

A large center pivot irrigation system is shown over a vast, dry, and cracked field. The system consists of a long metal structure with multiple support legs, extending from the foreground into the distance. The ground is parched and cracked, with visible furrows from the irrigation wheels. The sky is a hazy, warm orange, suggesting a sunset or sunrise. The overall scene conveys the theme of water scarcity and the importance of irrigation in agriculture.

Markets Key to Texas Water Availability

Keith Phillips

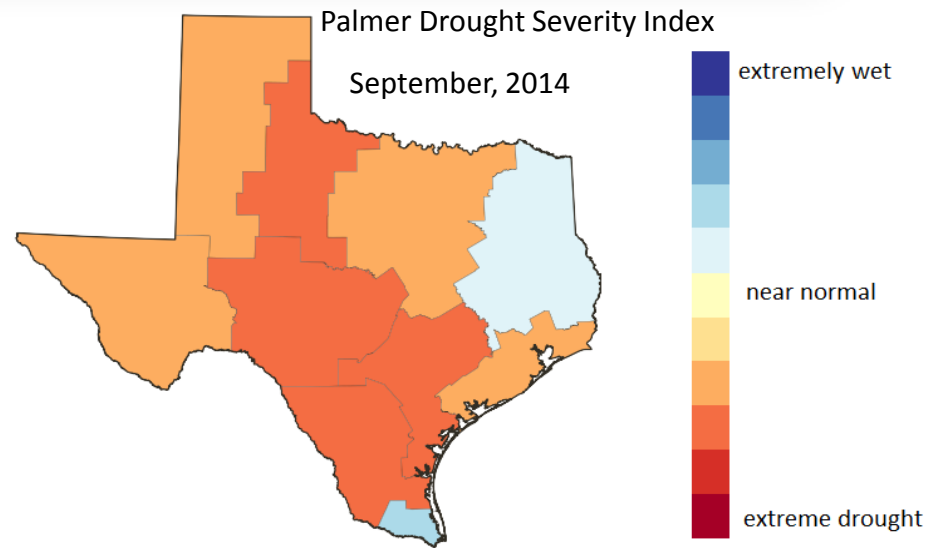
Mine Yücel

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Overview

- Is water scarce?
- How severe is the drought?
- What are the sources and uses of water?
- How is water allocated and priced?
 - Surface water
 - Groundwater
- Policies for more efficient water allocation

