

Water Reuse in Texas

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Innovative Water Technologies

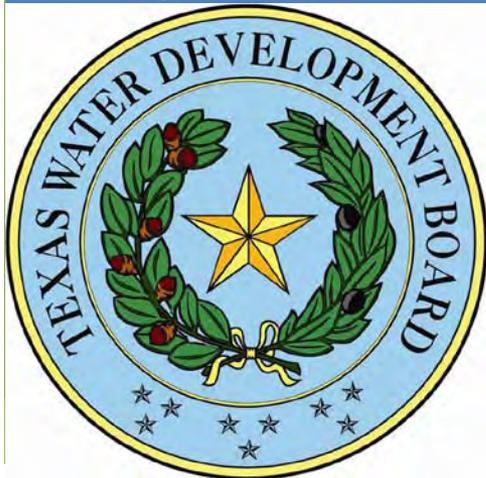


Presented at ChemInnovations 2010-Houston, Texas



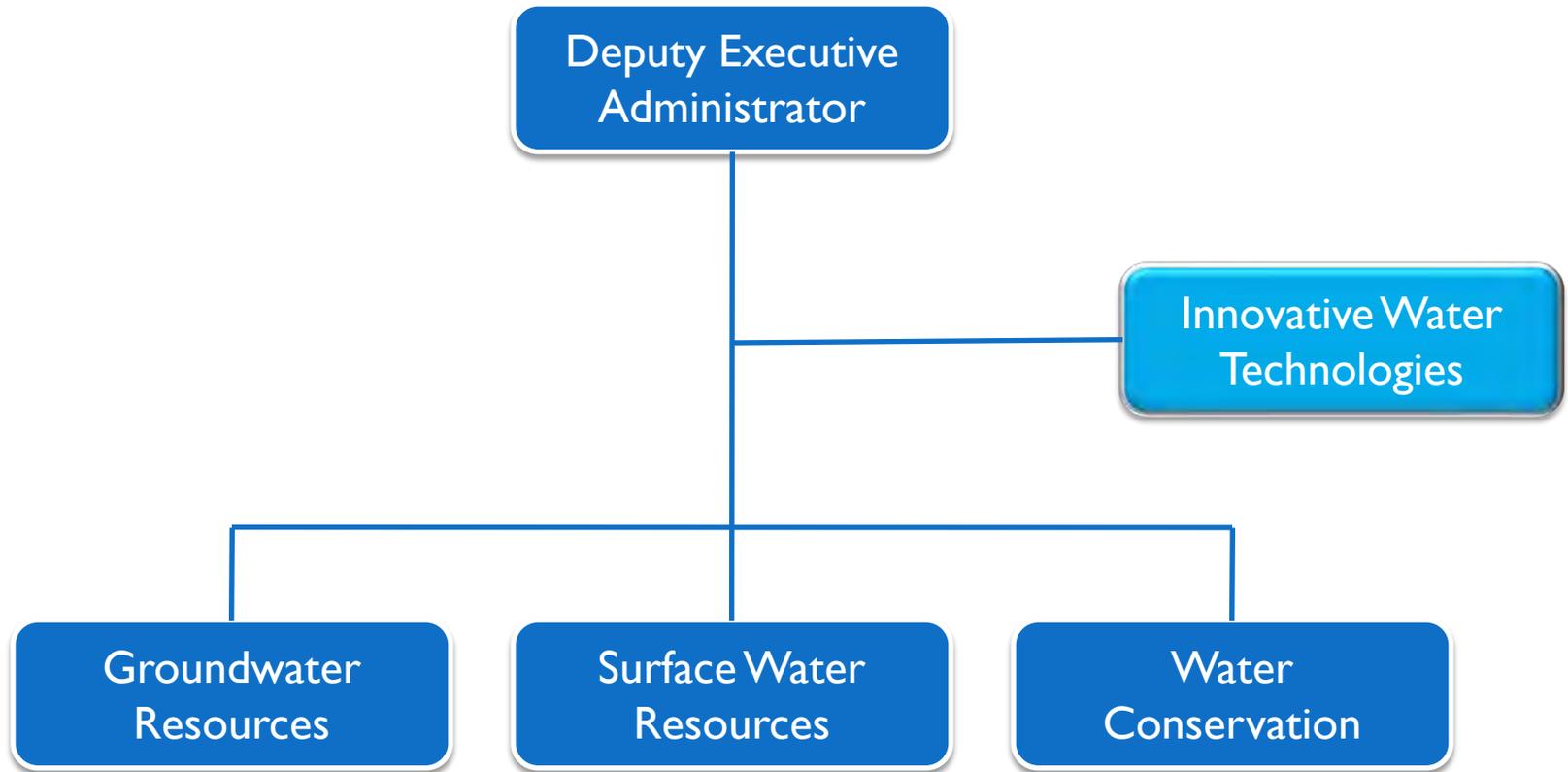
Texas Water Development Board

To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas



- **Water Planning**
 - Orderly development, management and conservation of the state's water resources
- **Financial Assistance**
 - Loans for a variety of water projects and groundwater conservation district creation expenses
 - Grants and loans for water and wastewater needs in economically distressed areas
 - Funds and grants for agricultural water conservation and water-related research
- **Water resource data collection and research**

Water Science and Conservation Innovative Water Technologies

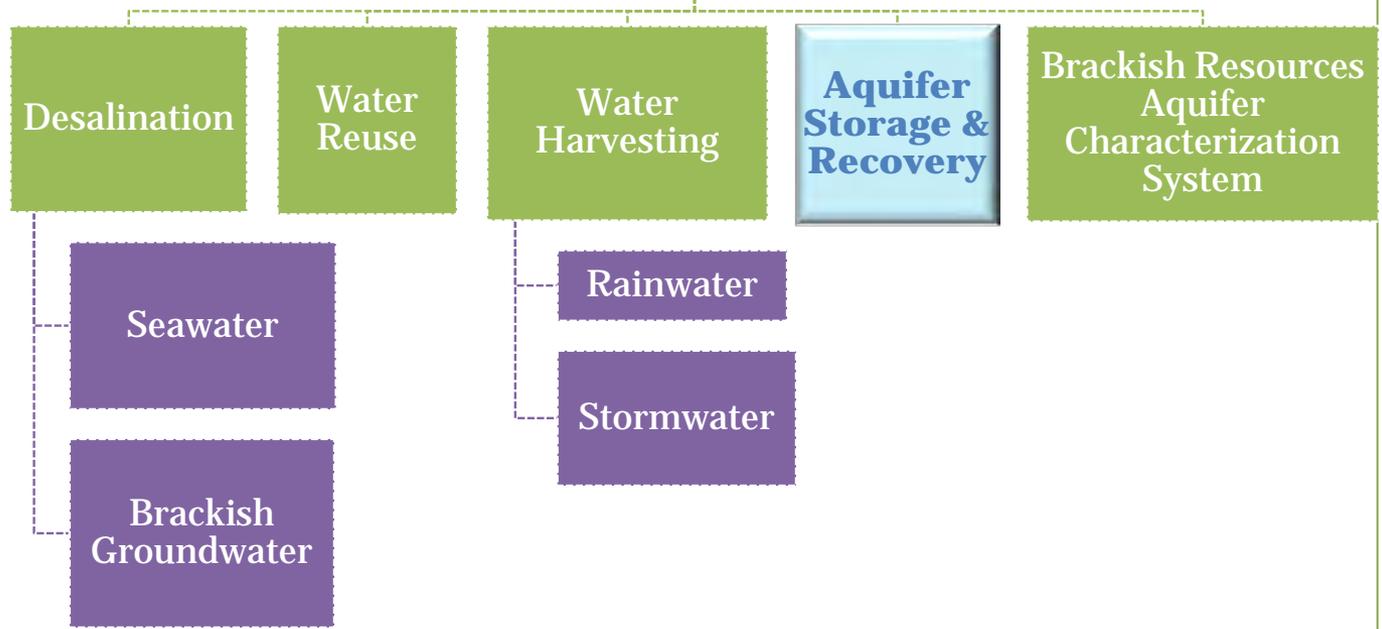




Innovative Water Technologies

To research, develop, and disseminate information to advance the development of innovative water management strategies in Texas

Innovative Water Technology Programs





Innovative Water Technologies

To research, develop, and disseminate information to advance the development of innovative water management strategies in Texas

RWH: Impact of roof material on water quality

Seawater Pilot Plant Studies

Assessment of Forward Osmosis

Advancing Water Reuse in Texas

Aquifer Storage Recovery in Texas

Technology Demonstration Projects

Brackish GW Desalination Guidance

Stormwater Harvesting Guidance

Rainwater Harvesting Guidance



<http://www.twdb.state.tx.us/iwt/>

HIGHLY COMMENDED
Global Water Awards
2006

Innovative Water Technologies

helping to extend texas' water resources

Program Areas

[BRACS](#)

[Desalination](#)

