

2017 Texas Master Naturalists Water Certification Webinar

TEXAS
PARKS &
WILDLIFE

Texas Water Law and Planning

Chapter Nine:

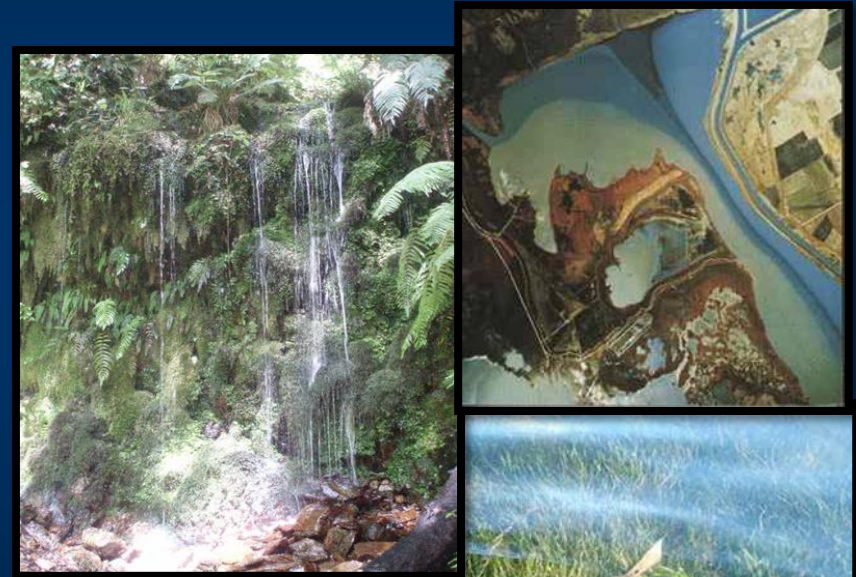
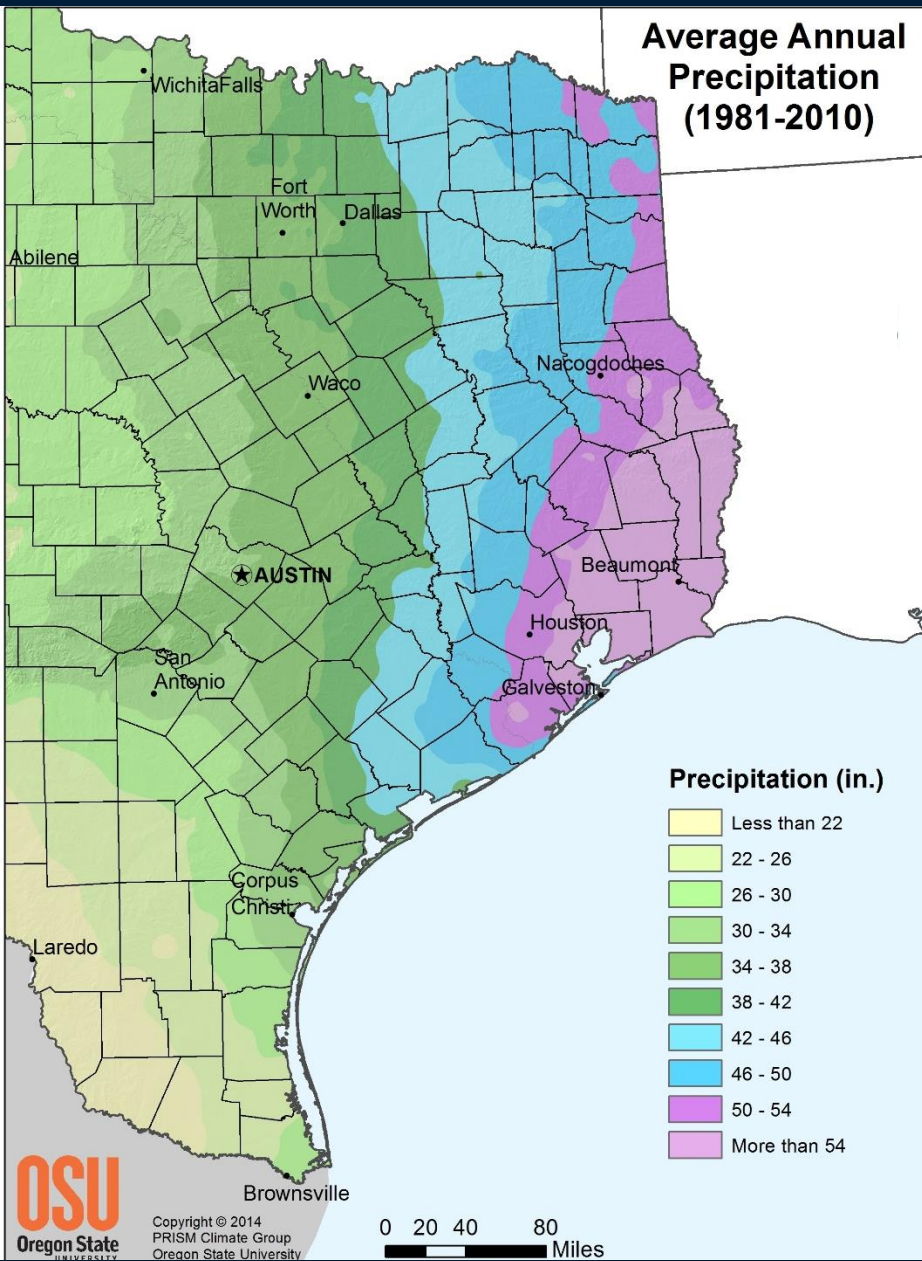
Texas Water Law and Planning

Cindy Loeffler, PE

Water Resources Branch Chief

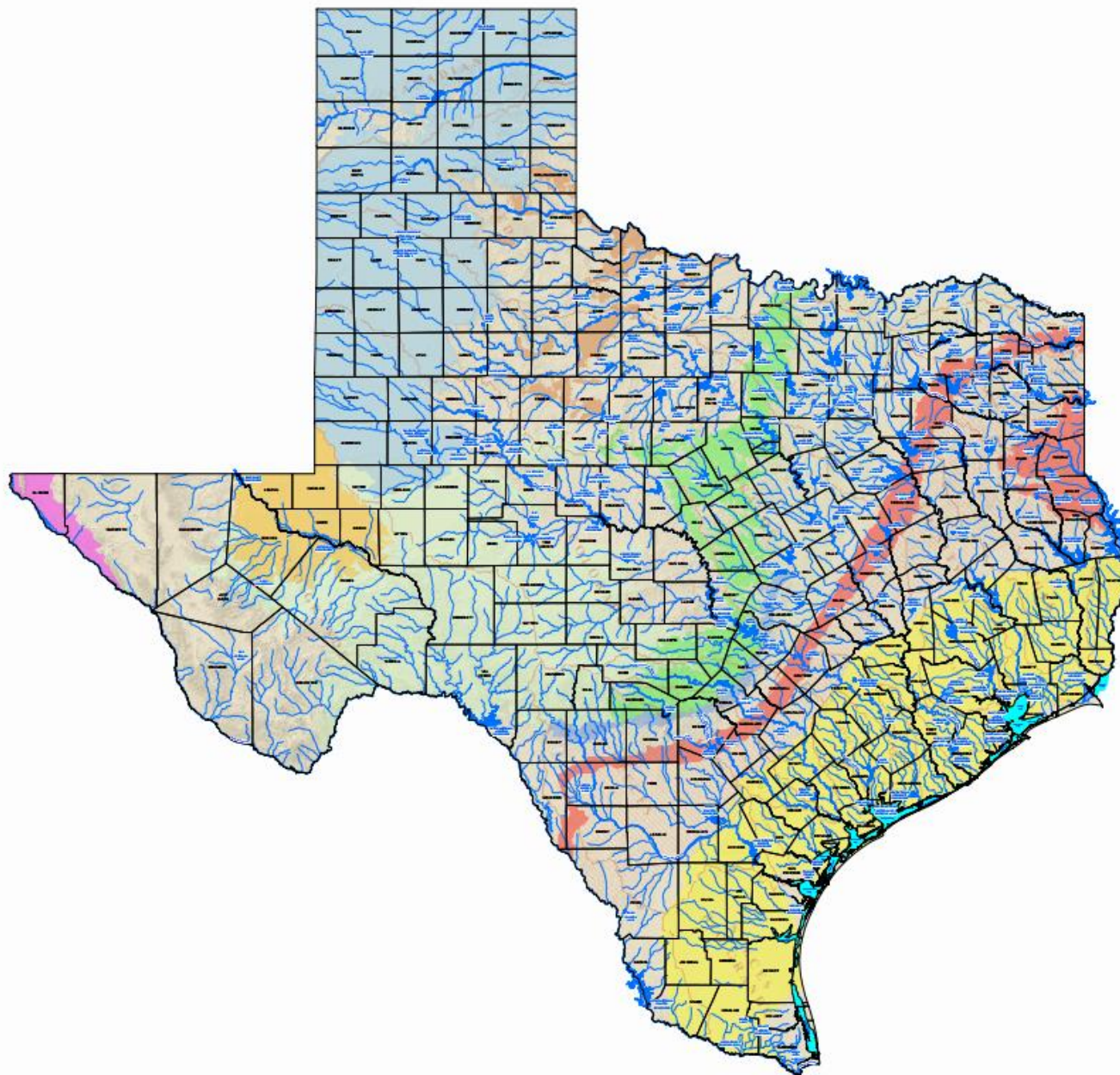
Cindy.Loeffler@TPWD.Texas.gov

Texas' climate gradient ...creates a diverse system of springs, streams, rivers, lakes and estuaries.



