly acknowledges the importance of such proactive steps in the form of "affirmative strategies" for achieving environmental flow protection and directs several steps toward identifying and implementing them, but only on a voluntary basis. Unfortunately, as discussed further below, SB 3, as currently implemented, is falling short on ensuring strong flow protections in new permits, particularly for freshwater inflows, and on advancing the identification and implementation of affirmative strategies. In addition, more than thirteen years after the effective date of SB 3, not one drop of unappropriated water has been set aside for environmental flow protection.

The adverse implications of a continuation of those shortcomings, in addition to putting at risk the state's rich natural heritage and the economic activity dependent on healthy rivers and bay systems, include undermining predictability in water management throughout the state. Until those critically important environmental values and resources are adequately protected in a comprehensive way, long-term certainty in water rights management will not be attainable. As flow levels decline because of increased consumptive use to meet the demands of a growing population and because of a changing climate, water quality will suffer and the recreational potential and biological productivity of rivers and coastal waters will be increasingly impaired.

> ***"More than thirteen years after the effective date of SB 3, not one drop of unappropriated water has been set aside for environmental flow protection."***

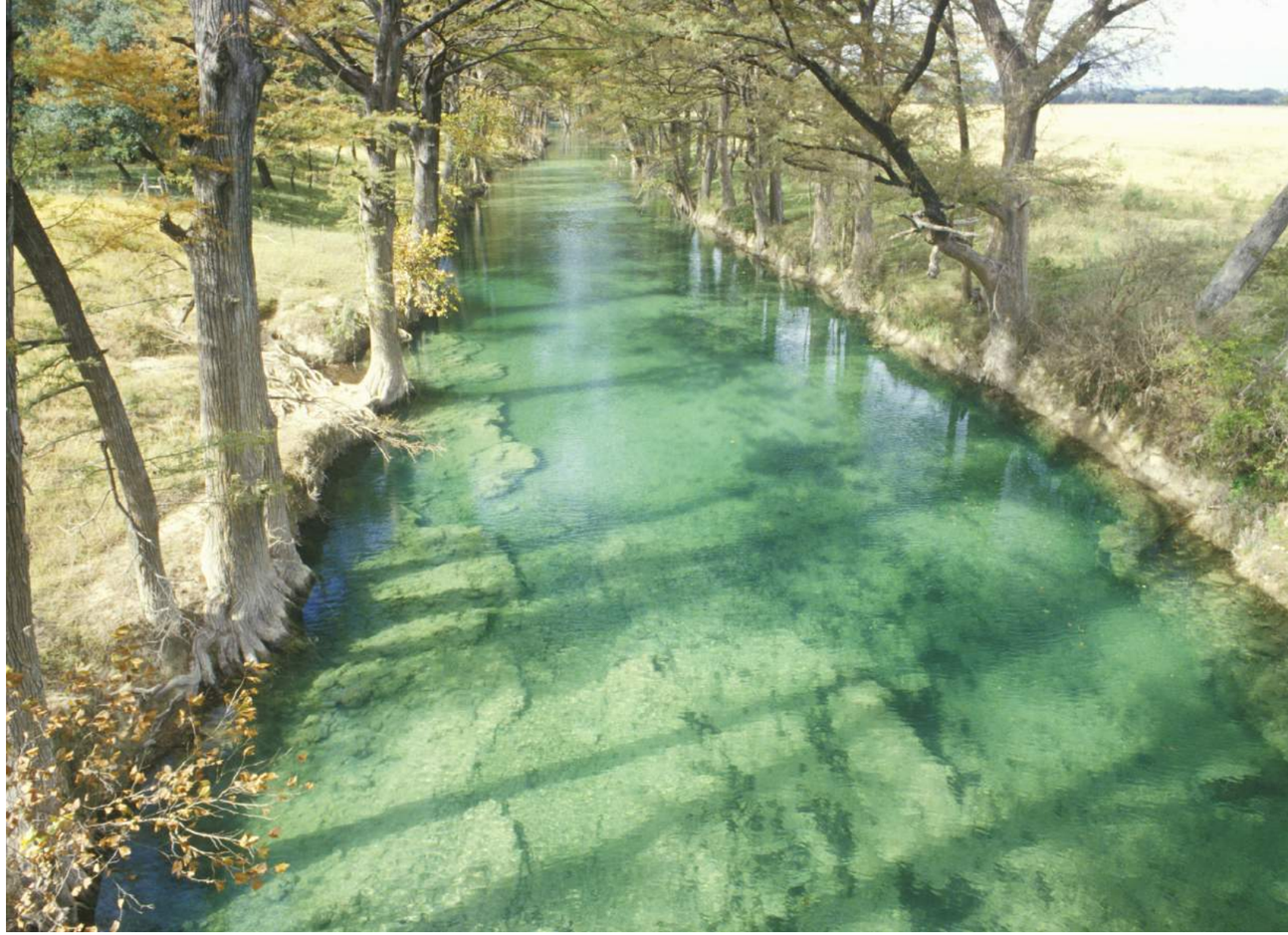
That is unlikely to be accepted by the citizens of Texas without significant pushback, both by those who will suffer economically because of the loss of recreational potential and seafood production—collectively representing billions of dollars of economic activity annually—and by those who see their natural heritage being squandered. In addition, regulatory issues related to water quality impacts and to protection of threatened and endangered species will become increasingly significant with major implications for management of water rights.

Collectively, those impacts will significantly upend the assumed relative certainty of water rights management if environmental flow protection is not addressed proactively. Fortunately, if approached holistically, a reasonable balance between consumptive water uses and environmental flow protection can be achieved, especially if we begin to comprehensively identify and address environmental flow needs now, while a broad variety of management approaches remain as viable options.

6 In Section 11.0235 (d-3)(2), which was added to the Water Code in SB 3, the Legislature explained that a variety of public and private market approaches, also known as affirmative strategies, would be needed to help satisfy environmental flow standards.

7 Tex. Water Code § 11.0235 (b).

8 Return flows are made up of water diverted pursuant to a water right but not consumed during its use, that is returned to the stream, usually after being treated to protect water quality. Depending on the use, 50 to 60% of the water diverted may come back as return flow. For many types of uses, a large percentage of the water diverted comes back to the stream as return flow. Under Texas law, absent specific permit requirements providing otherwise, a water right holder is authorized to reuse the water over and over without returning it to the stream until it is fully consumed. Tex. Water Code § 11.046 (c). Return flows can be dedicated for flow protection purposes.

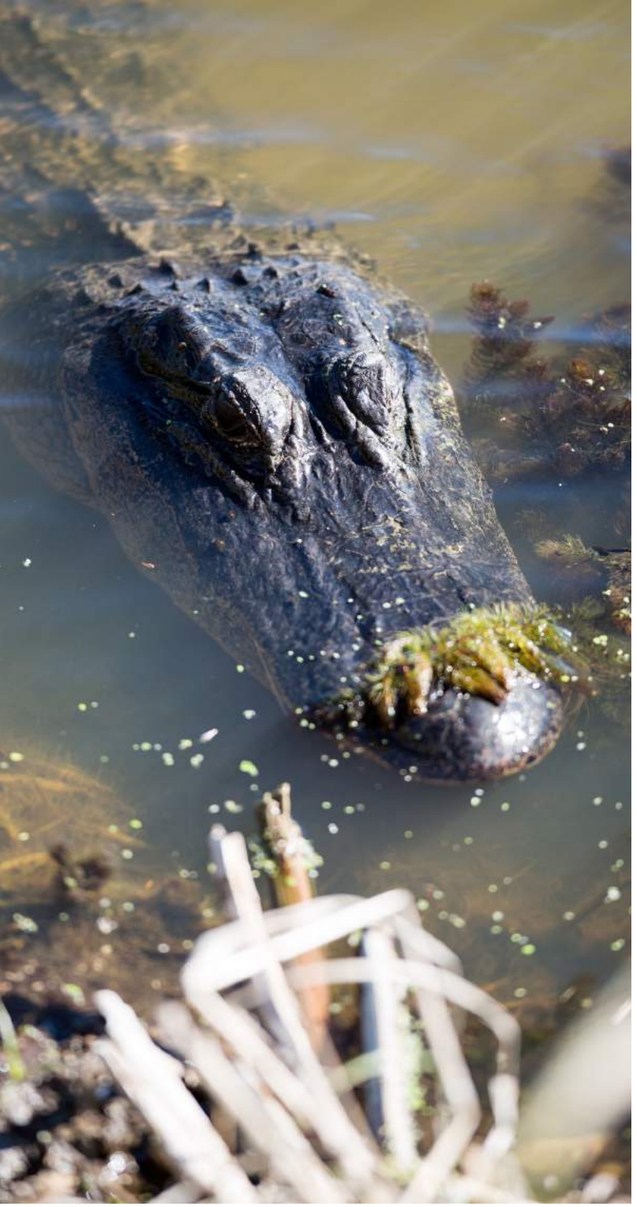


A clear stretch of the Guadalupe River in Central Texas. An application for a permit specifically to protect flows in this river from being diverted proved to be a key motivation for the Texas Texas Legislature enacting SB 3 in 2007.

Where Do We Go From Here?

Most of the energy, focus, and effort around implementation of SB 3 since its adoption has been on the adoption and application of environmental flow standards to new permits. However, the Legislature directed a much more comprehensive approach to flow protection including identifying and implementing affirmative strategies to make some of that previously permitted water—particularly the pre-1985 water rights referenced above—reliably available to help meet environmental flow needs. SB 3 directed stakeholder committees to evaluate options for doing so on a basin-specific level[9] and, directed a newly constituted statewide body, the Environmental Flows Advisory Group, to undertake a review of regulatory and policy options for facilitating water donations and transactions of various kinds.

9 Tex. Water Code § 11.02362 (o).



An alligator in the Aransas National Wildlife Refuge. Freshwater inflows are crucial to forming the unique ecosystems of coastal Texas. Photo: Kaila Drayton, National Wildlife Federation.

"The time is ripe to take advantage of SB 3's built-in adaptive management process to assess what is working, what has been accomplished, and what needs to be adjusted."

However, in the absence of funding or technical support to do the work, that stakeholder committee evaluation, where it was undertaken at all, mostly consisted of generic consideration of types of approaches that might be feasible. For example, the reports developed by some stakeholder committees identified potential strategies to maintain environmental flows including dedication of return flows; donation, purchase, or lease of existing rights; financial support for water conservation measures with some of saved water allocated to flow protection; and consideration of enhancing groundwater contributions. The Environmental Flows Advisory Group, during the relatively brief period when it was meeting, never began its assigned review of options for facilitating donations or transactions. SB 3 also directed the Texas Commission on Environmental Quality (TCEQ) to set aside unappropriated water, where available, to help protect environmental flows as an initial step in helping to meet the environmental flow standards.[10] TCEQ universally declined to do so in adopting the first iteration of flow standards for watersheds flowing to the Texas coast,[11] but did note that it might consider adopting set-asides at a later date.[12]

In the meantime, new perpetual water rights are continuing to be issued with priority dates that likely will be senior to any set asides that might subsequently be adopted.

TCEQ has adopted environmental flow standards for most stream and river basins in Texas.[13] As discussed

10 Tex. Water Code § 11.1471 (a)(2).

11 *See, e.g.*, 37 TexReg 6629, 6644 (Aug. 24, 2012)(presenting the agency's rationale for declining to adopt set-asides in that particular situation).

12 For example, for the Lavaca Basin, in the rulemaking process, the Commission expressly noted its willingness to revisit the issue of establishing set asides as part of the adaptive management process. 37 TexReg 6629, 6652 (Aug. 24, 2012). With respect to the Brazos, Nueces, and Rio Grande basins, the Commission noted in adopting standards it was only determining not to establish set-asides at the current time and was willing to revisit the issue. 39 TexReg 1416, 1429 (Feb. 28, 2014).

13 No environmental flow standards have been adopted for the Canadian, Red, or Sulphur river basins or for the Cypress Creek Basin. Similarly, there are no flow standards applicable to various coastal basins.

Double Mountain Fork Brazos River, a tributary of the Brazos River, in the Llano Estacado region, Fisher County, West Texas. While occasional low levels of flow can serve an important ecological function, many Texas rivers face increasing risk of extended periods of very low flows because of increased diversions coupled with flow standards less protective than science teams recommended.

below, numerous aspects of the current standards do not meet the statutory test requiring that they must be "adequate to protect a sound ecological environment, to the maximum extent reasonable." Fortunately, SB 3 also established an adaptive management process providing for periodic review and potential revision of the adopted standards and of the Work Plans that are to provide, among other things, for identification of affirmative strategies to help meet the adopted standards. The time is ripe to take advantage of that opportunity to assess what is working, what has been accomplished, and what needs to be adjusted. As recognized in SB 3, but not yet meaningfully implemented, a suite of proactive measures, such as environmental flow transactions, placement of existing water rights in the Texas Water Trust to be managed for flow protection,[14] and dedications of return flows, will be required as part of a comprehensive approach for meeting environmental flow needs. Part 2 of this report provides an overview of the environmental flow protection process created in SB 3, including the various players and intended outcomes. Part 3 focuses on key successes in the process of implementing SB 3 so far, with Part 4 focusing on missed opportunities to implement flow protection in a way that realizes the potential of SB 3. Part 5 provides recommendations for a path forward using adaptive management opportunities and legislative adjustments to protect the economic promise and rich natural heritage of all Texans that is embodied in healthy streams, rivers, and estuaries.

14 The Texas Water Trust was created in 1997 as part of the Texas Water Bank. Water rights issued for other uses can be placed in the Trust, converted to environmental flow protection purposes and protected from potential cancellation. Tex. Water Code § 15.7031.

Image: The San Fernando, Santa Gertrudis and Los Olmos streams flow into Baffin Bay

Key Components of Flow Protection in SB 3

The Players and Assigned Roles: Who Was Tasked with Doing What?

