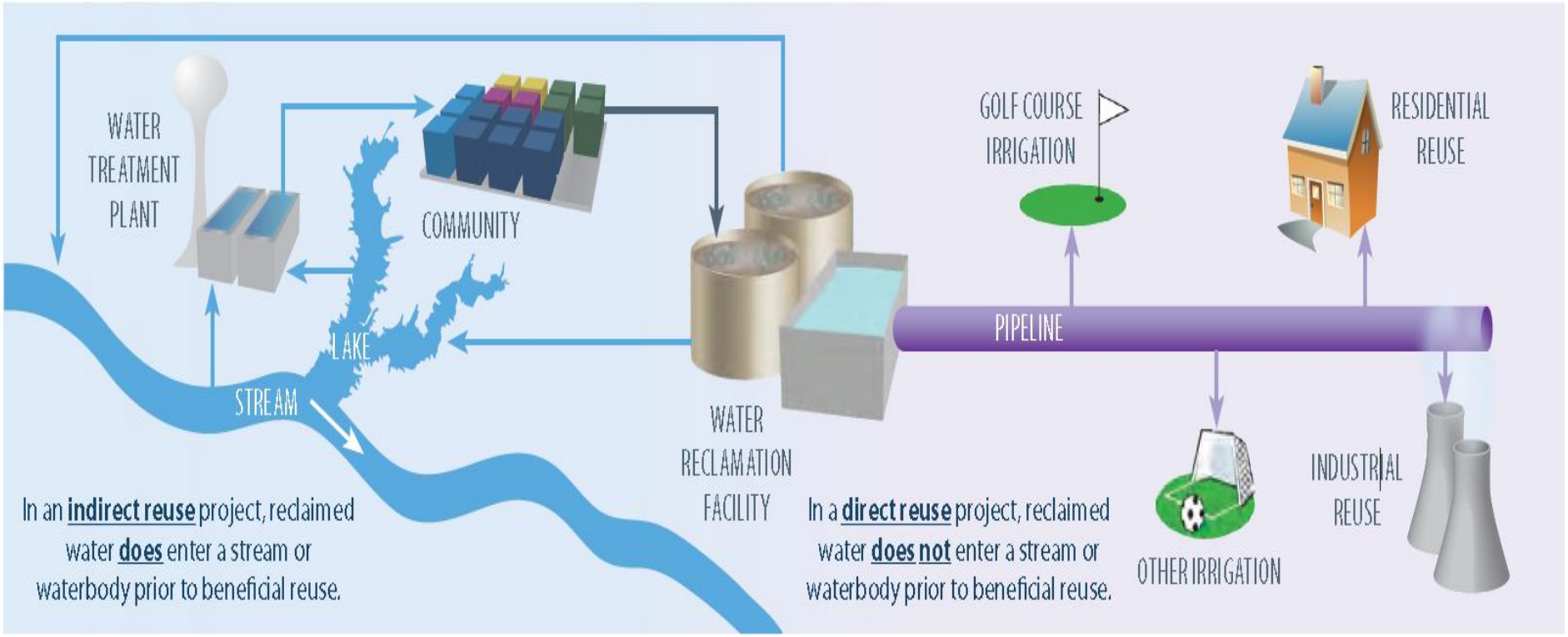
# Reuse in Texas

Basin Clean Rivers Program
Steering Committee Meeting
April 13, 2017
By Erika Mancha

The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.



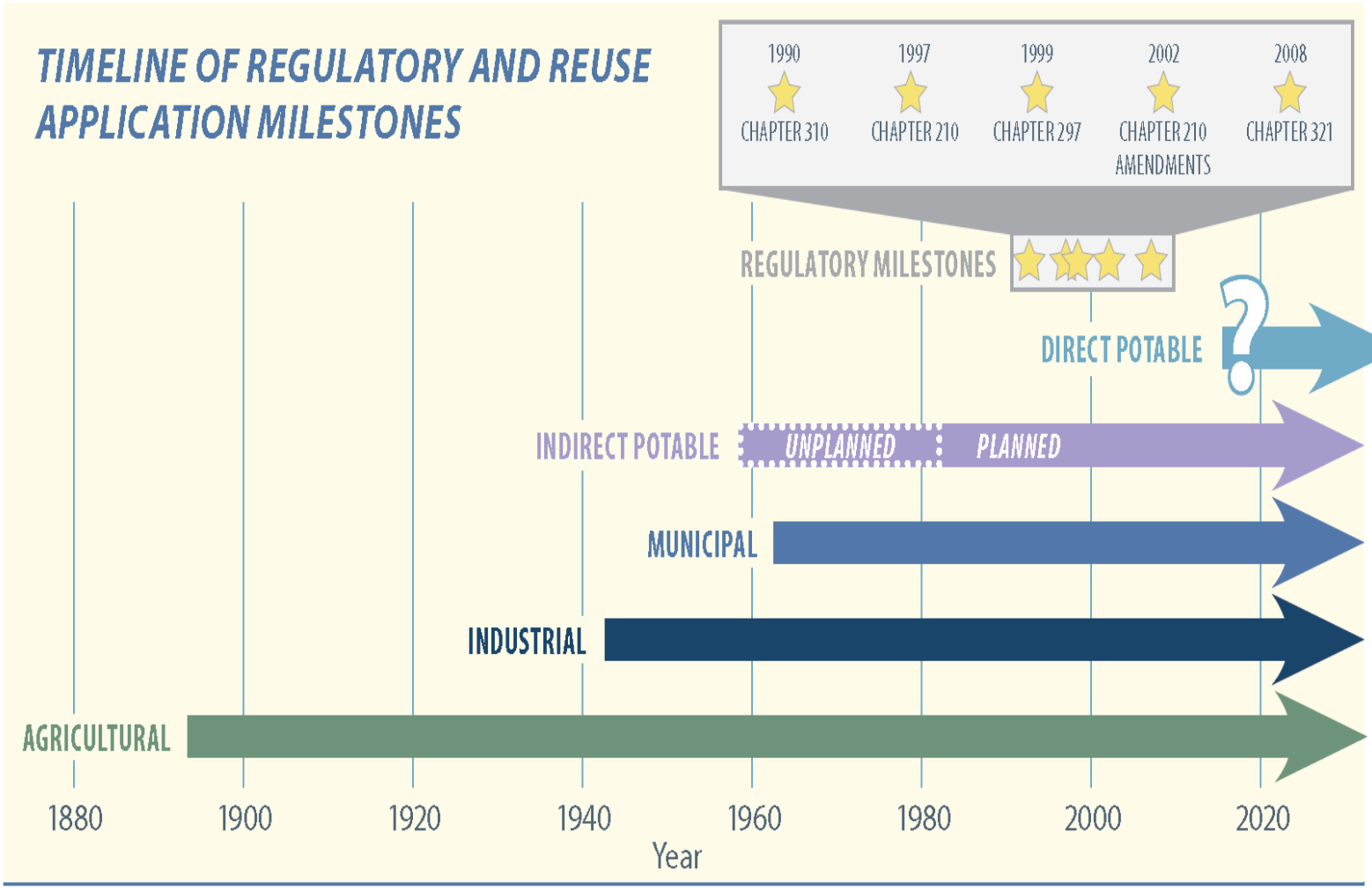

**INDIRECT REUSE:** The use of reclaimed water by discharging to a water supply source, such as surface water or groundwater, where it blends with the water supply and may be further purified before being removed for non-potable or potable uses.

**DIRECT REUSE:** The use of reclaimed water that is piped directly from the wastewater treatment plant to the place where it is used.