**TEXAS
PARKS &
WILDLIFE**

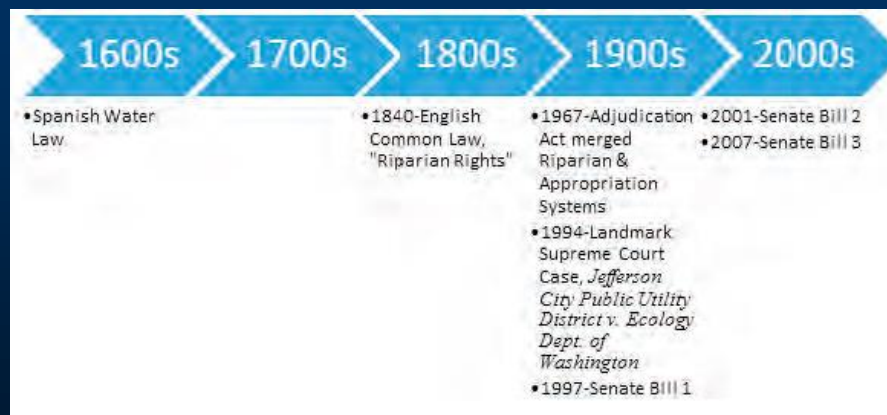




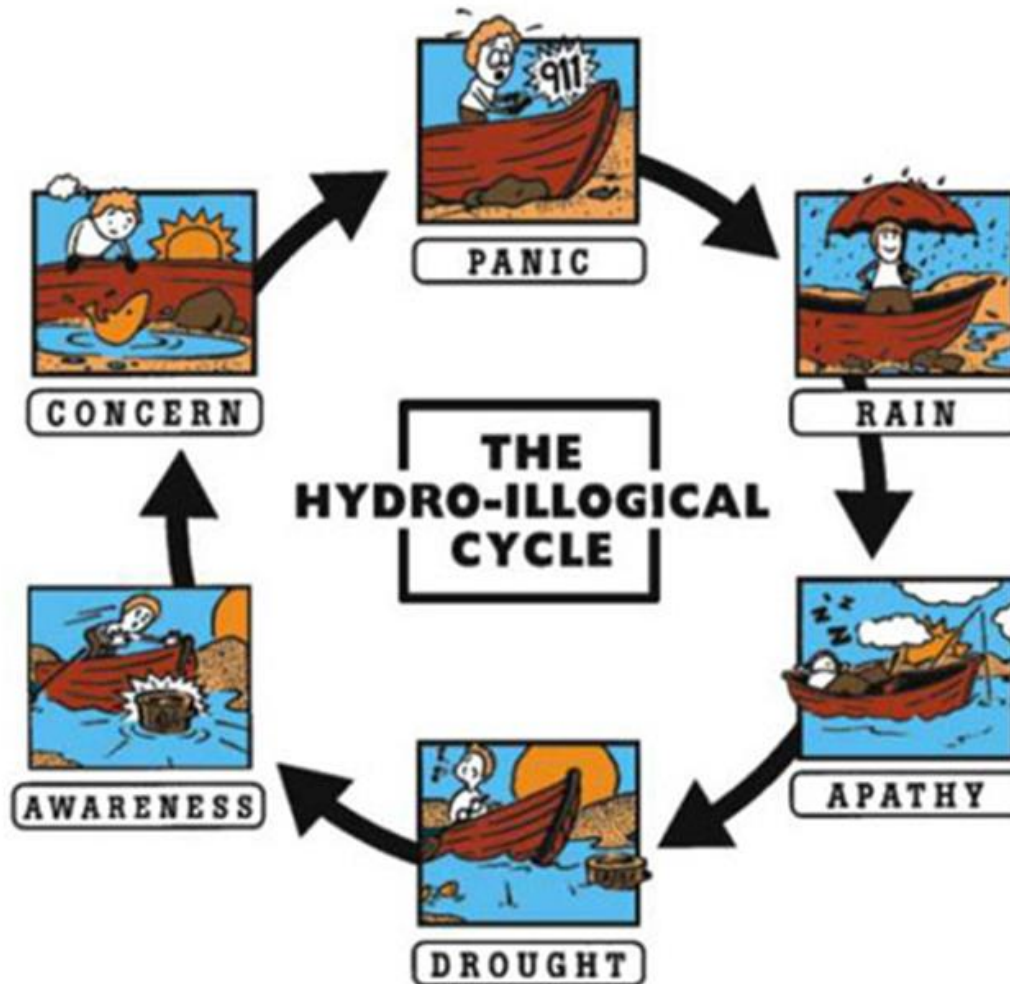
Major Water Resources of Texas

Evolution of water law in Texas

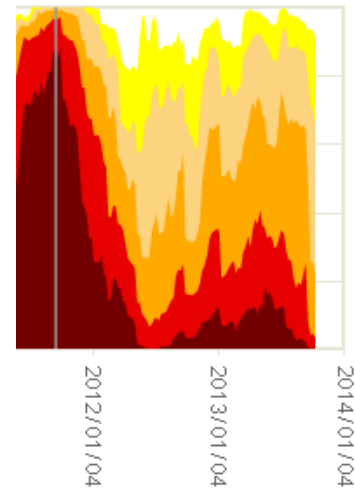
- Spanish Colonial
- Mexican rule
- Republic of Texas
- State of Texas
- Prior Appropriation – surface water belongs to the state
- Groundwater is privately held



Drought Severity in Texas 2000-2014



© National Drought Mitigation Center



2011/09/13, y:100.00%
 2011/09/13, y:100.00%
 2011/09/13, y:99.17%
 2011/09/13, y:96.75%
 11/09/13, y:87.83%



<http://droughtmonitor.unl.edu/DataArchive.aspx>

Texas Water Timeline:

Milestones compared to annual Travis County rainfall totals

1904: Texas Supreme Court adopts the “rule of capture” doctrine.

1917: Conservation and preservation of all the natural resources of the State of Texas are public rights and duties.

1938: Development of Texas Rivers: A Water Plan for Texas.

1957: Texas Legislature passes Texas Water Planning Act

1913: Texas Board of Water Engineers created to regulate appropriations of water.

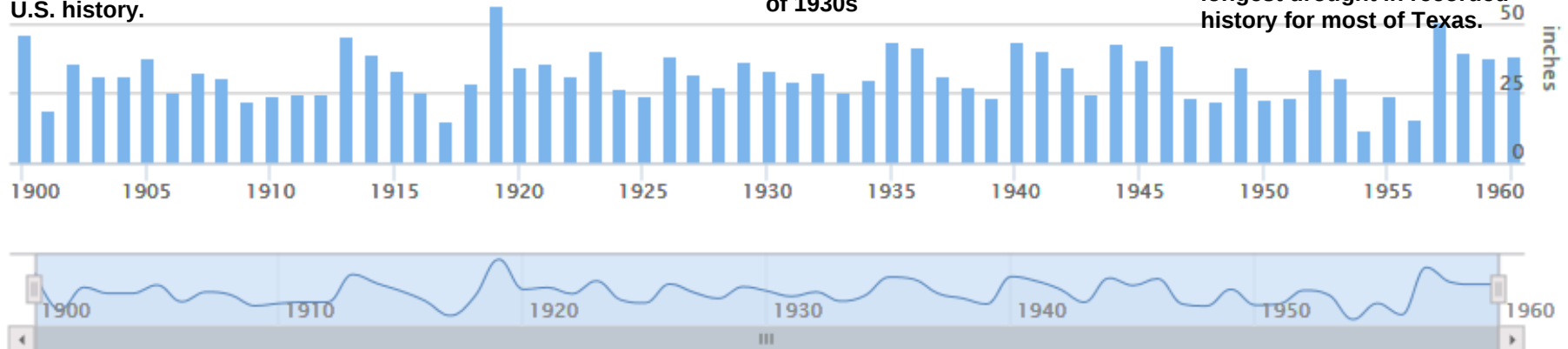
1923: Texas Legislature begins to address pollution of water courses and other bodies of water.

1959: Passage of the Texas Open Beaches Act recognized public’s right to use Texas Gulf coast beaches.

1900: Galveston Hurricane deadliest natural disaster in U.S. history.

“The Dust Bowl” of 1930s

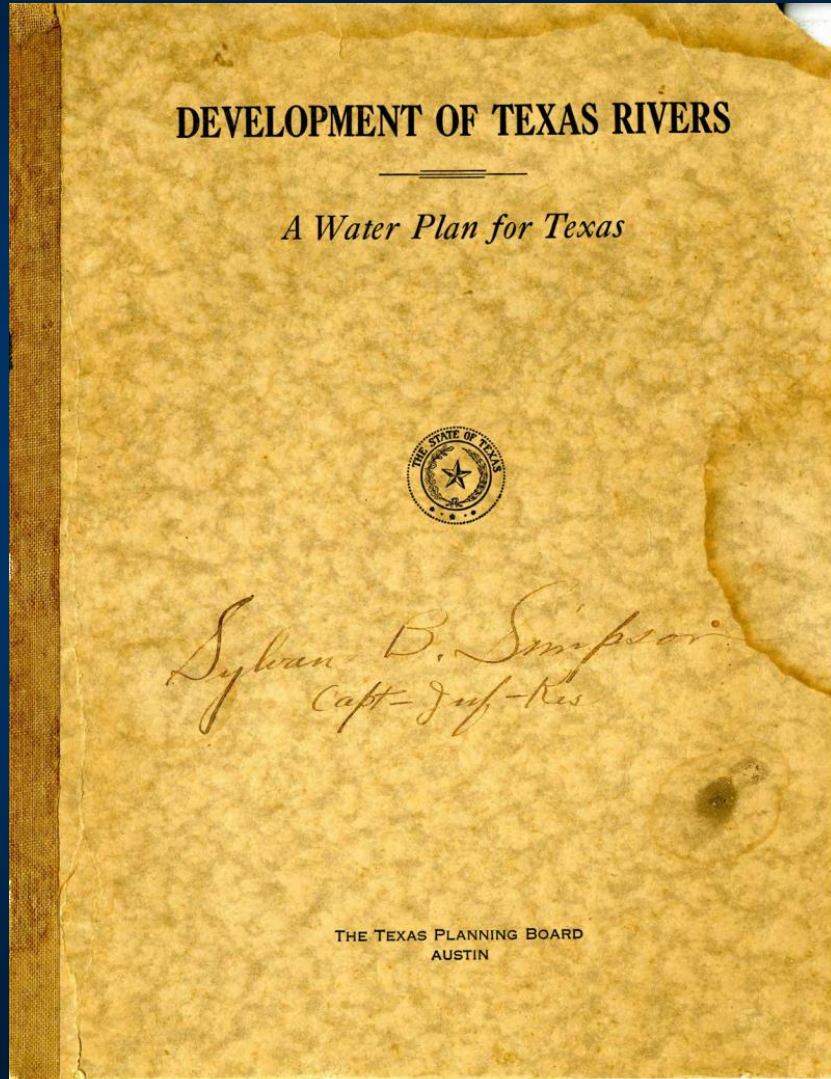
Drought of the 1950s: longest drought in recorded history for most of Texas.



1900: Population = 3 million

1950: Texas Population = 7.7 million

1938 Development of Texas Rivers: A Water Plan for Texas



Water Resources Committee Included William J. Tucker, Executive Secretary State Game, Fish and Oyster Commission, Austin

“Oyster beds and important shellfish areas are located at the mouths of these rivers in the bays. Pollution of these areas by sewage should be eliminated.” page 73.

“Wildlife Conservation: The proposed constructions of dams...offers a fine opportunity for the development of waterfowl and other wildlife habitat, and their needs should be taken into consideration as far as possible without hazarding the prime purpose for which the construction was planned.” page 14.

Texas Water Timeline:

Milestones compared to annual Travis County rainfall totals

1961: Pesticide runoff in Austin creates massive fish kill extending downstream to Matagorda Bay. State Water Pollution Control Board created.

1967: Water Rights Adjudication Act and Water Quality Standards adopted.

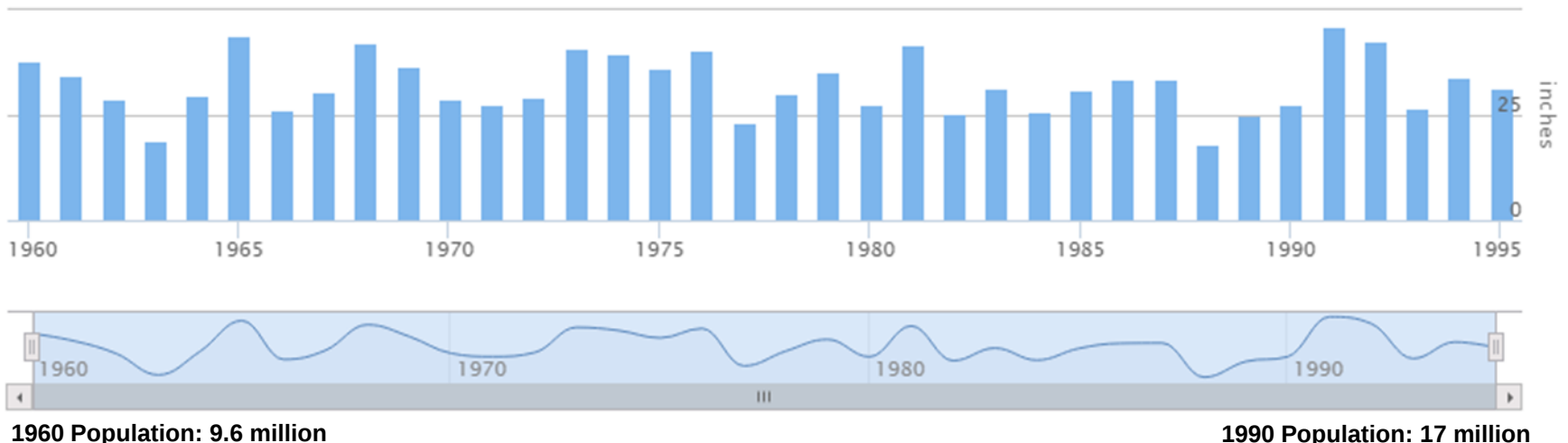
1968: 1st Texas Water Plan, including a recommendation to move Mississippi River water to Texas, is adopted.

