Statewide and Regional Water Planning for the Future

Planning process for future water supplies in Texas

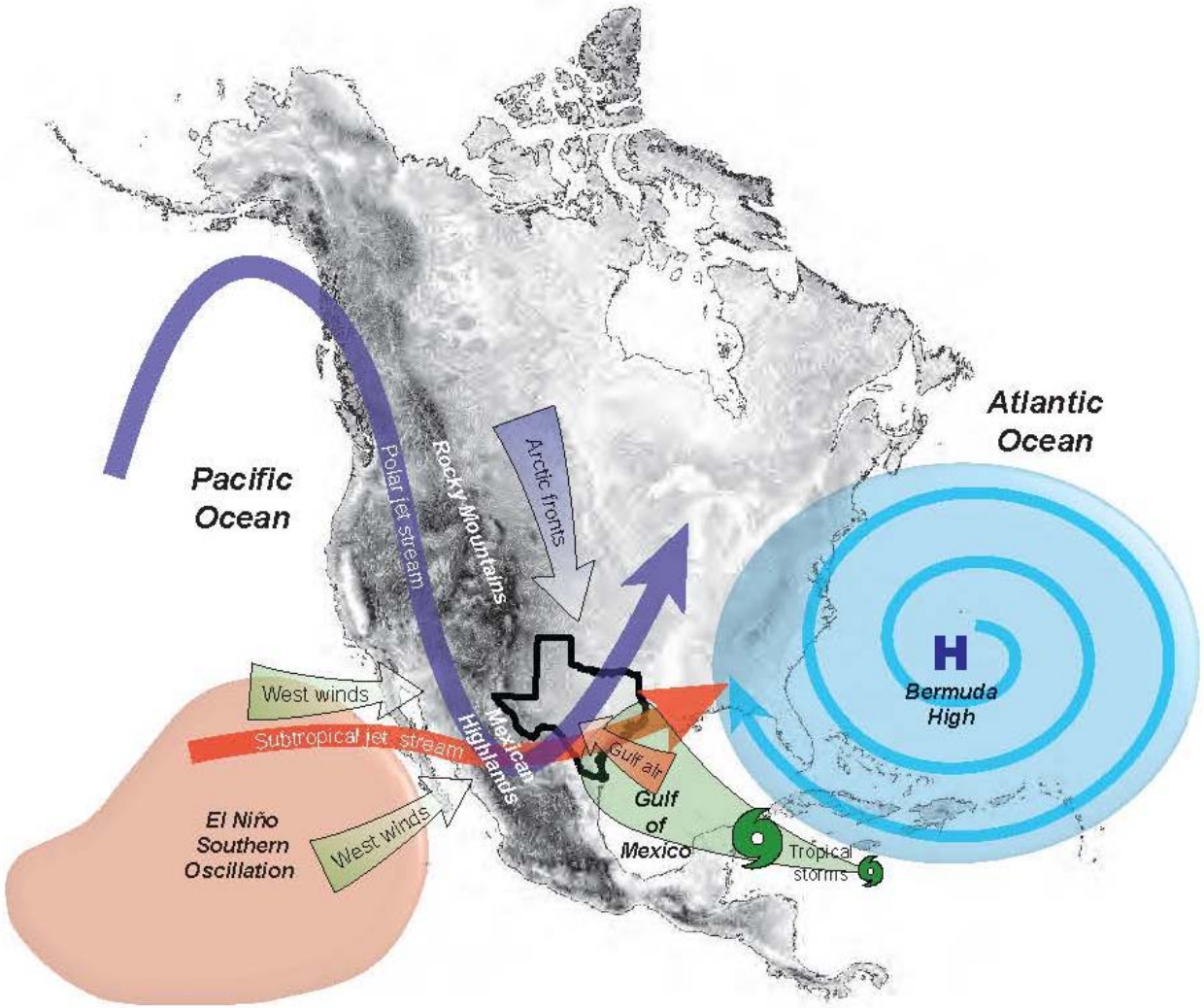
Sunset Valley City Council

May 14, 2015

Presenter:

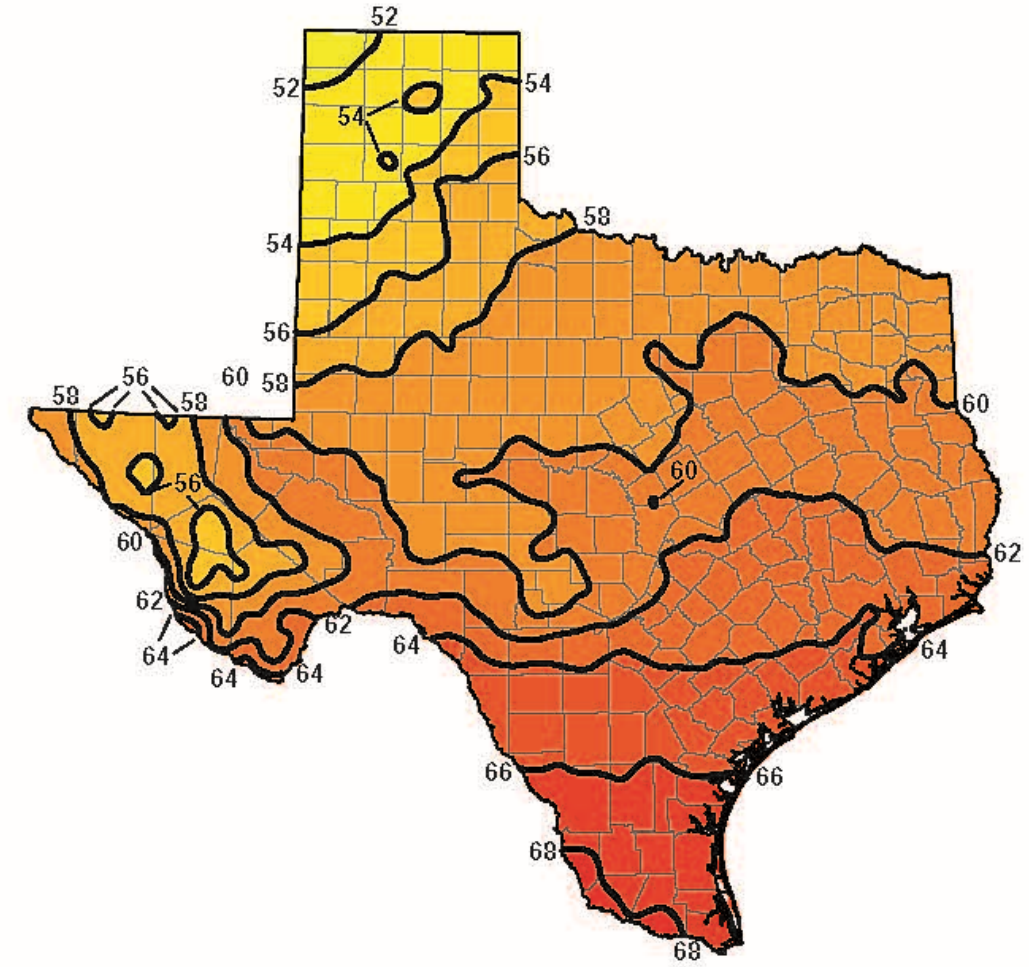
David Meesey, Ret.