# Texas Water Reuse History

Evolution of reuse influenced by five factors:

- Water availability
- Population growth
- Regulations
- Advancing technology
- Public acceptance


TIMELINE OF REGULATORY AND REUSE APPLICATION MILESTONES
1990
CHAPTER 310
1997
CHAPTER 210
1999
CHAPTER 297
2002
CHAPTER 210 AMENDMENTS
2008
CHAPTER 321
REGULATORY MILESTONES
DIRECT POTABLE
?
INDIRECT POTABLE
UNPLANNED
PLANNED
MUNICIPAL
INDUSTRIAL
AGRICULTURAL
1880
1900
1920
1940
1960
1980
2000
2020
Year

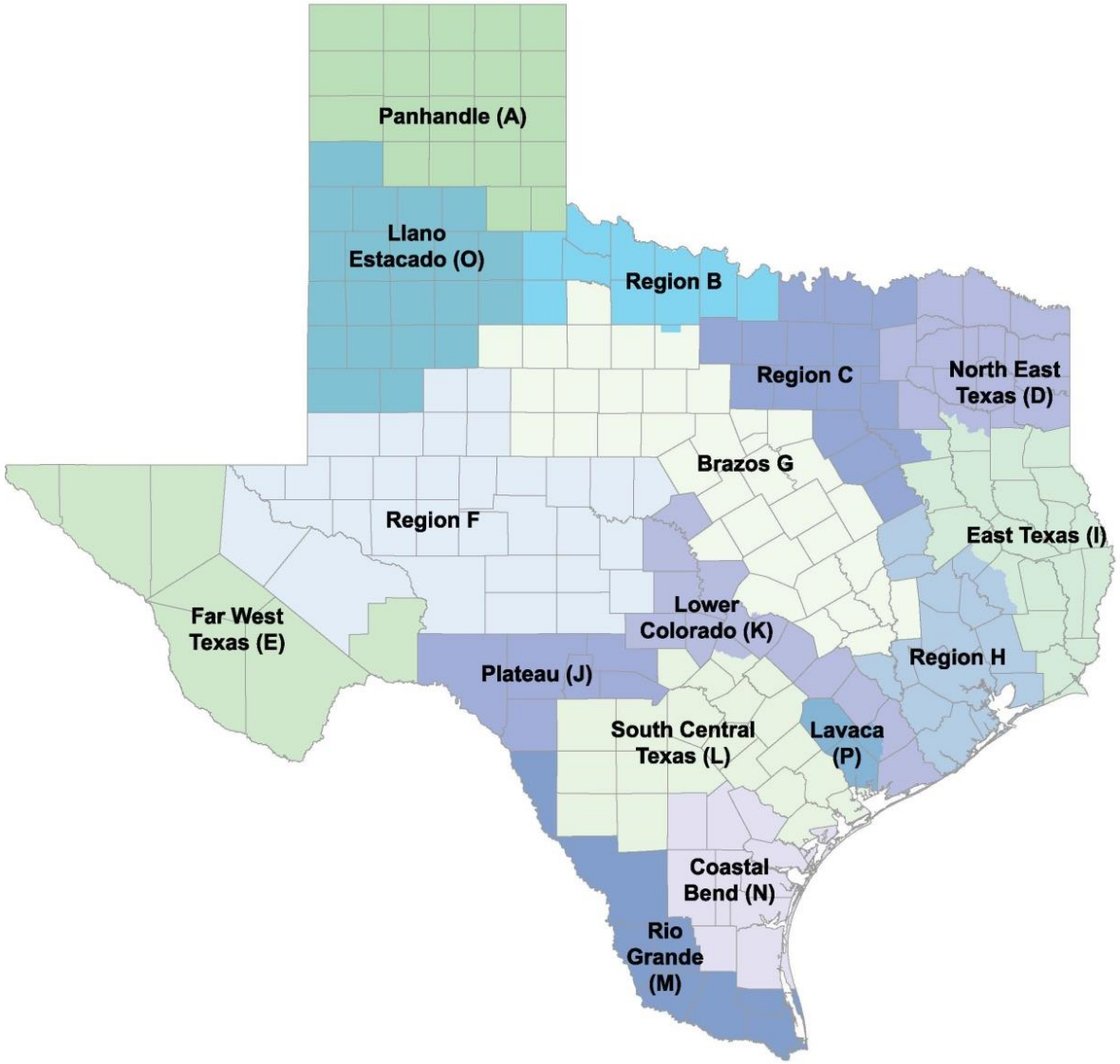
| REGULATORY MILESTONES | |
|---|---|
| 1990 | Adoption of Texas Administrative Code Chapter 310—The first state regulations specifically addressing the use of reclaimed water. |
| 1997 | Adoption of Texas Administrative Code Chapter 210—Establishes rules and the authorization process for direct nonpotable water reuse projects. Replaces Chapter 310. |
| 1999 | Adoption of Texas Administrative Code Chapter 297.49—Grants the right to reuse treated wastewater as long as the water is not discharged to a waters belonging to the state of Texas. |
| 2002 | Adoption of amendments to Texas Administrative Code Chapter 210 to include rules for use of industrial reclaimed water. |
| 2008 | Adoption of Texas Administrative Code Chapter 321, Subchapter P – Reclaimed Water Production Facilities—Establishes streamlined permitting requirements for reclaimed water treatment (production) facilities at remote sites. |

| | |
|---|---|
| **now** | **Direct potable reuse is permitted on project by project basis** |

Mission to provide **leadership**, **information**, **education**, and **support** for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas.

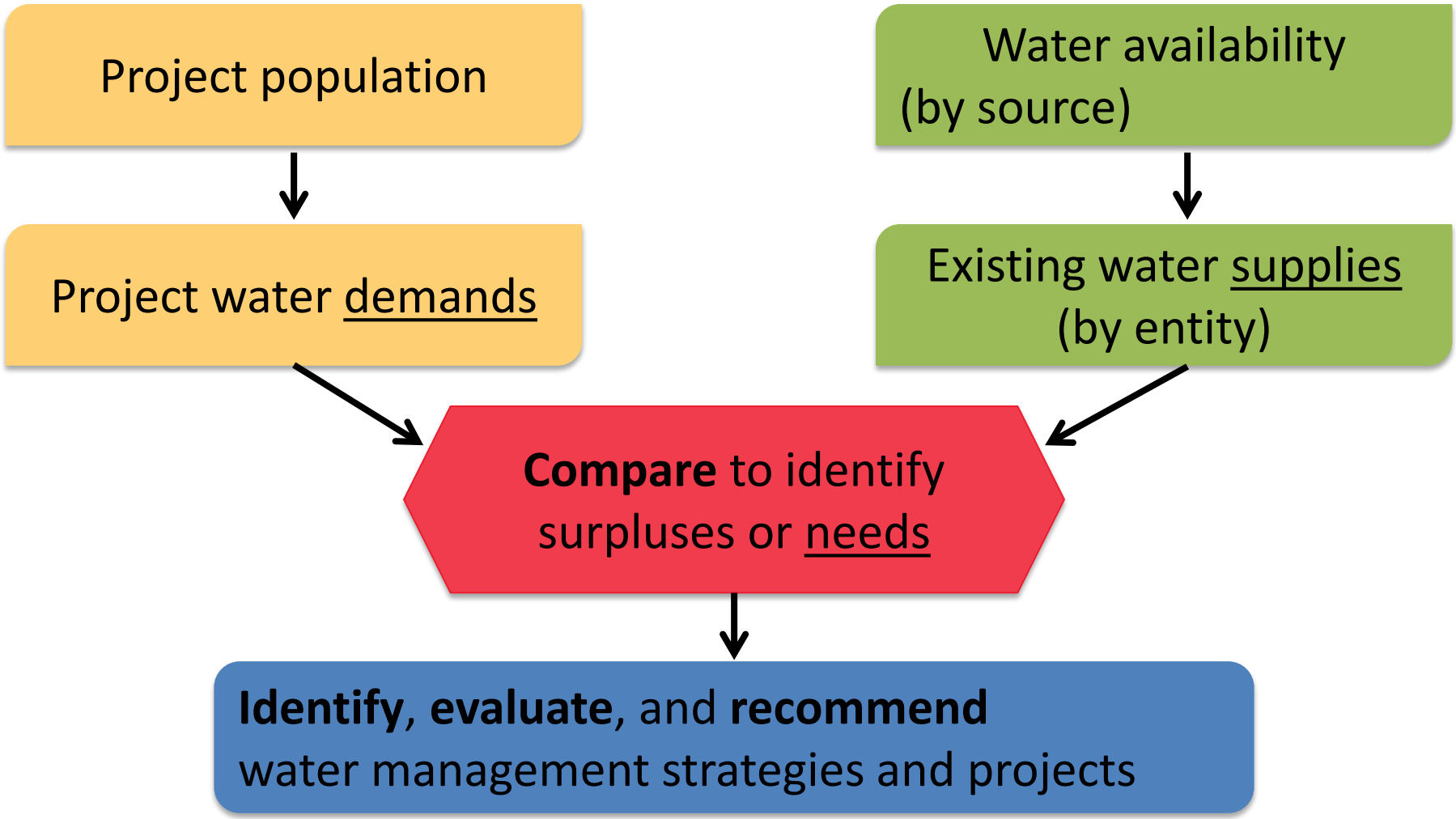
- Water Science & Conservation
- Water Supply & Infrastructure
- Texas Natural Resource Information System
- Operations & Administration
- Finance