[Rainwater Harvesting](#)

[Water Reuse](#)

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[Projects](#)

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Current Projects

Project	Start Date	End Date	Total Cost	Keywords
Advancing water reuse in Texas	Jun 2009	Nov 2010	\$246,230	Texas, water reuse

Completed Projects

Date Completed	Study Title	Contract No.	Contractor	Funding
03/2010	Stormwater Harvesting in Texas 	080-483-0853	Alan Plummer Associates, Inc.	\$99,670
09/2008	Developing a Baseline GIS Database and Tools to Identify Water Reuse Potential in Texas  3.37 MB	070-483-0753	URS Corporation	\$70,000
10/2005	Ship Channel Wastewater Reclamation and Reuse Feasibility Study  71 KB	2003-483-505	City of Houston/GCA	\$360,826.50
08/2005	Recycled Water Implementation Plan - Dallas Water Utilities  13.4 MB	2003-483-486	City of Dallas	\$348,634

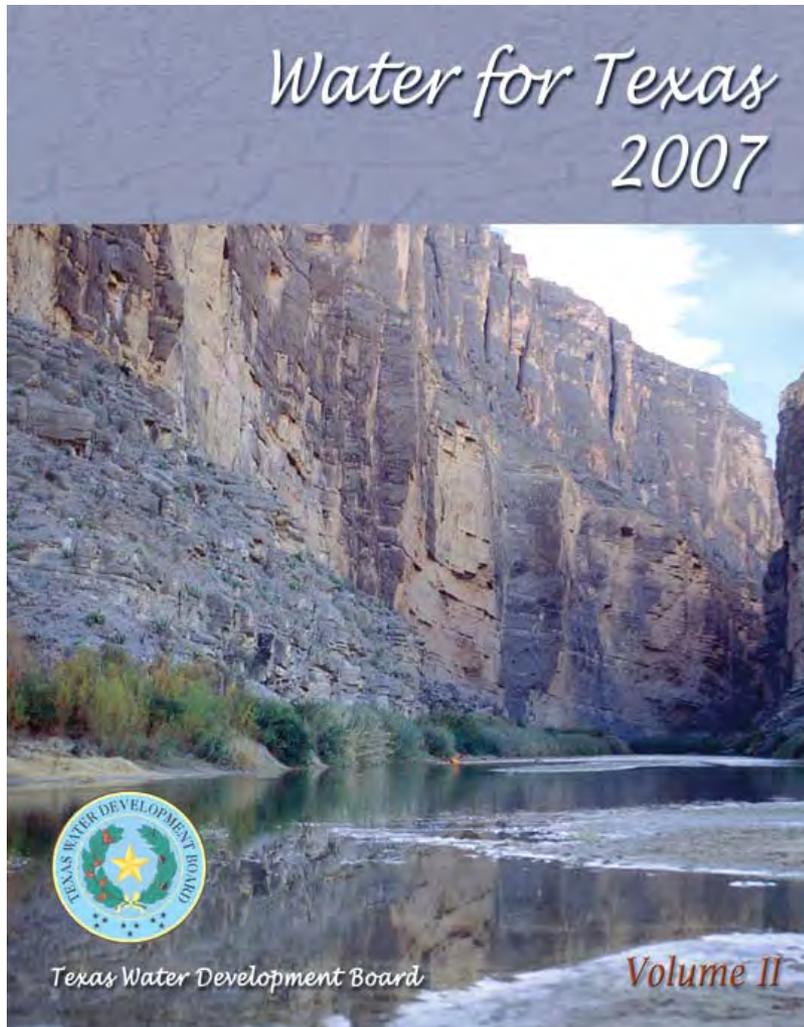
SIGN UP

TWDB E-NEWSLETTER



Form fields for newsletter sign-up

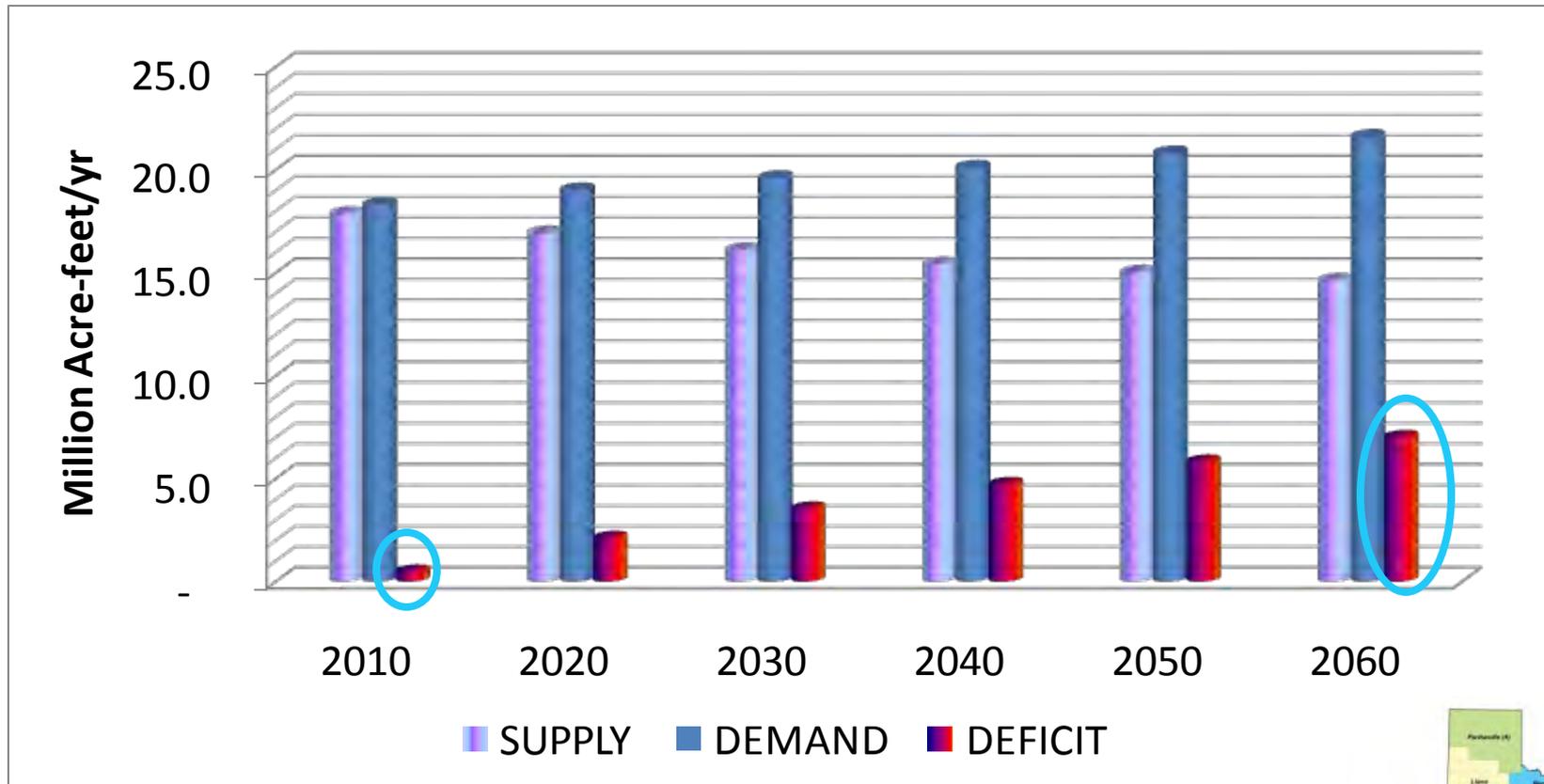
Texas Water Development Board's Planning Role



- ▶ Texas Water Code § 16.051 directs the TWDB to prepare State Water Plan
- ▶ Incorporate Regional Water Plans
- ▶ Sufficient water available in times of drought
- ▶ 50-year planning horizon
- ▶ Revised every 5-years