Texas' Unique Climate Variability

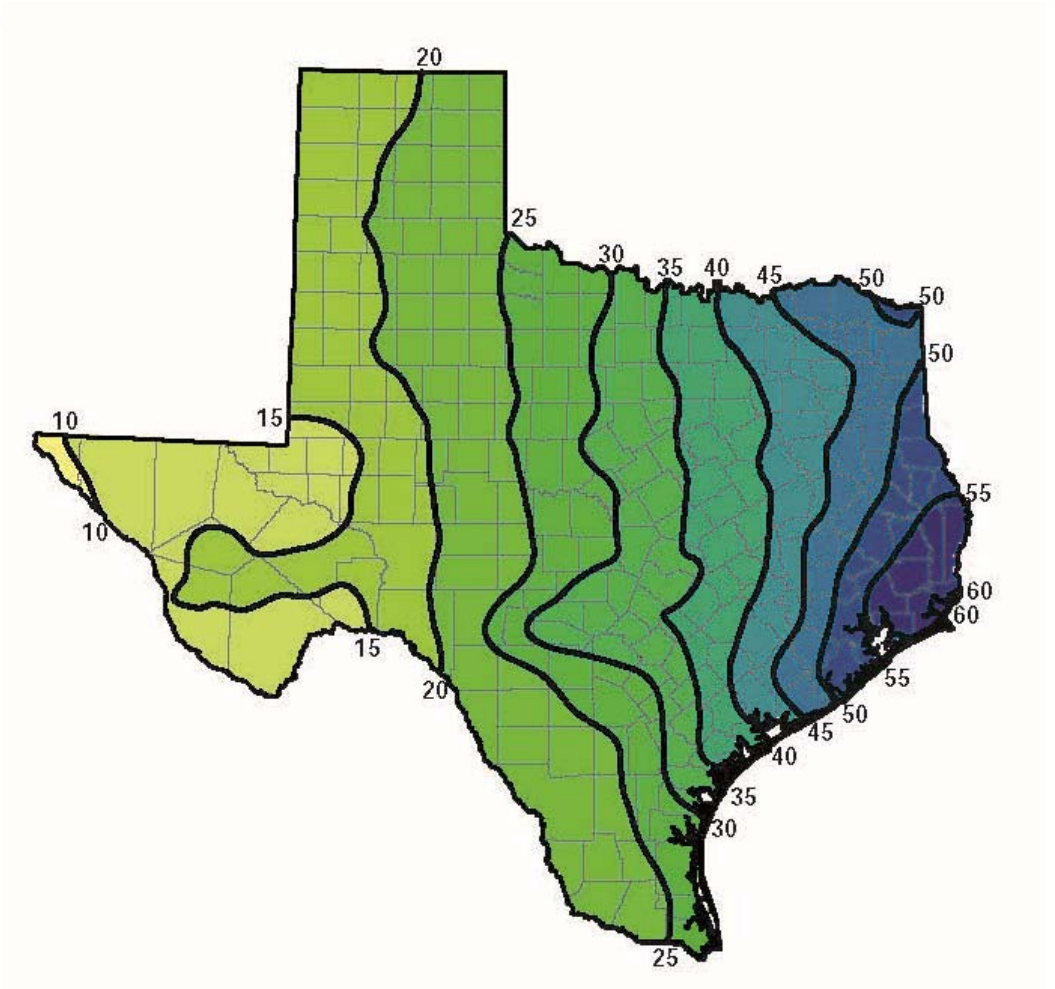



Texas River Basins
Canadian
Red
Sulphur
Cypress
Sabine
Trinity
Brazos
Neches
Colorado
Rio Grande
San Jacinto
Guadalupe
San Antonio
Lavaca
Nueces
Nueces-Rio Grande
Neches-Trinity
Trinity-San Jacinto
San Jacinto-Brazos
Brazos-Colorado
Colorado-Lavaca
Lavaca-Guadalupe
San Antonio-Nueces
OKLAHOMA
ARKANSAS
NEW MEXICO
LOUISIANA
USA
Mexico
CHIHUAHUA
COAHUILA
DURANGO
NUEVO LEON
TAMAULIPAS
Gulf of Mexico

Average Annual Temperature for 1981 to 2010 (Degrees Fahrenheit)

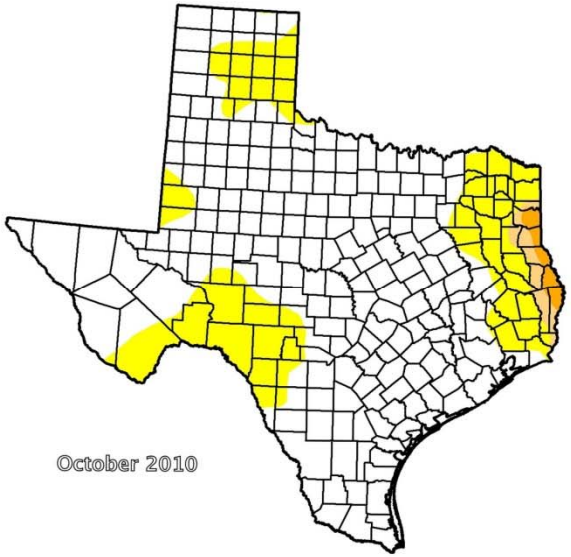


Average Annual Precipitation for 1981 to 2010 (Inches)

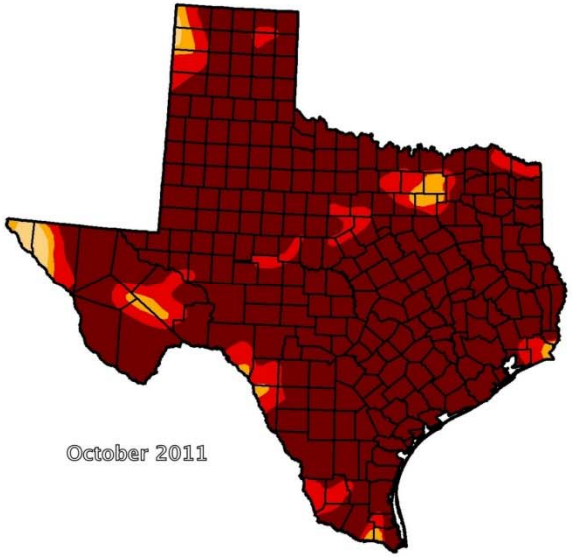


U.S. Drought Monitor (TX)