ENVIRONMENTAL FLOWS ADVISORY GROUP

The Environmental Flows Advisory Group (EFAG), made up of legislators and state agency representatives,[1] was created to oversee various aspects of the SB 3 environmental flows process, including by establishing geographic boundaries of the bay and basin areas[2] and providing the timeline for development of environmental flow regime recommendations, the work of the stakeholder committees, and the adoption of flow standards and set-asides.[3] In addition, the EFAG was assigned responsibility for appointing the members of the statewide Science Advisory Committee[4] (SAC) and the members of the various Bay and Basin Area Stakeholder Committees (BBASCs) to represent a "fair and equitable balance" of the interest groups in the basin, including those set out in the statute.[5] Another key role assigned to the EFAG was providing a forum for the study and discussion of policy implications and big picture options for protecting environmental flows, including through the administration and enforcement of water rights and the facilitation of water right donations and transactions.[6]

BAY AND BASIN AREA STAKEHOLDER COMMITTEES

The Bay and Basin Area Stakeholder Committees, appointed by the EFAG, were charged with appointing the members of the Bay and Basin Expert Science Team (BBEST) for their individual bay and basin area. In addition, each BBASC was directed to review the science-based environmental flow regime recommendations from the BBEST and, after incorporating other considerations including future needs for water for other uses, develop recommendations regarding environmental flow standards and strategies to meet the standards.[7] The BBASCs were directed to "operate on a consensus basis to the maximum extent possible."[8] Each BBASC was also directed to develop, with the assistance of the relevant BBEST, a work plan establishing a periodic review—to occur at least once every 10 years—of the environmental flow regime recommendations, the environmental flow standards, and the strategies for meeting the flow standards.[9] The work plans also are required to prescribe activities to monitor, study, and validate or refine the environmental flow regime recommendations, flow standards, and strategies.[10]

1 Tex. Water Code § 11.0236 (b). The nine member EFAG is made up of three members of the Senate, appointed by the Lt. Governor; three members of the House, appointed by the Speaker; and three members appointed by the Governor, with one coming from the commissioners of the Texas Commission on Environmental Quality, one from the Texas Parks and Wildlife Commission, and one from the members of the Texas Water Development Board. The House member slots currently are vacant.
2 Tex. Water Code § 11.02362 (a).
3 SB 3 established the timeline for the first two bay and basin areas, Tex. Water Code § 11.02362 (c), and directed the EFAG to flesh out the remaining timelines. Tex. Water Code § 11.02362 (d) and (e).
4 Tex. Water Code § 11.02361 (a).
5 Tex. Water Code § 11.02362 (f).
6 Tex. Water Code § 11.0236 (i).
7 Tex. Water Code § 11.02362 (o).
8 Tex. Water Code § 11.02362 (o).
9 Tex. Water Code § 11.02362 (p)(1).
10 Tex. Water Code § 11.02362 (p)(2).

Senate Bill 3 Flows Process Overview

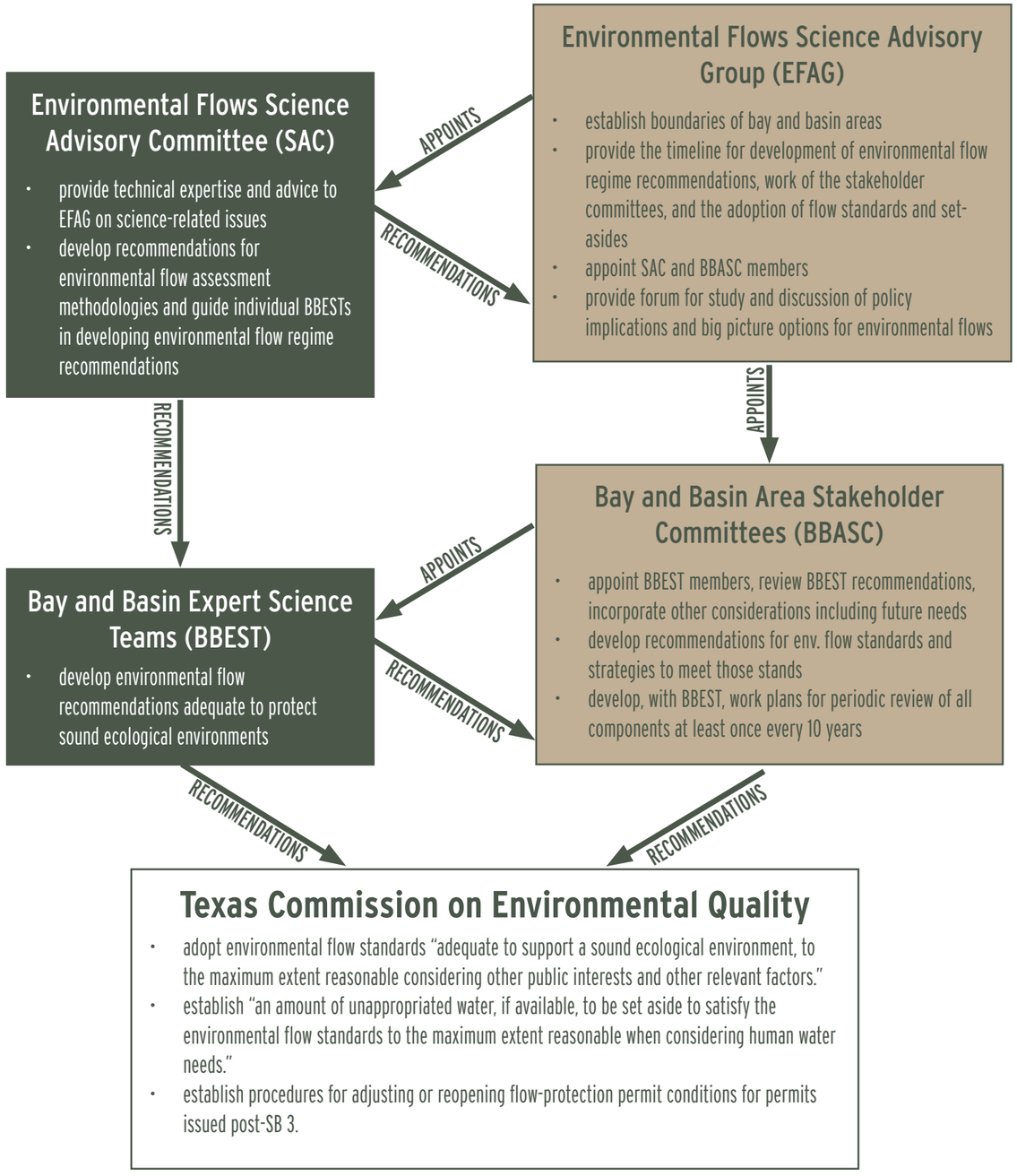


Figure 2. Environmental flows allocation process overview.

BAY AND BASIN EXPERT SCIENCE TEAMS

The Bay and Basin Expert Science Teams were directed to develop, based solely on consideration of the best available science, environmental flow analyses and recommendations for an environmental flow regime the team determined to be adequate to protect a sound ecological environment in aquatic habitats in and along the relevant waterbodies.[11] BBESTs, as appointed by the BBASCs, are required to be made up of "technical experts with special expertise regarding the river basin and bay system or regarding the development of environmental flow regimes."[12] Like the BBASCs, BBESTs were directed to follow a process designed to achieve consensus recommendations.[13] Technical staff from the Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas Water Development Board were directed to assist the BBESTs in that work, but did not participate in a voting capacity.[14]

TEXAS ENVIRONMENTAL FLOWS SCIENCE ADVISORY COMMITTEE

The Texas Environmental Flows Science Advisory Committee (SAC) was established to provide technical expertise and advice to the EFAG on science-related issues and to develop recommendations to guide the overall consideration of environmental flow assessment methodologies and programs and the work of the individual BBESTs in developing environmental flow regime recommendations.[15] Members of the SAC were appointed by the EFAG to provide an objective perspective and technical expertise relevant to evaluation of environmental flow needs.[16] The SAC developed a number of guidance documents intended for use by the BBESTs, as well as memoranda reflecting its reviews of environmental flow regime recommendations developed by the BBESTs.[17]

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

The Texas Commission on Environmental Quality (TCEQ), which is the state agency that grants and administers surface water rights among many other things, was charged with adopting appropriate environmental flow standards "adequate to support a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors."[18] TCEQ is directed to consider a variety of factors in adopting flow standards, including the environmental flow regime recommendations from the relevant BBEST, the BBASC recommendations, economic factors, and competing water needs, and other appropriate information.[19] TCEQ also is directed to establish "an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs."[20] In addition, TCEQ is directed to establish procedures for implementing an adjustment, or reopening, of flow-protection permit conditions for permits and certain types of amendments issued after the effective date of SB 3.[21] Those adjustments allow for making environmental flow special conditions contained in the permit or amendment more stringent if TCEQ determines adjustments to be appropriate to achieve compliance with more protective environmental flow standards adopted after issuance of the permit or amendment.

11 Tex. Water Code § 11.02362 (m). SB 3 defined "environmental flow regime" to mean "a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment and to maintain the productivity, extent, and persistence of key aquatic habitats in and along the affected water bodies." Id. at § 11.002 (16).
12 Tex. Water Code § 11.02362 (i).
13 Tex. Water Code § 11.02362 (m).
14 Tex. Water Code § 11.02362 (k).
15 Tex. Water Code § 11.02361 (e).
16 Tex. Water Code § 11.02361 (b).
17 Those documents are available on the TCEQ website here.
18 Tex. Water Code § 11.1471 (a)(1).
19 Tex. Water Code § 11.1471 (b).
20 Tex. Water Code § 11.1471 (a)(2).
21 Tex. Water Code § 11.1471 (a)(3).

Caddo Lake in East Texas is fed by Big Cypress Bayou, a major tributary of the Red River. The lake was initially formed after a giant mass of downed trees on the Red River caused water to back up into the Big Cypress Bayou. Although the plug was partially cleared in the late 19th century, a dam built in 1914 helped make the lake permanent. Ongoing voluntary efforts to manage releases from an upstream reservoir to benefit the bayou and Caddo Lake are demonstrating the importance of healthy flow regimes. See "Caddo Lake Worth Saving" [video, Caddo Lake Institute] and "Big Cypress Bayou: Enhancing interconnected rivers, lakes, and wetlands" [website, US Army Corps of Engineers].

The Required Outcomes: What Was SB 3 Designed to Accomplish?

ESTABLISHMENT OF ENVIRONMENTAL FLOW SET-ASIDES

SB 3 provides for the adoption of environmental flow set-asides as the foundation for implementation of flow protections. The use of set-asides was established as the replacement for the issuance of environmental flow permits. As noted above, applications for very large water rights specifically to protect environmental flow precipitated the legislative efforts which resulted in the adoption of SB 3. Instead of issuing actual permits to entities seeking to protect environmental flows, a key premise of SB 3 is that the state will "set aside" unappropriated water for that purpose and make it unavailable for permitting for other uses.[22] A set-aside would be similar to reservations of water for environmental flow protection under some other state water right systems.[23] SB 3 explicitly directs TCEQ to "establish an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs."[24] Thus, the only justifiable basis for not establishing a set-aside of at least some amount of unappropriated water is if there is no unappropriated water available at the relevant location. In determining how much of the available unappropriated water to set aside, the legislation directs TCEQ to satisfy the environmental flow standards to the maximum extent reasonable when considering a variety of interests. The legislation provides that water set aside for flow protection may be made temporarily available, under emergency situations, for other essential beneficial uses but only if there are no other practical means for meeting those other uses.[25]

Set-asides were to be assigned priority dates coinciding with the date the relevant bay and basin expert science team conveyed its recommendations for a protective environmental flow regime to TCEQ.[26] Thus, the set-asides were designed to be managed, and protected from impairment, in a manner similar to a non-consumptive water right. Significantly, designation of set-asides would give environmental flows, and especially freshwater inflows, a recognized place in line in terms of priority instead of leaving them relegated to the end of the line, relying on whatever water is left after other uses. The Legislature assigned the Texas Parks and Wildlife Department responsibility to act in the same manner as the holder of a water right in protecting against the unauthorized diversion of water that had been set aside for flow protection. [27]

ADOPTION OF PROTECTIVE FLOW STANDARDS

The Legislature recognized that the amount of unappropriated water available to be set aside for flow protection likely would be inadequate fully to protect a sound ecological environment in many locations.[28] Accordingly, SB 3 directs TCEQ to adopt environmental flow standards to better define what is needed to accomplish the larger goal of environmental protection,

22 See Tex. Water Code § 11.023 (a) expressly noting that appropriations for all uses are limited based on water set aside for environmental flow needs by the commission under Section 11.1471 (a)(2).
23 See, for example, Section AS 46.15.145 of the Alaska Code providing for reservations of water for instream flow protection and Section 85-2-316 of the Montana Code which also includes authority for reservations of water for instream flow protection.
24 Tex. Water Code § 11.1471 (a)(2).
25 Tex. Water Code §§ 5.506 (a-1); 11.148 (a-1).
26 Tex. Water Code § 11.1471 (e). Consistent with the water rights management approach followed in those areas, set asides in the middle and lower Rio Grande would not have been assigned priority dates. Id.
27 Tex. Water Code § 11.0841 (c)(2), (3).
28 Tex. Water Code § 11.0235 (d-3)(2).

"to the maximum extent reasonable considering other public interests and other relevant factors."[29] The Legislature specified that flow standards must consist of a schedule of flow quantities reflecting both seasonal and yearly variations that may vary by location.[30] The flow standards are designed to play multiple roles. One key use is for establishing permit provisions for flow protection to be included in new permits, and in certain permit amendments, issued after the adoption of applicable flow standards. Under the Water Code, permit provisions for environmental flow protection can take many forms, including "pass-through" limits on the diversion or impoundment of water; a quantified-return-flow requirement for water diverted and used, but not consumed, under the permit; and releases from storage.[31] Flow standards also are acknowledged as establishing target levels of environmental flows to be met through affirmative strategies to the extent that the amounts protected through set asides and permit provisions are not adequate to protect a sound ecological environment.[32]

IDENTIFICATION OF AFFIRMATIVE STRATEGIES TO ADDRESS INADEQUATE FLOWS

As noted above in Section 1, most of the reliably available water in Texas rivers and streams was allocated through perpetual water rights issued prior to 1985 and without any consideration of the flows needed to protect healthy stream or bay and estuary ecosystems and the economic benefits they provide. In SB 3, the Legislature acknowledged that problematic legacy and the need for pursuing affirmative strategies—measures beyond what can be accomplished through set asides and permit provisions included in new water rights—to meet environmental flow needs.[33] As part of the SB 3 process, stakeholder committees are directed to recommend, along with environmental flow standards, strategies for meeting the flow standards.[34] However, SB 3 is short on details about how such strategies might be implemented, including how that implementation is to be funded. For example, although the Legislature noted that public and private market approaches would be needed to meet the gap between flow needs and available water, it did not establish any mechanisms for pursuing those approaches.[35] As noted on page 19 above, the Environmental Flows Advisory Group was charged, among other things, with providing a forum for evaluating options for implementing affirmative strategies. Presumably, if that forum had functioned as intended, it would have developed specific recommendations to be considered for further legislative action.

REFINEMENT OF ALL COMPONENTS THROUGH AN ITERATIVE PROCESS: ADAPTIVE MANAGEMENT

The Legislature acknowledged that there is still a lot to be learned about the science of environmental flows,[36] but also recognized the need to move forward quickly in adopting initial set asides and environmental flow standards as perpetual water right permits continue to be granted.[37] Accordingly, SB 3 directs an ongoing revision, or adaptive management, process through which flow protections and the identification of strategies to meet flow standards are to be revised on a periodic basis. Significantly, the Legislature directed that all permits or amendments involving new appropriations approved after the effective date of SB 3 must include permit language allowing the adjustment of permit terms to increase the level of environmental flow protection in order to achieve compliance with environmental flow standards.[38] Through that reopener mechanism, if flow standards are revised to be more protective, the Commission has authority to revisit those post-SB-3 permits to increase protections. Recognizing the need for predictability for holders of water rights, SB 3 includes a limit on the extent of the adjustments: cumulatively, such adjustments can only increase the relevant flow-protection provisions in the permit[39] by 12.5 percent.