2007 State Water Plan-Projections

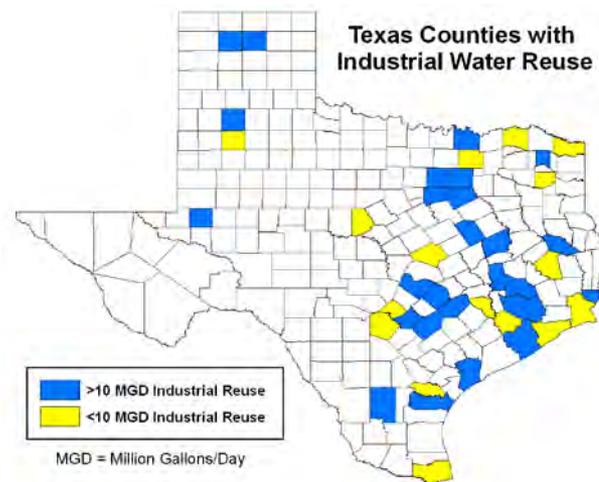
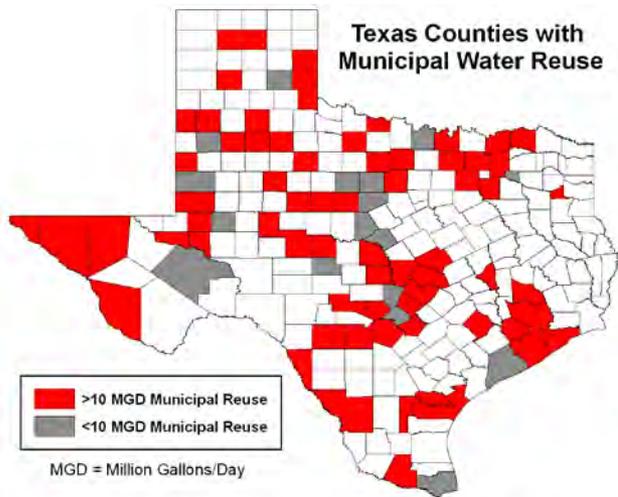
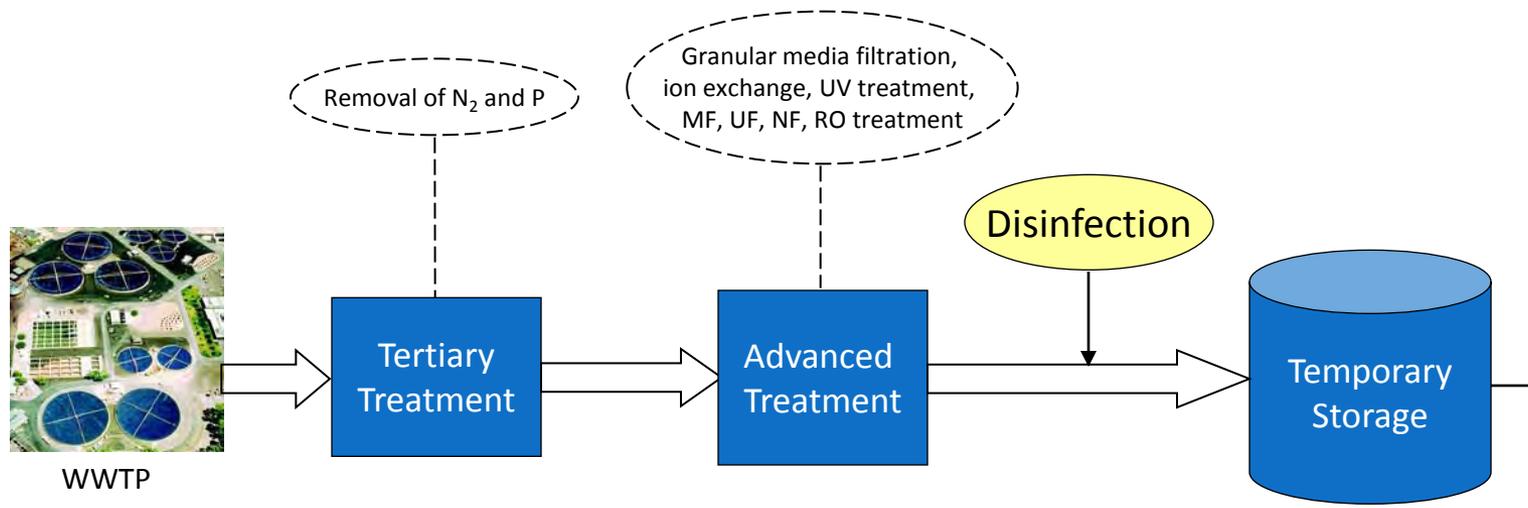