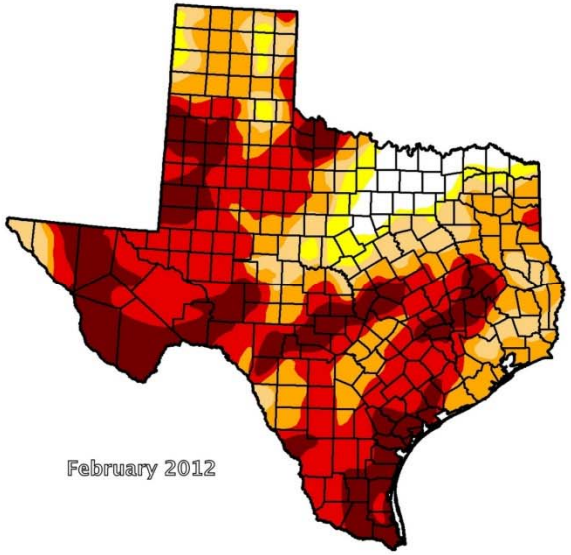
Oct. 2010, Oct. 2011, and Feb. 2012



October 2010



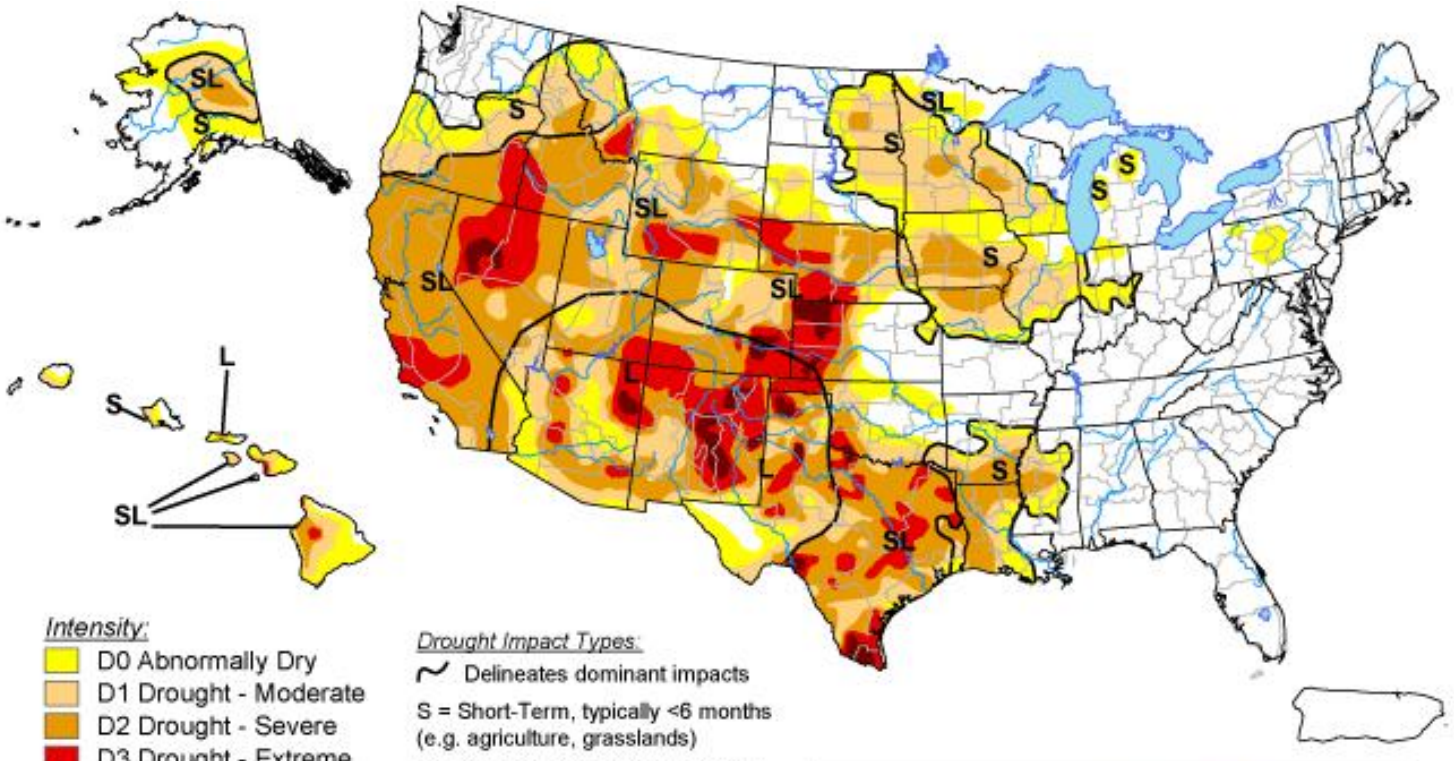
October 2011



February 2012

U.S. Drought Monitor

September 3, 2013



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically <6 months (e.g. agriculture, grasslands)

L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, September 5, 2013

Author: David Miskus, NOAA/NWS/NCEP/CPC

Texas Water Law

TWC Section 11.021(a)

- "State water" defined:
  - The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the ***property of the state***.

Texas Surface Water Law:

Evolved from Two Doctrines of Water Law

- Riparian Doctrine
  - Private water rights are tied to the ownership of land bordering a natural stream or river
- Doctrine of Prior Appropriation
  - Water rights are acquired through express appropriation from sovereign and by compliance with statutory requirements
  - **First in Time, First in Right**

TWC Section 11.023

- Purposes for which water may be **appropriated, stored or diverted**:
  - Domestic and municipal
  - Agricultural and industrial
  - Mining and recovery of minerals
  - Hydroelectric power and navigation
  - Recreation and pleasure, public parks and game preserves
  - Or for any other beneficial use.

TWC Section 11.121

- Permit Required
  - No person may appropriate any state water or begin construction of any work designed for the storage, taking, or diversion of water **without first obtaining a permit** from the commission.

Water Rights Permit Exemptions
TWC Sections 11.142, 11.1421, 11.1422

1. 200 acre feet (or less) dam or reservoir for domestic and livestock purposes
2. 200 acre feet (or less) dam or reservoir for fish and wildlife purposes
3. Using water from the Gulf of Mexico for drilling and producing petroleum
4. Constructing a reservoir for sediment control as part of a surface coal mining operation
5. Using water from the Gulf of Mexico for mariculture activities
6. Using water to irrigate historic cemeteries

TWC Section 11.134

Requirements for Obtaining a Water Right

- Unappropriated Water Available
- Beneficial Use Requirement
- **Impairment of Existing Water Rights**
- Not Harmful to the Public Welfare (social, economic, environmental)
- **Environmental Impacts**
- Consistency with **Regional and State Plans**
- **Conservation and Drought Contingency Plans**

Direct Reuse

- Water Code 11.046(c) – Water appropriated may be beneficially used and reused
- Treated effluent never reaches a state watercourse (i.e., flange-to-flange, or drain-to-faucet)
- Quality regulated by TWC Chapter 26 and 30 TAC Chapter 210
- Primarily used for agriculture or landscape irrigation or for industrial supplies, but some cities looking to direct reuse of effluent for municipal water supplies

Indirect Reuse

- Effluent is discharged into a state watercourse pursuant to TPDES permit and diverted downstream for reuse
- Quantity regulated by TWC Chapter 11 and 30 TAC Chapters 295 and 297
- Developed water-based return flows vs. in-basin surface water-based return flows
- Historical return flows vs. future return flows

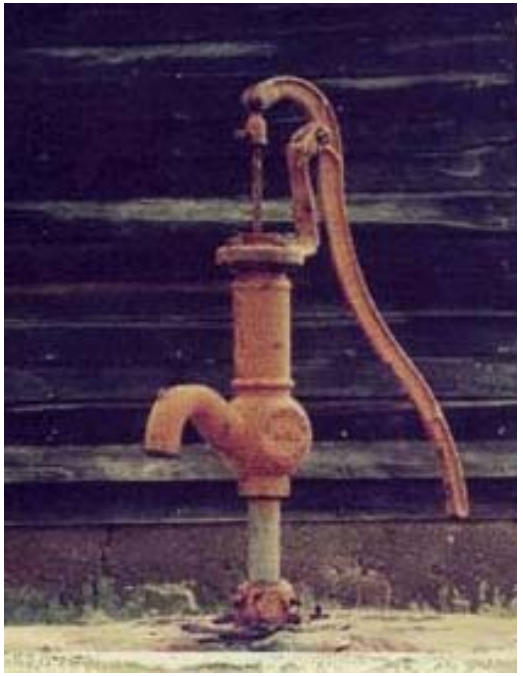
Texas Groundwater Law

Texas Groundwater Law

- Rule of Capture
  - English common law doctrine
  - First adopted by Texas Supreme Court in 1904
  - Texas Supreme Court reaffirmed rule of capture several times since
  - Surface estate owner has the right to pump groundwater from beneath the surface of his or her surface estate
  - Rule of the “biggest pump”

Texas Groundwater Law

- Rule of Capture
  - One cannot sue his or her neighbor for injunctive relief or damages resulting from the neighbor's depletion of the groundwater resources, except for:
    - Wasteful pumping
    - Pumping with malicious intent to injure neighbor
    - Negligent pumping that causes subsidence