# Regional Water Planning Areas

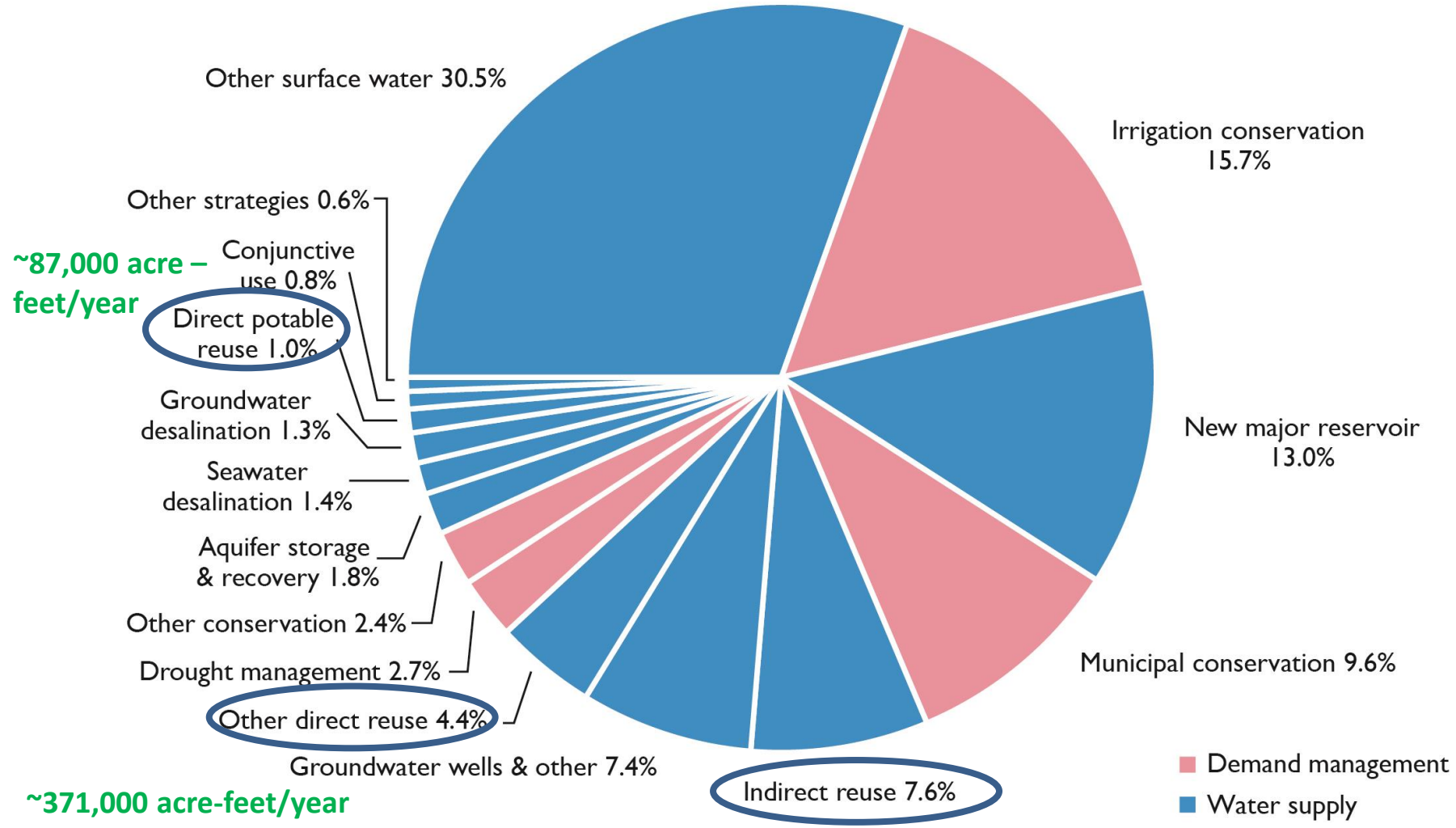



- Bottom-up approach
- State Water Plan every five years
- 2017 State Water Plan

# Water Planning Basics



# Recommended Water Management Strategies by 2070

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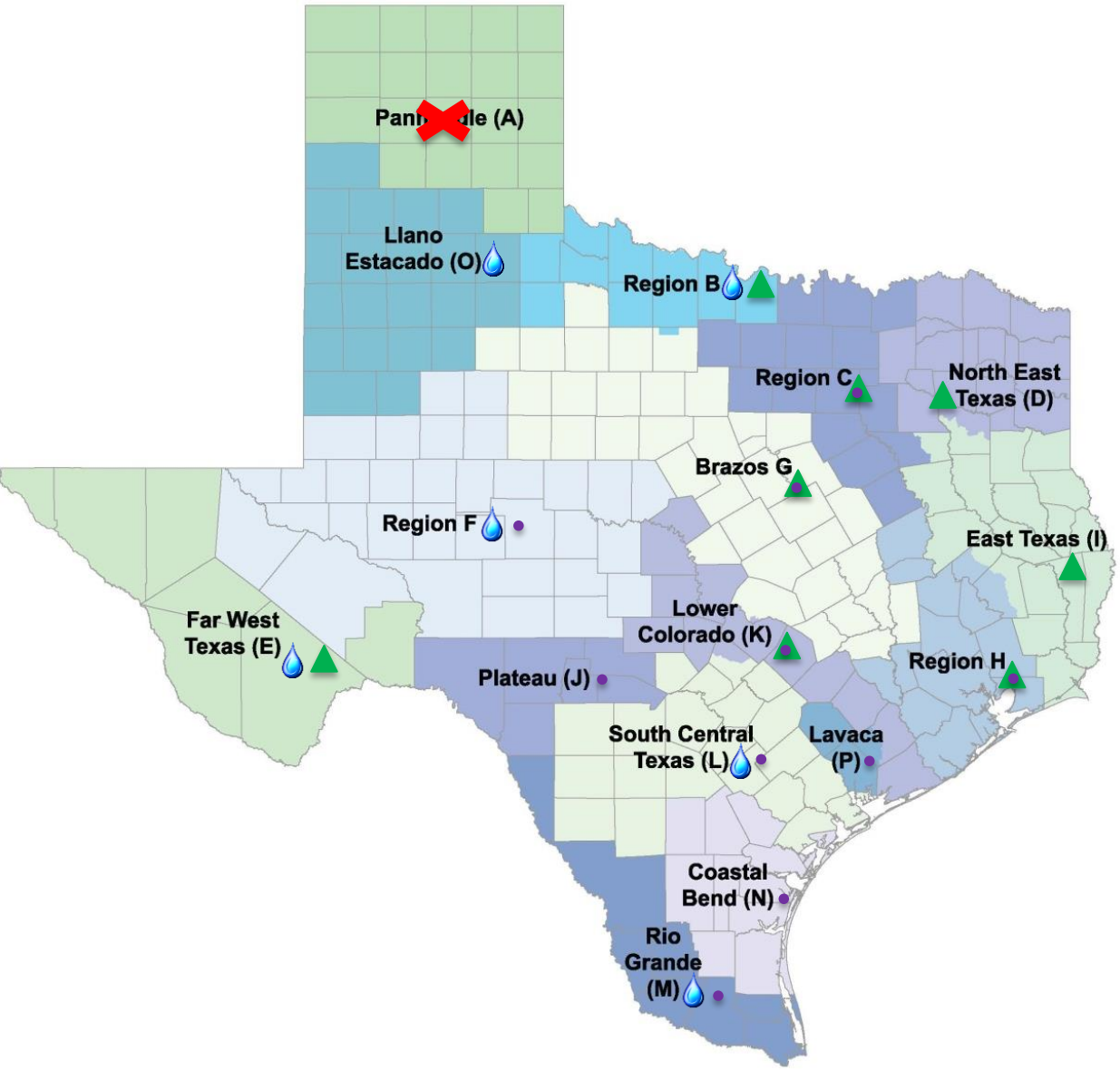
# Reuse recommended water management strategies