Water Reuse Opportunities & Benefits

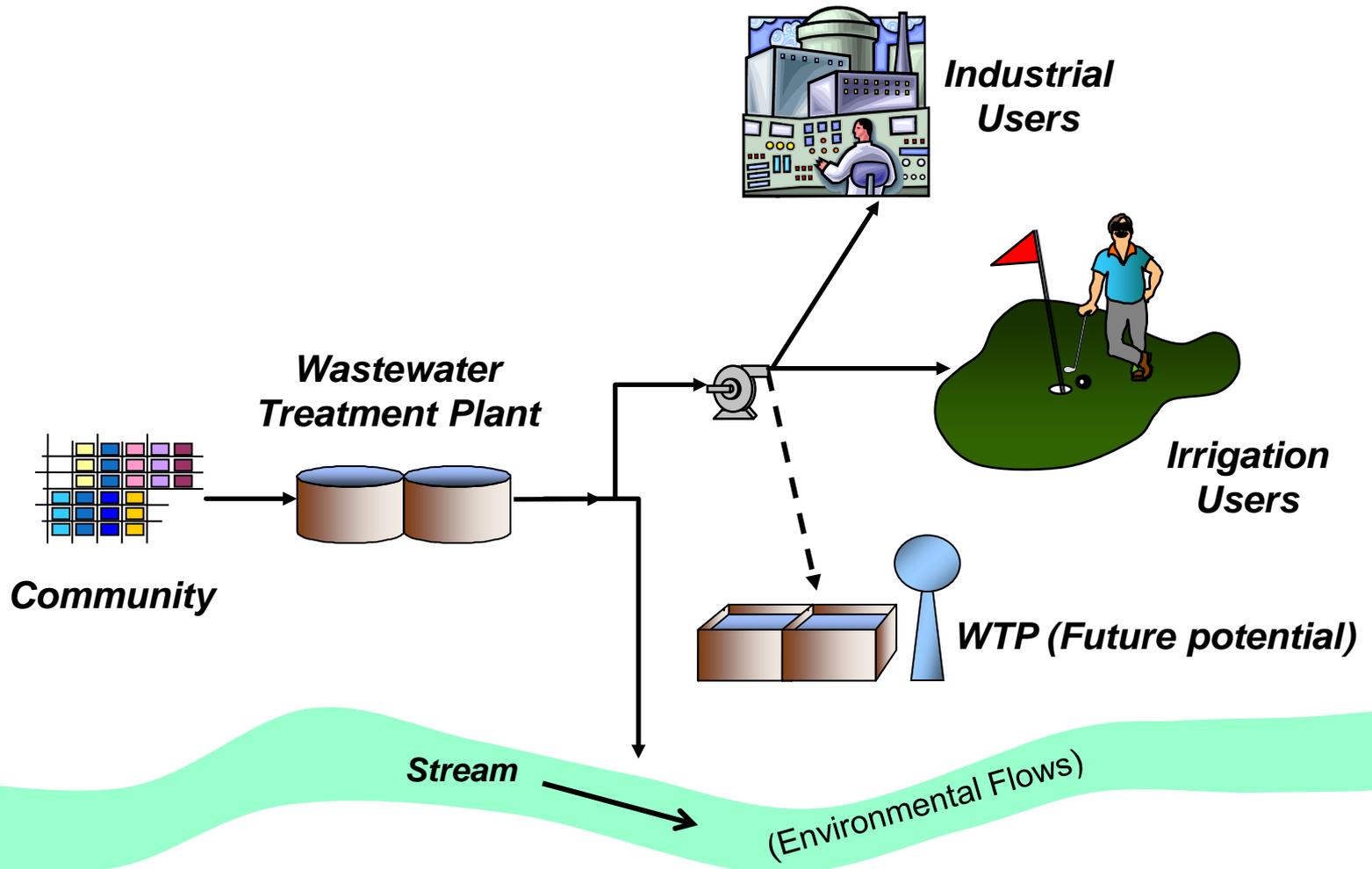
- ▶ Opportunities
 - ▶ Urbanization and population growth
 - ▶ Centralized wastewater treatment
 - ▶ Limited fresh surface and groundwater
- ▶ Benefits
 - ▶ Reduces demands on fresh water source
 - ▶ Reduces pollutant loading to surface waters
 - ▶ Enhances drought-proof reliability
 - ▶ May postpone investments in costly new supplies