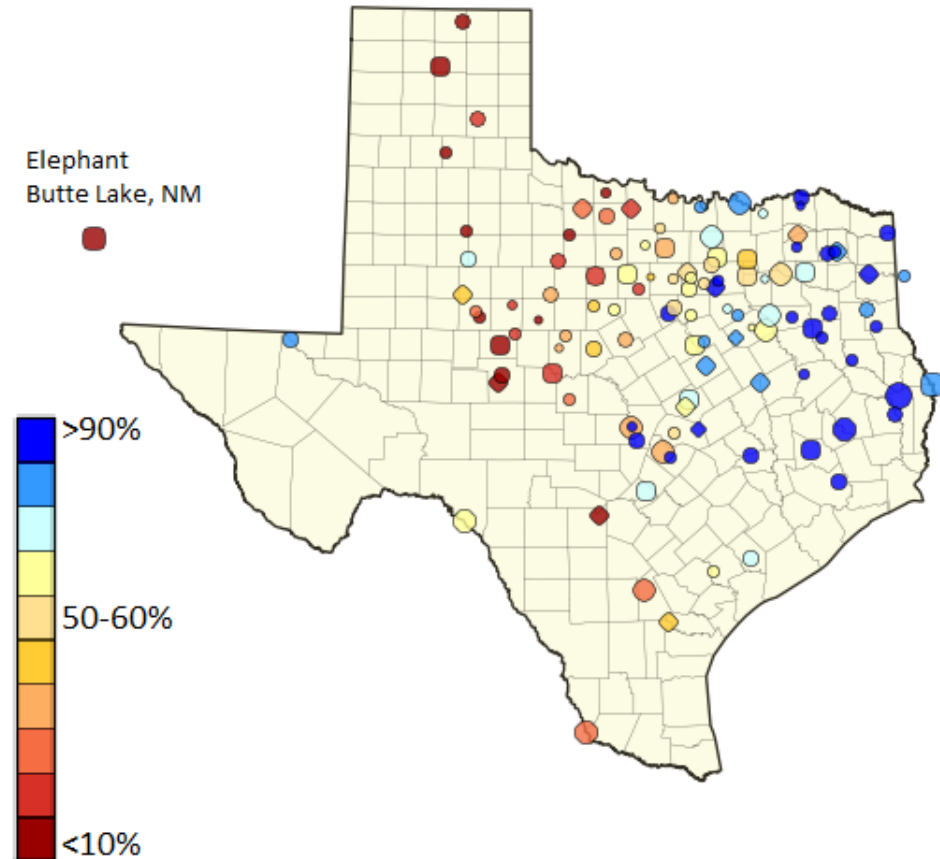
Drought visible in many areas



SOURCE: Texas Water Development Board

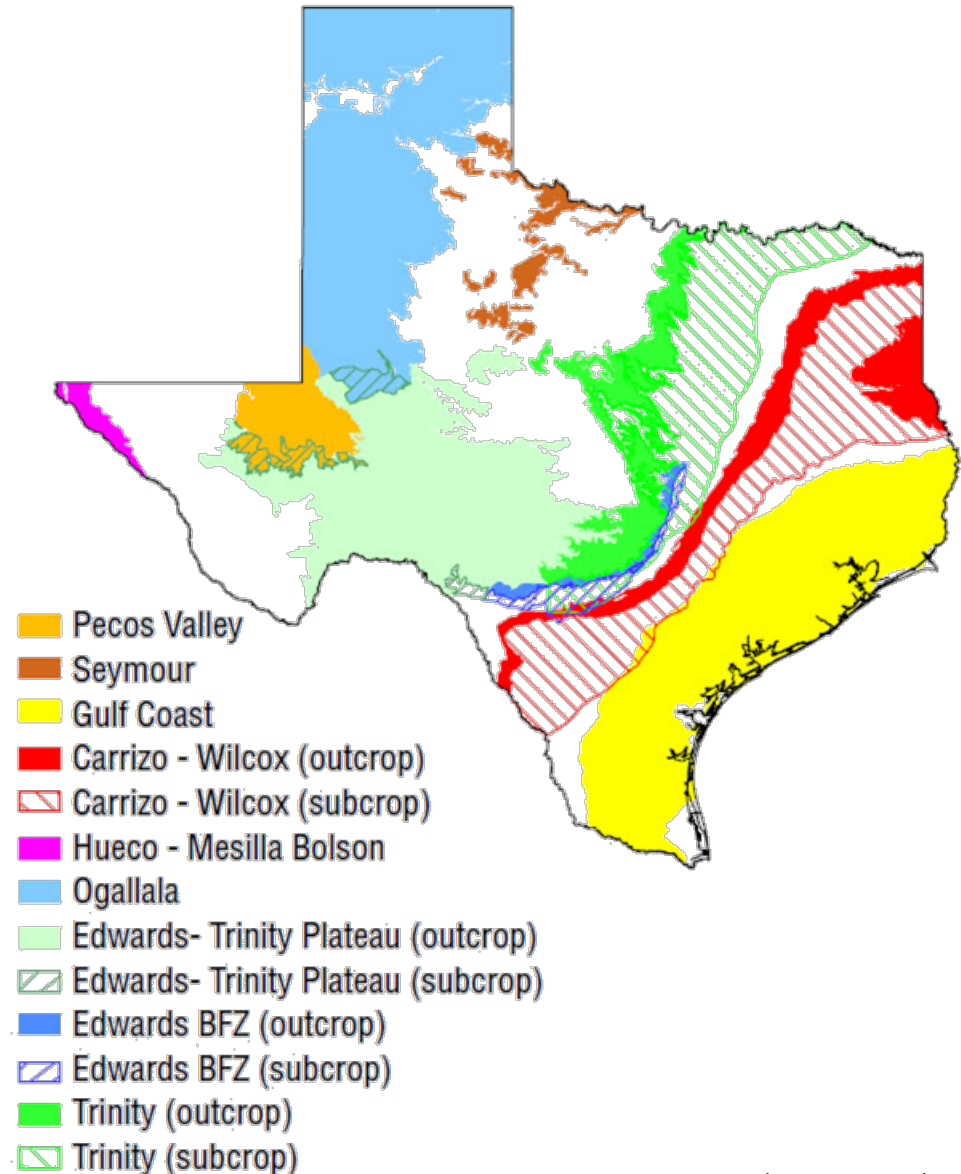
Surface water levels falling

- Statewide levels under 63 percent capacity
 - East Texas reservoirs and lakes at 90 percent
 - Despite recent rainfall, large areas of West and South Texas remain below 33 percent



Groundwater levels also falling

- Water levels have declined much below normal in majority of major Texas aquifers
 - Trinity aquifer in North Texas has fallen over 1,000 feet in areas around Dallas.
 - Large swaths of Ogallala aquifer down by hundreds of feet



Water usage will continue to increase...