1975: Maintaining health of bays and estuaries becomes state policy. When granting water rights Texas Water Commission must assess effects on bays and estuaries. TWDB, in cooperation with TPWD, directed to investigate effects of freshwater inflows.

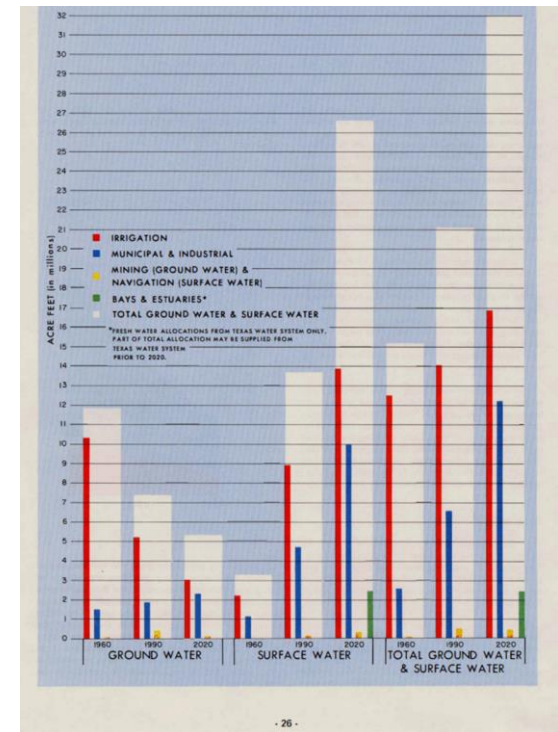
1985: HB2 directs TPWD and TWDB to determine the bay conditions necessary to support a sound ecological environment and directs TPWD to recommend the specific quantities and qualities of freshwater inflows necessary to maintain bay productivity. Texas Water Commission

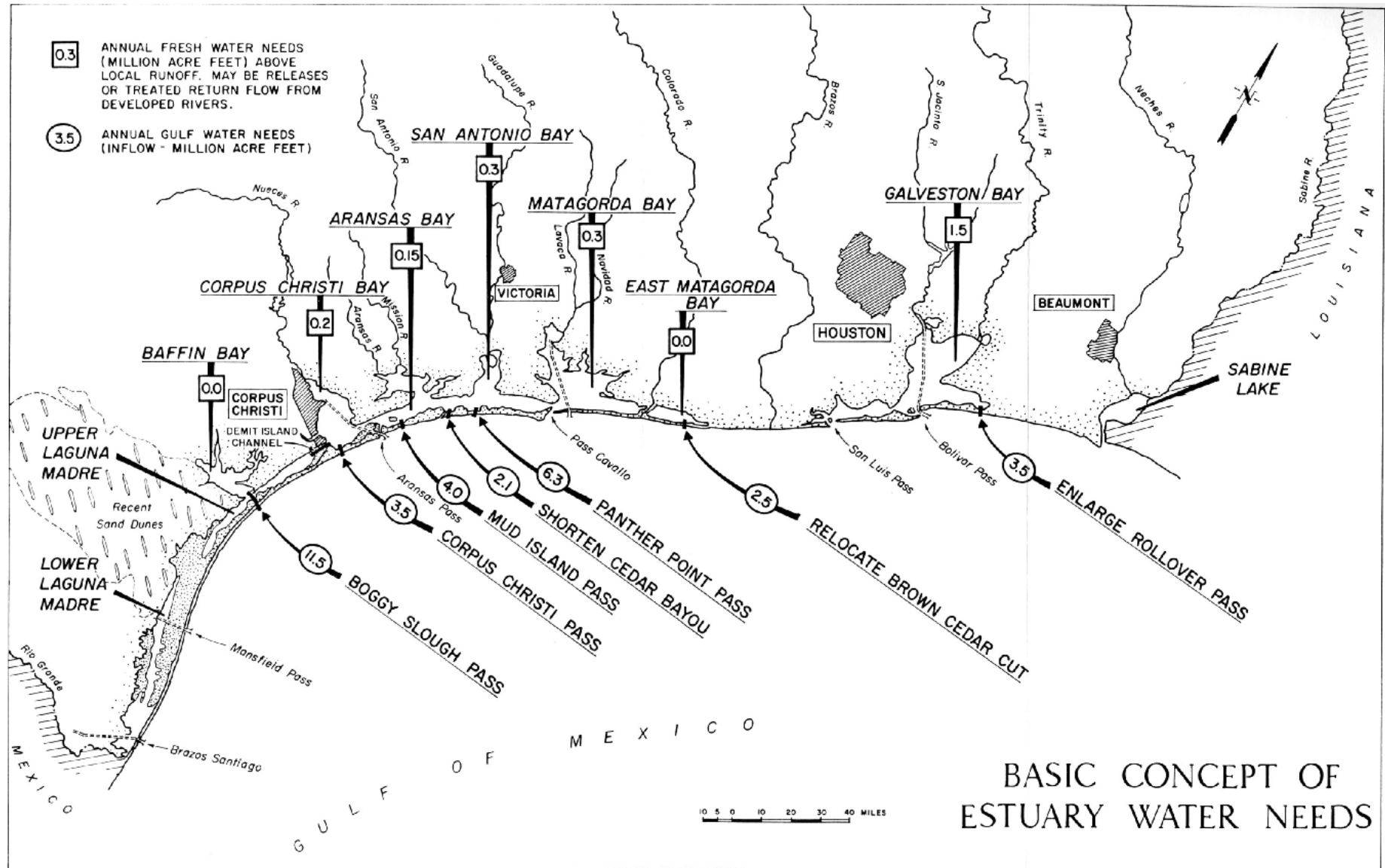
1987: Legislature grants Texas Water Commission authority to place special conditions in water rights to protect environmental flows. TPWD becomes actively involved in water rights process.

1993: TPWD "Kills and Spills Team," created.



“Based on best available estimates of need, provide regulated fresh water inflows to the bays and estuaries, and participate as justified in other measures such as structural modifications to obtain better tidal circulation, with the objective of maintaining suitable quality condition for fish and shellfish.”





TWDB Report 43 "A New Concept – Water for Preservation of Bays and Estuaries", 1967, Lockwood, Andrews and Newman

Texas Water Timeline:

Milestones compared to annual Travis County rainfall totals

1997: Consensus-based Water Plan, first state water plan to include TPWD recommendations that address environmental concerns, including freshwater inflows to bays and estuaries, is adopted.

1997: Senate Bill 1 signed into law by Governor Bush. This legislation calls for the development of regionally-based water plans that protect agricultural and natural resources. TPWD is designated as a non-voting member.

2000: In alignment with Texas' Seagrass Management Plan, adopted in 1999 by TPWD, TCEQ and GLO, TCEQ establishes a water quality standard for seagrass protection.

2001: TPWD enters Aquaculture MOU with TDA and TCEQ. MOU seeks to ensure regulation and addresses non-native species, wastewater discharges, and disease management.

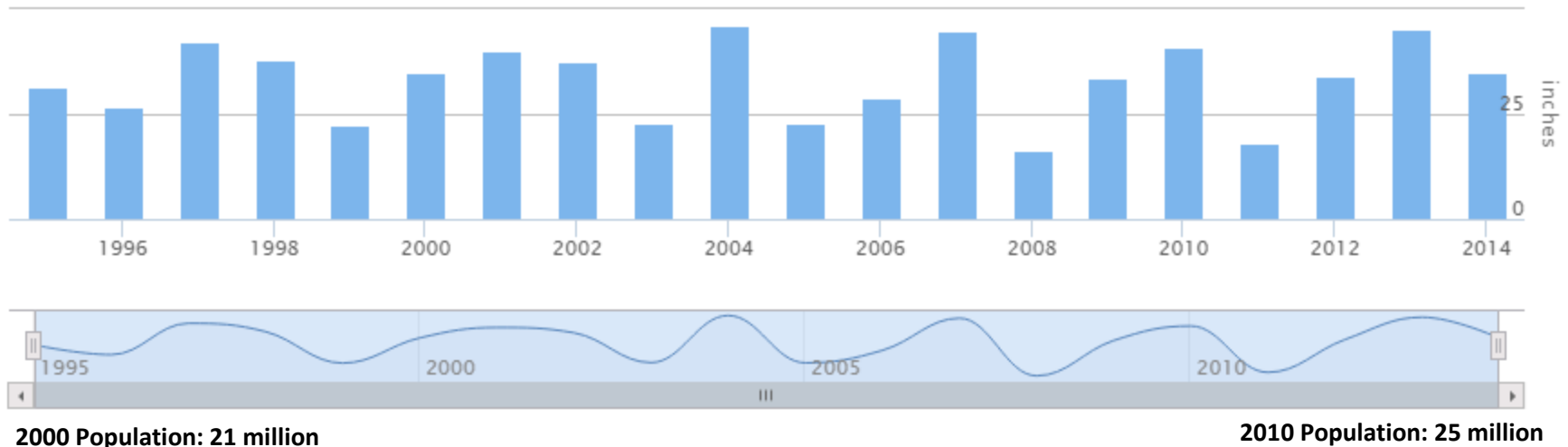
2001 - The Rio Grande ceases flowing to the Gulf of Mexico for the first time in recorded history

2007: SB 3 Environmental Flows Process begins. TCEQ adopts environmental flow standards for basins across the state during 2012-2014.

2011: worst 1-year drought since statewide weather records began

2016: Current Texas Water Plan released. Texas Population is expected to increase from 29.5 million to 51 million people by 2070. Water conservation and reuse are expected to meet about 1/3 of future water needs.

2016: Wettest year on record in Texas. Hottest year on record for Planet Earth.