Water Reuse in Texas

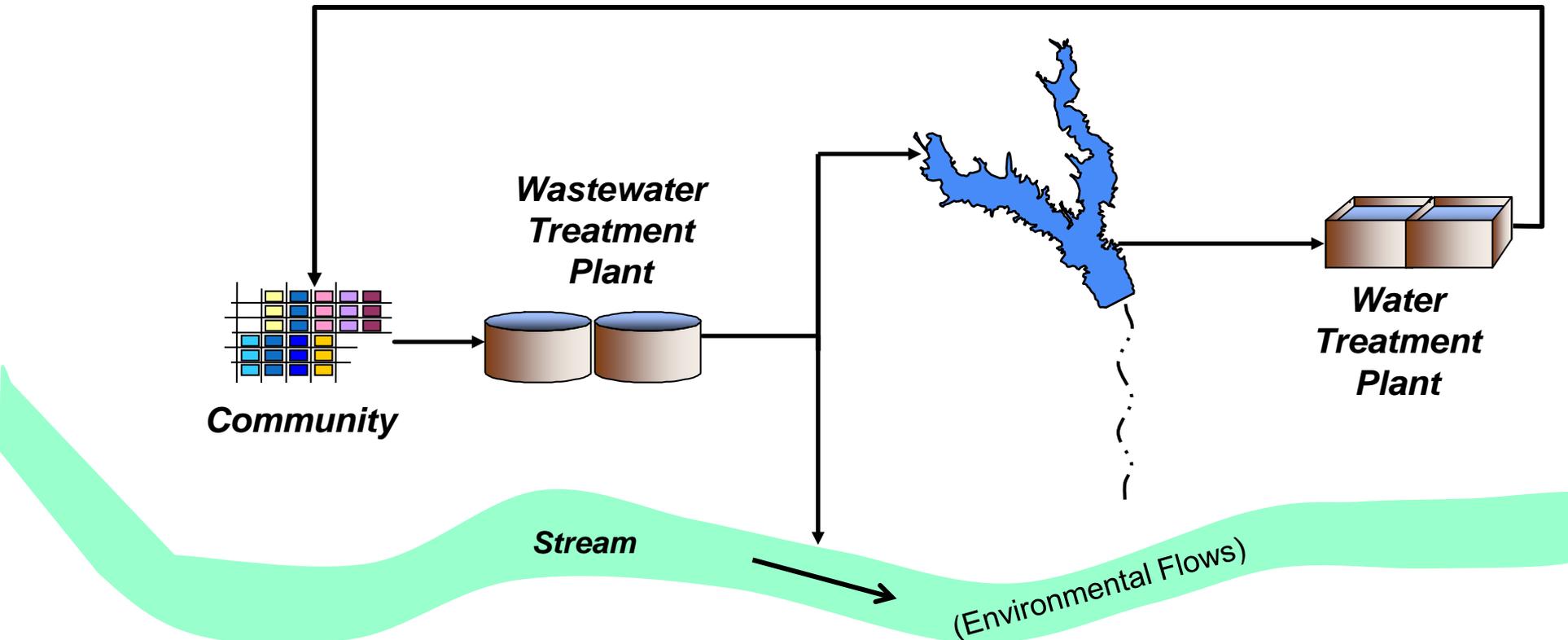


Direct Reuse



Direct Reuse is the use of effluent from a wastewater treatment plant that is piped directly from the plant to the place where it is used.

Indirect Reuse



Indirect Reuse (also called “bed and banks”) is the use of treated wastewater effluent that is discharged into a water body (lake, river, or stream) and then diverted further downstream to be used again.

Table 1. Type I Reclaimed Water Use Water Quality Criteria

Parameter	30-Day Average
BOD5 or CBOD5	5 mg/L
Turbidity	3 NTU
Fecal Coliform	20 CFU/100 mL (geometric mean)
Fecal Coliform (not to exceed)	75 CFU/100 mL (single grab sample)

Table 2. Type II Reclaimed Water Use Water Quality Criteria

Parameter	30-Day Average
For a pond system [see 30 TAC 210.33(2)(B)]:	
BOD5	30 mg/L
Fecal Coliform	200 CFU/100 mL (geometric mean)
Fecal Coliform (not to exceed)	800 CFU/100 mL (single grab sample)
For a non-pond system [see 30 TAC 210.33(2)(A)]:	
BOD5	20 mg/L
CBOD5	15 mg/L
Fecal Coliform	200 CFU/100 mL (geometric mean)
Fecal Coliform (not to exceed)	800 CFU/100 mL (single grab sample)