Details on the mechanisms for implementation of the adaptive management process, particularly as it relates to the process for developing revised flow standards and for implementing affirmative strategies, are lacking in SB 3. For the initial process of adopting standards for river basins flowing to the Texas coast, the Legislature made funds available to support the work of technical experts and scientists—members of the Science Advisory Committee and the Bay and Basin Expert Science Teams—involved in developing flow regime recommendations considered adequate to protect a sound ecological environment. However, that funding ran out many years ago.

The Legislature has continued to provide funds to the Texas Water Development Board (TWDB) for studies of environmental flow issues. TWDB, with input from the Bay and Basin Area Stakeholder Committees that have remained active, has funded numerous studies intended to help inform revision of the flow standards and, in some basins, studies evaluating potential strategies to help meet standards.[40] In addition, TCEQ, TWDB, and the Texas Parks and Wildlife Department, working with cooperating entities, have continued work on instream flow studies, often referred to as Senate Bill 2 studies.[41] However, the process for converting those various study results into revised recommendations and, ultimately, revised flow standards is only minimally defined and lacks structure and funding.

A whooping crane feeds on a blue crab in the Aransas National Wildlife Refuge. Freshwater inflows from the Guadalupe and San Antonio Rivers create the unique ecosystem that supports the only natural wintering home for the tallest bird in North America. A charter member of the Endangered Species Act of 1973, the whooping crane has slowly recovered from a low of 16 birds in 1941, however its official status remains endangered as of 2021. Photo: Kaila Drayton, NWF.

29 Tex. Water Code § 11.1471 (a)(1).
30 Tex. Water Code § 11.1471 (c).
31 For example, Water Code Section 11.147 (e-1)(1), in defining the limitation on increases in permit conditions imposed pursuant to SB 3, refers to "the amount of the pass-through or release requirement." Section 11.046 (b) of the Water Code authorizes TCEQ to include in a permit a requirement to return a specific amount or percentage of unconsumed water for various purposes, including instream uses or bays and estuaries. Nothing in SB 3 purports to limit that authority.
32 See, e.g., Tex. Water Code § 11.0235 (d-3)(2) acknowledging that other approaches beyond reliance on unappropriated water would be needed to meet environmental flow standards and § 11.1471 (b)(4) directing the Commission to include consideration of affirmative strategies in adopting flow standards.
33 In Section 11.0235 (d-3)(2) of the Water Code, the Legislature acknowledged the need for a variety of market approaches, both public and private, for filling the gap between unappropriated water available for flow protection and satisfaction of the environmental flow standards.
34 Tex. Water Code § 11.02362 (o).
35 Tex. Water Code § 11.0235 (d-3)(2).
36 See Tex. Water Code § 11.0235 (d-2).
37 See Tex. Water Code § 11.0235 (d-4).
38 Tex. Water Code § 11.147 (e-1)(1).
39 In the case of an amendment approved after the effective date of SB 3, as indicated in Water Code Section 11.147 (e-1), the authority to adjust flow protections applies only to the portion of the amendment that authorizes a new appropriation.
40 Although not fully up-to-date, a listing of many of those studies, along with links to study reports, can be found on the Texas Water Development Board website at http://www.twdb.texas.gov/surfacewater/flows/environmental/index.asp.
41 Those studies are ongoing pursuant to Tex. Water Code Section 16.059, which was enacted as part of Senate Bill 2 in 2001. An overview of the SB 2 study process can be found at http://www.twdb.texas.gov/surfacewater/flows/instream/index.asp.

Image: The Devil's River and the Rio Grande flow into Lake Amistad in Southern Texas

WHAT ACTUALLY GOT DONE: KEY SUCCESSES IN SB 3 IMPLEMENTATION SO FAR

RECOGNITION OF THE IMPORTANCE OF PROTECTING INSTREAM FLOWS

A key advancement reflected in most of the environmental flow recommendations and environmental flow standards developed pursuant to SB 3 is the recognition of the importance of protecting an overall, multi-part flow regime for streams and rivers. Prior to SB 3, the typical approach, when flow protection was addressed at all in issuing permits, was to identify a single minimum flow level to be protected. The work of the SAC and the BBESTs, although undertaken in a very compressed timeframe, greatly advanced knowledge and understanding of instream flow and, as discussed in the next section, freshwater inflow needs in Texas. In particular, the use of approaches that apply different levels of flow protections to reflect different hydrological conditions, and corresponding ecological needs, was previously very limited in Texas.[1]

That type of approach acknowledges that aquatic life in Texas streams and rivers has adapted to survive with periods of low flow, even periods when portions of some streambeds may be dry. Accordingly, flow protections during such dry periods, although especially important, can be set at relatively low levels for short periods of time. Conversely, the approach also recognizes that during less dry periods, levels of flow protection should be set higher to support healthy to thriving populations of aquatic organisms. Different species and groups of aquatic organisms do better with different levels of flow. Because of those varying needs, a flow regime that maintains a reasonable subset of natural flow levels, reflecting those natural variations, generally is considered most likely to support healthy aquatic ecosystems over the long-term, where attainable. In some areas, natural flow patterns have become, or are becoming, so disrupted that more managed approaches to make efficient use of the limited volumes of water available for environmental protection during dry periods may be required.[2]

Generally speaking, flow needs vary seasonally and geographically and also based on hydrologic condition. During limited periods of very dry hydrologic conditions, organisms are expected to be able to persist with subsistence flows, the levels of which usually vary by season. Periods of subsistence flows, if not unduly severe or extended compared to natural conditions, can even be beneficial by favoring native species over invasive species and maintaining balanced aquatic communities. However, significant artificial extensions of periods of subsistence flows would be expected to cause serious, even irreversible, harm to aquatic life. Accordingly, outside of those limited periods of subsistence flow, especially during average or wet hydrological conditions, a range of higher baseflows are needed to maintain a sound ecological environment in the relevant river or stream. In addition, short duration, high volume flows in response to rainfall events, commonly referred to as high flow pulses, also perform critical functions, including during drought periods.

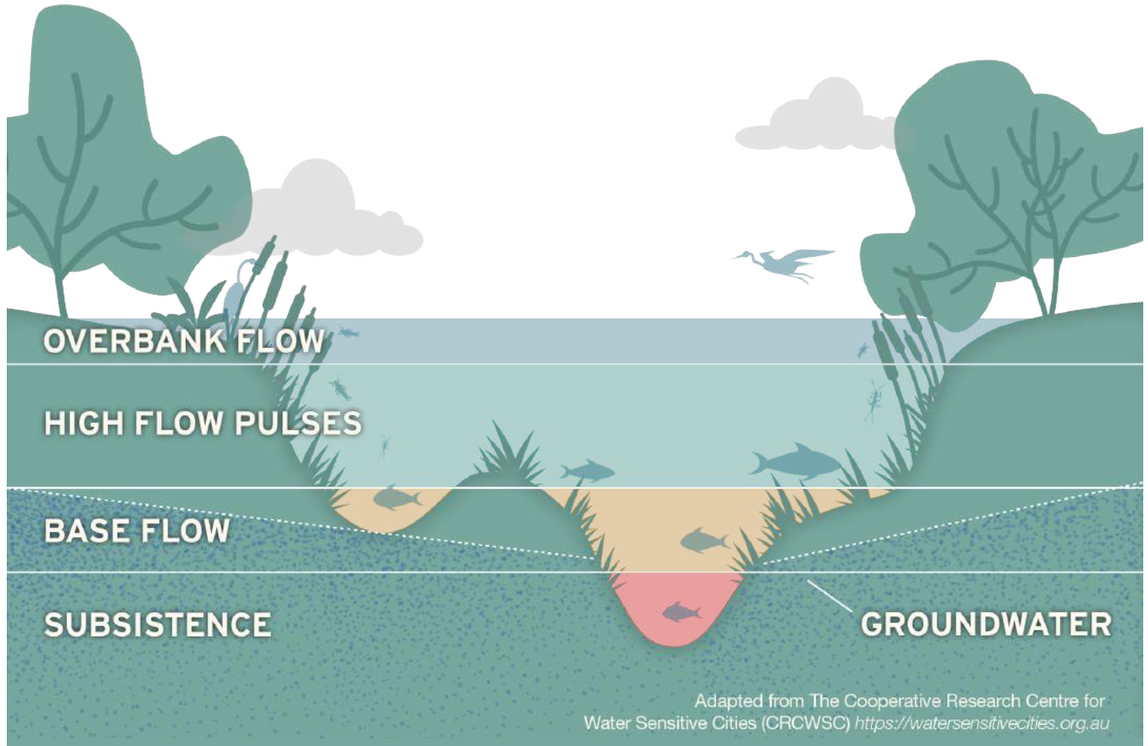
RECOGNITION OF THE NEED FOR ROBUST FRESHWATER INFLOW RECOMMENDATIONS

Compared to instream flow recommendations, there is more variation in the approaches taken by the various BBESTs in developing freshwater inflow recommendations. However, all Bay and Basin Expert Science Teams (BBESTs) assessed the need for specific freshwater inflow recommendations, although not always electing to include specific inflow amounts. Historically, few water rights permits have included permit conditions

1 The leading example of that type of approach in Texas is the Water Management Plan (WMP) developed by the Lower Colorado River Authority to implement the requirements of a 1988 court order entered pursuant to the water rights adjudication process. That WMP, which is subject to periodic adjustment, implements multiple tiers of instream flow and freshwater inflow targets, as well as allocations of "interruptible" supplies for rice irrigation and some other uses, based on storage levels in Lake Buchanan and Lake Travis. Because most of the flow protection provided in the WMP relies on "interruptible" supplies that have very limited availability during drought conditions and that will continue to decline as firm demands for water grow, the WMP process does not ensure flow levels adequate to provide long-term protection for the health and productivity of the Colorado River below Austin or for Matagorda Bay.

2 For these types of managed approaches, infrastructure would be needed to help manage delivery of freshwater inflows at critical times and critical locations. Currently, there is no mechanism for financing the construction or operation of that infrastructure and no water identified or set aside to be managed in that way.

Each Flow Level Serves an Important Ecological Function



Subsistence flows represent extreme low flows that are experienced for short periods during drought conditions. These flows often depend on groundwater and allow fish and wildlife to survive dry periods.

Base flows are normal condition flows. The levels vary by season and between wet and dry years. Base flows support healthy populations of fish and wildlife when supplemented with pulse flows. Base flows both recharge and rely on groundwater at different times.

High flow pulses are short duration flows that occur in response to heavy rains. They connect streams to wetlands and secondary channels, maintain channel structure and riparian vegetation, carry nutrients to streams, and help recharge groundwater.

Overbank flows represent very large pulse flows that overtop the bank and connect the waterway to the floodplain. Overbank flows serve the same functions as other flow pulses but to a greater degree. Some fish species only spawn in the floodplain, relying on water from overbank flows to support that important life stage.

Groundwater is water below the ground that interacts with surface water in streams and rivers to varying degrees. Water moves back and forth between groundwater and surface water under different flow conditions. Groundwater levels can be impacted by groundwater pumping from wells, reduced flows in the river, and increased impervious cover.

Figure 3. Ecological Functions of Flow Levels

designed to protect freshwater inflows to Texas bays and estuaries.[3] Two of the BBESTs concluded that the amount of flow they had recommended for protection of instream flows, if protected all the way to the coast, would be adequate to protect a sound ecological environment—in Sabine Lake and in the Brazos River estuary—without separate freshwater inflow criteria. In recognition of the highly altered flow regimes in the Rio Grande, that BBEST based its inflow recommendations for flows at the mouth of the Rio Grande on levels needed to prevent the mouth of the river from filling with silt, as happened in 2001 cutting the connection between the river and the Gulf of Mexico.[4] Those three estuary systems are relatively small in volume compared to river flow, particularly as compared to other Texas bay and estuary systems. In the case of the Brazos and Rio Grande estuaries, there are no actual bay systems connected directly to the river, only an estuarine portion of the river. Sabine Lake, although representing an actual bay system, has a small volume relative to the annual flow of the Neches and Sabine rivers that feed it.

The other BBESTs recommended specific freshwater inflow criteria, usually stated in terms of a set of seasonal inflow volumes with an associated frequency of occurrence,[5] in addition to instream flow criteria. The sets of seasonal inflow volumes are similar in concept to the varying levels of flows for instream flow protections, with lower volumes of inflow—conceptually comparable to subsistence and dry-condition base flows in the instream flow criteria—that are recommended to be met in almost all future years and with increasing volumes of inflow—conceptually comparable to average and wet-condition base flows and, in some systems, pulses—that are recommended to be met in varying percentages of future years.

THE RAISED PROFILE OF ENVIRONMENTAL FLOW PROTECTION

The water right applications filed to procure permits specifically for environmental flow protection came in response to the longstanding failure of state leadership to recognize the importance to the state's ecological and economic well-being of protecting the flows needed to support healthy rivers and bay and estuary systems. In enacting SB 3, although declining to support issuance of new permits to achieve that protection, the Legislature expressly recognized the need for a proactive response to that important challenge. The level of awareness of the importance of environmental flow protection was raised immensely through the passage of SB 3 and the subsequent implementation efforts to date. However, there also is now a risk that some, particularly those who do not understand how much remains to be done to realize the potential of SB 3, may mistakenly believe or assert that with the adoption of the current environmental flow standards, the challenge of flow protection has been met. As discussed elsewhere in this paper, that is far from true.

> ***"There also is now a risk that some may mistakenly believe with the adoption of the current environmental flow standards, the challenge of flow protection has been met... that is far from true."***

3 As discussed below, with current implementation approaches, the adopted flow standards do not result in actual permit conditions addressing freshwater inflow requirements, which creates several problems.

4 The BBEST report is available on the TCEQ website at BBEST Report (texas.gov). For inflows from the Arroyo Colorado, the BBEST focused on concerns about unnaturally increased inflows, including increased nutrient discharges.

5 For example, the flow standards might provide that at least a certain volume of water should reach the bay during a particular season in at least X% of years going forward. Although the basic concept is straight-forward, effective implementation of that type of approach can be quite challenging because it requires the ability to predict future climate conditions and future levels of water use. The state's water availability models are designed to handle the latter, assuming accurate predictions of future demand are available, but, as currently employed, those models routinely assume a repeat of climate conditions experienced over the last 50 to 60 years.

RECOGNITION OF NECESSITY OF CONSIDERING ENVIRONMENTAL FLOW NEEDS ON A WATERSHED BASIS

Prior to the adoption of environmental flow standards, permit provisions for flow protection, when they were considered at all, were developed entirely on a permit-by-permit basis, often without evaluation of how those individual provisions fit within the broader watershed context. In particular, there was little consideration of how individual reservoir and diversion projects would affect freshwater inflows to coastal waters. And, of course, flows at any particular point in a watershed are affected by operations under all water rights located upstream and by the environmental flow protections, or, in the case of most existing rights, the lack of any such protections, applicable to those upstream water rights. SB 3, at least in concept, is designed to result in environmental flow standards and protection efforts that function on a watershed scale.