Groundwater: Source of Springs and River Baseflows



- Springs
 - Support unique aquatic environments, including rare species
 - Serve as a barometer of local aquifer conditions
 - Relatively inexpensive means of monitoring groundwater
 - Provide important baseflows to rivers

- River Baseflows
 - Dependent on aquifer discharge
 - Important component of environmental flow regime, including inflows to bays and estuaries
 - Support habitats during dry periods



Confirmed Groundwater Conservation Districts *

1. Bandera County River Authority & Ground Water District - 11/7/1989
2. Barton Springs/Edwards Aquifer CD - 8/13/1987
3. Bee GCD - 1/20/2001
4. Blanco-Pedernales GCD - 1/23/2001
5. Bluebonnet GCD - 11/9/2002
6. Brazoria County GCD - 11/8/2005
7. Brazos Valley GCD - 11/5/2002
8. Brewster County GCD - 11/6/2001
9. Brush Country GCD - 11/3/2009
10. Calhoun County GCD - 11/4/2014
11. Central Texas GCD - 9/24/2005
12. Clear Fork GCD - 11/5/2002
13. Clearwater UWCD - 8/21/1999
14. Coastal Bend GCD - 11/6/2001
15. Coastal Plains GCD - 11/6/2001
16. Coke County UWCD - 11/4/1988
17. Colorado County GCD - 11/6/2007
18. Comal Trinity GCD - 8/17/2015
19. Corpus Christi ASRCD - 6/17/2005
20. Cove Creek GCD - 11/5/2002
21. Crockett County GCD - 1/26/1991
22. Culberson County GCD - 5/2/1998
23. Duval County GCD - 7/25/2009
24. Edwards Aquifer Authority - 7/28/1996
25. Evergreen UWCD - 8/30/1985
26. Fayette County GCD - 11/6/2001
27. Garza County UWCD - 11/5/1996
28. Gateway GCD - 5/3/2003
29. Glasscock GCD - 8/22/1981
30. Goliad County GCD - 11/6/2001
31. Gonzales County UWCD - 11/2/1994
32. Guadalupe County GCD - 11/4/1999
33. Hays Trinity GCD - 5/3/2003
34. Headwaters GCD - 11/5/1991
35. Hemphill County UWCD - 11/4/1997
36. Hickory UWCD No. 1 - 8/14/1982
37. High Plains UWCD No. 1 - 9/29/1951
38. Hill Country UWCD - 8/8/1987
39. Hudspeth County UWCD No. 1 - 10/5/1957
40. Iron County WCD - 8/2/1985
41. Jeff Davis County UWCD - 11/2/1993
42. Kennedy County GCD - 11/3/2004

Confirmed Groundwater Conservation Districts (Cont.) *

43. Kimble County GCD - 5/3/2002
44. Kinney County GCD - 11/2/2002
45. Lipan-Kickapoo WCD - 11/3/1987
46. Live Oak UWCD - 11/7/1989
47. Llano Estacado UWCD - 11/3/1998
48. Lone Star GCD - 11/6/2001
49. Lone Wolf GCD - 2/2/2002
50. Lost Pines GCD - 11/5/2002
51. Lower Trinity GCD - 11/7/2006
52. McMullen GCD - 11/6/2001
53. Medina County GCD - 8/22/1991
54. Menard County UWCD - 8/14/1999
55. Mesa UWCD - 1/20/1990
56. Mesquite GCD - 11/4/1986
57. Mid-East Texas GCD - 11/5/2002
58. Middle Pecos GCD - 11/5/2002
59. Middle Trinity GCD - 5/4/2002
60. Neches & Trinity Valleys GCD - 11/6/2001
61. North Plains GCD - 1/2/1955
62. North Texas GCD - 1/21/2009
63. Northern Trinity GCD - 5/15/2007
64. Panhandle GCD - 1/2/1955
65. Panola County GCD - 11/6/2007
66. Pecan Valley GCD - 11/6/2001
67. Permian Basin UWCD - 9/21/1985
68. Pineywoods GCD - 11/6/2001
69. Plateau UWC and Supply District - 3/4/1974
70. Plum Creek CD - 5/1/1993
71. Post Oak Savannah GCD - 11/5/2002
72. Prairielands GCD - 9/1/2009
73. Presidio County UWCD - 8/31/1999
74. Real-Edwards C and R District - 5/30/1959
75. Red River GCD - 9/1/2009
76. Red Sands GCD - 11/5/2002
77. Reeves County GCD - 11/3/2015
78. Refugio GCD - 11/6/2001
79. Rolling Plains GCD - 1/26/1999
80. Rusk County GCD - 6/5/2004
81. San Patricio County GCD - 5/12/2007
82. Sandy Land UWCD - 11/7/1989
83. Santa Rita UWCD - 8/19/1989
84. Saratoga UWCD - 11/7/1989
85. South Plains UWCD - 3/8/1992
86. Southeast Texas GCD - 11/2/2004
87. Southern Trinity GCD - 6/19/2009
88. Starr County GCD - 1/6/2007
89. Sterling County UWCD - 11/3/1987
90. Sutton County UWCD - 4/5/1985
91. Terrell County GCD - 11/6/2012
92. Texana GCD - 11/6/2001
93. Trinity Glen Rose GCD - 11/5/2002
94. Upper Trinity GCD - 11/6/2007
95. Uvalde County UWCD - 9/1/1993
96. Victoria County GCD - 8/5/2005
97. Wes-Tex GCD - 11/5/2002
98. Wintertown GCD - 1/17/1998

Unconfirmed Groundwater Conservation Districts

99. Aransas County GCD + #

+ Pending Election Results

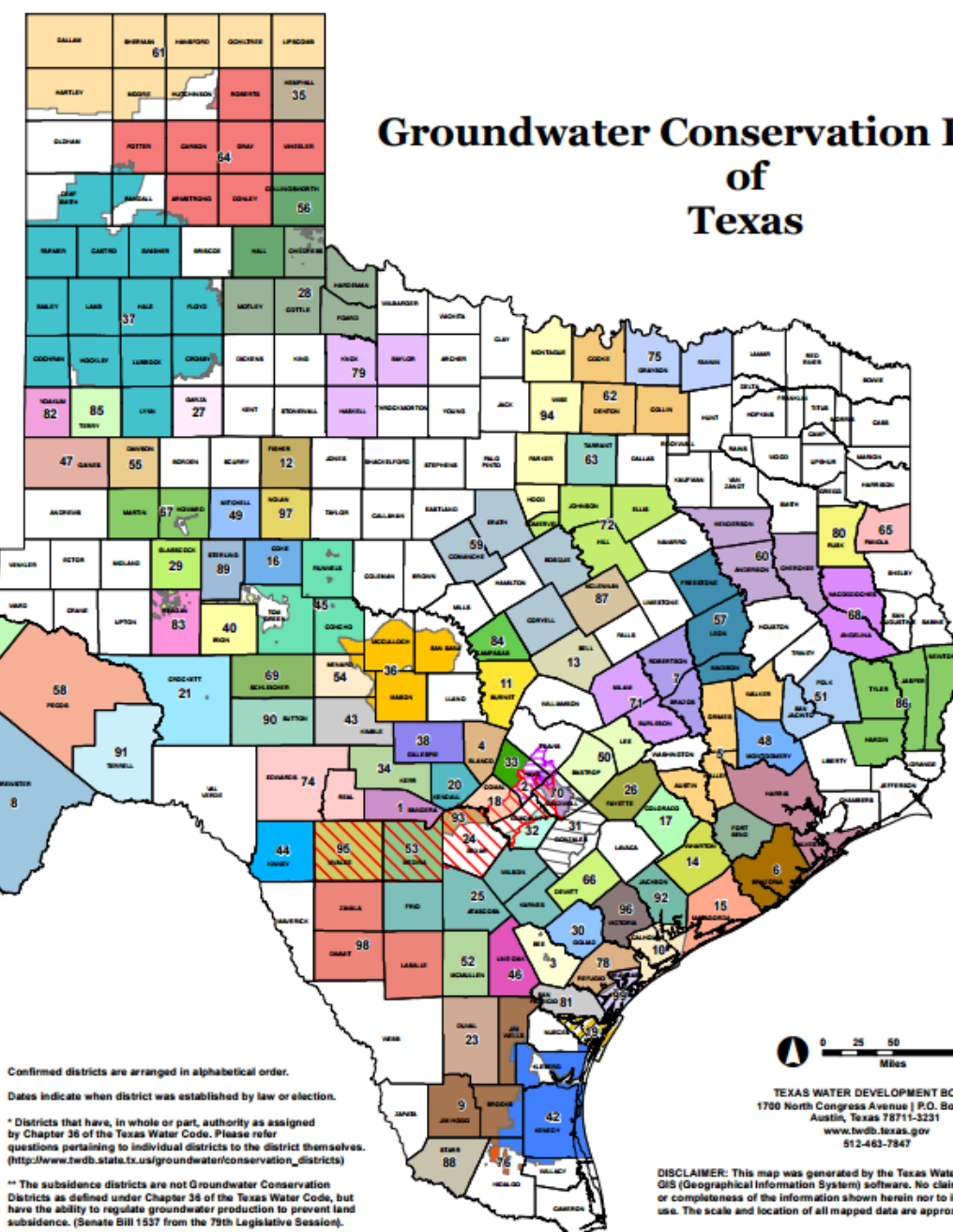
Created by the 84th Legislature

Subsidence Districts **

Harris-Galveston Subsidence District

Fort Bend Subsidence District

County Boundaries



Groundwater Conservation Districts of Texas

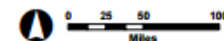
Confirmed districts are arranged in alphabetical order.

Dates indicate when district was established by law or election.

* Districts that have, in whole or part, authority as assigned by Chapter 36 of the Texas Water Code. Please refer questions pertaining to individual districts to the district themselves. (http://www.twdb.state.tx.us/groundwaterconservation_districts)

** The subsidence districts are not Groundwater Conservation Districts as defined under Chapter 36 of the Texas Water Code, but have the ability to regulate groundwater production to prevent land subsidence. (Senate Bill 1537 from the 79th Legislative Session).

Groundwater Conservation District GIS Data created by the Texas Commission on Environmental Quality. For more information, please contact TCEQ at 512-239-1000 or was@tceq.texas.gov.



TEXAS WATER DEVELOPMENT BOARD
1700 North Congress Avenue | P.O. Box 13231
Austin, Texas 78711-3231
www.twdb.texas.gov
512-463-7847

DISCLAIMER: This map was generated by the Texas Water Development Board using GIS (Geographical Information System) software. No claims are made to the accuracy or completeness of the information shown herein nor to its suitability for a particular use. The scale and location of all mapped data are approximate. Map date: NOV-2015

MISSION: The Texas Water Development Board's (TWDB) mission is to provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas.



1985: Resource Protection Responsibilities added to TPW Code



TPWD designated as the state agency with primary responsibility for protecting the state's fish and wildlife resources. Resource protection activities include:

- investigating fish kills and pollution events;
- identifying the responsible party and seeking restitution, where appropriate;
- providing recommendations to protect fish and wildlife resources; and
- providing recommendations on instream flows and freshwater inflows.



Alex Nunez, ©
Texas Parks and
Wildlife Department

TPWD's Role in Surface Water Rights Process

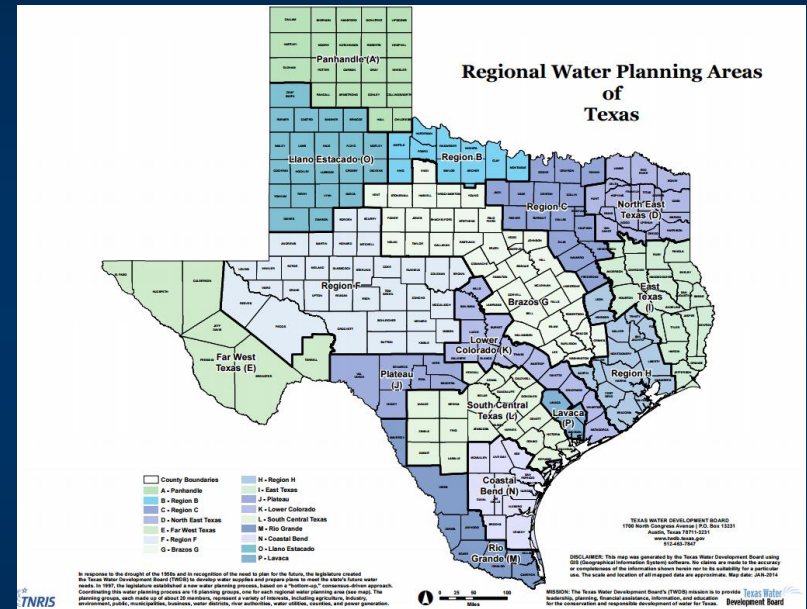


- **Parks and Wildlife Code Sec 12.0011**
- **Texas Water Code Sec 11.147 and 11.152 - Water Rights Permitting**
requires the TCEQ to assess the effects of the issuance of a water use permit on existing instream uses, water quality, fish and wildlife habitat, and freshwater inflow needs for bays and estuaries and to consider TPWD recommendations. Water Resources Branch works with TPWD Legal Division coordinate agency input to TCEQ.