- 15 regional water planning groups (except A)

- Direct Potable Reuse
- Other direct reuse
- Indirect reuse

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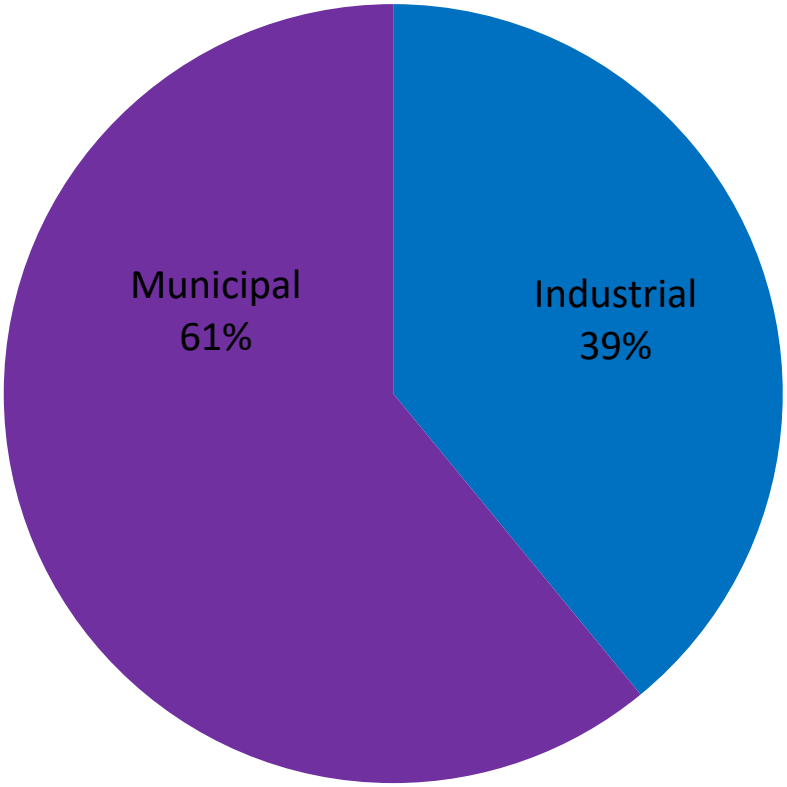
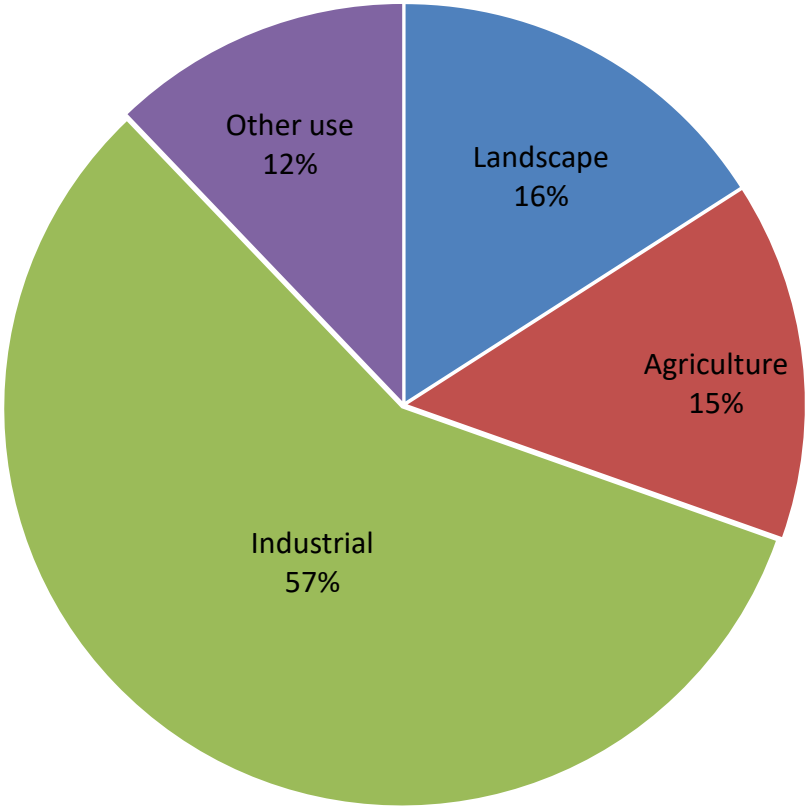
# Water Use Survey

- Conducted annually by water use survey team
- Two surveys types: Municipal and Industrial
- Survey ~4,300 municipal and 2,500 industrial