ACKNOWLEDGMENT OF THE NEED FOR STRATEGY TARGETS AND ACTIONS TO RESTORE FLOWS

Another major advancement of SB 3 is the legislative recognition of the necessity of implementing affirmative strategies to address the adverse impacts of existing, perpetual water rights issued without consideration of, or protection for, environmental flow needs. That recognition, and the development of a full suite of strategy targets and of viable approaches for implementing strategies to meet those targets, is a prerequisite for actually protecting a sound ecological environment in the state's precious streams, rivers, and bays and estuaries. Unfortunately, despite the legislative recognition of the importance of flow-protection strategies, the adopted flow standards include explicit strategy targets only for three bay and basin areas—the Colorado/Lavaca, the Guadalupe/San Antonio, and the Nueces/Corpus Christi[6]—and, even for those areas, the strategy targets solely address freshwater inflows to coastal waters.[7] Many of the Bay and Basin Area Stakeholder Committees (BBASCs) did undertake varying levels of consideration of potential strategy approaches that might be used to address inadequate flows, but, without dedicated funding to support analyses and facing a tight timeframe for recommending flow standards, those BBASCs generally were only able to compile lists of potential approaches.[8] Regardless, it is quite significant that the concept of a coordinated approach for identification and implementation of affirmative strategies has been acknowledged, including by explicitly incorporating some strategy targets into flow standards. The adaptive management process of SB 3, if rigorously pursued, provides a critical opportunity for making real progress in protecting streams, rivers, and estuaries through implementation of affirmative strategies.

6 See 30 TAC §§ 298.330 (a)(2)(figure), which includes columns with strategy targets for Matagorda Bay inflow; 298.330 (c) (figure), which includes a column with strategy targets for Lavaca Bay inflow; 298.380 (a)(3)(figure), which includes a column with strategy target frequencies for San Antonio Bay System for the spring season; and 298.380 (a)(4)(figure), which includes a column with strategy target frequencies for San Antonio Bay System for the summer season. Those adopted flow standards also include a strategy target applicable specifically to combined inflows to Mission and Aransas Bays, but it only addresses rare high flow periods, with a target frequency of being meet in at least 2% of future years. 30 TAC § 298.380 (a)(5)(figure). See also, 30 TAC § 298.430 (a)(3)(figure) incorporating seasonal target frequencies associated with identified inflow volumes to the Nueces Bay delta. As defined in Section 298.405 (9), those target frequencies are used solely for informing voluntary strategies.

7 Although the flow regime recommendations for the Lower Rio Grande and the Laguna Madre are not phrased as strategy targets, the reality that existing levels of appropriation exceed water availability means, in practical effect, that the recommendations likely could only be implemented through affirmative strategies.

8 See the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Area Stakeholders Committee Recommendations Report (Sept. 1, 2011) at p. 129 and Appendix H; the Colorado and Lavaca Basin and Bay Area Stakeholder Committee Environmental Flows Recommendation Report (Aug. 2011) at p. 129; the Nueces River and Corpus Christi and Baffin Bay Basin and Bay Area Stakeholder Committee Environmental Flow Standards and Strategies Recommendations Report (Aug. 22, 2012) at p. 97; and the Brazos River And Associated Bay And Estuary System Basin And Bay Area Stakeholders Committee Environmental Flow Standards And Strategies Recommendations Report (9/7/2012) at p. 48.

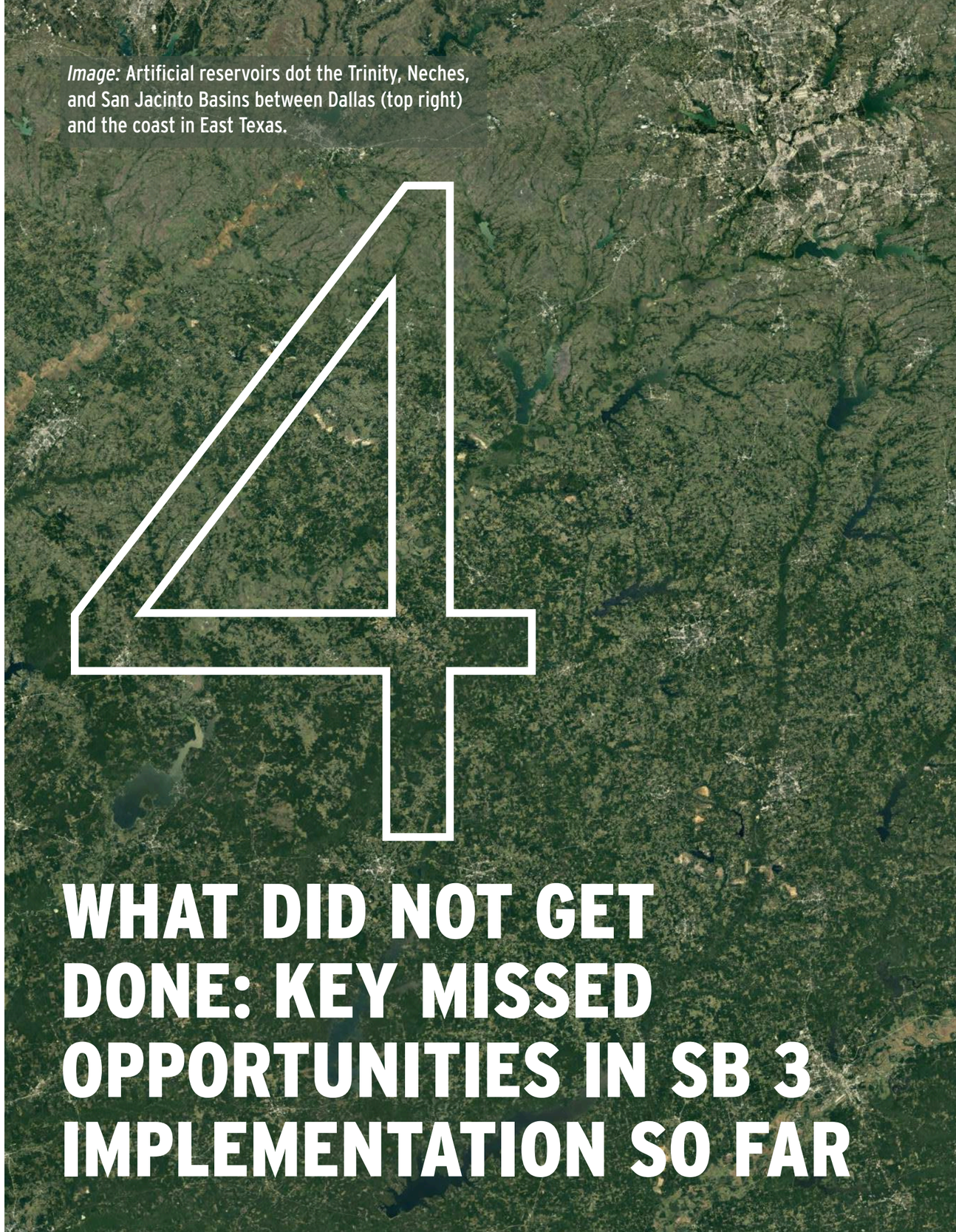


Image: Artificial reservoirs dot the Trinity, Neches, and San Jacinto Basins between Dallas (top right) and the coast in East Texas.

WHAT DID NOT GET DONE: KEY MISSED OPPORTUNITIES IN SB 3 IMPLEMENTATION SO FAR

Incomplete Implementation by TCEQ of Statutory Directives

The push to adopt environmental flow standards was a massive undertaking with a very aggressive timetable. TCEQ came up short in many ways in implementing its directives under SB 3, which, unquestionably, presented significant challenges. The Water Availability Division of TCEQ has a small staff and 2011, when the first standards were adopted, was also the worst drought year in recorded history for much of the state. The challenges for TCEQ in administering water rights increase greatly during periods of serious drought. In addition, because of the tight timeframes for developing recommendations and likely for other reasons, few BBASCs developed specific recommendations for strategy targets for consideration by TCEQ and none addressed specific recommendations for set-asides. Regardless of the cause of those shortcomings in implementation to this point, it is critically important to acknowledge them and ensure they are addressed moving forward through adaptive management.

FAILURE OF TCEQ TO ESTABLISH ANY SET-ASIDES

The establishment of set asides of unappropriated water for environmental flow protection is a key component of the basic concept behind SB 3. The Legislature provided that new permits to appropriate water for environmental flow protection, like the one the San Marcos River Foundation applied for, would not be issued but, in their place, reasonable amounts of unappropriated water would be set aside for that purpose and made unavailable for appropriation for other uses. In addition, recognizing that such set-asides alone likely would be insufficient to protect a level of environmental flows adequate to support a sound ecological environment, SB 3 also provides for inclusion of flow-protection permit provisions in new water rights permits issued and for the implementation of affirmative strategies. Despite the Legislature's express directive to TCEQ to establish set-asides,[1] the agency has declined, to date, to set aside a single drop of water for flow protection even as new permits to appropriate previously unappropriated water for other uses continue to be issued. That is a serious shortcoming.

As the flow standards currently are structured, the absence of set-asides is most glaringly problematic for our precious bays and estuaries, which are deprived of enforceable flow protections. For instream flow protection, the flow standards are being implemented through permit provisions designed to restrict diversions on a real-time basis. Those provisions require that unless the requisite flows are allowed to pass-through and flow downstream, impoundment or diversion pursuant to new permits is not allowed.[2] As discussed below, there are significant shortcomings with many of the adopted flow standards for instream flows and with implementation of those standards, but at least the instream flow aspects of the standards result in permit provisions that limit reductions in instream flow levels on an ongoing, and enforceable, basis. Unfortunately, those instream flow levels are not protected all the way to the coast to provide freshwater inflows and generally are not designed to maintain healthy conditions in bay systems, even if they were fully protected.

> ***"Despite the Legislature's express directive to TCEQ to establish set-asides, the agency has declined to set aside a single drop of water for flow protection even as new permits to appropriate previously unappropriated water for other uses continue to be issued. That is a serious shortcoming."***

A man on the US side of the Rio Grande River gazes down on a party of canoes traveling the river. Tourism is a major economic driver in the Big Bend region, but low flow levels now consistently threaten the viability of overnight river tours in the area.

By contrast, freshwater inflow protection, for those bays and estuaries that have separate freshwater inflow criteria, is being implemented in the adopted flow standards solely through a long-term modeling exercise.[3] If the modeling, which is undertaken before a permit is granted, predicts that the freshwater inflow criteria in the flow standards would be met with the full exercise of the new permit, along with all existing permits, then the permit will be issued.[4] That modeling assumes a repeat of historical climate conditions. Permits subject

1 Section 11.1471 (a)(2) of the Water Code directs the Commission to "establish an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs." Under that language, a set-aside is not required if no unappropriated water is available. However, when it is available, water must be set aside to the maximum extent reasonable.

2 Even in the absence of set-asides, because compliance with permit provisions for instream flow protection is a prerequisite to diversion or impoundment on a real-time basis and because other water rights that are junior in priority are not allowed to impair the ability of senior rights to divert, reasonable instream flow protection can be achieved, if the standards are implemented effectively.

3 Although somewhat variable, for most basins the modeling period-of-record used during the initial round of standards setting was from around 1940 to 1990 or 2000. In terms of climate patterns, that is a very short period-of-time and certainly not reflective of the continuing impacts of climate change.

4 The Commission's approach to implementation of inflow standards is described in Section 6 of the Draft Senate Bill 3 Permitting Guidelines, Water Availability Division, TCEQ, at pp. 6-9 (Section 6.0 Bay and Estuary Evaluation), available at revised_draft_sb3_implementation_guidelines.pdf (texas.gov).

Texas rivers are home to more than 50 species of freshwater mussels. A foundational layer of the food pyramid and a critical provider of ecosystem services, mussels are vulnerable to highly altered flow regimes and many species are now in rapid decline. 11 species in Texas are under consideration for listing under the Endangered Species Act.

to the flow standards are issued without any provisions specifically to protect freshwater inflows. If, in the real world with actual climate impacts instead of the no-change assumption employed in model predictions (model world), no flow was to reach the bay downstream of the new permit, that would still constitute compliance with the flow standards and nothing in the permit would limit diversion or impoundment to protect bay inflows. As a result, there is no mechanism to ensure real-world protection for bay health. New permits for any other use, regardless of when they are issued always have real-world priority over bay inflows because the permits for those uses have enforceable priority dates and bay inflows do not. That is in direct conflict with the directives of SB 3 for establishing environmental flow set-asides. Environmental flow set asides were to have priority dates entitling them to real-time and real-world protection and seniority over new water rights for other uses.

The freshwater inflow standards for Galveston Bay provide a useful example. Those standards do not include any inflow criteria for the driest 25% of future years.[5] Even if the modeling for a proposed new permit predicts, based on an assumed repeat of historical climate, near-zero inflows to Galveston Bay in one-fourth of future years, that would constitute compliance with the adopted inflow standards, allowing the permit to be granted. Add in the effects of climate change, which the model ignores, and the percent of future zero inflow, or, more realistically, near-zero inflow, years could go even higher. Because there are no set-asides and no permit provisions protecting freshwater inflows, there is no mechanism for real-world protection of inflows. Not even a total cessation of inflows to the bay for years at a time would represent a violation or prevent issuance of additional permits. In the absence of set-asides, there is no mechanism to protect from diversion the inflow to the bay from periodic rainfall events that are likely to occur even during future dry years. Every permit, regardless of priority date, has an enforceable right to claim some of that water, but, without a set aside, the bay has none.

That approach is inconsistent with the explicit legislative directive in SB 3 for establishing set-asides to protect environmental flows. The Legislature directed that set asides must be assigned a priority date and protected against impairment by new water rights, with those newer rights being junior in priority to the set-aside.[6] Instead, under the current implementation approach, with no set-asides and no permit conditions to protect bay inflows, the entire risk of reduced water availability in the future, including from climate change,[7] falls on the bay and, by extension, on the people, businesses, and the fish and wildlife relying upon healthy and productive coastal waters.[8] Unfortunately, contrary to the Legislative directive in SB 3, water for freshwater inflows remains last in line in terms of legal protection.

FAILURE OF TCEQ TO SET FLOW STANDARDS AT LEVELS REASONABLY CALCULATED TO SUPPORT A SOUND ECOLOGICAL ENVIRONMENT, ESPECIALLY OVER THE LONG-TERM

The flow standards adopted by the Commission, with only rare exceptions, protect less flow than the levels identified by the respective Bay and Basin Expert Science Teams (BBESTs) as being adequate to protect a sound ecological environment. The Legislature directed the Commission to adopt flow standards "that are adequate to protect a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors…."[9] That means the Legislature did give the Commission authority to protect lower levels of flow than would be adequate

"Even if the modeling for a proposed new permit predicts near-zero inflows to Galveston Bay in one-fourth of future years, that would constitute compliance with the adopted inflow standards."

to protect a sound ecological environment, but only upon a demonstration, undertaken through a balancing of competing interests, that the Commission was providing the maximum level of protection that is reasonable. Although the Commission chose to adopt flow standards at levels below, and often far below, what the respective BBESTs identified as adequate to protect a sound ecological environment, the Commission did not provide a justification for its decisions, never acknowledging the trade-offs it was making.