Senate Bill 1 (1997-present) Regional Water Planning



- Water supply plan to meet Drought of Record needs
- 50-year planning horizon
- 5-year planning cycle
- Created the Texas Water Bank and Texas Water Trust
- Ecologically Unique Stream Segments
- Must consider environmental water needs



Regional Water Planning: Planning Process



Required Tasks:

- Describe the regional water planning area;
- Quantify current and projected population and water demand over a 50-year planning horizon;
- Evaluate and quantify current water supplies;
- Identify surpluses and needs;
- Evaluate water management strategies and prepare plans to meet the needs;
- Evaluate impacts of water management strategies on water quality;

Interactive State Water Plan

<https://2017.texasstatewaterplan.org/statewide>

Regional Water Planning: Planning Process



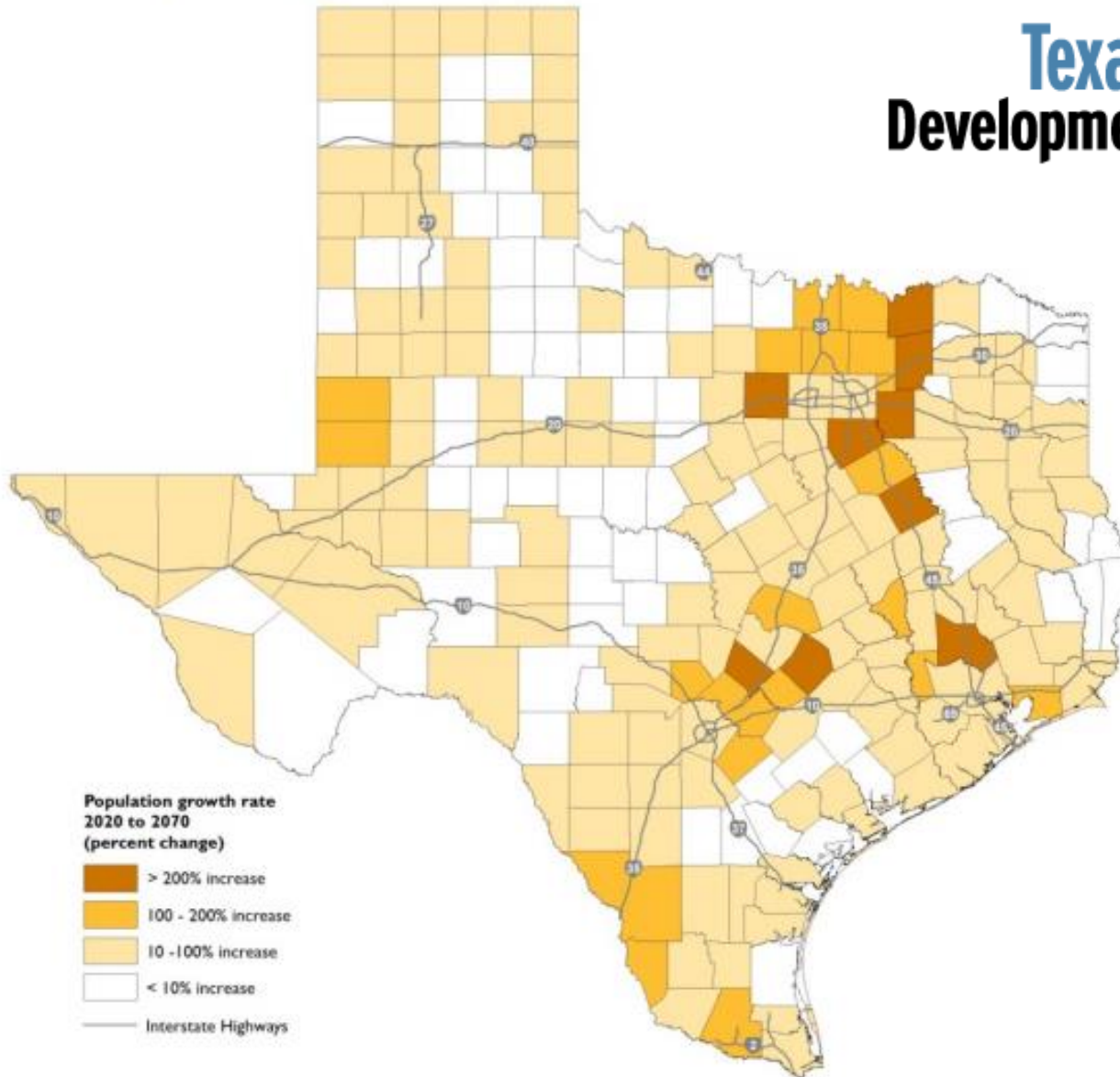
Required Tasks (continued):

- Describe how the plan is consistent with long- term protection of the state's water, agricultural, and natural resources;
- Recommend regulatory, administrative, and legislative changes;
- Describe how sponsors of water management strategies will finance projects; and
- Adopt the plan, including the required level of public participation.

Interactive State Water Plan

<https://2017.texasstatewaterplan.org/statewide>

Projected Population Growth



River and Stream Segments of Unique Ecological Value



A RWPG may recommend a river or stream segment as being of unique ecological value if the segment meets one or more of the following criteria:

- Biological function
- Hydrologic function
- Riparian conservation areas
- Unique or critical habitats and exceptional aquatic life uses
- Unique or extensive natural communities including threatened and endangered species habitat

Texas Water Code

Section 16.051



(f) The legislature may designate a river or stream segment of unique ecological value. This designation means solely that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection.

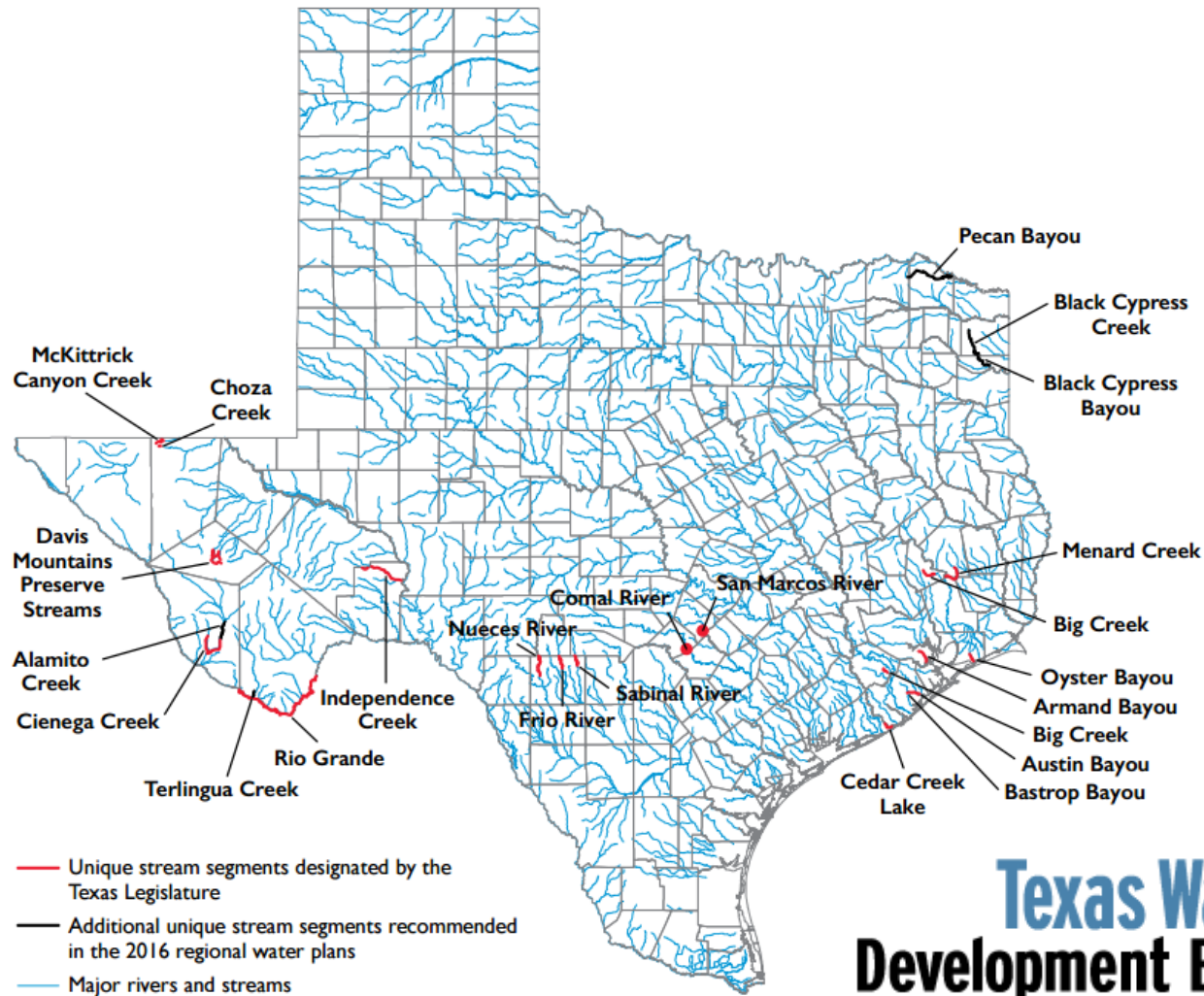
Texas Water Code

Section 16.051



- (g) A state agency or political subdivision may not obtain a fee title or an easement that would:
 - *(1) destroy the unique ecological value of a river or stream segment designated by the legislature...*
 - (2) significantly prevent the construction of a reservoir on a site designated by the legislature...

Designated and Additional Recommended Ecologically Unique Stream Segments





SB 1 Water Planning Rules



Evaluations of potentially feasible water management strategies shall include:

a quantitative reporting of:
environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico;





SB 1 Water Planning Rules



Evaluations of potentially feasible water management strategies shall include:

Evaluations of effects on environmental flows will include **TCEQ adopted environmental flow standards, site specific information or environmental planning criteria** after coordinating with TPWD to ensure that water management strategies are adjusted to provide for environmental water needs.

Strategies for Meeting Future Demand (least environmentally impacting)