- http://www.twdb.texas.gov/waterplanning/waterusesurvey/index.asp

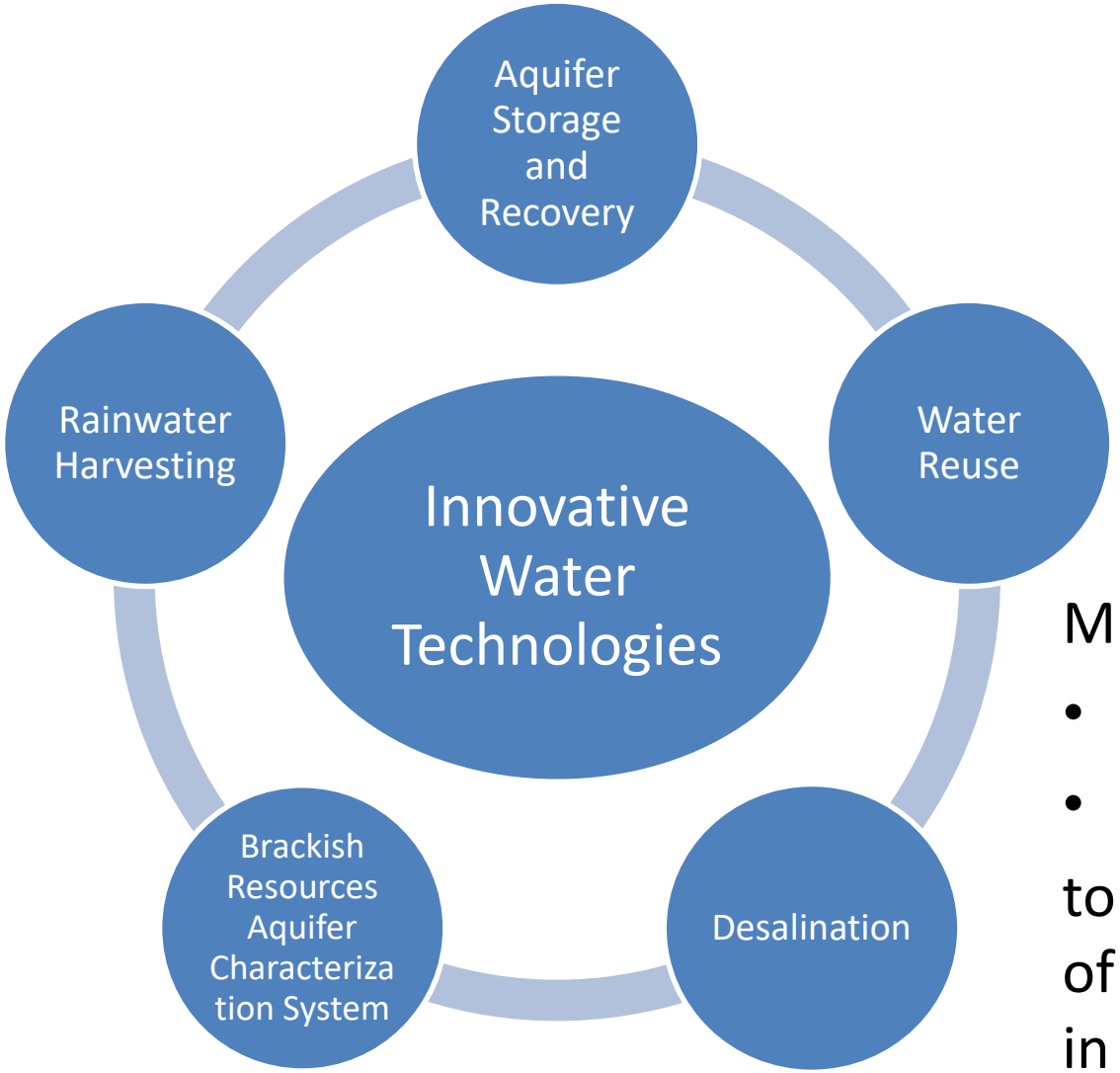
# 2015 Water Reuse in Texas




69,352,037,775 gallons
Total Water Reuse

2015 Water Use Survey




Mission is to

- conduct research and
- disseminate information

to advance the development of alternative water supplies in Texas.


WATER RECYCLES
-The Complete Story-
HYDROELECTRIC
BIOGAS
REUSE
WASTEWATER TREATMENT PLANT
BIOSOLIDS
DRINKING WATER PLANT
Poster created by:
Water Quality Protection Division EPA Region 6
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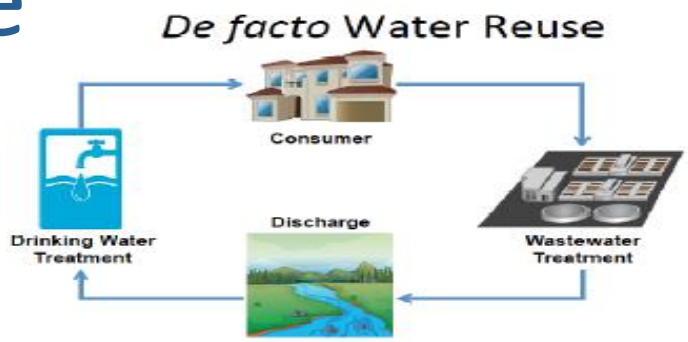
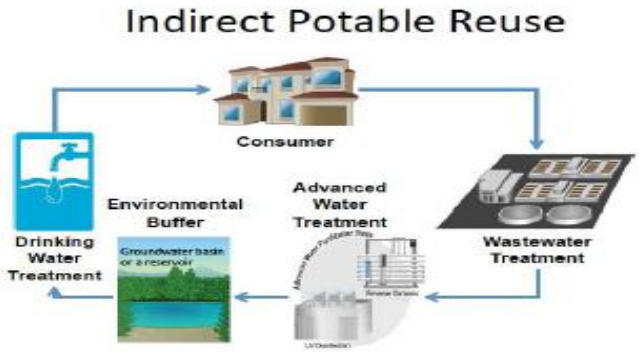
# Types of potable reuse

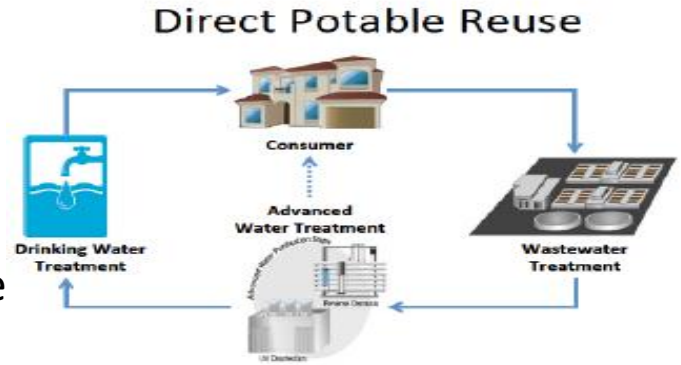
**De facto Water Reuse**:
A drinking water supply that contains a significant fraction of treated wastewater, typically from wastewater discharges, although the water supply has not been permitted as a water reuse project.

**Indirect Potable Reuse (IPR)**:
The use of reclaimed water for potable purposes by discharging to a water supply source, such as a surface water or groundwater. The mixed reclaimed and natural waters then receive additional treatment at a water treatment plant before entering the drinking water distribution system.