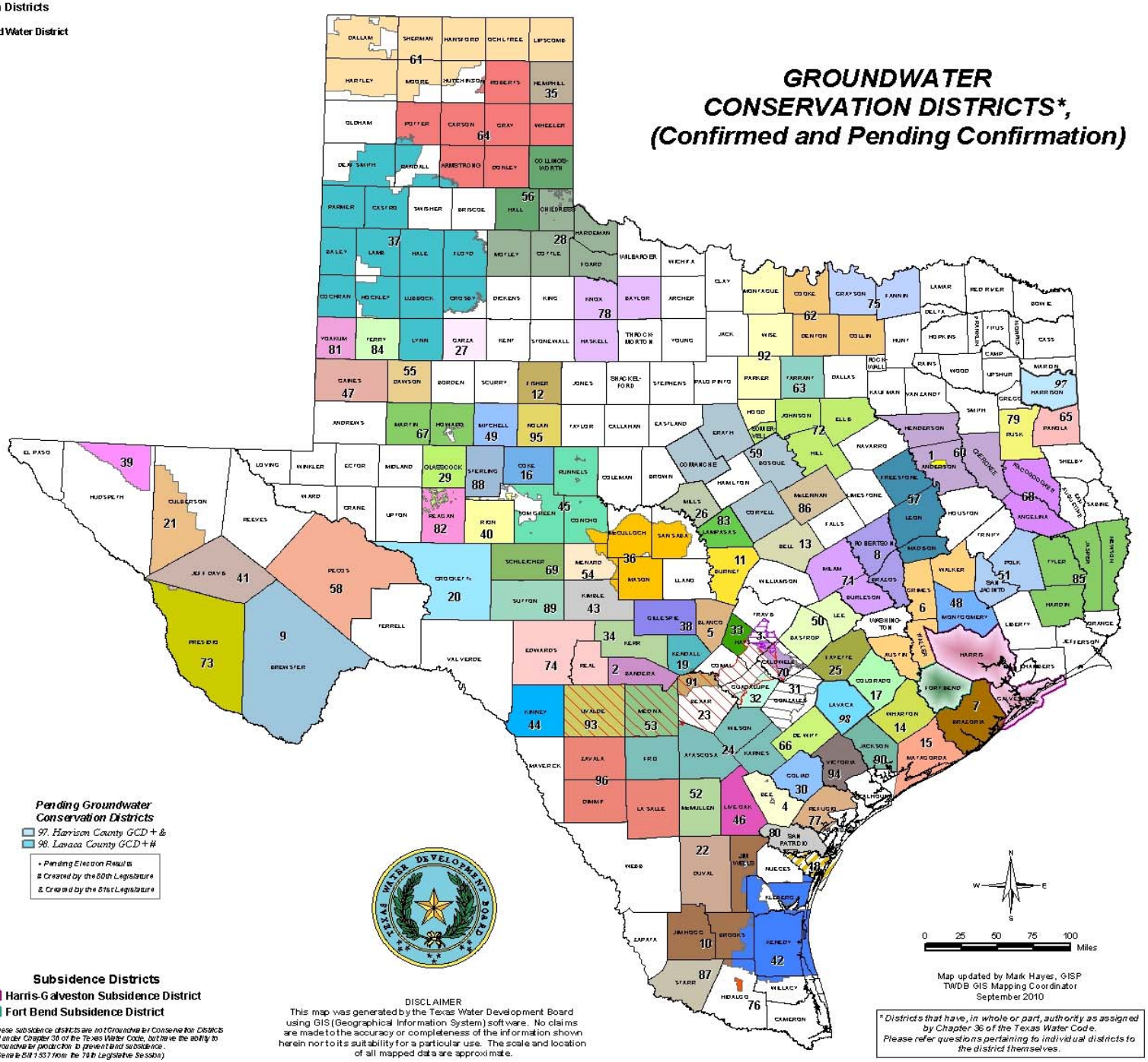
Texas Groundwater Law

- Chapters 35 and 36 of the Texas Water Code regulate groundwater law and groundwater conservation districts
- TWC Section 36.002:
- “Sec. 36.002. OWNERSHIP OF GROUNDWATER
- (a) The legislature recognizes that a landowner owns the groundwater below the surface of the landowner's land as real property.
- (d) This section does not…affect the ability of a district to regulate groundwater production as authorized by this chapter.”

TWC Section 36.0015

- In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, consistent with the objectives of Section 59, Article XVI, **Texas Constitution, groundwater conservation districts may be created as provided by this chapter**. **Groundwater conservation districts** created as provided by this chapter are the **state's preferred method of groundwater management** through rules developed, adopted, and promulgated by a district in accordance with the provisions of this chapter.

GROUNDWATER CONSERVATION DISTRICTS*, (Confirmed and Pending Confirmation)



Confirmed Groundwater Conservation Districts

1. Anderson County UWCD
2. Bandera County River Authority & Ground Water District
3. Barton Springs/Edwards Aquifer CD
4. Bee GCD
5. Blanco-Pedernales GCD
6. Bluebonnet GCD
7. Brazoria County GCD
8. Brazos Valley GCD
9. Brewster County GCD
10. Brush Country GCD
11. Central Texas GCD
12. Clear Fork GCD
13. Clearwater UWCD
14. Coastal Bend GCD
15. Coastal Plains GCD
16. Coke County UWCD
17. Colorado County GCD
18. Corpus Christi ASRCD
19. Cow Creek GCD
20. Crockett County GCD
21. Culberson County GCD
22. Duval County GCD
23. Edwards Aquifer Authority
24. Evergreen UWCD
25. Fayette County GCD
26. Fox Crossing Water District
27. Garza County UWCD
28. Gateway GCD
29. Glasscock GCD
30. Goliad County GCD
31. Gonzales County UWCD
32. Guadalupe County GCD
33. Hays Trinity GCD
34. Headwaters GCD
35. Hemphill County UWCD
36. Hickory UWCD No. 1
37. High Plains UWCD No.1
38. Hill Country UWCD
39. Hudspeth County UWCD No. 1
40. Irion County WCD
41. Jeff Davis County UWCD
42. Kenedy County GCD
43. Kimble County GCD
44. Kinney County GCD
45. Lipan-Kickapoo WCD
46. Live Oak UWCD
47. Llano Estacado UWCD
48. Lone Star GCD
49. Lone Wolf GCD
50. Lost Pines GCD
51. Lower Trinity GCD
52. McMullen GCD
53. Medina County GCD
54. Menard County UWD
55. Mesa UWCD
56. Mesquite GCD
57. Mid-East Texas GCD
58. Middle Pecos GCD
59. Middle Trinity GCD
60. Neches & Trinity Valleys GCD
61. North Plains GCD
62. North Texas GCD
63. Northern Trinity GCD
64. Panhandle GCD
65. Panola County GCD
66. Pecan Valley GCD
67. Permian Basin UWCD
68. Pineywoods GCD
69. Plateau UWC and Supply District
70. Plum Creek CD
71. Post Oak Savannah GCD
72. Prairielands GCD
73. Presidio County UWCD
74. Real-Edwards C and R District
75. Red River GCD
76. Red Sands GCD
77. Refugio GCD
78. Rolling Plains GCD
79. Rusk County GCD
80. San Patricio County GCD
81. Sandy Land UWCD
82. Santa Rita UWCD
83. Saratoga UWCD
84. South Plains UWCD
85. Southeast Texas GCD
86. Southern Trinity GCD
87. Starr County GCD
88. Sterling County UWCD
89. Sutton County UWCD
90. Texana GCD
91. Trinity Glen Rose GCD
92. Upper Trinity GCD
93. Uvalde County UWCD
94. Victoria County GCD
95. Wes-Tex GCD
96. Wintergarden GCD

Pending Groundwater Conservation Districts

97. *Harrison County GCD + &*
98. *Lavaca County GCD + #*

+ Pending Election Results
 # Created by the 80th Legislature
& Created by the 81st Legislature

Subsidence Districts

- Harris-Galveston Subsidence District
- Fort Bend Subsidence District

NOTE: These 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. (Refer to Senate Bill 1337 from the 70th Legislative Session)

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.