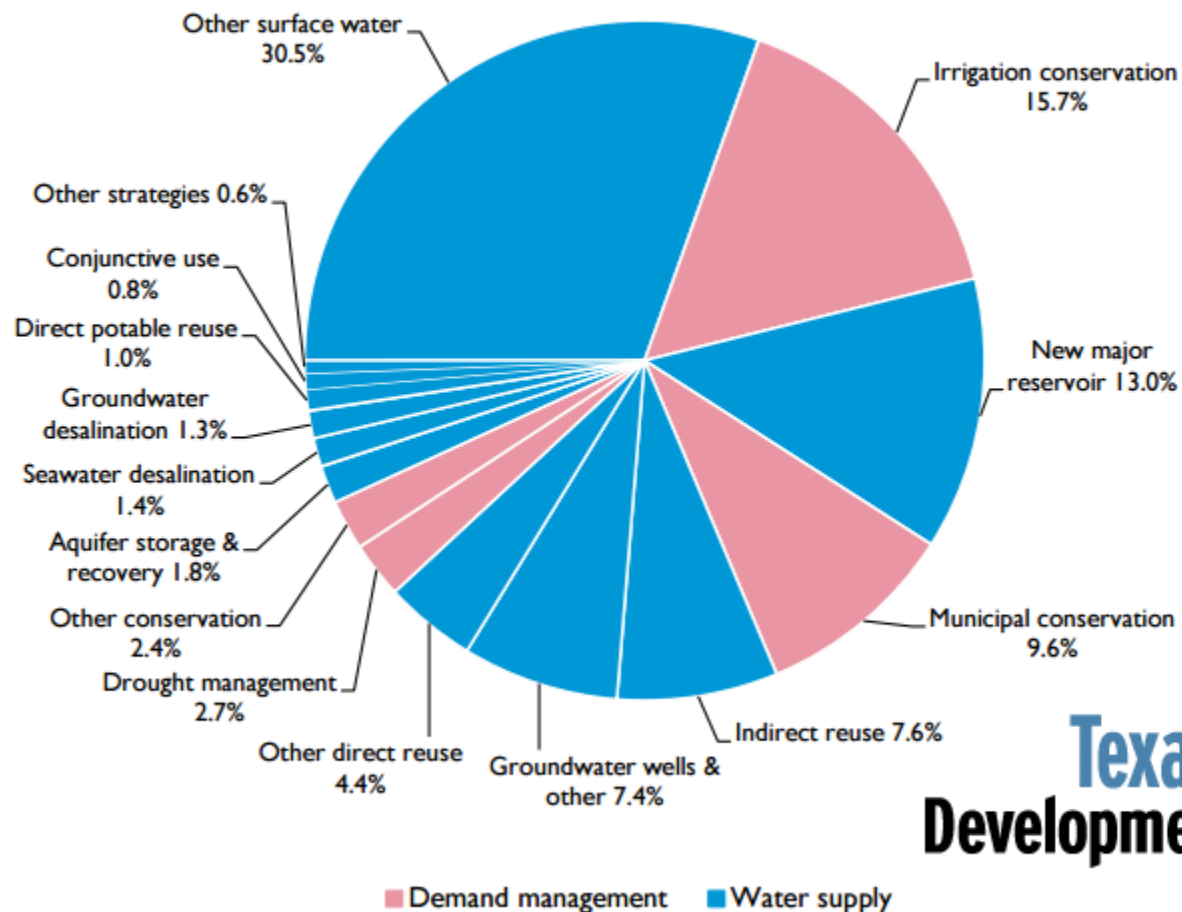
- Water conservation
- Wastewater reuse/rainwater harvesting/brush management/other alternative supplies
- Water marketing
- Conjunctive use of surface and groundwater (ASR)

Strategies for Meeting Future demands (more environmentally impacting)

- Groundwater pumping
- Interbasin transfers
- Direct diversion to off-channel reservoirs
- On-channel reservoirs
- On-channel reservoirs that destroy irreplaceable habitat

Relative Volume of Recommended Water Management Strategies 2070

Figure ES.7 - Share of recommended water management strategies by strategy type in 2070



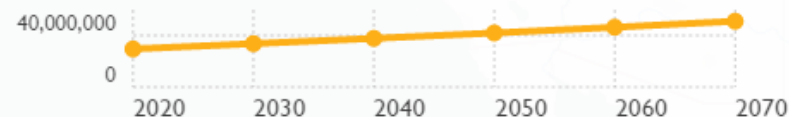
View data for All of Texas

GO

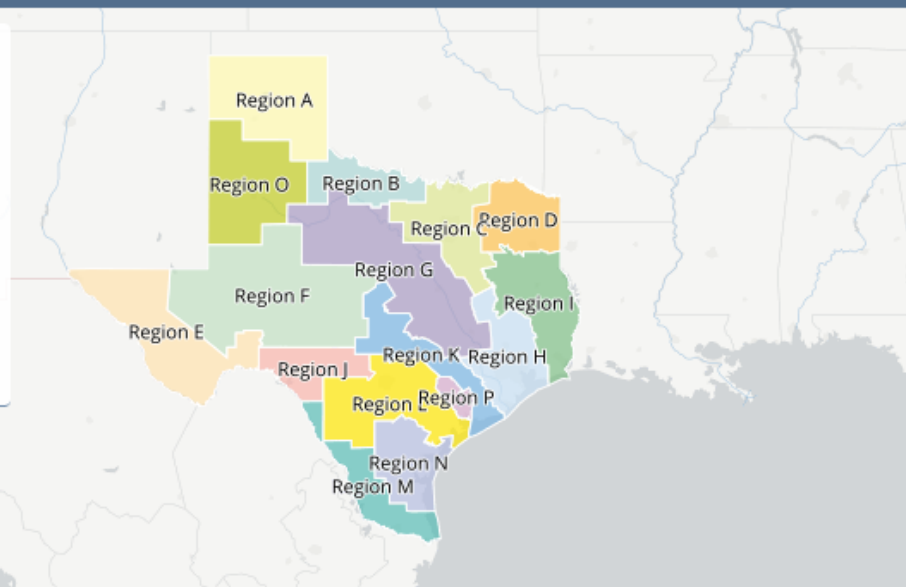
<https://2017.texasstatewaterplan.org/statewide>

TEXAS

Population



SHOW DATA TABLE



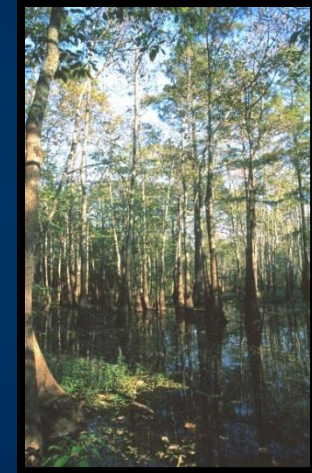
Development of the state water plan is central to the mission of the Texas Water Development Board. Based on 16 regional water plans, the plan addresses the needs of all water user groups in the state – municipal, irrigation, manufacturing, livestock, mining, and steam-electric power – during a repeat of the drought of record that the state suffered in the 1950s. The regional and state water plans consider a 50-year planning horizon: 2020 through 2070.

This website lets water users statewide take an up-close look at data in the 2017 State Water Plan and how water needs change over time by showing:

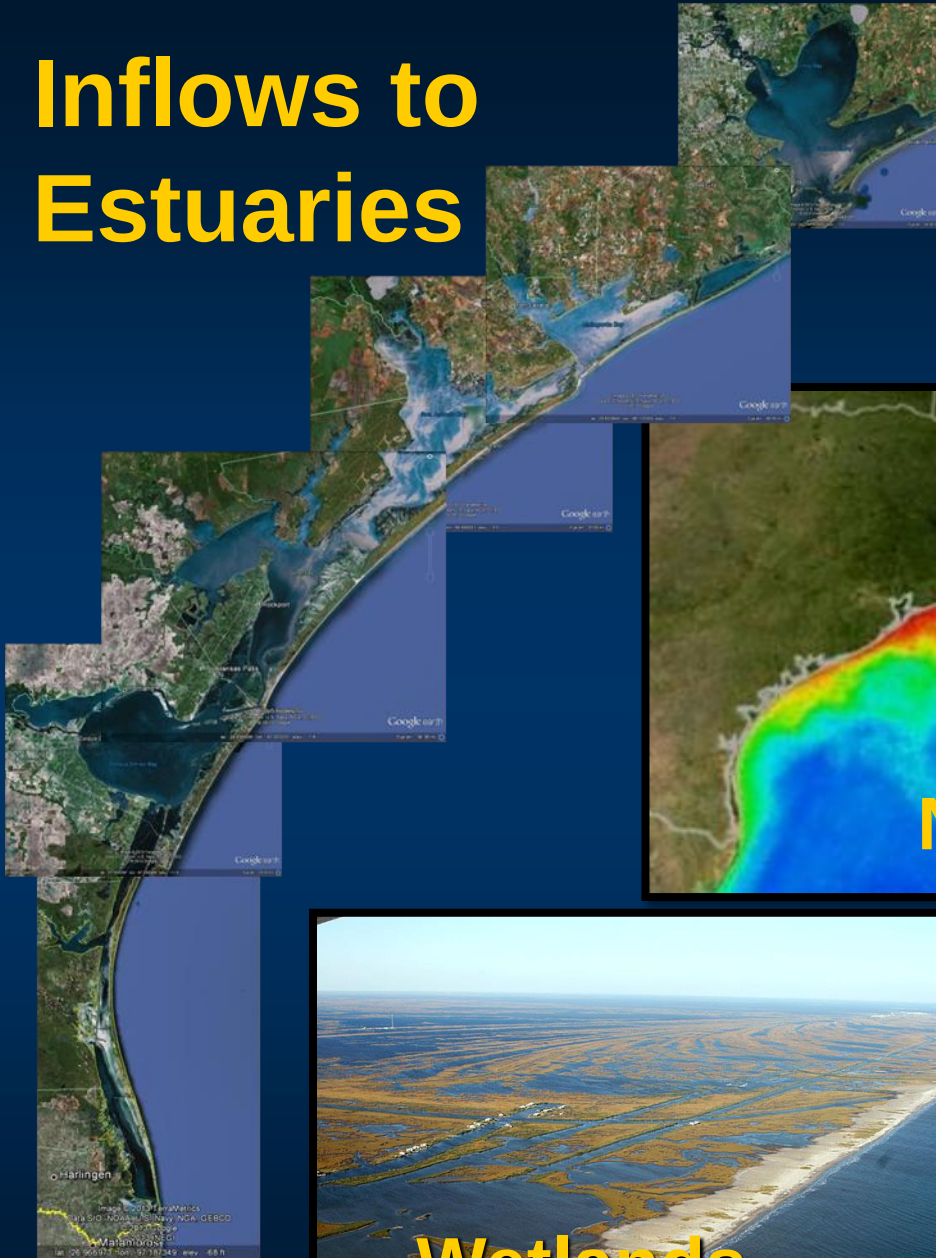
- projected water demands,
- existing water supplies,
- the relative severity and projected water needs (potential shortages),
- the water management strategies recommended to address potential shortages, and
- recommended capital projects and their sponsors.

Environmental Flows:

Flows that remain in the stream and provide for aquatic and riparian habitat; water quality protection; recreation; navigation; and freshwater inflows to bays and estuaries.



Inflows to Estuaries



**Salinity
gradients**

Nutrients

**....create and sustain
estuaries.**

Wetlands

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Reduced Freshwater Inflows Impact Bays and Estuaries