- Water usage projected to rise 22 percent by 2060 due to rapid urban growth
 - Near doubling of population will increase municipal usage by 70 percent
 - Agricultural use projected to fall by 17 percent

...and supplies will likely fall

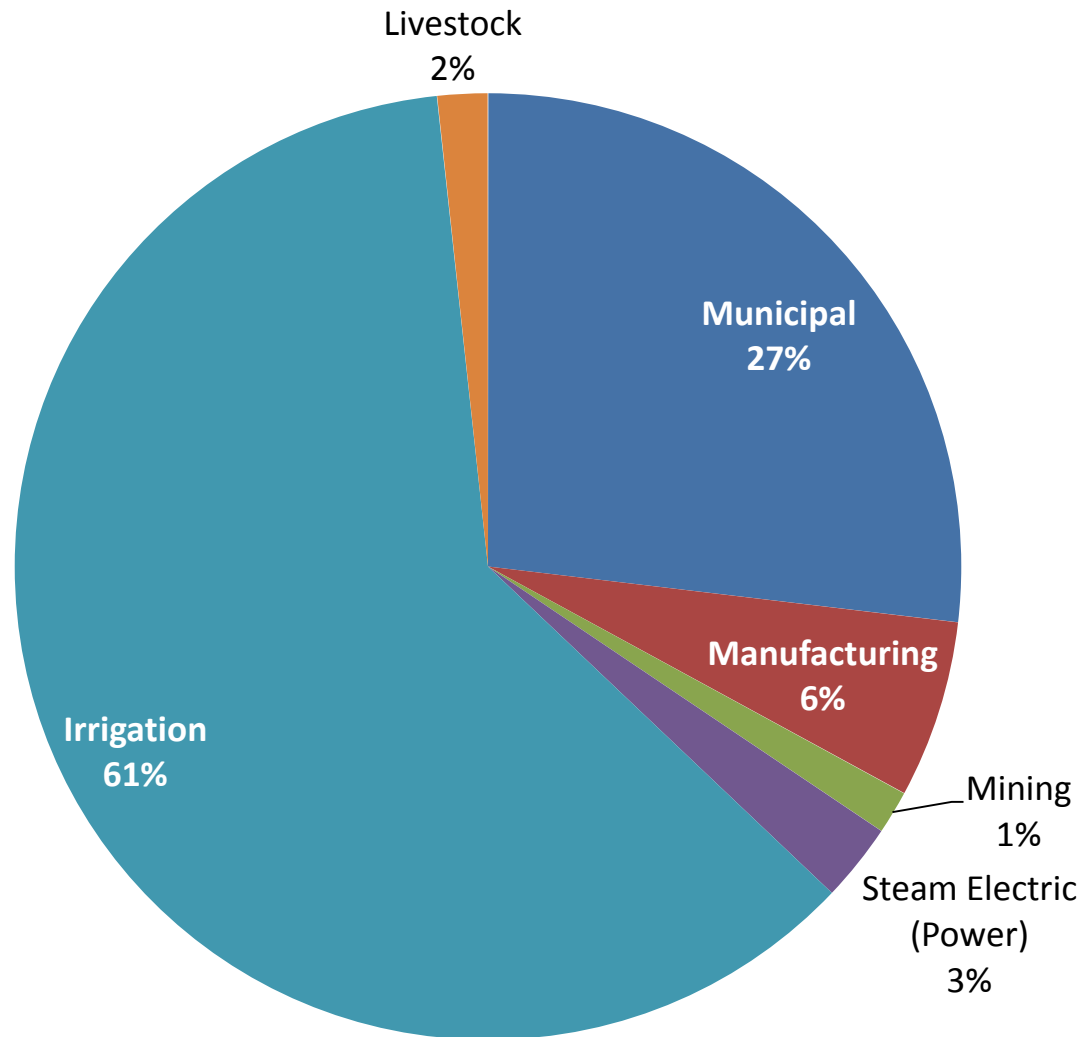
- Statewide water supplies projected to fall by 10 percent over the same period, due to:
 - Weather
 - Excessive pumping
 - Limited new reservoirs