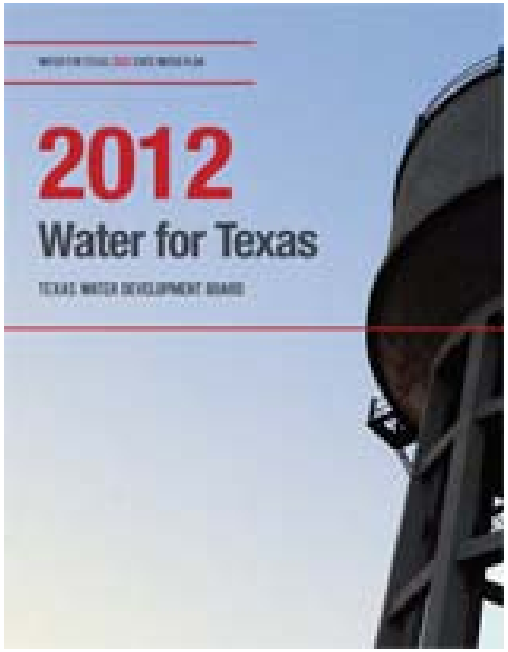
0 25 50 75 100 Miles

Map updated by Mark Hayes, GISP
TWDB GIS Mapping Coordinator
September 2010

** 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.*

Water-Related State Agencies and State Water Planning

Texas Water Development Board



TCEQ

Texas Commission on Environmental Quality

- Primary agency oversight for Texas surface water law and almost all water quality matters
  - Drinking water
  - Water Availability
  - Water Quality Issues
- Responsible for surface water and water quality permitting and enforcement
- Implements curtailment of water rights during times of drought

Drought Curtailment Rules
Texas Water Code §36.1-36.0

- The Executive Director may determine not to suspend a junior water right based on **public health, safety and welfare concerns**. §36.5

- Gives TCEQ Executive Director the authority to take steps to address drought conditions, such as temporarily suspending the right to divert and/or adjust the allocation of water between water rights holders in light of their respective **priority and purpose of use**.

- Curtailment to be made in accordance with Texas' prior appropriation system and "to the greatest extent possible" conform to the **preferences** for water use established in the Texas Water Code. §11.024

Texas Water Development Board

Responsibilities

- Support of **regional water planning process**
- Generation of the **State Water Plan**
- Provision of grants and loans for water supply and water quality-related projects, as well as groundwater conservation district creation expenses
- Data collection and technical assistance
- Review and approve groundwater district management plans and participate in the establishment of Desired Future Conditions for aquifers

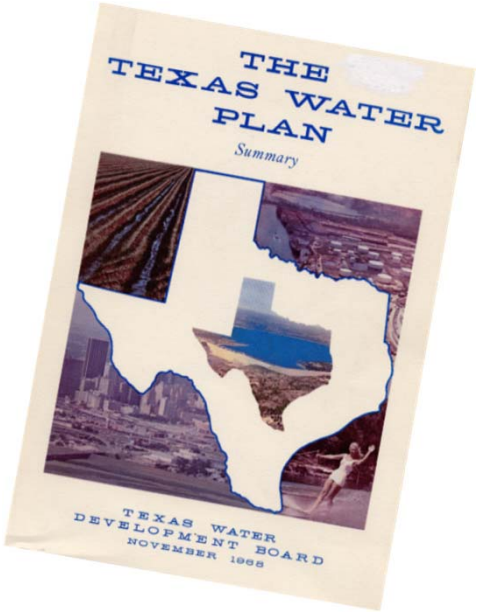
Texas Water Development Board (TWDB)
State Water Planning

- **Financing**
  - Water/Wastewater Infrastructure Financing
  - Below market interest rates; programs w/flexible terms
- **Planning**: Regional and State Water Plans
  - Planning to meet water needs for 50 years
  - Regional facility and flood protection planning
- **Data**: Natural Resource Data Clearinghouse
  - Texas Natural Resource Information System
  - TNRIS Director: State GIS Officer

1950's Drought – Legislative Response

- **Late 1950s Drought of Record**
  - 1957: Creation of TWDB
  - $200 million Water Development Fund
- **First Water Plan: State Board of Water Engineers 1961**
  - 9 State Water Plans, 1961-2012
- **'68 Plan featured "Burleigh's Ditch" which would move Mississippi River water into Texas to the Panhandle**

State developed the water plan with input from stakeholders



Planning Paradigm Shift: SB1 & Regional Planning

- Late 1990s: Potential New Drought of Record
  - ~$6 billion economic losses in '96 (mostly agriculture)
  - ~300 entities with threat to water supplies
  - 1997 & 2001: Implementation of SB 1 & 2 which created & refined regional water planning
- SB 1 in 1997 – plans would be developed for each region to meet needs during drought of record
  - State water plan would be developed based on 16 approved regional plans
  - TWDB interprets data & make policy recommendations

Developing Regional Water Planning

- TWDB developed rules for planning - 1997
- TWDB delineated 14 planning regions; expanded to final 16 through public comment
- Initial Coordinating Bodies formed by TWDB – 1998; added 1 member and became regional water planning groups
- Regional and State plans produced every 5 years; first plans developed in 2.5 years – Jan 2001
- Statutory interests (12) represented in each region; TWDB staff are non-voting members
- Members represent interest groups for the entire region, not just their home areas

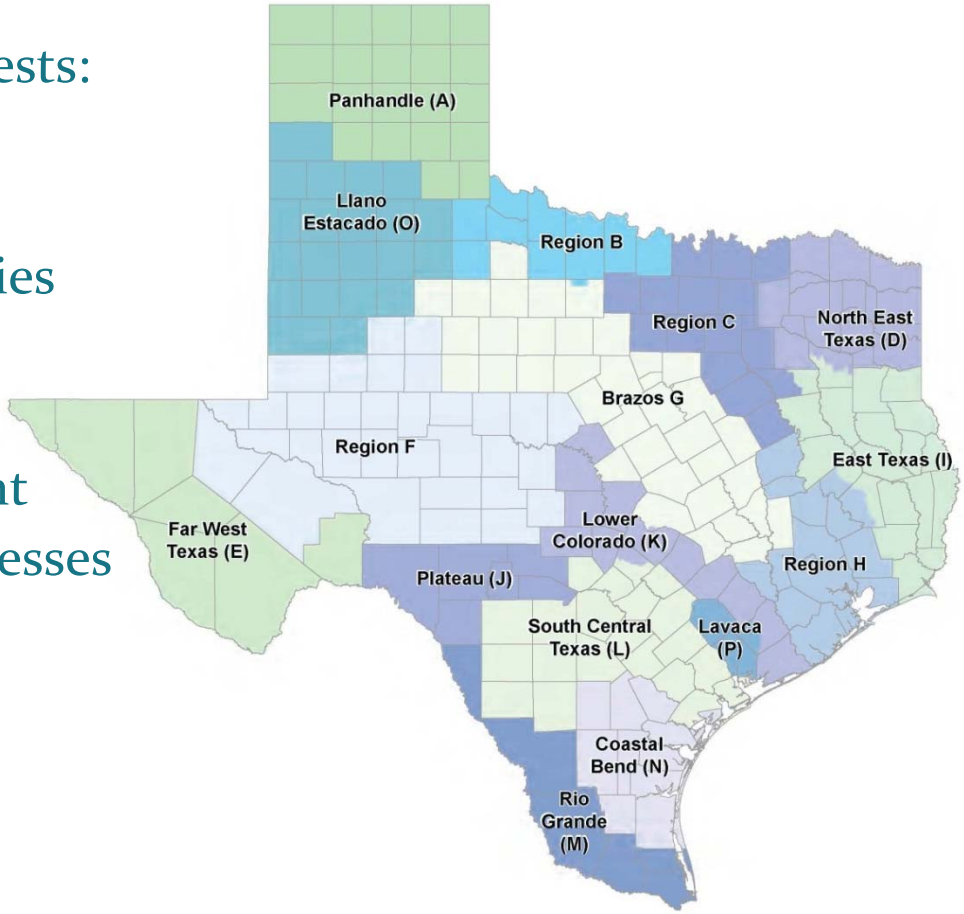
Water Planning Terms & Concepts

- Drought-of-Record (**DoR**) - not the worst ever but the worst that was recorded in TX (about 100-150 years)
- We plan for **50** years by decade – the 2016 regional plans will project to **2070**
- Water volume in plans is shown in **acre-feet-yr (AFY)**
  - 1 Acre-foot = **325,851 gallons**
  - Major reservoir = **5,000 acre-feet** (**1.63 billion gal**)
- Need is not equal to demand (supply – demand = **surplus**) (positive) or **need** (negative)
- Water management strategy – **WMS (ex: new well)**
- Wholesale water provider – **WWP (ex: LCRA)**
- Water user group – **WUG (ex: Burnet; Wharton Co Irrigation)**