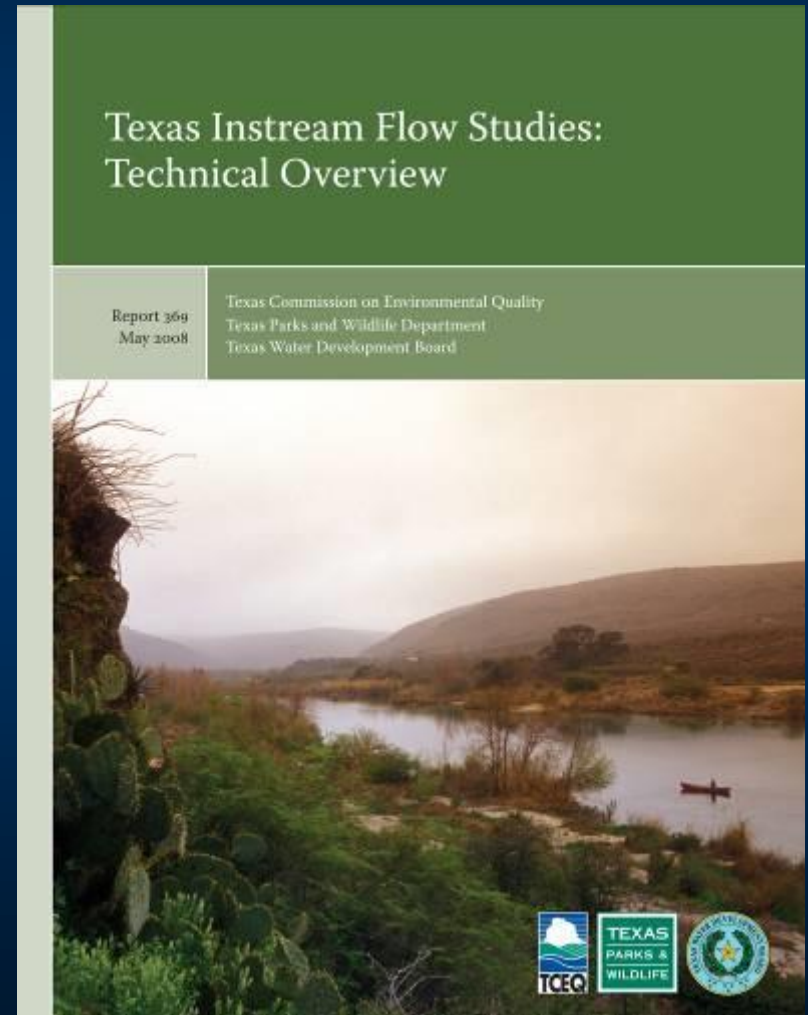
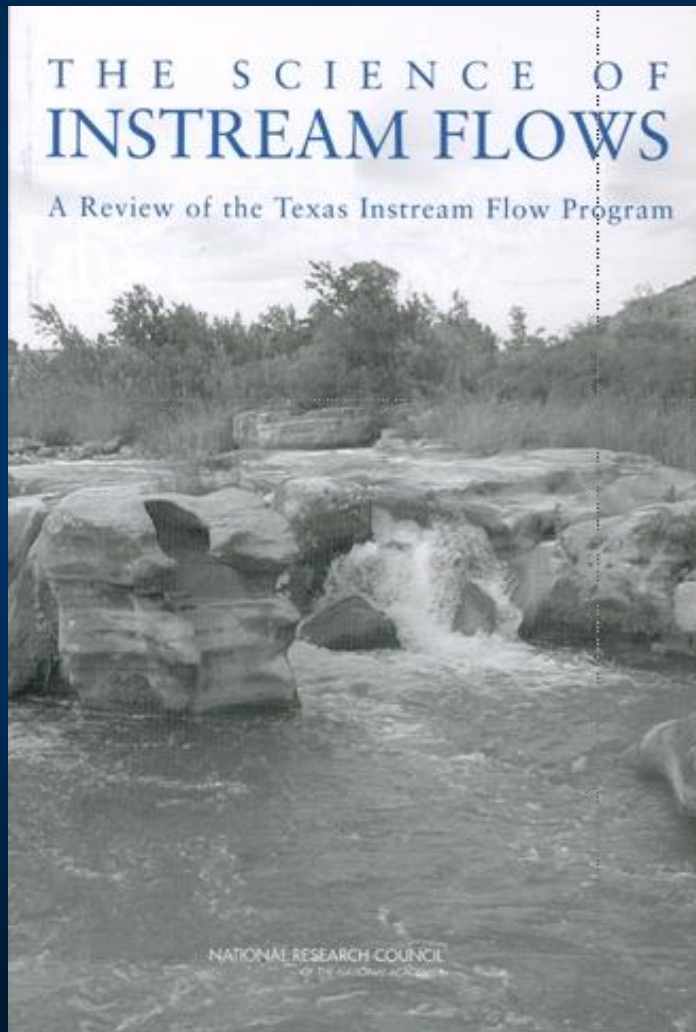


- Reduced freshwater inflows during 2011 led to record high salinities in Texas estuaries that contributed to a coast-wide red tide harmful algal bloom event.
- The 2011 bloom started in September and lasted into 2012. Fish mortality was estimated at 4.4 million.
- Oysters have been impacted by parasites and diseases – the commercial oyster season closed in 2011. Total economic loss was estimated at \$7.5 million.



Senate Bill 2 (2001)

Texas Instream Flow Program



Texas Instream Flow Program

In 2001, Senate Bill 2 directed (but did not fund) TCEQ, TPWD & TWDB to:

- Establish data collection & evaluation program
- Determine “appropriate methodologies” to identify flow conditions necessary to support a sound ecological environment

<http://www.twdb.texas.gov/surfacewater/flows/instream/index.asp>

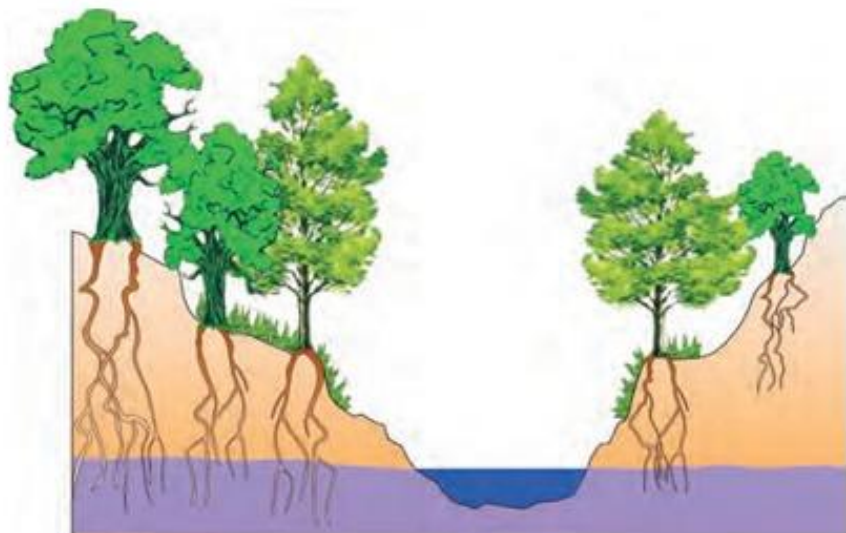


FIGURE 9.7 - Subsistence Flow, Image courtesy of the Texas Instream Flow Program (TIFP), 2008.

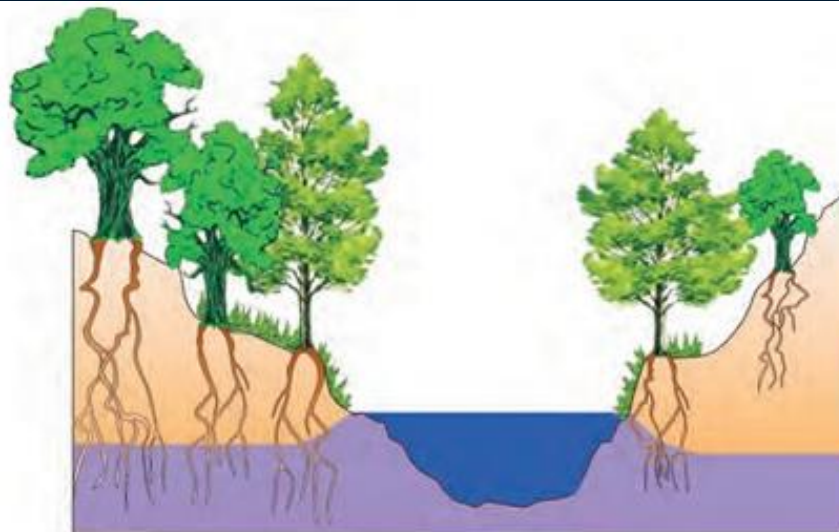


FIGURE 9.8 - Base Flow, Image courtesy of the Texas Instream Flow Program (TIFP), 2008.

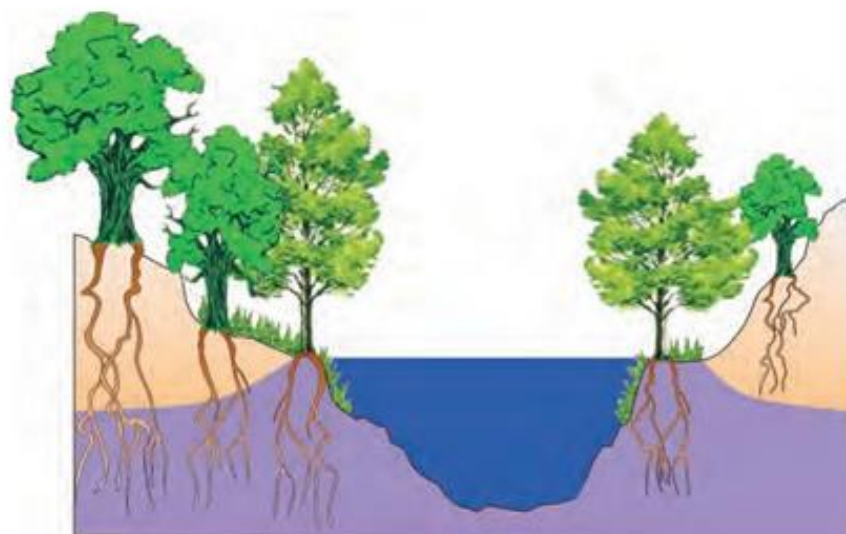


FIGURE 9.9 - High Pulse Flow, Image courtesy of the Texas Instream Flow Program (TIFP), 2008.

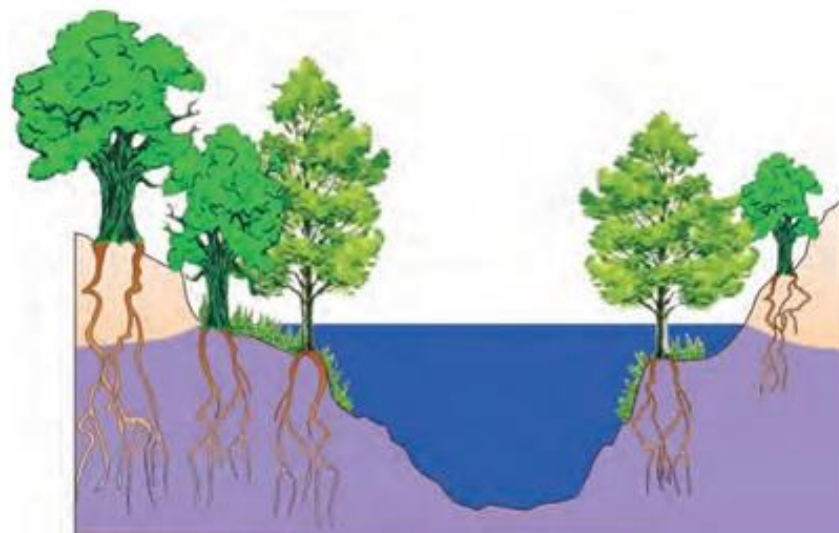
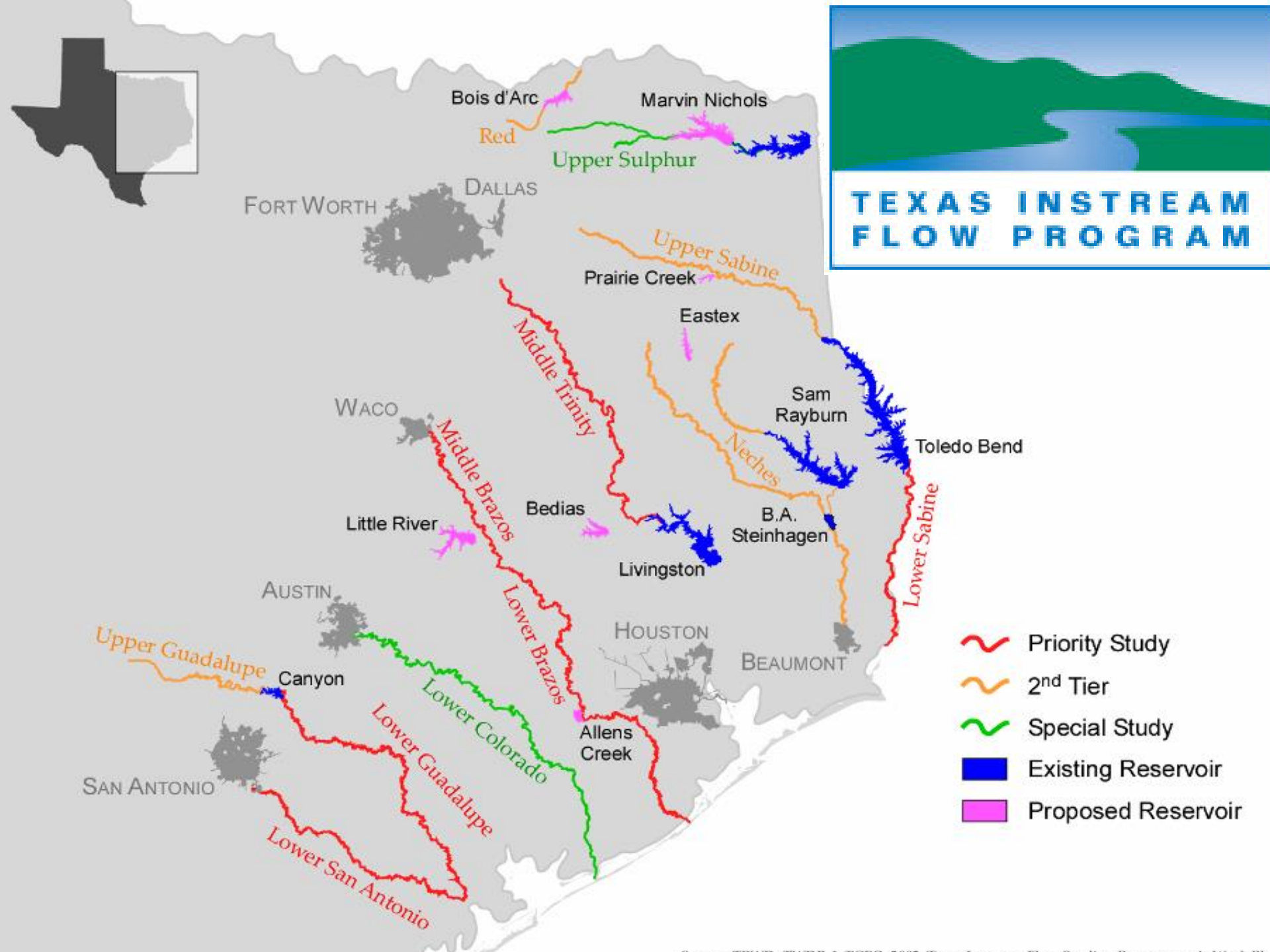