A large-scale center pivot irrigation system is shown in operation over a vast, dry, and cracked agricultural field. The system's long metal arm, supported by a series of towers, extends from the background towards the horizon. Numerous wheels are visible along the arm. From the arm, a series of vertical risers descend to the ground, each with a rotating wheel and a horizontal pipe that sprays water in a fine mist across the parched earth. The field is divided into long, straight rows of furrows, some of which are filled with water. The ground is a deep reddish-brown color, showing significant cracking and dryness. The sky is a pale, hazy orange, suggesting the time is either dawn or dusk. The overall scene conveys the critical role of irrigation in maintaining agricultural productivity in arid regions.

Sources and Uses of Water in Texas

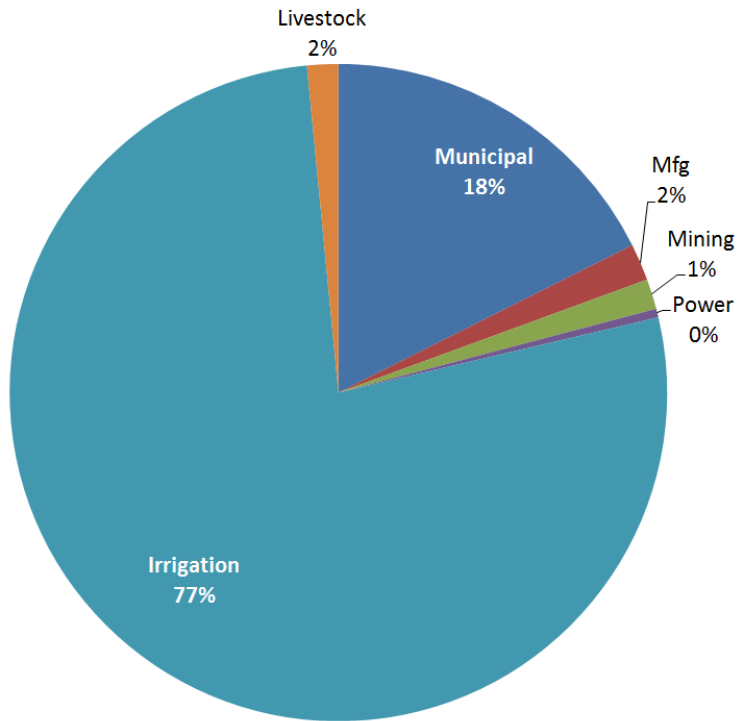
Agriculture uses most of the water in Texas

2011 Consumption Shares



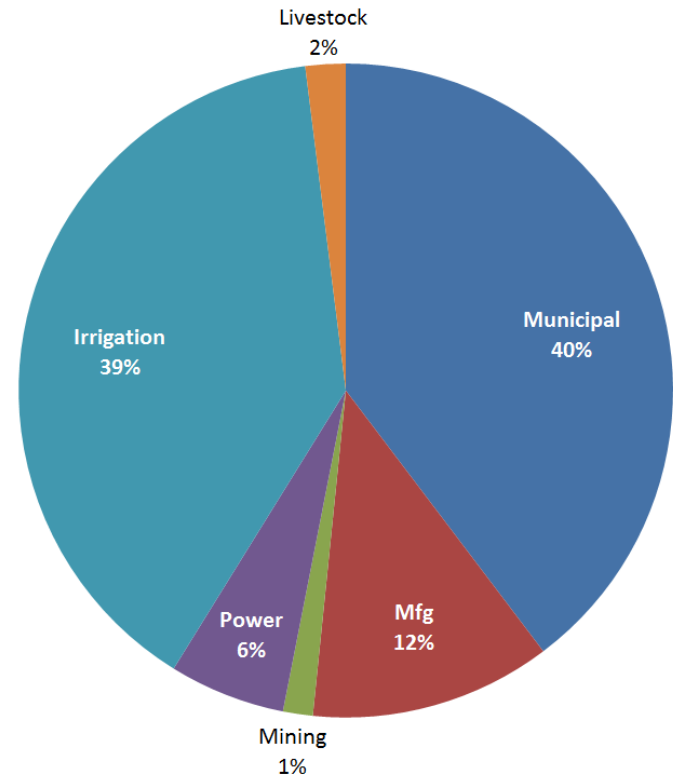
Uses vary by water source

Texas Groundwater Use, 2011



Accounts for 60% of Statewide Water Use

Texas Surface Water Use, 2011



Accounts for 40% of Statewide Water Use

Water allocation and price not based on supply and demand

- Surface water rights issued by the state
- Most consumers purchase water from public entities such as cities or water authorities
- Water prices generally based on cost of treatment and delivery
- Groundwater historically open access, but growing powers of Conservation Districts to issue rights