The inadequacy of the adopted flow standards often is not obvious because of the way the standards are constructed. For example, with the exception of inflows to Galveston Bay from the Trinity and San Jacinto Rivers, the adopted flow standards do not list the attainment frequencies for freshwater inflows that are applied in reviewing applications for new permits. Those attainment frequencies play a critical role in determining the protectiveness of the standards. As discussed immediately below and in Appendix A, the attainment frequencies used in the permitting process are derived from the Commission's water availability models

5 30 TAC § 298.225 (a). The table found in the rule indicates volumes and associated frequencies of attainment. The highest attainment listed in the table is 75%, meaning the associated volumes are to be attained in 75% of years as predicted in the modeling exercise. That leaves 25% of years without any inflow target or minimum inflow amount. For the seasonal volumes, the highest attainment frequency is 60%, leaving 40% of years without any seasonal inflow targets. In addition, for inflows from the Trinity Basin, there are no target frequencies at all for the Fall season.

6 Senate Bill 3 directed that set asides would be assigned a specific priority date and gave the Texas Parks and Wildlife Department the role of asserting that priority, in the same manner as a holder of a water right, if the protected inflow amounts were being diverted under water rights with a junior priority. The priority date is established as the date the relevant BBEST provided its environmental flow regime recommendations to the Commission. Priority dates do not apply for the middle and lower Rio Grande areas, which operate on a court-developed equitable allocation system. Tex. Water Code § 11.1471 (e). The authority of the Parks and Wildlife Department to enforce set-asides is granted by Water Code sections 11.0841 (c)(2, 3).

7 That modeling generally also fails to predict the impacts of future groundwater pumping because, with only very limited exceptions, it assumes historical relationships between groundwater and surface water will continue unchanged. As a result, where increased groundwater pumping reduces the contribution of future springflows or seeps below historical levels, the modeling also will predict greater surface water flow than will be available. Just as for climate change, which also may reduce groundwater recharge resulting in reduced flow from springs or seeps, under the current TCEQ approach, the full risk of those impacts falls on freshwater inflows contrary to legislative direction for set-asides.

8 In recognition of that intended prioritization, the Legislature did provide a safety valve, in the form of an emergency suspension option, to ensure that set asides would not unduly result in putting the environment ahead of other critical human water needs. SB 3 makes set-asides and environmental flow conditions subject to suspension during emergency conditions if suspension is shown to be necessary to meet essential human needs. See Tex. Water Code §§ 5.506 (a-1), 11.148 (a-1). Those statutes allow for suspending set-asides only to meet "other essential beneficial uses" of water and only under emergency conditions that "cannot practically be resolved in other ways." Thus, such suspensions are intended to be very rare events requiring strong justification.

9 Tex. Water Code § 11.1471 (a)(1).

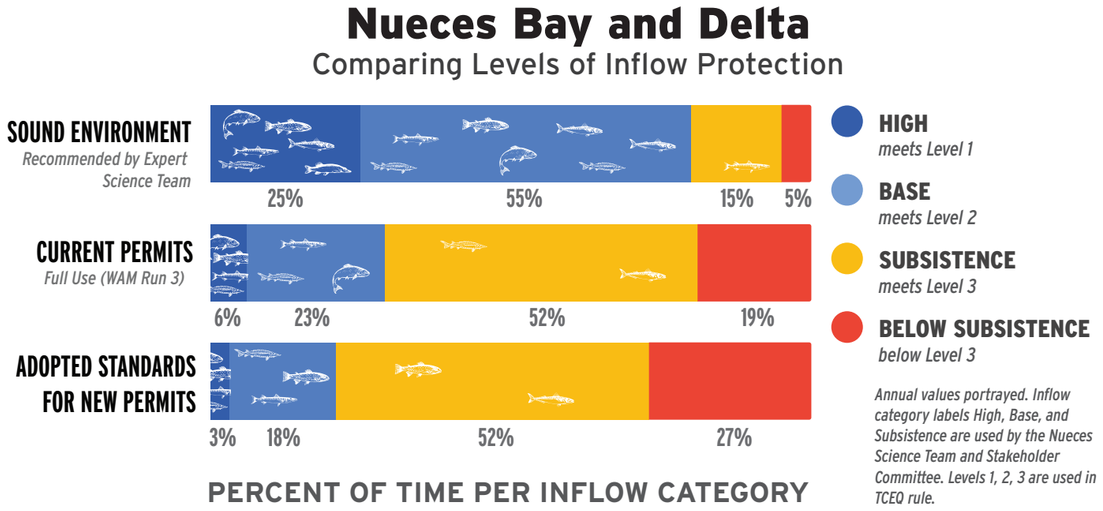


Figure 4 - The BBEST recommended an inflow regime adequate to protect a sound ecological environment with different inflow levels to be met in a percentage of future years. For example, the BBEST recommends meeting high seasonal inflows (very good conditions) in 25% of future years and base seasonal inflows (good conditions) in 55% of future years. The "current permits" bar shows predicted percentages from the water availability model with all existing water rights fully used. The adopted flow standards bar shows what can be authorized under the standards governing new permits.[1] The contrast is stark: the BBEST indicates 80% of years should be at high or base levels, with only 20% of years at or below subsistence, and the flow standards allow issuing permits until that combination of high or base falls to only 21% of years, with 79% of years at or below subsistence.

1 The values come from running the state's water availability model to calculate the current permits level and applying the percentage reductions described in 30 TAC §298.430 (a)(3)(A)-(C) of the standards to the calculated values.

and deviate dramatically from the levels the BBESTs identified as adequate to protect a sound ecological environment. The flow standards for Matagorda, Lavaca, San Antonio, and Nueces bays do list strategy or target frequencies, but they are applied solely to inform efforts to pursue affirmative strategies for improving protection levels.

Inadequately protective flow standards for freshwater inflows—bays and estuaries

Specific standards for freshwater inflows, although varying from one bay system to another, generally establish volumes of inflow by season with associated frequencies of occurrence indicating how frequently inflows of at least the indicated volume should reach the estuary in future seasons and years.[10] The adopted freshwater inflow standards, as they apply to new permits,[11] generally fall short of being adequately protective primarily because they provide for the protected volumes to reach the estuary at an attainment frequency (for example, an identified percentage of future years and seasons when inflows must meet the recommended volumes) far below the attainment frequencies identified by the relevant BBESTs as adequate to protect a sound ecological environment.

The adopted inflow standards are not sufficiently protective. As discussed on page 32, the freshwater inflow standards for Galveston Bay would be satisfied even if the bay were predicted to receive zero inflows in one out of every four years in the future. TCEQ did not provide any information indicating that a sound ecological environment could be supported in Galveston Bay with such a low level of inflows. Instead, it appears the attainment frequencies protected in the adopted standards were developed based on using the state's water availability models (WAMs) to determine the frequencies with which the various volumes were predicted to occur if all existing water rights were fully exercised. Generally, those frequencies were adjusted to be less protective than those predictions in order to accommodate issuance of new permits. Although that likely would be a logical approach for quantifying a set-aside of unappropriated flow, it falls seriously short of satisfying the statutory standard for justifying environmental flow standards, which are intended to be met through a combination of set-asides, permit conditions on new permits, and affirmative strategies.

One way to provide some context for understanding the inadequacy of those protected levels to maintain a sound ecological environment is by comparing them to what the relevant bay system has experienced historically.[12]

"Under the current implementation approach, the entire risk of reduced water availability in the future, including from climate change, falls on the bay and, by extension, on the people, businesses, and the fish and wildlife relying upon healthy and productive coastal waters."

Under the adopted flow standards for Galveston Bay, at least 1,357,133 acre-feet of water must be predicted to flow into Galveston Bay from the Trinity River in at least 75% of future years based on modeling using the WAM.[13] As discussed above, there is no minimum inflow amount for the remaining 25% of years, meaning an annual inflow of 0 acre-feet or anything above 0 in 25% of future years would comply. That is also true for inflows from the San Jacinto River, which also provides significant inflow to the bay. In up to 25% of future years, inflows from that river also could be 0 acre-feet or anything above.[14] During 1941-1990, the lowest annual inflow to Galveston Bay from those two rivers was about 1,475,000 acre-feet.[15] That means annual inflows as low as 1,475,000 from the two rivers have been extremely rare events and, when it did happen, populations of aquatic life have had ample time to recover before again experiencing such stressful conditions.

Under the adopted standards, those incredibly low inflows, and much lower, would be allowed to occur, on average, 1 out of every 4 years. Thus, an extremely rare event from which the bay was able to recover would be

10 Approaches for inflow recommendations vary from one basin to another because individual BBESTs took somewhat different approaches and had differing levels of information available to inform the recommendations. The flow standards adopted by TCEQ generally follow a similar organizational approach to that recommended by the respective BBESTs, however the levels of protection in the standards are much lower than the BBEST recommendations.

11 For three basin and bay systems, the adopted standards for freshwater inflows also include a component that is used solely to inform use of affirmative strategies to improve inflow levels. Those attainment frequencies for "strategy targets" are not used in assessing applications for new water rights.

12 Because the approach taken by the Commission in adopting freshwater inflow standards differs greatly from the approach recommended by the BBEST, a comparison of those recommendations is not feasible.

13 That application of the WAM assumes full exercise of existing water rights along with any new water right under review with no return flows that are not mandated by the applicable permit. The standards also include seasonal quantities and attainment frequencies as well as larger inflow quantities that must be predicted to be met in lower percentages of years. For example, 2,816,532 acre-feet must be predicted to flow into Galveston Bay from the Trinity River in at least 50% of years. See 30 TAC § 298.225 (a).

14 The comparable values for inflow from the San Jacinto River are at least 703,699 acre-feet must be predicted to flow into the bay in at least 75% of future years under the standards. 30 TAC § 298.225 (a). There are higher volumes that must be met in a lower percentage of years, but no minimum inflow requirements for the other 25% of years.

15 The lowest total inflow to the bay during the period was 1.8 million acre-feet and, on average, 54% of inflow comes from the Trinity River, 28% from the San Jacinto River, and 18% from smaller coastal drainages. See Trinity and San Jacinto and Galveston Bay Basin and Bay Expert Science Team Environmental Flows Recommendations Report (Nov. 20, 2009) at p. 129 and p. 154. Eighty two percent (54 + 28) of 1.8 million is 1,476,000.

A check dam slows the flow of the San Gabriel River, a tributary of the Brazos River, one of the few major river basins in Texas that does not connect to a bay system (it does, however, have an estuarine section).

allowed to become a much more frequent occurrence under the adopted standards, with a highly uncertain likelihood for recovery and persistence of bay health. In addition, the seasonal timing of inflows is critically important and, although the adopted flow standards do include seasonal components for most seasons, the lowest volumes of seasonal inflows are protected in only 60% of future years, meaning, in almost half of future years, there are no seasonal minimum inflow requirements.

Another example of inadequate protection is that one component of the BBEST recommendation for inflows to San Antonio Bay indicates that in order to support a sound ecological environment, inflows less than 50,000 acre-feet during the July-September period should not occur in more than 6% of future years. By comparison, the flow standards TCEQ adopted for use in reviewing permit applications would allow inflows to fall that low in over 22% of years.[16] That is a troubling picture.

It is true, as Commission staff sometimes asserts in discussing the adopted flow standards, that the WAM analysis assumes full use of existing rights and most water rights currently are not being fully used. However, that provides little solace. Water use is growing and, as indicated in the Texas Water Plan, is projected to increase dramatically by 2070.[17] The flow standards are being applied to evaluate the impacts of, and develop flow protections to be included in, perpetual permits that authorize full use and consumption of the water. There is only limited potential to increase the flow protections being included in new permits through the SB 3 adaptive management process and, as discussed on page 42, unless the Commission changes its approach, even those limited adjustments are unavailable specifically to improve freshwater inflow protections.

As another example, illustrated in Figure 3, the adopted inflow standards for Nueces Bay provide far less protection than the levels identified by the relevant BBEST as being adequate to protect a sound ecological environment.

Although directed to protect a sound ecological environment to the maximum extent reasonable in adopting environmental flow standards, the Commission was directed to consider other factors in making that determination.[18] A key factor considered was the impact on availability of water for new water rights. In discussing its rationale for the adopted standards in the Trinity River, the Commission referred to the water availability analysis it undertook indicating it "found that there would be no significant impact from implementation of the adopted standards."[19] Similarly, in describing the impact of the standards for protection of San Antonio Bay inflows, the Commission noted: "The Executive Director applied the proposed standards for San Antonio Bay and found that application of the standards, as proposed in the rule, did not impact water availability for the scenario."[20] The absence of an impact on water availability undercuts any argument that the adoption of greater levels of protection, closer to the levels the BBEST recommended as being adequate to protect a sound ecological environment, was not reasonable.

Deficiencies in flow standards for instream flows (i.e., rivers and streams)

Although the instream flow components of the flow standards are less glaringly inadequate than the freshwater inflow protections, many aspects also fall seriously short of protecting flows adequate to protect a sound ecological environment. Again, the Commission did not provide justification for setting protections below the levels identified by the Bay and Basin Expert Science Teams as adequate to protect a sound ecological environment.[21] Key deficiencies in the instream flow components of the adopted standards, many of which are covered in more detail in Appendix A, include:

- the protection of far fewer pulse flow events than recommended by the relevant BBESTs as being adequate to protect a sound ecological environment;
- the failure in many basins[22] to protect higher levels of base flows identified by the relevant BBEST as important to support thriving populations of aquatic life during average or wet hydrological conditions;
- the failure, especially in the Sabine, Neches, Trinity, and San Jacinto basins,[23] to include reasonable approaches for transitioning between protecting subsistence-level flows—flows designed to support

16 That example and others are discussed in more detail in Appendix A.
17 The 2017 State Water Plan, published by the Texas Water Development Board, projects that total water demand will increase 17 percent from 18,407,000 acre-feet in 2020 to 21,598,000 acre-feet in 2070. Page 52, Table 5.2.
18 Tex. Water Code § 11.1471 (a)(1).
19 See 36 TexReg 2908, 2952 (May 6, 2011).
20 See 37 TexReg 2521, 2529 (Apr. 13, 2012).
21 For example, for flow standards for the Trinity and San Jacinto Rivers and Galveston Bay, the Commission rejected comments requesting protection of additional pulse flows under certain hydrological conditions, consistent with recommendations of the majority of the BBEST. In doing so, it referenced the use of the WAM noting: "Commission staff used the WAM to determine the impact of the proposed standards on a future water use scenario and found that there would be no significant impact from implementation of the adopted standards." 36 TexReg 2908, 2952 (May 6, 2011). It is hard to understand how the absence of any significant impact on water availability from the standards the Commission chose to adopt can be construed to support a refusal to incorporate additional flow protections into those standards. TCEQ's directive is to protect a sound ecological environment to the maximum extent reasonable and that analysis indicates that greater protection is reasonable.
22 That failure to protect higher levels of baseflows, which were recommended for protection in the BBEST science-based recommendations, occurs throughout the Sabine, Neches, Trinity, San Jacinto, and Nueces river basins and in a portion of the Guadalupe River basin.
23 Although flow standards for the Nueces basin and a portion of the Guadalupe Basin also include a similar approach of basing protection levels in new permits solely on the flow remaining in the stream after diversion or impoundment, those flow standards include additional measures designed to ameliorate the impacts somewhat. In the four listed basins, whenever flow is even slightly below the baseflow level, protection in permits subject to the standards falls all the way down to the subsistence level. In the Nueces and Guadalupe basins, approaches, such as the 50% limit, are incorporated to make the loss of flow protection more gradual. This issue is discussed in greater detail in Appendix A.

short-term survival—and protecting base-flow-level flows—flows designed to support longer-term healthy populations of aquatic life—resulting in less flow protection precisely when fish and wildlife need more protection: when diversion or impoundment under existing water rights lacking any flow protection provisions causes artificially low flow levels, which put fish and wildlife at serious risk, the flow standards for those basins also provide less flow protection under new permits, further increasing threats to fish and wildlife at those critical times;

- the failure to incorporate any type of flow-protection provision other than a pass-through requirement even though the Commission has authority to include additional types of provisions such as releases from storage and quantified return-flow requirements.