Regional Water Planning

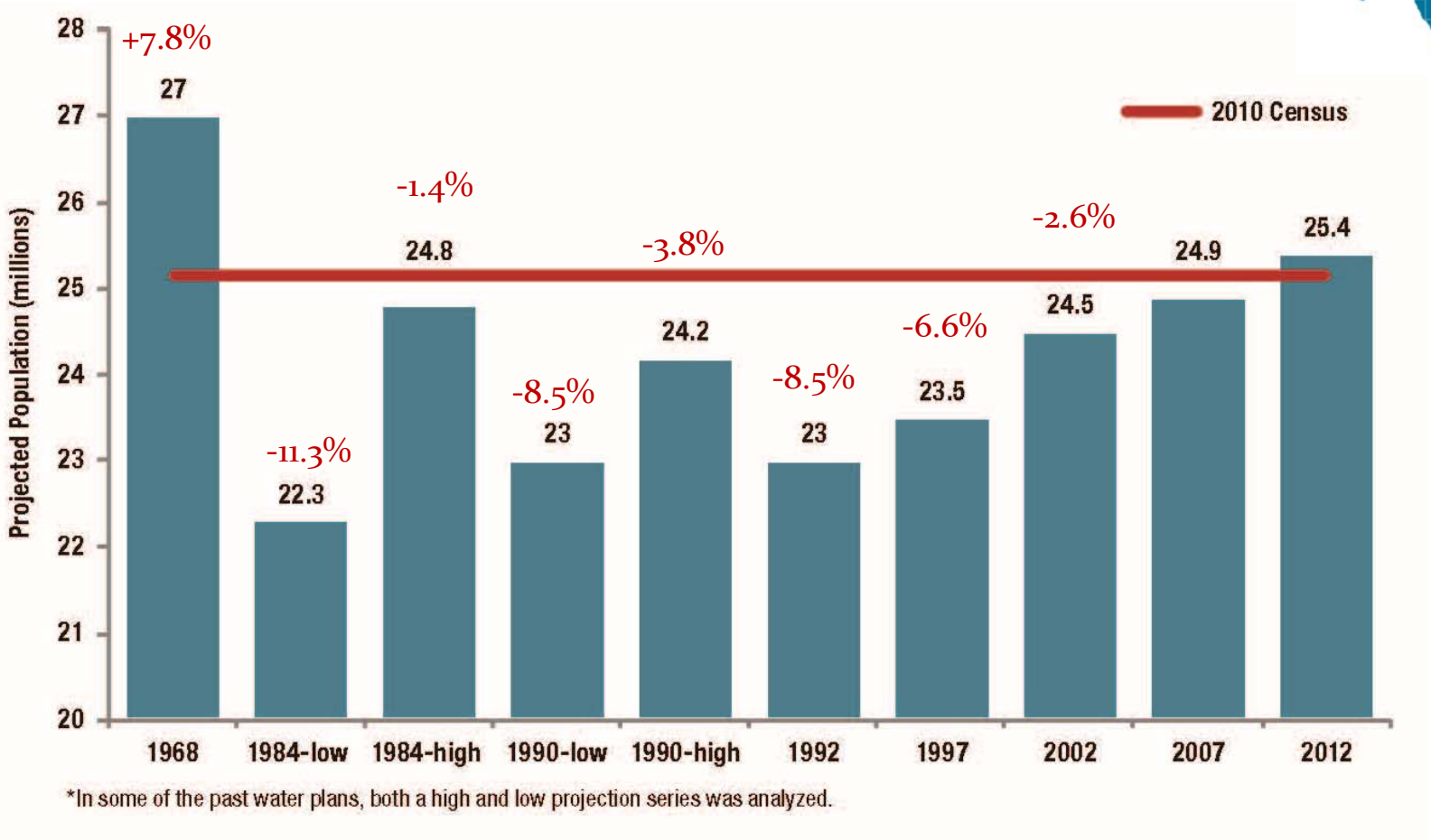
Statutory interests:

- Public
- Counties
- Municipalities
- Industries
- Agriculture
- Environment
- Small businesses

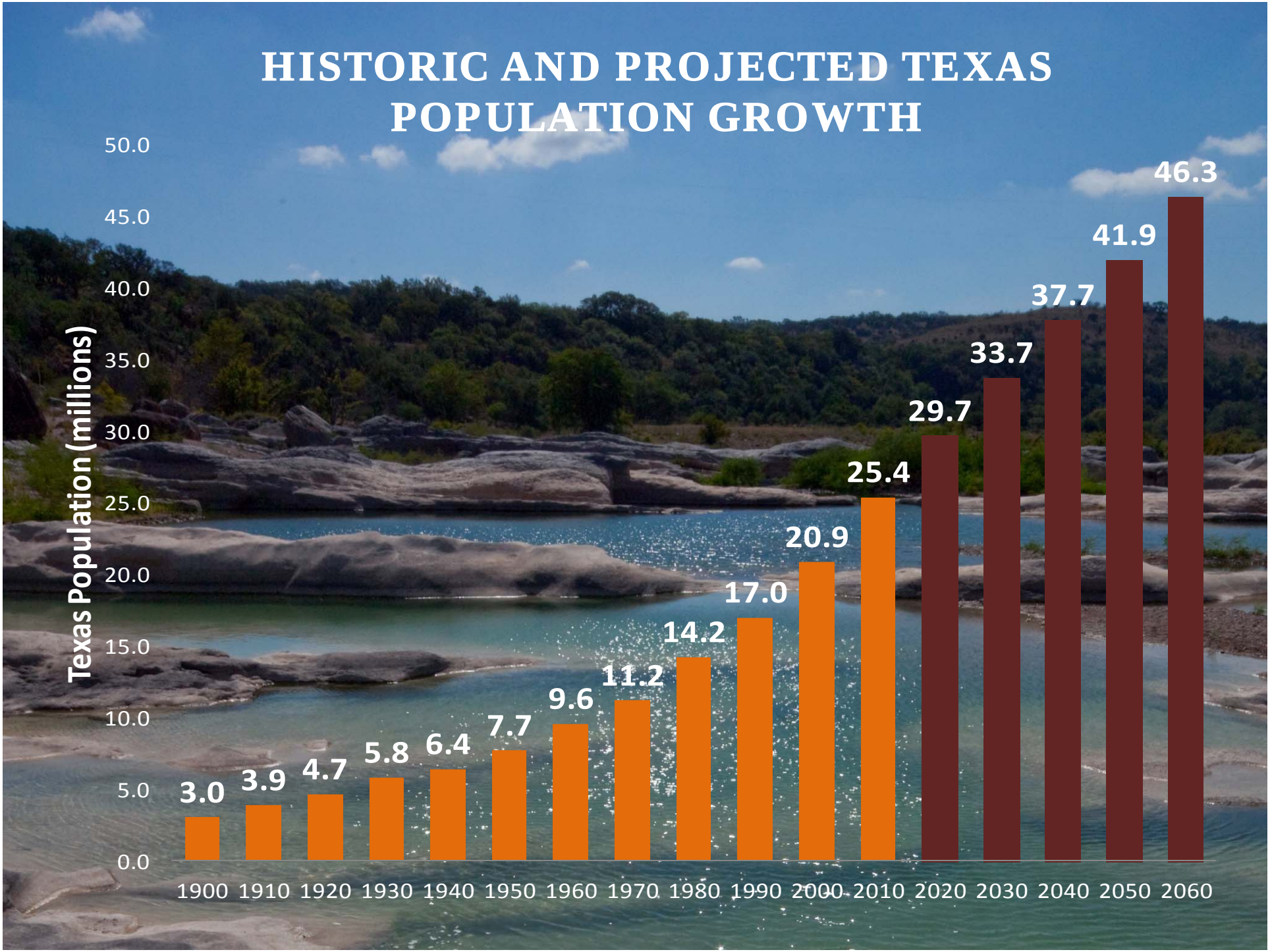


- Electric-generating utilities
- River authorities
- Water districts
- Water utilities
- Groundwater management areas