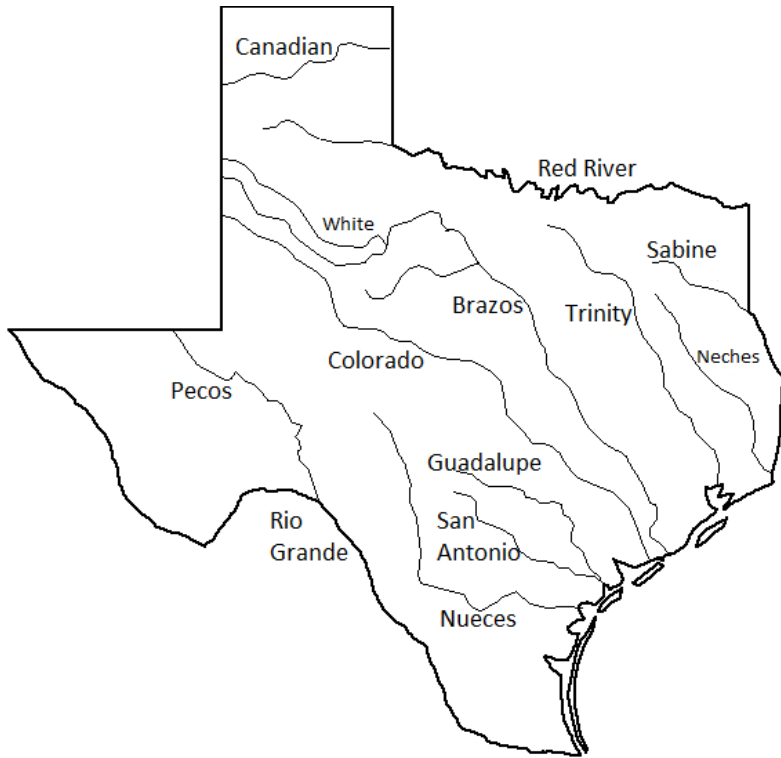
Market principles would allocate water more efficiently

- Water is not priced based on demand and supply, but cost of service
- Prices often do not change with scarcity, discouraging conservation
- Scarcity is often managed by rationing water among users

A large center pivot irrigation system is shown in a dry, cracked field at sunset. The long metal arms of the system stretch across the horizon, with multiple wheels visible. The ground is parched and cracked, with the irrigation wheels creating a misty spray of water as they move. The sky is a warm, hazy orange, and the overall scene conveys the importance of water management in arid regions.

**Surface and Groundwater are
Allocated and Priced Differently**

Surface water allocation



- Water rights allocated by state
 - First-in-time, first-in-right
 - Most basins fully allocated
- Legal framework allows for water transfers
 - In practice, many restrictions
- Some active water markets exist
 - The Lower Rio Grande Valley

Challenges for surface water markets

- No-injury rule for water transfers
- Inter-basin transfers hampered further by junior rights rule
- Seventy percent of water rights held by public entities and water authorities
 - Inflexible “take-or-pay” contracts
 - Customers of river authorities not allowed to resell water

Groundwater allocation

- Property rights not clearly defined
- “Rule of Capture” stipulates water is not owned until pumped out of the ground
 - Leads to tragedy of the commons: one person’s actions leave less for everyone else
- Groundwater Conservation Districts (GCD) have been given authority to regulate groundwater

Challenges for groundwater markets

- No legal right to a fixed amount of water means seller can't guarantee amount
- Groundwater Conservation Districts have imposed export limits and fees