FIGURE 9.10 - Overbank Flow, Image courtesy of the Texas Instream Flow Program (TIFP), 2008.



Senate Bill 3

Environmental Flows

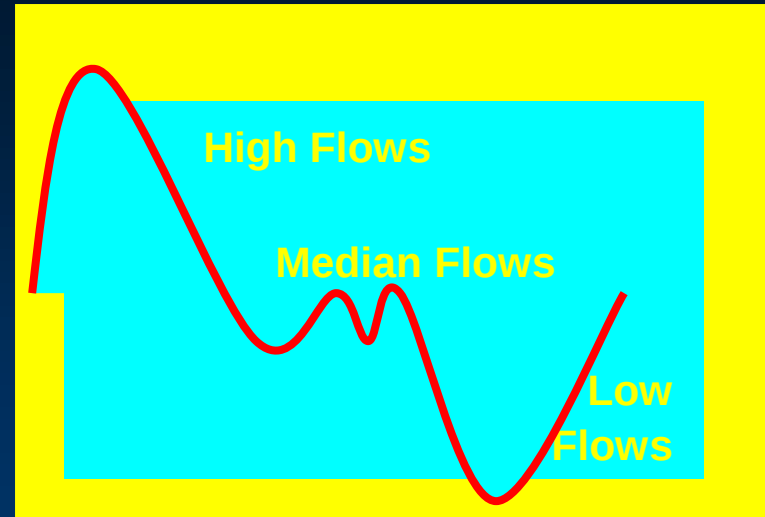
(2007- present)



Environmental flow regimes are to be developed and recommended by expert science teams working with technical support from state agencies and academic institutions; recommendations shall be based solely on best available science.



Environmental Flow Regime Definition



“A schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by a 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.”

Environmental Flows Process



Each Basin/Bay Area Stakeholders Committee reviews findings of Expert Science Team and recommends environmental flow regimes to TCEQ

Through rulemaking, TCEQ adopts environmental flow standards and establishes an environmental flow “set aside” if unappropriated water is available; rulemaking process allows for broad public input

Environmental Flows Management



Environmental flow standards and implementation strategies are subject to “adaptive management,” meaning that the success and/or failure of management measures will be assessed and adjusted as new science and information becomes available. Flow standards will be subject to periodic review and revision.

Gage ID 08030500

[Link to eflow table](#) [More info](#)

Link to basin rule [More info](#)
TAC298

[Link to gage website](#) [More info](#)

Agency

Station name	Sabine Rv nr Ruliff, TX
--------------	----------------------------

State	TX
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Site Status
(Active/Inactive)

Drainage area (sq mi) 9,329

Reviewed	Y
----------	---

RFT years	80
-----------	----

Zoom to

SB 3: Next Steps



- Adaptive management requires periodic review and possible revision of the standards.
- Develop strategies to meet environmental flow needs.
- Decision Support Tools
- Voluntary Water Market-based approach
- Continue to improve science!





- [Water Rights: Technical Resources Home](#)
- [Water Availability Models](#)
- [Water Conservation Plans and Reports](#)
- [Drought Contingency Planning](#)
- [Environmental Flows](#)
- [Instream Uses Program](#)

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Environmental Flows

Committees, stakeholder and advisory groups, rules, and tools for assessing environmental flows.

Background

The Legislature passed bills to develop, manage and preserve the water resources of the state and protect instream and freshwater inflows. The bills established the Environmental Flows Advisory Group and Science Advisory Committee and required TCEQ to adopt rules related to environmental flows. (House Bill 3 and Senate Bill 3, 80th Legislature, 2007)

What is Environmental Flow?

An environmental flow is an amount of water that should remain in a stream or river for the benefit of the environment of the river, bay, and estuary, while balancing human needs. (For the legislative definition of an environmental flow regime, see ([Title 2, Texas Water Code, Section 11.002.16.](#))

Environmental Flows Advisory Group

Environmental Flows Science Advisory Committee

Basin and Bay Stakeholder Committees and Expert Science Teams

- [Trinity and San Jacinto Rivers and Galveston Bay](#)
- [Sabine and Neches Rivers and Sabine Lake Bay](#)
- [Colorado and Lavaca Rivers and Matagorda and Lavaca Bays](#)
- [Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays](#)
- [Nueces River and Corpus Christi and Baffin Bays](#)
- [Brazos River and Associated Bay and Estuary System](#)



River Basins with
Adopted Flow
Standards



How are we doing? Take our customer satisfaction survey

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To be notified when we add new information to our Environmental Flows Web pages, please [sign up for E-Flows program updates.](#)

Related Content

- [Assistance for Small Business and Local Government](#)
- [Compacts with Other States](#)
- [Dam Safety](#)
- [Groundwater](#)
- [Irrigation](#)
- [TCEQ Regional Offices](#)

Environmental Flow Information Toolkit (EFIT)

1. Decision Support Tool (DST)

Multi-disciplinary geospatial tool to identify/prioritize water rights and groundwater permits with **highest conservation value**.

2. EFIT Strategies

Identify and implement voluntary strategies to secure water for the environment, suitable for Texas policy and public dialogue.

Texas Water Explorer



Categories —

- ☐ Water Quantity
- ☒ Water Quality
- ☐ Economic Productivity
- ☐ Governance
- ☐ River Ecosystem Health
- ☐ Water Conservation

☒ Groundwater | ☒ Surface Water

Indicators

— Surface Water Quality Impairments

☒ 303d Listings

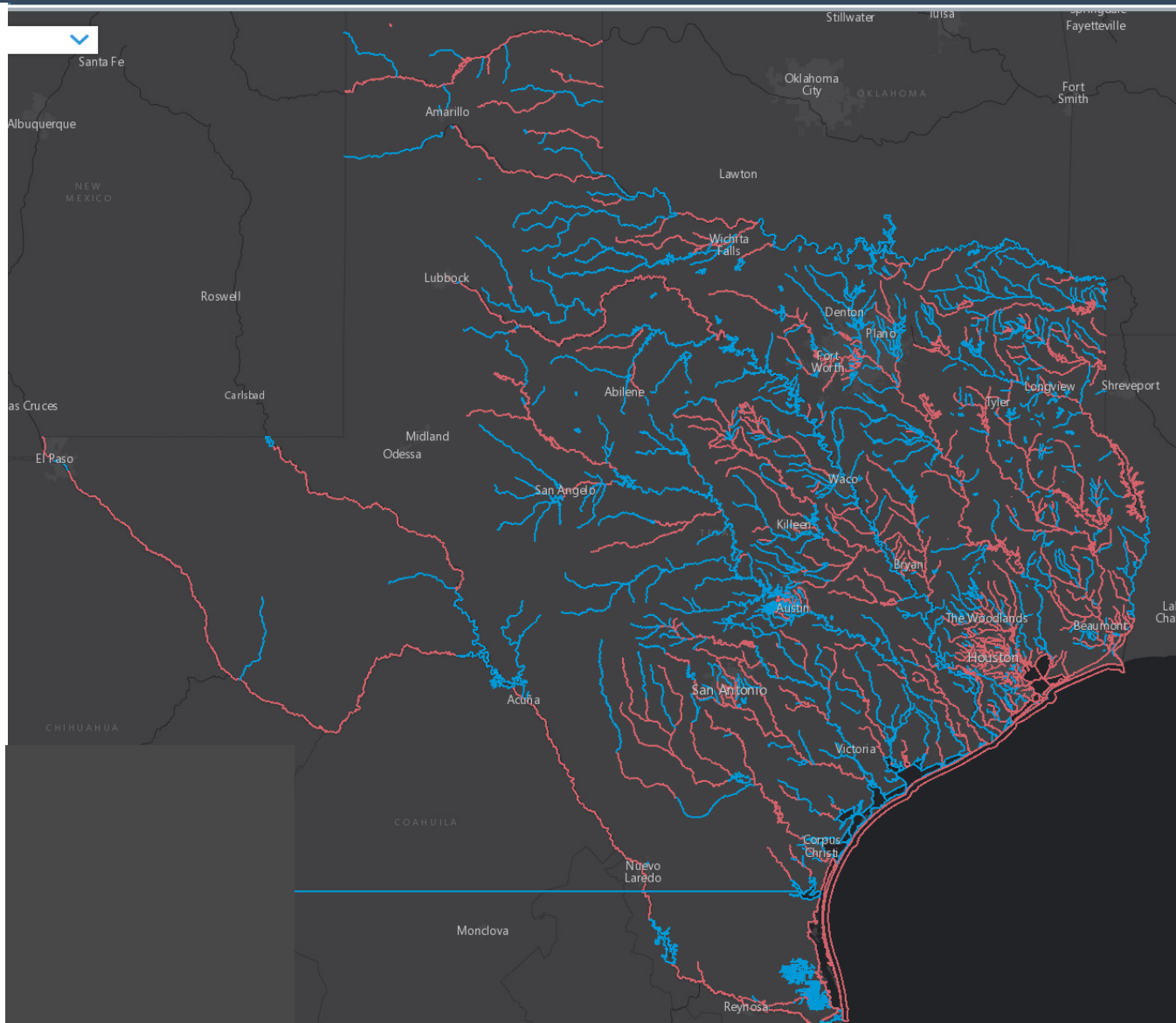
☒ River Segments on 303d List

☐ Pct. of River Basin on 303d List, by Segment Length

+ Vulnerability to Ecological Impacts From Land Uses

+ Groundwater Quality: Trends In Water Quality Parameters

+ Groundwater Exceedances of Drinking Water Quality Standards



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