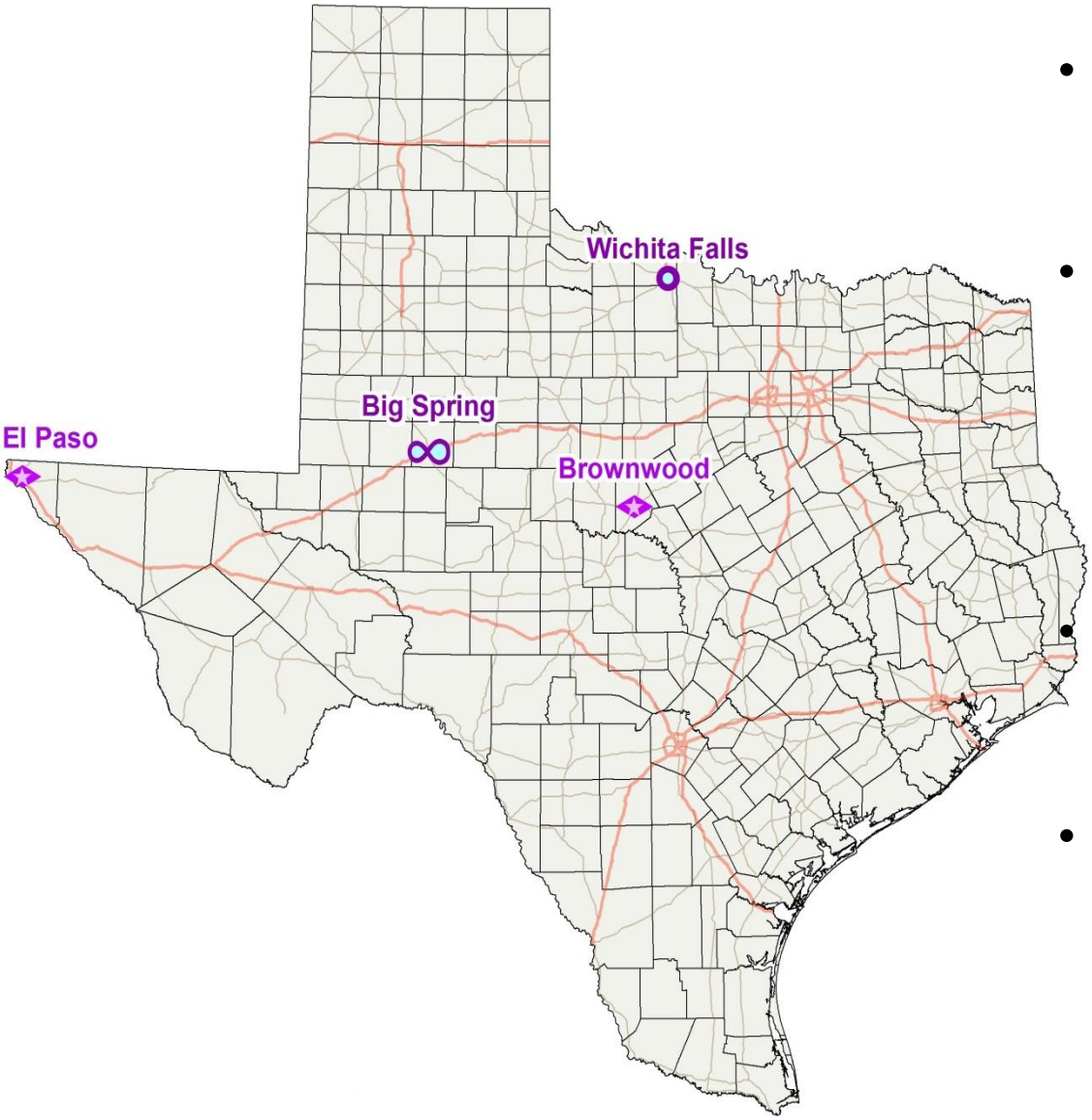
**Direct Potable Reuse (DPR)**:
The introduction of advanced-treated reclaimed water either directly into the potable water system or into the raw water supply entering a water treatment plant.



# Direct Potable Water Reuse Existing and Proposed Facilities

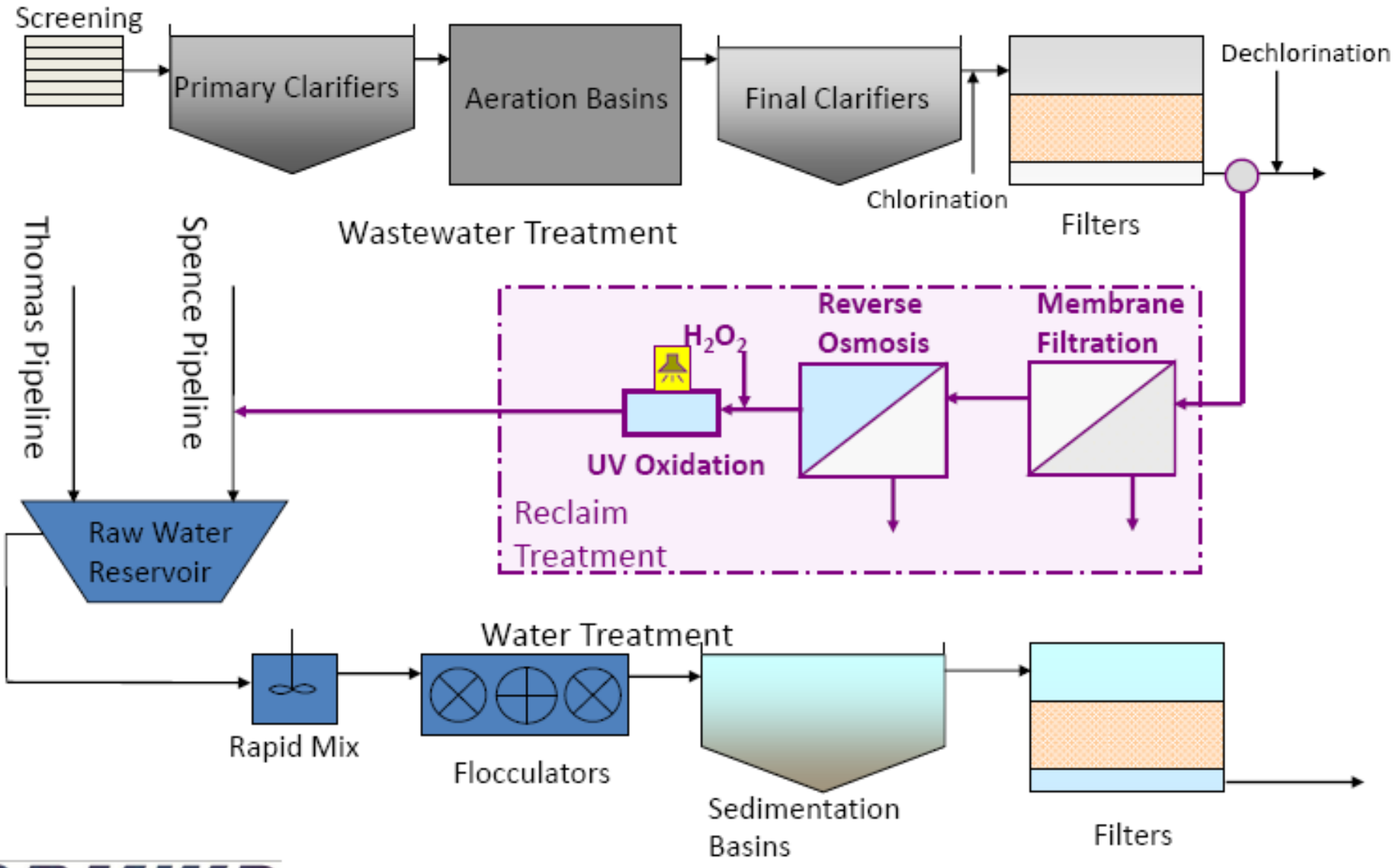



- Raw Water Production Facility
  - Operating since May 2013
- Direct Potable Reuse Project (emergency project)
  - Operating since July 2014
  - Decommissioned July 2015
- Advanced Purified Water Treatment
  - Conducted pilot study
- Direct potable reuse project
  - Awaiting city council approval

# Other communities interested in potable reuse

- Laguna Madre Water District
  - Completed feasibility study for direct potable
- San Angelo
  - Completed feasibility study and pilot for direct potable
- Wichita Falls
  - Obtained permits for Lake Arrowhead indirect potable
- Lake Fort Phantom Hill
  - Implemented indirect potable reuse on January 2015