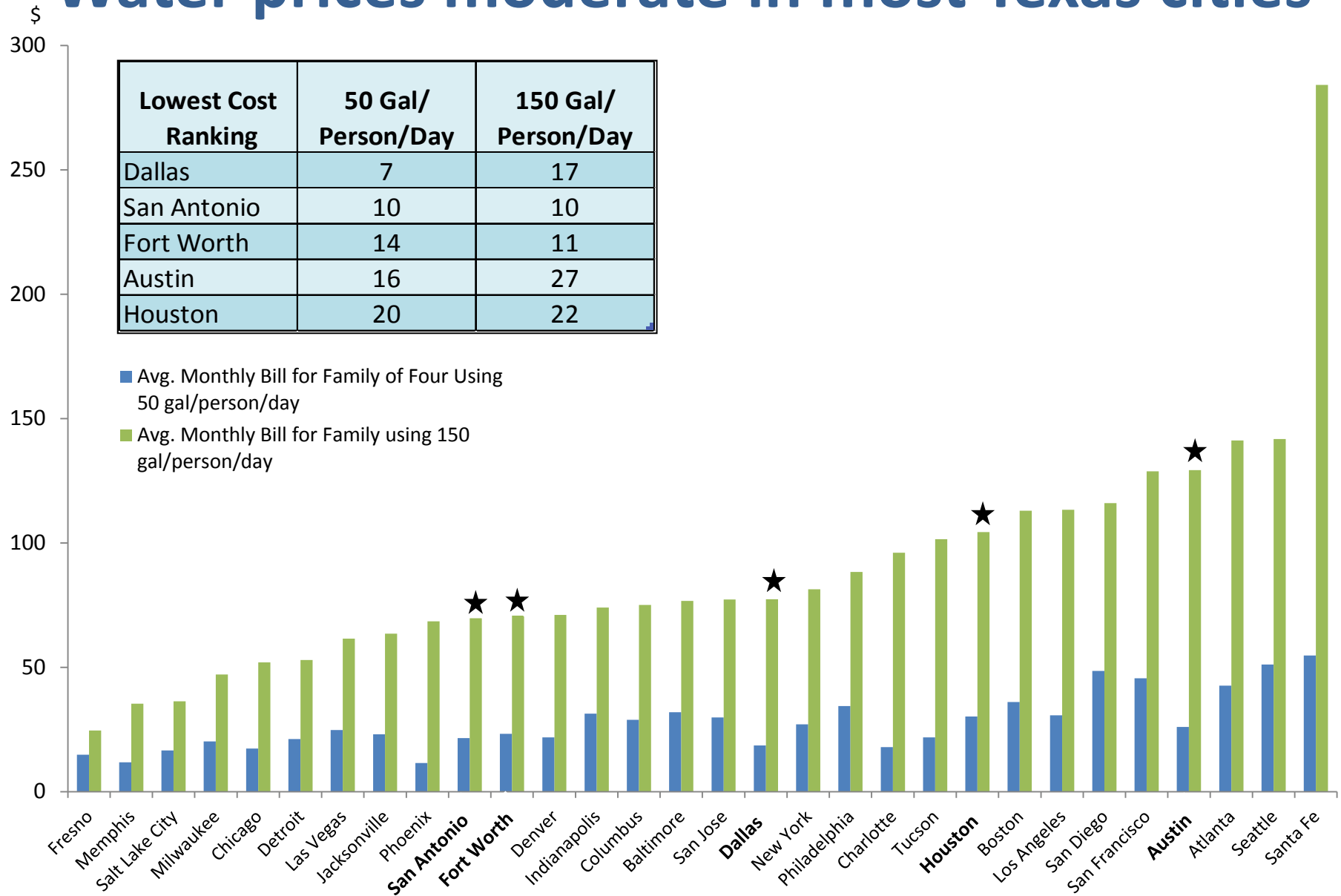
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Policy Changes to Encourage Market Principles in Water Allocation

Reducing inefficiencies

- Surface water:
 - Better define “injury”
 - Eliminate junior rights rule on inter-basin transfers
 - Encourage water authorities to reduce “take or pay” contracts and to allow re-sales
- Groundwater:
 - Strengthen the role of GCDs to assign private property rights
 - Minimize export restrictions
- In general:
 - Protect the property rights of others but encourage marketing so that prices reflect scarcity

Water prices moderate in most Texas cities



SOURCE: Circle of Blue

Reasons to be optimistic about the future

- Sales of water from agriculture to cities and industries already happening and likely to increase
- Regional water plans under Senate Bill 1 (1997) have embraced water transfers and markets
- More water planners, farmers, cities realizing that market principles are a part of the solution

Further reading

- Keith Phillips, Edward Rodrigue, Mine Yücel
“Water Scarcity a Potential Drain on the Texas Economy,” *Southwest Economy*, Q4 2013
- Ronald Kaiser, “Solving the Texas Water Puzzle: Market-Based Allocation of Water,”
Texas Public Policy Foundation, March 2005