Lack of flow standards establishing strategy targets

Under SB 3, flow standards are intended to serve two primary purposes: defining flow-protection provisions applicable to new permits and establishing target levels of flows to be achieved through implementation of affirmative strategies.[24] In general terms, flow-protection provisions, although potentially taking multiple forms, are designed to limit the adverse effects of flow reductions resulting from new permits. Affirmative strategies, on the other hand, represent proactive measures to be undertaken to remedy flow reductions caused by the exercise of existing perpetual permits, most of which were issued with little or no provision for environmental flow protection. If the state were starting from scratch, without those older permits that have the first claim to water during dry periods but lack flow protection provisions, a single set of flow standards could be established limiting diversion and impoundment to maintain a sound ecological environment.

Because of the need to recognize those existing permits and because of the trade-offs the Commission made in adopting flow standards between flow protections and limiting constraints on the issuance of new permits, it is essential also to have components of the standards that define flow levels adequate to support a sound ecological environment for the purpose of establishing strategy targets.[25] Without a clear acknowledgment of the level of flows actually expected to protect a sound ecological environment, as reflected in strategy targets, there is a huge risk that the adoption of flow standards for permitting will be perceived, or portrayed, as somehow ensuring sufficient flow to fully protect a sound ecological environment. The adopted standards, with the exception of the few strategy targets included for bay inflows, do not come close to achieving that level of protection, particularly over the long-term as permits are more fully used, which makes any such perception or portrayal a very misleading picture of the status of flow protection in Texas.[26] In reality, the standards were set below protective levels because of other considerations primarily related to ready availability of water for new permits.

A full set of strategy targets, that define flow levels expected to protect a sound ecological environment and that can be used to prioritize when affirmative strategies should be pursued, are needed for all streams, rivers, and bay systems. Unfortunately, with very limited exceptions,[27] those strategy targets, along with a clear acknowledgment of what flow levels actually would be expected to protect a sound ecological environment, are missing from the adopted standards. The current flow standards only include strategy targets for freshwater inflows to Matagorda, Lavaca, Nueces, and San Antonio bays, and to a lesser extent, Mission and Aransas bays, with none for the other bay or estuary systems or for instream flows anywhere in the state.

For instream flows, a critical contribution of strategy targets would be defining how often, and for how long, flows can remain below designated base flow levels without causing unacceptable ecological damage. Although the current standards identify subsistence flow levels that operations under new permits should never cause flows to drop below, the standards lack criteria for determining how often, or for how long, flows can drop that low before a sound ecological environment is put at risk. That is a critical role the strategy-target component of flow standards is intended to address in order to inform efforts to restore flow. Similarly, for flow regimes with multiple levels of base flows, criteria are lacking for informing how often and for how long flows can remain at or below the dry base flow level or, conversely, how frequently and for how long flows should be at wet/high baseflow levels.[28]

A yellow-crowned night-heron in the Aransas National Wildlife Refuge. In addition to abundant fish species, the estuaries of the Texas Mid-Coast are home to a stunning array of bird life. Photo: Kaila Drayton, NWF.

24 See Footnote 33 on page 24endnote xlviii above.

25 It is difficult to imagine any justification that would support adoption of strategy targets below the levels understood to be adequate to support a sound ecological environment. And, in the limited instances where TCEQ did incorporate strategy targets for freshwater inflows, it set them at the levels identified by the relevant BBESTs as being adequate to achieve that result.

26 Unfortunately, the position being taken by TCEQ staff in permitting proceedings contributes to that misunderstanding. For example, in the hearing on the application by the Guadalupe-Blanco River Authority for Permit No. 12378, in objecting to prefiled testimony, the Executive Director, referring to the standards applied in permitting, asserted: "These standards are considered by rule to be adequate to support a sound ecological environment." In The Matter of the Appl. of the Guadalupe-Blanco River Authority for New Water Use Permit No. 12378, SOAH Docket No. 582-15-2477, TCEQ Docket No. 2014-1658-WR, The Executive Director's Objections To Prefiled Testimony, at p. 2. No language in the actual rules supports that statement.

27 As discussed on page 40, TCEQ did adopt flow standards that define strategy targets for freshwater inflows for Matagorda Bay, Lavaca Bay, Nueces Bay, San Antonio Bay, and, by extension, Mission and Aransas Bays. Those strategy targets represent the inflow levels the relevant BBEST identified as being adequate to support a sound ecological environment. However, those standards for San Antonio Bay and Mission and Aransas Bays are not comprehensive. The BBEST recommendations are somewhat incomplete because the BBEST, noting the absence of available information, did not identify inflow targets for San Antonio bay for all seasons. Because the BBEST determined that inflows to San Antonio Bay are the primary factor affecting conditions in Mission and Aransas Bays, the group only identified a single high seasonal inflow target to be met, in addition to the San Antonio Bay inflows, at least 2% of the time.

28 Flow standards for some basins, or parts of basins, do incorporate hydrological criteria for implementing permit provisions applicable to new permits, but, because of the massive impacts of existing rights not subject to environmental flow protections, those criteria do not define the frequency that overall flows in the system will, or should, reflect specific flow levels. Those hydrological criteria are used in determining what level of restrictions apply for permits subject to the flow standards. For example, the holder of a permit subject to the flow standards may not be allowed to divert unless the flow downstream of his or her diversion point equals or exceeds the average base flow level during the 50% of time the average hydrologic condition is in effect. However, even when the average hydrologic condition is in effect, the actual flow in the stream may often be much lower than the average base flow level because of the impacts of upstream water rights that are not subject to environmental flow protection conditions. In addition, the flow standards adopted by TCEQ that do include attainment frequencies were set, in most instances, at flow levels or attainment frequencies developed primarily to accommodate continued issuance of water rights permits rather than to ensure protection of a sound ecological environment.

The Frio River flows through Garner State Park in Central Texas. The Frio is part of the Nueces River Basin, one of several basins with flow standards allowing frequent diversions below base-flow levels. Those standards apply less protection under new permits just when fish and wildlife need more protection because older permits issued without flow protections have caused unnaturally low flows.

FAILURE TO INCORPORATE ANY PERMIT CONDITIONS PROTECTING FRESHWATER INFLOW

Freshwater inflow protections included in the flow standards for many bay systems are inadequately protective and require revision. For Galveston Bay, for example, needed changes include adding drought-level inflow amounts to ensure flows are not allowed to drop to zero or near-zero in up to 25% of future years and up to 40% of future seasons. In addition, an across-the-board change for all inflow standards is needed to incorporate freshwater inflow requirements as permit provisions. The failure to include permit provisions means there is no real-time protection for freshwater inflows and no potential for using the adaptive management process to adjust freshwater inflow protections. The reopener mechanism mandated by SB 3 as a component of adaptive management[29] provides for a potential increase in the level of flow protection in all new water rights issued after September 1, 2007, if environmental flow standards are strengthened after issuance of the water right. That mechanism bases the extent of the allowable increase in protection—up to 12.5 percent—on the annualized total of the relevant instream flow or freshwater inflow requirement included in the permit.[30] Computing the potential extent of an adjustment likely would be relatively straight-forward for instream flow requirements because new permits include instream-flow protection provisions that are readily quantified to provide an annualized total for the various instream flow components, such as subsistence flow, each level of base flow, and each level of pulse flows.[31]

Unfortunately, the opposite is true for freshwater inflow requirements. Under its current implementation approach, TCEQ is not including any permit provision addressing freshwater inflow protection, relying instead solely on a long-term modeling exercise to predict compliance with freshwater inflow criteria. As a result, the permits lack a starting point from which the annualized total of any component of freshwater inflow protection can be calculated. That is inconsistent with the SB 3 mandate for TCEQ to retain discretion to reopen permits issued after the effective date of that legislation to increase flow protections, for both instream flows and freshwater inflows. Both the Legislature, in SB 3, and TCEQ, in adopting flow standards,[32] acknowledged the need to retain discretion to increase freshwater inflow protections as we learn more about the levels of freshwater inflow needed to ensure a sound ecological environment in our estuaries in the future.

Merely reopening and adjusting instream flow permit provisions, which control flows at one or more specific inland locations, does not ensure that additional flow will reach the affected bay or estuary. That flow may be diverted under existing permits between the inland location and the coast and, even if some of the flow did reach the coast, an adjusted instream flow requirement may not match the timing or magnitude of what is needed for the affected bay or estuary.

FAILURE TO INCORPORATE INTO THE FLOW STANDARDS OTHER TYPES OF FLOW-PROTECTION PERMIT PROVISIONS IN ADDITION TO PASS-THROUGH REQUIREMENTS

Under the current flow standards, TCEQ is only implementing environmental flow standards in new permits solely through the imposition of pass-through provisions and, as noted above, only for instream flows. Pass-through provisions require water right holders governed by the flow standards to allow a certain amount of flow from upstream to pass by the diversion point or through a reservoir. Although pass-through provisions are an important means of reducing additional adverse impacts to flows caused by diverting or impounding water under new permits, they are only one form of flow-protection provision. To protect flows, TCEQ has authority to include additional types of provisions in new permits, such as requirements for releases from storage and for specified quantities of return-flows to be directed back to the stream.[33] Those types of provisions can offset other harms caused by new permits and could even help to minimize some of the problems created by existing rights issued without any flow protections.

Particularly during average or wet conditions, flow levels often may be above what is necessary for environmental flow protection, so that reasonable levels of additional impoundment or diversion, subject to appropriate pass-through requirements, can be authorized. However, especially during drier periods, flow levels in many stream reaches, and into estuaries, may be below the

29 Tex. Water Code § 11.147 (e-1)(1). Such a provision is required to be included in all water rights granting a new appropriation that are issued after September 1, 2007, which is when SB 3 went into effect.

30 An individual adjustment or any combination of adjustments is limited to increasing the particular requirement by no "more than 12.5% of the annualized total of that requirement contained in the permit as issued." Tex. Water Code § 11.147 (e-1)(1).

31 TCEQ provided some guidance in its rules about how it anticipates calculating allowable adjustments for various types of instream flow permit requirements. See 30 TAC § 298.25 (h).

32 In adopting rules governing the operation of the reopener provision, TCEQ acknowledged, in response to a comment, that freshwater inflow requirements are subject to adjustment pursuant to the reopener provision: "However, the Commission does agree that inflow requirements would be subject to adjustment." 36 TexReg 2908, 2942 (May 6, 2011).

33 "Return flows" represent water that has been used pursuant to a water right but not consumed during that use. In the absence of a quantified return flow requirement, as noted in Tex. Water Code § 11.046 (c), a water right holder may reuse and fully consume the amount authorized for diversion. In other prior appropriation states, water rights also routinely include a limit on total consumption in addition to a limit on diversion.

amounts needed for critical levels of flow protection because of the impacts of older water rights located upstream that are not subject to any flow protection provisions. Those situations will become more common as consumptive water demands continue to grow and existing permits are more fully used.[34] By incorporating appropriate pass-through permit provisions in new permits, as well as reasonable requirements for releases from storage and quantified amounts of return flow that can help maintain flow levels at critical times, the Commission could strike an appropriate balance.[35] Incorporation of those types of flow-protection approaches would allow water to be diverted or impounded, particularly during average to wet periods, under new permits while ensuring some limited amount of that water would then be returned to the stream during extreme low flow periods to help meet critical environmental needs.

INADEQUATE IMPLEMENTATION OF PASS-THROUGH INSTREAM FLOW PROTECTIONS IN PERMITS

SB 3 requires that water right permits issued after the effective date of that legislation must be designed to comply with applicable flow standards. It does not impose requirements on existing water rights issued prior to its effective date. Unfortunately, because of the implementation approach used in the flow standards for some basins, diversions under such existing rights can dramatically undermine the flow protections being included in those new water rights. For major portions of the state—the entire Sabine, Neches, Trinity, and San Jacinto basins—the current flow standards, and resulting permit conditions in new permits, base the level of flow protection solely on how much flow makes it downstream of older water rights, most of which do not include any type of flow-protection provisions. In those basins, the adopted instream flow protections only include a subsistence flow level and a single base flow level pass-through requirement applicable for any season, along with limited protection for rare, short-duration pulse flow events, with compliance measured at a small number of measurement points. The standards implemented in the Nueces River basin and a portion of the Guadalupe River basin suffer from many of the same deficiencies, but also include a measure, referred to as the 50-percent rule,[36] intended to help mitigate the impact of the transition from base flow to subsistence level protections.

In those four basins, at any time diversion or impoundment taking place under one or more of those older water rights causes flow at a measurement point to drop even slightly below the applicable base flow level, pass-through requirements applicable to new permits drop all the way down to subsistence flow levels. The loss of flow protection between base flows and subsistence flows can be dramatic. For example, on the Sabine River, at the measurement point near Ruliff, the subsistence flow for the spring season is 436 cfs and the corresponding base flow is 1,329 cfs.[37] During that season, if diversion or impoundment under one or more older upstream water rights causes flow at the measurement point to drop to 1,328 cfs or less, the pass-through requirement for new permits governed by that measurement point drops all the way from 1,329 cfs to 436 cfs.[38] Subsistence flow levels basically represent survival-level flows that are intended to be experienced only infrequently and for relatively short periods of time.[39]

Under the flow standards throughout those four basins, and to a slightly lesser degree in the Nueces River basin and the portion of the Guadalupe River basin because of the 50 percent rule, a lower level of flow protection applies for those new permits exactly when fish and wildlife need more protection because flow levels are already unduly low because of the adverse impacts of existing water rights. That puts rivers and streams at undue risk and undermines effective flow protection. In most other basins, the flow standards include a hydrological-condition-based approach[40] for determining when protections for subsistence flows and for various levels of base flows apply. Under a hydrological-condition-based approach, pass-through protection levels for new permits are based on rainfall conditions rather than on the level of flow able to make it downstream past existing permits with no or only minimal flow protections.