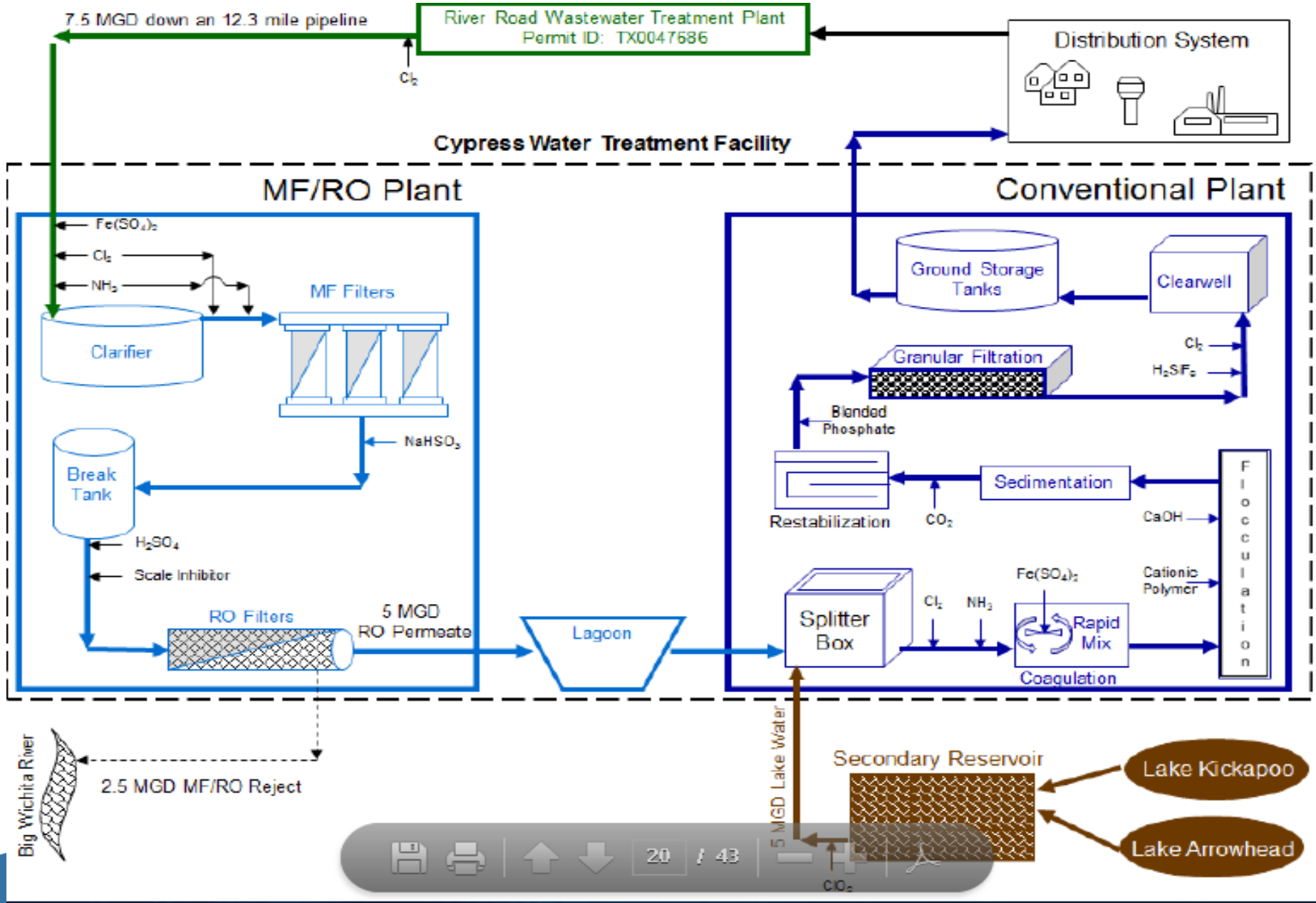
# Raw Water Production Facility in Big Spring




CRMWD Colorado River Municipal Water District

FREESE AND NICHOLS

# Direct Potable Reuse Project in Wichita



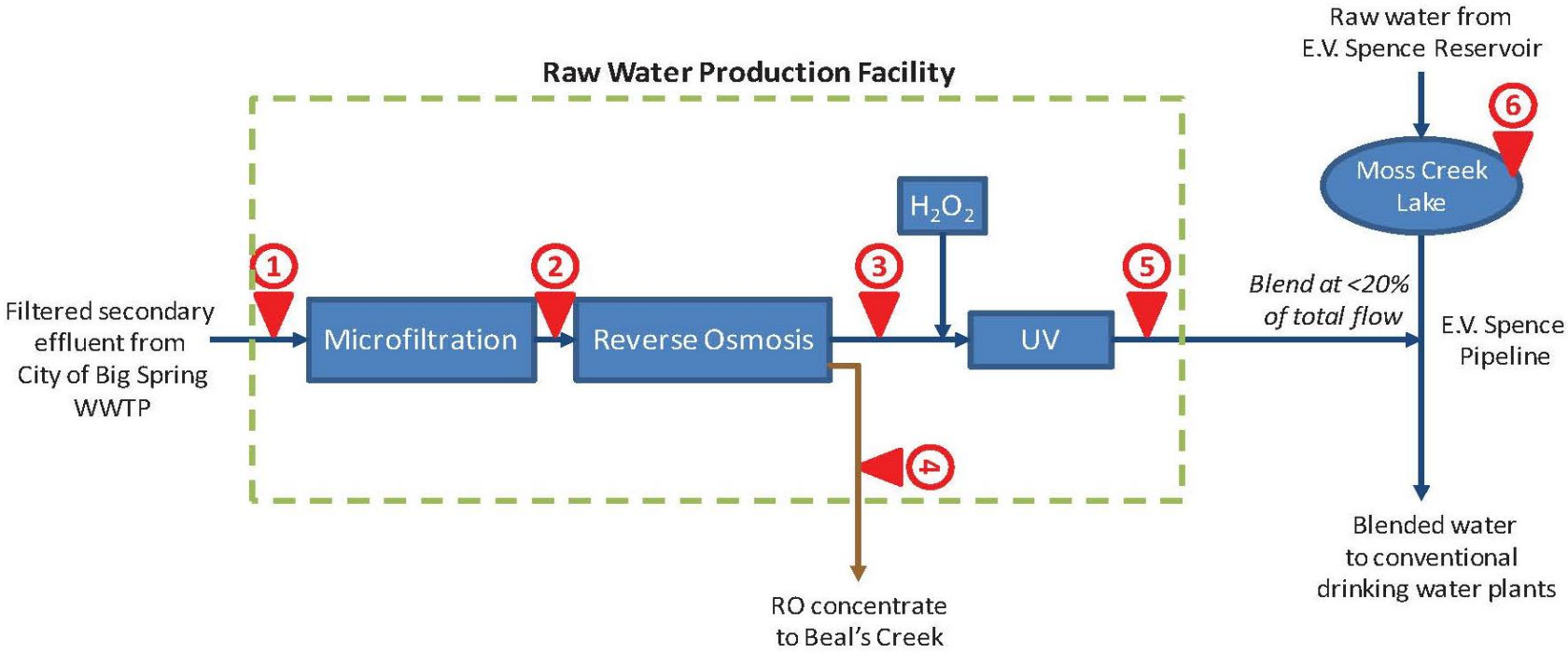
# Evaluating the Potential for Direct Potable Reuse

- Contaminants of Concern
- Water quality performance targets
- Water quality characterization
- Source control
- Treatment technologies
- Environmental buffers
- Quantitative relative risk assessment
- Pilot protocols
- Regulatory summary
- Public awareness and outreach

# Testing Water Quality in a Municipal Wastewater Effluent Treated to Drinking Water Standards

- Quarterly sampling
  - Chemicals of Emerging Concern
  - Microbial pathogens
- Develop correlations for surrogates compounds
- Guidance document for monitoring at direct potable reuse facilities


# Sample Locations




Proposed Sample Location

# EXECUTIVE SUMMARY

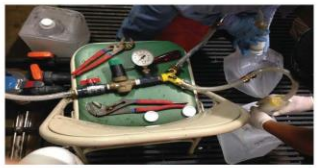
In May 2013, the Colorado River Municipal Water District (CRMWD or District) began augmenting raw water supplies with advanced treated reclaimed water from its Raw Water Production Facility (RWPF) in Big Spring, Texas. Since the implementation of direct potable reuse projects at Big Spring and Wichita Falls, many view direct potable reuse (DPR) as a viable option for increasing a community's water supply.