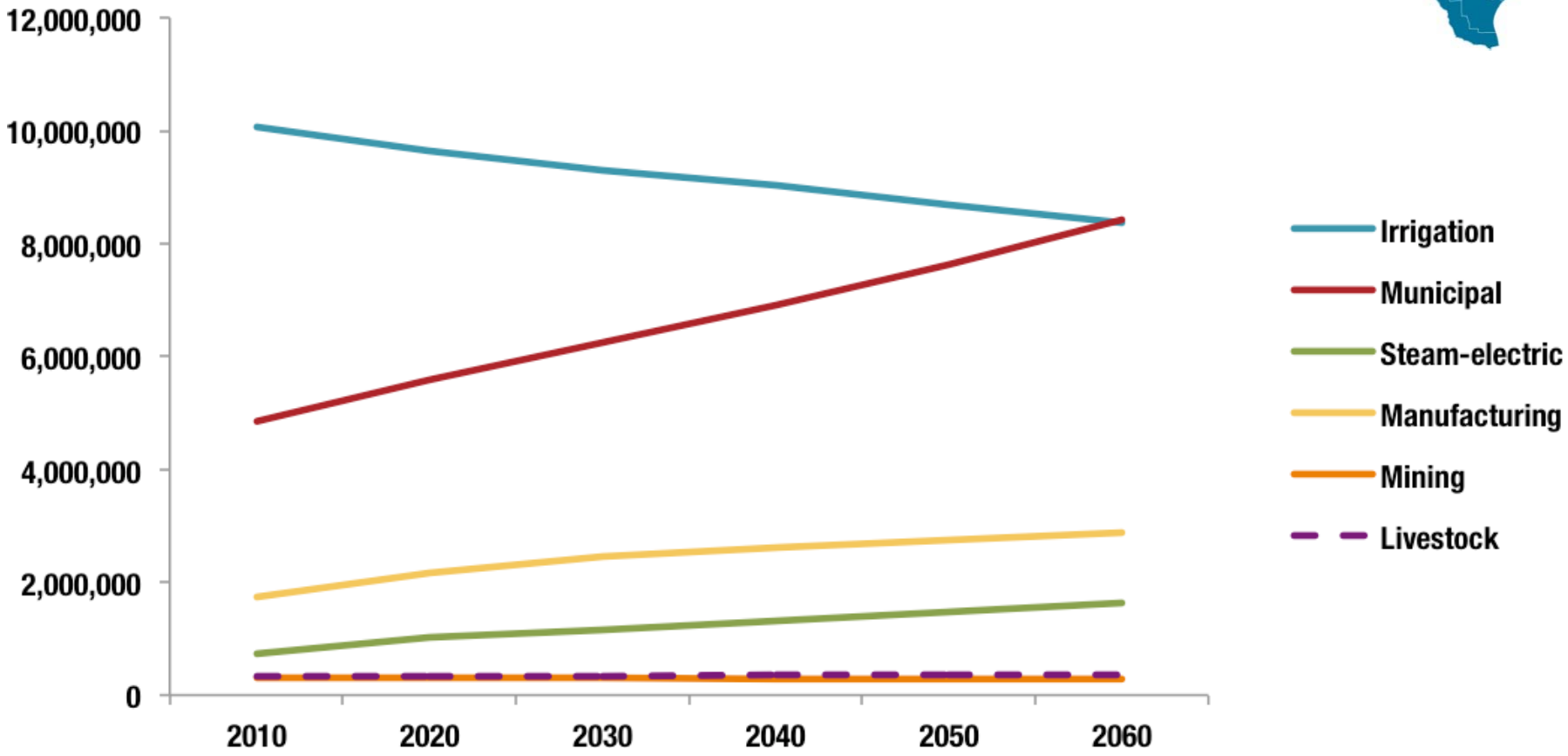
State Water Plan Population Projections and Actual 2010 Census Population Data



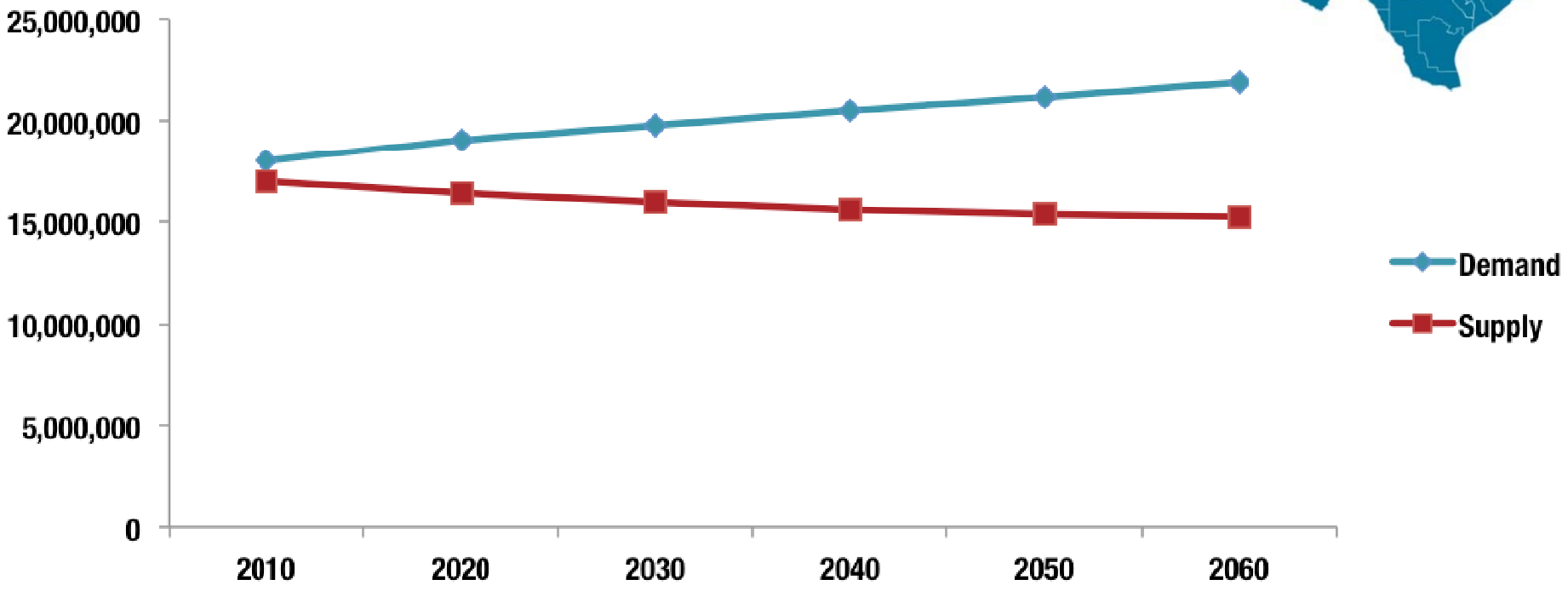
*In some of the past water plans, both a high and low projection series was analyzed.