Another key problem in the adopted flow standards is that the Commission has chosen to assess compliance

Oysters have traditionally thrived in Texas bays and estuaries, where they provide multiple benefits. Prolonged periods of low freshwater inflows put oysters at risk.

34 It also is true that, in some reaches, because of releases from storage for diversion downstream and discharges of return flows of unconsumed water, flow will be increased over natural levels at various times.

35 In SB 3, the Legislature expressly acknowledged that environmental flow protections might include releases from storage. See e.g., Tex. Water Code § 11.147 (e-1)(1) referring to adjustments of permit conditions as affecting the "amount of pass-through or release requirement." The current flow standards, which only limit when diversions or impoundment can occur, represent types of pass-through requirements. The Legislature also has specifically acknowledged the need for release requirements in other provisions, mandating, for reservoirs located near the coast built with certain types of state funding, that 5% of the project yield is appropriated for protection of freshwater inflows and instream flows. See Tex. Water Code §§ 15.3041 and 16.1331. The Legislature also provided the Commission authority to require a quantified level of return flows in any water right to help protect environmental flows. Tex. Water Code § 11.046 (b).

36 The 50 percent rule, which is explained in more detail in Appendix A, provides for a sharing of flow when flow levels are above the subsistence level but below the base-flow level. For example, if the subsistence flow level is 60 cfs and the actual flow is 100 cfs, a permit holder would be allowed to divert 20 cfs, or 50 percent of the amount by which the actual flow exceeds the subsistence level (100 – 60 = 40/2 = 20).

37 30 TAC § 298.280 (5). Under those flow standards, if flow at the measurement point is 1400 cfs, only a 71 cfs diversion is authorized under a permit subject to the SB 3 standards because 1,329 cfs must be passed downstream. However, if diversions or impoundment occurring under existing rights not subject to SB 3 standards cause the flow to drop to 1,320 cfs at the measurement point, the flow protection under SB 3 immediately drops down to 436 cfs and all of the flow above that level can be diverted or impounded.

38 There could be a temporary exception if, at the time of the upstream diversion, pulse flow protections were in effect at the measurement point.

39 As explained in the Science Advisory Committee guidance document "Essential Steps for Biological Overlays in Developing Senate Bill 3 Instream Flow Recommendations" (Aug. 31, 2009) at p. 7: "Subsistence flows are infrequent low flows that occur during times of drought or under very dry conditions (TCEQ et al. 2008). The primary objectives of subsistence flows are to maintain water quality criteria and prevent loss of aquatic organisms due to, for example, lethal high temperatures or low dissolved oxygen levels."

40 That approach uses longer-term indicators of hydrological condition to determine when it would be appropriate to apply subsistence flow protections versus dry, average, or wet baseflow protections. For some basins, hydrological condition is determined by assessing the levels of water in storage in reservoirs at the end of the previous season or by comparing overall flow levels during the previous season to historical flow levels. Low levels of storage or flow result in applying dry condition flow protections during the coming season, with average levels resulting in applying average condition flow protections and so on.

Forming much of the northern boundary of Texas, most of the Red River's water is shared between Texas and Oklahoma. It has been the subject of a number of contentious disputes between the states, with some reaching the U.S. Supreme Court.

with flow standards only at the limited number of measurement points listed in the flow standards themselves.[41] There are only four measurement points for the entire 710 mile-long Trinity River Basin. Because those measurement points can be well more than a hundred river-miles apart and because many tributary streams may not have any designated measurement points, key aspects of the flow standards are not being implemented effectively. If flow at a distant measurement point meets the applicable standard, diversion or impoundment on a tributary stream could be allowed to entirely dry up that stream and still be considered to comply with the standard.

Use of distant measurement points also creates problems because of the time it can take, up to several days, for water to flow downstream between the measurement point and the diversion or impoundment location for the permit governed by the measurement point. For example, pulse flow protections are in effect for periods ranging from 2 to 26 days, depending on the basin, location, and size of the pulse, after the trigger flow level occurs at the measurement point. The basic approach for most pulses is that once the trigger flow for the pulse is reached, diversion or impoundment can only occur when the flow allowed to pass downstream exceeds the trigger flow until the restriction ends, which happens when either the duration or volume aspect is satisfied.[42] Each aspect is important. The requisite flow level needs to be reached to perform the intended functions and high flow also must be maintained for a reasonable duration. If the flow level is sufficiently high that the volume amount is reached before the full duration has been satisfied, the intended functions are considered to have been accomplished. But, that only works if the requisite flow has been protected throughout the relevant area, including downstream of the location of the permit.

For example, the summer pulse for the Trinity River near Oakwood measurement point has a trigger flow of 2,500 cfs, with a volume of 23,000 acre-feet and a duration of five days.[43] If a pulse resulting from upstream rainfall is moving downstream and the trigger flow is reached on day one at the measurement point but it takes days for that higher flow to reach the downstream diversion or impoundment location governed by the measurement point, the pulse flow will be protected for less than the full duration at the downstream location. During those initial days, diversion or impoundment was limited but, because the pulse flow had not yet reached that location, the intended effect of allowing the pulse to pass downstream was not achieved and the protections cease before the remainder of the pulse has even reached that location.

That can create a serious disconnect from reality with pulse-flow protection being triggered and treated as having been complied with at the measurement point, in some instances, before, or just slightly after, the pulse of water actually has reached the location of the diversion or impoundment governed by that measurement point. As a result, limitations on diversion or impoundment to protect the pulse may be rendered substantially meaningless. A variation of that same problem occurs when the diversion or impoundment location is located a substantial distance upstream of the measurement point.

If the diversion or impoundment capacity is sufficiently great, the triggering flow may never reach the measurement point because it will have been captured upstream. As a result, the "protection" may be rendered illusory: no protection is triggered because the pulse trigger was not reached at the measurement point, but it was not reached because the permit that, in theory, is required to pass the pulse is allowed to impair it.

A similar problem occurs when transitioning between subsistence and base flows in basins without hydrologic-condition approaches.[44] If the upstream diversion or impoundment lessens the flow sufficiently to prevent the flow at the measurement point from increasing to the base flow level, base flow protections may never be triggered. Flow standards suffering from those deficiencies do not represent protection of a sound ecological environment to the maximum extent reasonable. Fortunately, the adaptive management process provides a mechanism for addressing the deficiencies.

Areas Where Statutory Changes Are Needed

LACK OF PROGRESS IN ADVANCING CONSIDERATION OF POLICIES AND APPROACHES FOR IDENTIFYING AND IMPLEMENTING AFFIRMATIVE STRATEGIES TO IMPROVE FLOW CONDITIONS

In SB 3 the Legislature recognized the need to identify and develop approaches for implementing affirmative strategies to address the environmental flow challenges created by the legacy of existing perpetual water rights. Those existing rights, with senior priority dates guaranteeing the first claim to water during dry periods, authorize diversion and capture of millions of acre-feet per year and, with only rare exceptions, were issued without flow protection provisions. The Legislature also acknowledged the "strong public policy imperative that exists in this state recognizing that environmental flows are important to the biological health of our

41 TCEQ, in developing draft guidance for implementing the flow standards, acknowledges that it has latitude to use compliance points other than those listed in the standards but indicates its intent to do so only when the permit applicant requests use of an alternate compliance point. See Draft Senate Bill 3 Permitting Guidelines, Water Availability Division, TCEQ, at p. 4 (Section 5.0 Translating Environmental Flow Standards), available at revised_draft_sb3_implementation_guidelines.pdf (texas.gov).

42 In some basins, pulse flows have only a pulse flow level and a duration without a volume component. Those pulses have short durations and the pulse flow level must be maintained for that full duration. Despite that variation in approach, the problem created by use of a distant measurement point is the same as for other pulses and, in fact, somewhat worsened because of the short duration.

43 30 TAC § 298.225 (c)(3). In that basin, only two pulses are required to be passed during any season and the summer and fall seasons are combined for pulse-flow purposes, so that only two pulses are required to be allowed to flow-through during that combined period. See 30 § 298.220 (d)(3).

44 Long distances between measurement points also can create problems even within basins that do include a hydrologic-condition approach. The flow standards for several basins use a "50% rule" to provide for a more gradual transition of flow levels between base and subsistence flows. Under the 50% rule, if actual measured flow is below the applicable base flow level and above the subsistence flow level, a permit subject to the standards is only allowed to divert 50% of the difference between the actual flow and the subsistence flow. The permit holder and the environment basically are directed to share the amount of flow about the subsistence level. However, when the measurement point and the permit controlled by that measurement point are a long distance apart, flow levels can be quite different at the two locations at any given time, which can seriously undermine effectiveness of the 50% rule.

public and private lands, streams and rivers, and bay and estuary systems and are high priorities in the water management process."[45] In addition to overseeing various aspects of the process for adopting flow standards, the Environmental Flows Advisory Group (EFAG) was specifically charged with addressing ways to improve water rights administration, enforcement, and allocation to help achieve environmental flow protection.[46] The EFAG also was tasked with exploring approaches for encouraging voluntary conversions of reasonable amounts of existing water rights to flow protection purposes.[47]

The initial focus of efforts by the EFAG, and all participants in the SB 3 process, necessarily was directed to the very challenging task of developing environmental flow standards to govern new permits. Unfortunately, by the time those initial flow standards for major basins flowing to the Texas coast were adopted, legislative attention had shifted from the issue of environmental flow protection as new problems arose demanding legislative action and the EFAG had basically ceased to function. As a result, those additional critical tasks have not been pursued. The EFAG last submitted a biennial report to the Legislature on its activities in June 2013[48] and has been entirely inactive for many years. Unfortunately, more than 13 years after enactment of SB 3, very little progress has been made on those efforts to improve water rights administration, enforcement, and allocation or in facilitating voluntary conversions of existing rights to flow protection.[49]

A more robust and pragmatic structure is needed for identifying and advancing proactive approaches for meeting environmental flow needs. One option would be for the Legislature to create, and fund, a Texas Environmental Flows Transaction Experts Committee, consisting of practitioners with a balance of perspectives as well as policy and legal expertise and practical experience in management of water rights and in pursuing a variety of flow-protection approaches. Ideally, it would include representatives from Texas and other areas where successful flow protection efforts are underway. That committee would be charged with developing, through an open and public process, recommendations for practical approaches to improve management and to fund and facilitate meaningful affirmative strategies to meet environmental flow needs. Providing legislators with a curated slate of specific approaches to consider is likely to be more efficient and have greater potential for success than expecting legislators, with many competing demands on their time, to identify and evaluate potential approaches as a starting point for legislative action as was called for in SB 3.

A significant and concerted effort is needed to explore and advance new approaches for improving management of water rights and for initiating large-scale voluntary conversions of water rights to flow protection purposes in a manner consistent with meeting other water needs.

LACK OF CLEAR MECHANISM FOR ENSURING ONGOING ROLE FOR STAKEHOLDER COMMITTEES AND SCIENCE EXPERTS IN THE ADAPTIVE MANAGEMENT PROCESS FOR IMPLEMENTATION OF SB 3

SB 3 established an aggressive timeline for adoption of initial environmental flow standards and to help meet that timeline the Legislature provided funding to support the work of the Science Advisory Committee (SAC) and the Bay and Basin Expert Science Teams (BBESTs) in developing environmental flow regime recommendations. Although acknowledging the critical importance of adaptive management and affirmative strategies to help meet environmental flow standards, the legislation does not establish clear mechanisms through which the adaptive management process, including revisions of environmental flow standards and identification and implementation of affirmative strategies to help meet the standards, will be achieved. Bay and Basin Area Stakeholder Committees (BBASCs) are directed to develop, with support from the respective BBEST, Work Plans that identify needed studies and potential affirmative strategies to help meet flow standards. Work Plans, with varying levels of specificity, were developed, but there is no explicit mechanism, or funding, for implementing those Work Plans or for updating them. In addition, there is no defined ongoing role for the SAC, BBASCs, or BBESTs in developing recommendations for revisions to flow standards and no defined procedure for the revision process. In fact, the statute does not expressly provide for continuation of the SAC, BBASCs or BBESTs beyond the initial five-year term of the original members. However, the statutory structure does contemplate those entities will continue in existence beyond that time because, in addition to the ongoing assigned tasks, those bodies are not abolished

In 2001, low flows from a combination of drought and high water use in the U.S. and Mexico caused the mouth of the Rio Grande to fill with silt. In recognition of the highly altered flow regime, the BBEST based its flow recommendation for this reach on preventing more such occurrences of the river losing its connection to the Gulf of Mexico. Photo: TPWD.

45 Tex. Water Code § 11.0236 (i).
46 Tex. Water Code § 11.0236 (i)(1).
47 Tex. Water Code § 11.0236 (i)(2).
48 Records of the activities of the EFAG are available on the TCEQ website at https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/group.html
49 The Texas Water Trust, which is part of the Texas Water Bank overseen by the Texas Water Development Board, holds a total of three water rights dedicated to environmental flow protection after being in existence for 23 years. The TWDB website indicates the last of those rights was placed in the Trust in 2006, which is prior to the enactment of SB 3.

Recreational and commercial fishing are major economic engines in coastal Texas and form the foundation of a long-lasting relationship between many Texans and the beloved waterscapes of their state. Adequate freshwater inflows are critical to healthy fisheries." Photo: Kaila Drayton, NWF.

until flow standards have been adopted for all of the river basins and bay systems in the state. Standards for several basins remain to be developed.[50]

A portion of funding appropriated to the Texas Water Development Board (TWDB) for environmental flow activities over the last few budget cycles has been allocated by TWDB, with input from those BBASCs and BBESTs choosing to participate, to various studies designed to inform potential revision of some aspects of flow standards and, in limited instances, to assess the viability of some potential affirmative strategies.

However, funding has not been available specifically to reactivate the BBESTs or the SAC to support those efforts, to update the Work Plans, or to develop recommendations for potential revisions to the adopted environmental flow standards.

In addition to the lack of funding, the official status of the BBASCs and BBESTs themselves, and the members, is far from clear. SB 3 authorized the BBASCs to fill vacancies among their ranks as well as vacancies on the BBESTs. SB 3 also recognizes that the Environmental Flows Advisory Group, SAC, BBASCs, and BBESTs are to remain in existence until environmental flow standards are adopted for all basins in the state.[51] River basins for which no standards have been adopted include the Sulphur, Cypress Creek, Red, and Canadian. Similarly, many of the smaller coastal basins lack flow standards. In addition, SB 3 directs that work plans must provide for a review of adopted flow standards no less frequently than every 10 years.[52] The first environmental flow standards were adopted in 2011, with additional flow standards adopted in 2012 and 2014, meaning that the 10-year-review process should be well underway now for many of those standards.