## Study Goals

Because this newfound acceptance may lead to more DPR projects across the state, the Texas Water Development Board commissioned this study to increase confidence in the safety and effectiveness of the RWPF's DPR applications through a detailed sampling campaign. In addition, this study includes guidance focused on indicators and surrogates for improved DPR process monitoring at a reasonable cost. Both of the aforementioned goals support further developing DPR projects as a viable water supply alternative across Texas and the United States.

## Sample Results

Testing was conducted in accordance with a detailed Test Protocol, and data were compiled into summary tables and graphics. Samples collected unequivocally showed that the RWPF produces water of very high quality. In fact, the water is more than sufficient to serve as a raw water source that is blended with other, conventional raw water sources before being retreated in conventional water treatment plants served by the District. This conclusion is supported by a number of facts:



*Plant Operators Collecting Compliance Samples*

1. RWPF compliance testing already addresses parameters with regulatory limits. Based on the data provided to the project team (see Appendix C), no regulated parameters have been exceeded.

*Sampling at Moss Creek Lake Pump Station*

2. Study sampling for constituents of emerging concern (CECs) indicate that concentrations of CECs in the RWPF influent are below health-based benchmarks, and concentrations in the product water are correspondingly lower. In fact, unregulated CECs in the RWPF product water were generally lower than concentrations measured in samples from Moss Creek Lake. Water from Moss Creek Lake is blended with RWPF product water. This means that the RWPF product water is actually improving the quality of the blended water provided to downstream conventional water treatment plants for final drinking water treatment and distribution to customers.

*Field-Filtering for Virus*

3. Pathogen testing yielded equally clear results: Protozoa (Giardia and Cryptosporidium) and bacteria (Escherichia coli) were not detected past the first treatment process in the RWPF (microfiltration). Not a single sample collected at the RWPF tested positive for enteric virus.

# Brazos River Wetland

- Engineered wetland constructed in Waco, Texas to evaluate how endocrine disrupting compounds can be reduced from treated wastewater effluent.

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Innovative Water Technologies

http://www.twdb.texas.gov/innovativewater/reuse/index.asp

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Team #4: Nancy Richards, (512) 463-0250
Team #5: Clay Schultz, (512) 463-6277
Team #6: Mireya Loewe, (512) 475-0590

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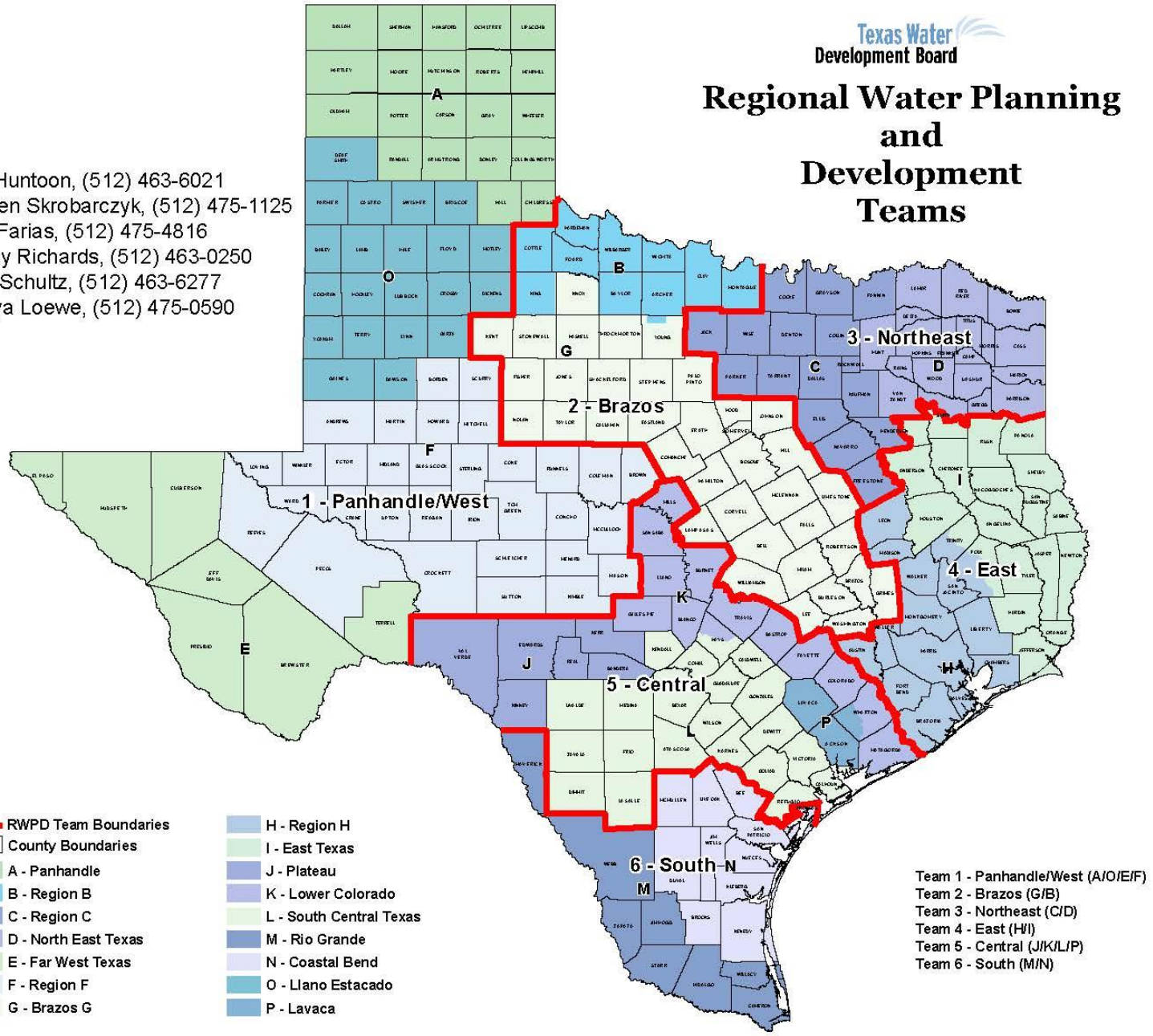
# Regional Water Planning and Development Teams




RWPD Team Boundaries
County Boundaries
A - Panhandle
B - Region B
C - Region C
D - North East Texas
E - Far West Texas
F - Region F
G - Brazos G
H - Region H
I - East Texas
J - Plateau
K - Lower Colorado
L - South Central Texas
M - Rio Grande
N - Coastal Bend
O - Llano Estacado
P - Lavaca

Team 1 - Panhandle/West (A/O/E/F)
Team 2 - Brazos (G/B)
Team 3 - Northeast (C/D)
Team 4 - East (H/I)
Team 5 - Central (J/K/L/P)
Team 6 - South (M/N)

# State Water Implementation Fund

- Recommended water management strategy in 2017 State Water Plan and have capital costs
- 20% of the funds for water conservation and reuse projects
- First round of funding:
  - 21 applicants approved for ~$1 billion in first year
  - No reuse projects

# Projected **reuse** existing water supplies

*Table 6.1 - Texas' annual existing water supply (acre-feet)*

| Source | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | Percent change |
|---|---|---|---|---|---|---|---|
| Surface water | 7,463,000 | 7,520,000 | 7,505,000 | 7,491,000 | 7,468,000 | 7,417,000 | -1 |
| Groundwater | 7,191,000 | 6,770,000 | 6,367,000 | 6,048,000 | 5,776,000 | 5,432,000 | -24 |
| Reuse | 564,000 | 602,000 | 631,000 | 671,000 | 710,000 | 723,000 | 28 |
| **Texas[a]** | **15,218,000** | **14,892,000** | **14,503,000** | **14,210,000** | **13,954,000** | **13,572,000** | **-11** |

[a] *Does not reflect some portions of existing supplies that are associated with purely saline water sources such as untreated seawater*

Source: 2017 State Water Plan