HISTORIC AND PROJECTED TEXAS POPULATION GROWTH
Texas Population (millions)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
3.0
3.9
4.7
5.8
6.4
7.7
9.6
11.2
14.2
17.0
20.9
25.4
29.7
33.7
37.7
41.9
46.3
1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060

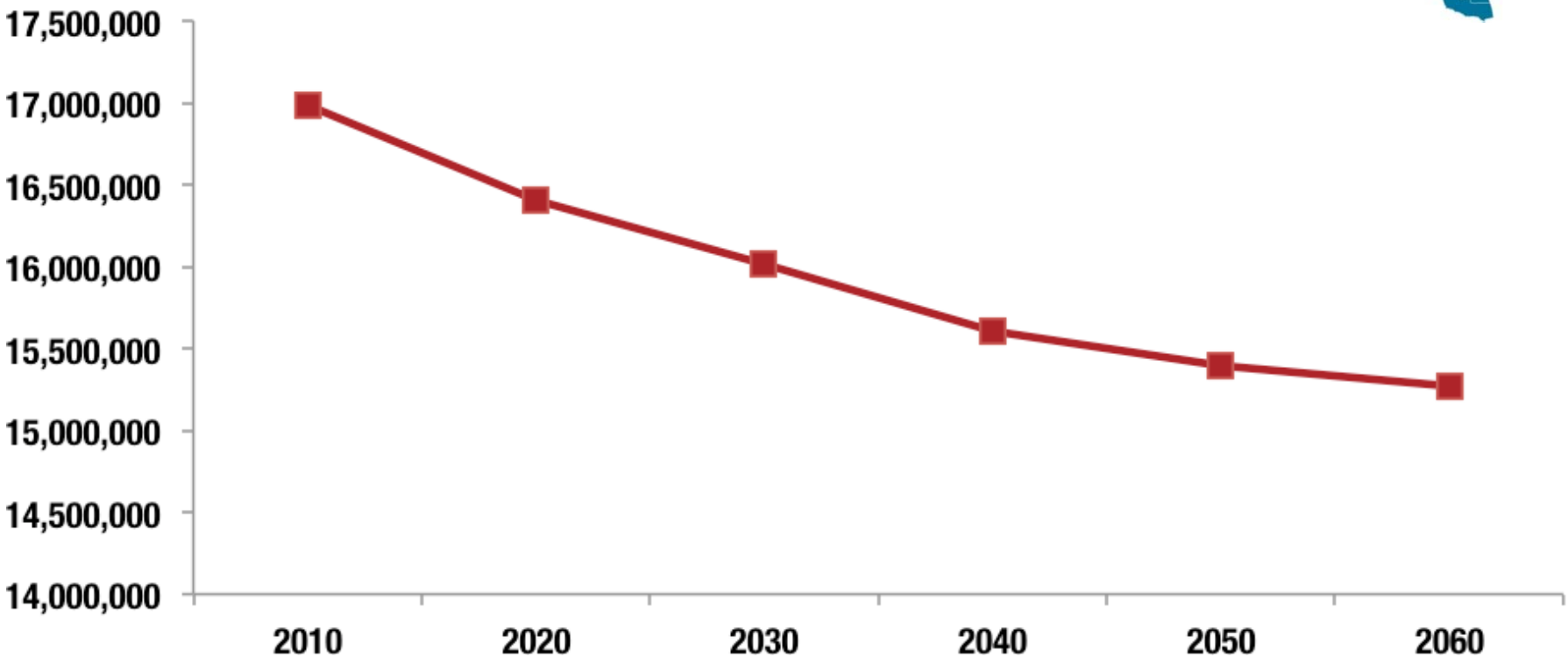
Water Demand Projections by Category (Acre-Feet per Year)



Projected Water Demands and Existing Supplies (Acre-Feet per Year)



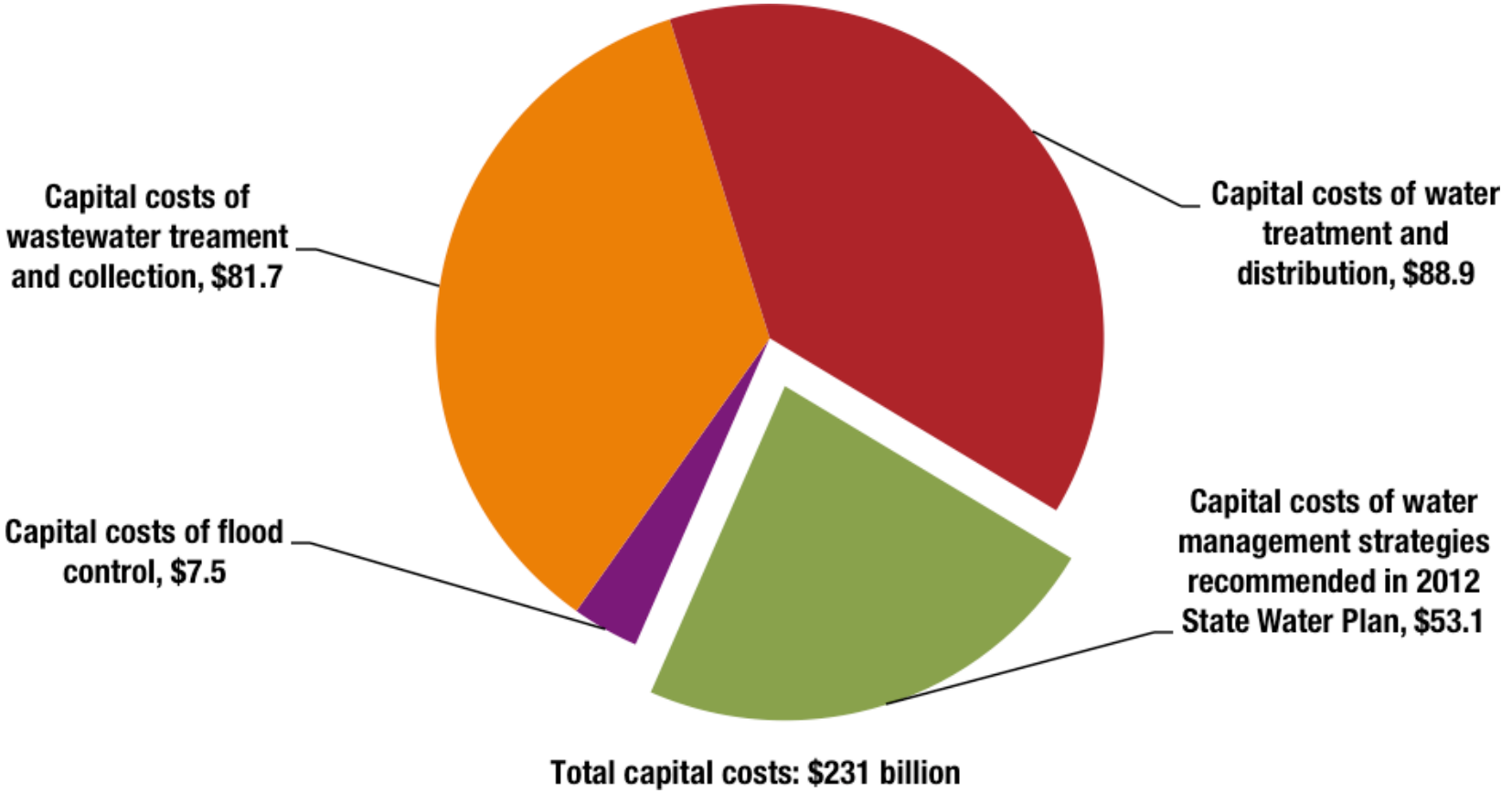
Projected Existing Supplies (Acre-Feet per Year)



Water Management Strategies

- WMS are the **projects or actions recommended to meet water needs**
- Examples: conservation; wastewater reuse; desalination of surface or ground water
- New infrastructure to access existing supplies (Example: new pipeline to a distant reservoir)
- New surface water diversions or impoundments in reservoirs (on/off-channel)
- New groundwater wells

State Total Water Supply Capital Costs: $53 Billion (2012)



What Is Our Water Future?

- Additional groundwater regulation through local/regional districts
- More water is needed to meet growing demands
- Water must be used more efficiently
- We must rely more on “non-traditional” water supplies
- Good news: we can use wastewater to meet many needs