By contrast, SB 3 also provides that BBASC and BBEST members are appointed for five-year terms. In recognition of the ongoing need for input, such as to the Texas Water Development Board regarding ongoing studies consistent with Work Plans, many of the BBASCs have continued to meet, at least periodically, on a voluntary basis and to fill the inevitable vacancies that have developed. However, other BBASCs, particularly for the Sabine, Neches, and Sabine Lake Bay and Basin area and for the Arroyo Colorado/Rio Grande Bay and Basin area have not met for many years. Various BBESTs have had limited ongoing activity on an informal basis with some individual members supporting the active BBASCs on a voluntary basis.

INADEQUATE INCORPORATION OF ENVIRONMENTAL FLOW PROTECTION INTO WATER PLANNING

The State of Texas has a highly acclaimed water planning process, overseen by the Texas Water Development Board (TWDB), that does a lot of things well.

Unfortunately, the process generally has failed to include proactive consideration of the amount of river flow and freshwater inflow needed to maintain healthy rivers and bays and the incorporation of those needs into planning for the water future of Texas and Texans. Currently, consideration of environmental flow protection in regional planning generally involves acknowledging that permits for new water supply projects will be subject to environmental flow provisions consistent with any applicable flow standards. Although providing a realistic reflection of the state's permitting process, that current effort falls seriously short of producing comprehensive water plans that can be relied upon as a realistic approach for meeting all of the state's projected water needs. Unless we assume that Texans are going to be okay with dramatically degrading our rivers and estuaries, along with the fish and wildlife populations they support, and that a corresponding increase in the number of threatened and endangered species and a loss of our rich natural heritage will not affect future water management, regional water plans that do not meaningfully address environmental water needs are not realistic templates for future water management. In adopting SB 3, the Legislature acknowledged the need for integrating environmental flow standards into the regional water planning process.[53]

Water plans that do not proactively incorporate environmental flow needs in a meaningful way also fail to meet the legislatively prescribed test that only regional plans ensuring consistency with the long-term protection of the state's natural resources may be approved by the Texas Water Development Board.[54] Texas can, and must, do better than that in order to pass down to future generations the rich natural heritage that has been the birthright of previous and current generations of Texans.

50 Tex. Water Code § 11.02362 (g) establishes the terms for BBASC members and § 11.02362 (j) does the same for BBEST members. Those provisions also authorize BBASCs to fill vacancies on BBASCs and BBESTs for the remainder of unexpired terms. No statutory provision addresses how successor members of BBASCs or BBESTs are to be selected. Section 11.02362 (s) provides that the BBASCs and BBESTs are abolished when the Environmental Flows Advisory Group (EFAG) is abolished. Section 11.0236 (m) indicates that the EFAG is abolished "on the date that the commission has adopted environmental flow standards under Section 11.1471 for all of the river basin and bay systems in the state." Flow standards have not been adopted for a number of river basins in Texas and no steps have been initiated for developing those standards.

51 Even that contemplated period of longevity is unduly constrained because of the ongoing need to identify and pursue affirmative strategies for meeting flow needs and to refine flow standards.

52 Tex. Water Code § 11.02362 (p). Section 11.147 (f) of the Water Code provides that TCEQ may not alter a flow standard or a set-aside more frequently than once every 10 years except as specifically provided otherwise in a Work Plan approved by the Environmental Flows Advisory Group.

53 Tex. Water Code § 11.0235 (e).

54 Section 16.053 (h)(7)(C) of the Water Code provides that the Texas Water Development Board may only approve a regional water plan if the Board determines the plan "is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources…." (Emphasis added). There can be no serious question that fish and wildlife resources dependent on adequate instream flow and freshwater inflow are among the natural resources required to be protected. The Board is directed to develop guidance principles to implement that provision. Regional plans also are separately required to include consideration of "appropriate provision for environmental water needs." Tex. Water Code § 16.053 (e)(5)(F).

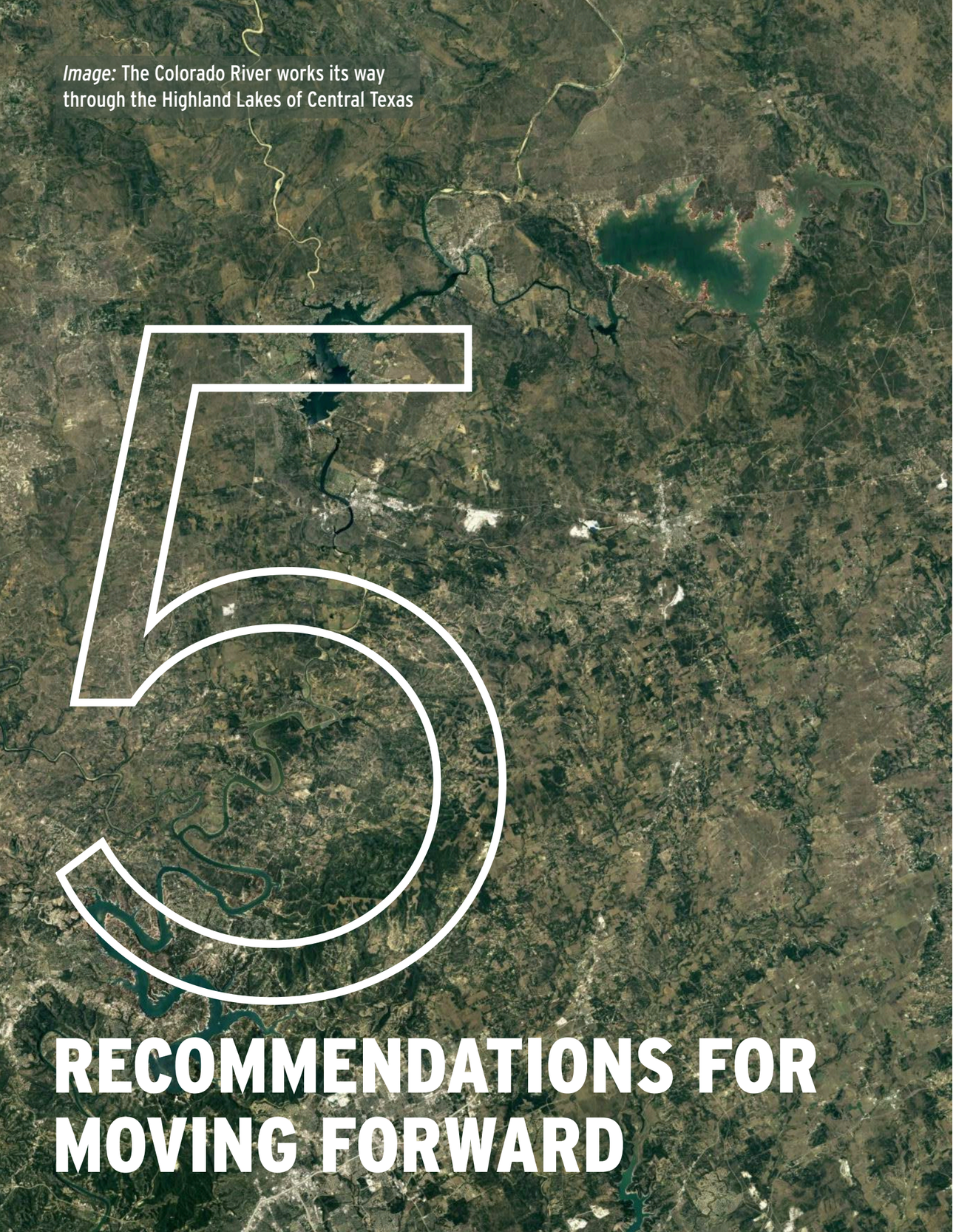


Image: The Colorado River works its way through the Highland Lakes of Central Texas

5 RECOMMENDATIONS FOR MOVING FORWARD

RECOMMENDATIONS FOR CHANGES IN TCEQ PROCESS

1. Adopt set-asides where possible and at maximum level reasonable

Contrary to legislative directives, TCEQ declined to adopt any set asides in adopting environmental flow standards to date. It is reasonable to believe that a combination of proactive permit conditions included in new permits and affirmative strategies, with adequate funding and prioritization, can be implemented at levels sufficient to help to address periods of low instream flows and low freshwater inflows. However, it is not realistic to expect to implement affirmative strategies to restore large pulse flows or other high flow events, such as higher levels of freshwater inflows, that, although not occurring with great frequency, play a critical role in maintaining ecological health in the state's streams, rivers, and bays and estuaries. Where unappropriated water is available, a reasonable level of such events must be protected through the adoption of set-asides, as SB 3 explicitly directed, to ensure those flow events are not unreasonably impaired by new water projects.

TCEQ should, as part of the SB 3 adaptive management process, adopt set-asides where unappropriated water is available and in amounts that represent the maximum reasonable levels in order to protect flow events that are critical to protection of a sound ecological environment.

2. Establish strategy targets for all basins, including for instream flow components

A key component of the SB 3 approach to environmental flow protection is using affirmative strategies to improve flow conditions over the levels expected as water rights are more fully exercised. It is essential to have clearly defined strategy targets—flow targets identifying the levels, and frequency, of instream flow and of freshwater inflow reasonably expected to support a sound ecological environment over the long-term—that can be used for assessing when, and where, affirmative efforts to maintain flows should be prioritized. Those targets also are needed to inform consideration of environmental flow needs in the water planning process.

TCEQ should revise existing environmental flow standards and incorporate a full suite of strategy targets, for instream flows and freshwater inflows, defining flow levels adequate to support a sound ecological environment to help inform implementation of affirmative strategies for flow protection and consideration of environmental flow needs in the state's water planning process.

3. Revise flow standards to incorporate additional protection approaches beyond pass-through requirements

The current flow standards provide for environmental flow provisions that seek to limit the additional harm caused by new water right projects solely through restrictions on the timing or amount of diversions or impoundment. Although such pass-through flow provisions are a critically important tool for limiting additional damage, they are not adequate for the challenge at hand. Nothing in SB 3 or the Water Code limits permit provisions for protection of environmental flows solely to pass-through requirements. For example, TCEQ has explicit authority to require releases from storage and to mandate quantified amounts of return flow, either as a percentage of diversion or specific amount, to be discharged back to a stream when issuing a permit.

TCEQ should revise existing environmental flow standards to incorporate reasonable requirements for permit provisions in addition to pass-through requirements, using mechanisms such as releases from

storage and quantified levels of return flows, in new permits to help support a sound ecological environment in the state's streams, rivers, and bays and estuaries.

4. Improve freshwater inflow protections including by ensuring meaningful implementation approaches for the mandated reopener mechanism for freshwater inflow protections

TCEQ should revise its approach for implementing freshwater inflow protections by ensuring that all new permits include quantified freshwater inflow requirements sufficient to allow calculation of annualized totals. Regardless of whether those inflow requirements are directly applied in governing permit operations on a real-time basis, the revised approach should ensure that the reopener provision can be effectively implemented to increase freshwater inflow protections when determined appropriate.

5. Move away from simplistic subsistence/baseflow instream flow protection approaches and from relying on an unduly limited number of compliance points

As discussed on page 44, there are significant inadequacies in the structure of flow standards addressing protection of instream flows. In many basins, instream flow protection levels applied for new permits are based solely on the level of flow reaching a specific measurement point. Because the impacts of existing permits that lack any type of flow protection often cause unnaturally low flows at measurement points, protections being applied under new permits are inadequate. Flow standards in slightly more than half of the basins use hydrological condition, based on indicators of recent climate conditions, to set flow protection levels, resulting in a more ecologically sound approach. Similarly, using only a small number of measurement points, often located far apart, results in inadequate flow protection in tributary streams and inadequate implementation of flow components, such as pulse flows and the 50 percent rule, that are designed to respond to short-term flow changes at a specific location.

TCEQ should revise its flow standards to incorporate, for all basins, multiple-level base flow requirements for instream flow protection with reasonable hydrological-condition criteria for determining which base-flow level applies and when subsistence level protections are in effect. TCEQ also should revise the flow standards, or its implementation approach, to incorporate additional compliance points to protect flow in significant tributary streams and to minimize travel-time complications for implementing pulse flow requirements and approaches such as the 50 percent rule.

RECOMMENDATIONS FOR BROADER LEGISLATIVE CHANGES

1. Initiate a new approach to develop and implement recommendations for flow protection through improved management and conversion of existing permits to flow protection.

The Environmental Flows Advisory Group did not initiate the anticipated efforts to develop approaches for improved management of water rights to protect environmental flows or for facilitating conversion of existing water rights to flow protection purposes. Because that work is critical to the long-term success of SB 3 and the protection of the state's streams, rivers, and estuaries, a new approach is needed involving more realistic expectations of the time that legislators and agency representatives can devote to developing potential approaches.

The Legislature should re-energize the Environmental Flows Advisory Group, including by establishing a Texas Environmental Flows Transaction Experts Committee to provide specific recommendations to the Advisory Group. That new committee should be funded and tasked with developing specific proposals for facilitating and incentivizing environmental flow transactions and for improving water rights management to facilitate environmental flow protection.

2. Revitalize scientific and stakeholder input processes to inform adaptive management component of SB 3

Much work remains to be done by the Texas Environmental Flows Science Advisory Committee, the Bay and Basin Area Stakeholder Committees and Bay and Basin Expert Science Teams to inform the adaptive management process. However, the status and future roles of those groups are unclear.

The Legislature should recognize the critical need for continued engagement of the Texas Environmental Flows Science Advisory Committee, Bay and Basin Area Stakeholder Committees, and Bay and Basin Expert Science Teams in the ongoing adaptive management components of SB 3. Those groups should be explicitly continued in existence beyond the time when initial flow standards are adopted for all basins, with a clearly defined ongoing role in the process for revision of flow standards and work plans, including consideration of affirmative strategies, and provided with reasonable funding to support that critical work.

3. Proactively incorporate consideration of environmental flow needs into water planning

Existing statutory provisions require that regional water plans, which are the backbone of the state water plan, must include appropriate provision for environmental water needs and may only be approved if the plan is consistent with long-term protection of the state's natural resources. To date, those aspects of regional planning have received little attention. Absent more specific legislative direction, that situation appears unlikely to change, resulting in incomplete water plans that fail to account for healthy streams, rivers, and bays and estuaries.

The Legislature should strengthen its directives for the state's water planning process to ensure more comprehensive consideration of environmental flow needs. Regional water plans should be expressly required to evaluate the potential for implementation of affirmative strategies to help meet comprehensive environmental-flow strategy targets.

CONCLUSION

SB 3 holds great potential for moving Texas forward in ensuring healthy streams, rivers, and bays and estuaries for future generations of Texans. As noted in this report, the initial round of adoption of environmental flow standards fell short of realizing that potential in many ways, but the robust adaptive management process included in that legislation provides ample opportunity to overcome those shortcomings, particularly with some legislative refinements. The recommendations included above provide a potential roadmap for seizing that opportunity.

It is time to act—the natural heritage of current and future Texans is at stake.

Sunrise over Aransas Bay.
Photo: Kaila Drayton, NWF

Texas Living Waters Project

The Texas Living Waters Project is a collaboration of conservation groups working to ensure Texas has the water it needs for thriving communities and abundant fish and wildlife.

National Wildlife Federation

Sierra Club

Galveston Bay Foundation

hill country alliance