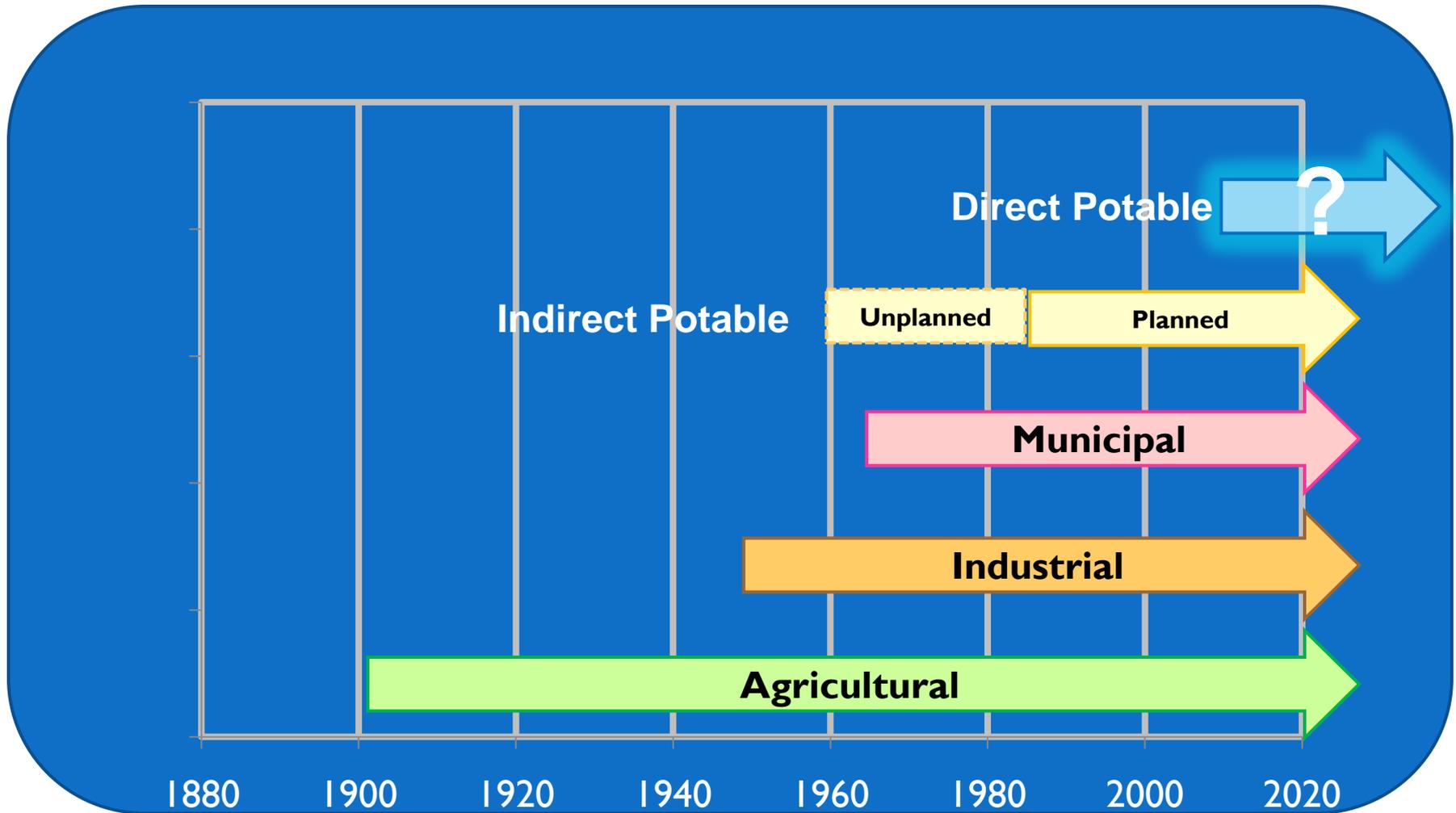
Developing a Baseline GIS Database and Tools to Identify Water Reuse Potential in Texas- TWDB-URS 070-483-0753



Water Reuse Applications

Type	Use	Opportunities	Precautions
Direct Reuse	Irrigation	<ul style="list-style-type: none"> • Production of agricultural crops 	<ul style="list-style-type: none"> • Soil, plant, groundwater, and local environment should be protected from contamination. • The cross-connection between reused water and potable water should be avoided.
	Residential uses	<ul style="list-style-type: none"> • Garden irrigation • Toilet flushing • Home air conditioning • Car washing. 	<ul style="list-style-type: none"> • Quality of water should be ensured. • The cross-connection between reused water and potable water should be avoided.
	Urban and recreational use	<ul style="list-style-type: none"> • Street cleaning • Firefighting • Ornamental impoundments • Decorative fountains. 	<ul style="list-style-type: none"> • Reused water should be free from contamination.
	Aquaculture	<ul style="list-style-type: none"> • Cultivation of aquatic plants and animals. 	<ul style="list-style-type: none"> • Aquatic environment should be protected from adverse effects of toxic substances.
Indirect Reuse	Aquifer recharge	<ul style="list-style-type: none"> • Recharging aquifers 	<ul style="list-style-type: none"> • Indirect reuse reduces flow in the downstream watercourse.
	Surface water augmentation	<ul style="list-style-type: none"> • Augmenting surface water 	<ul style="list-style-type: none"> • Quality of water should be ensured.

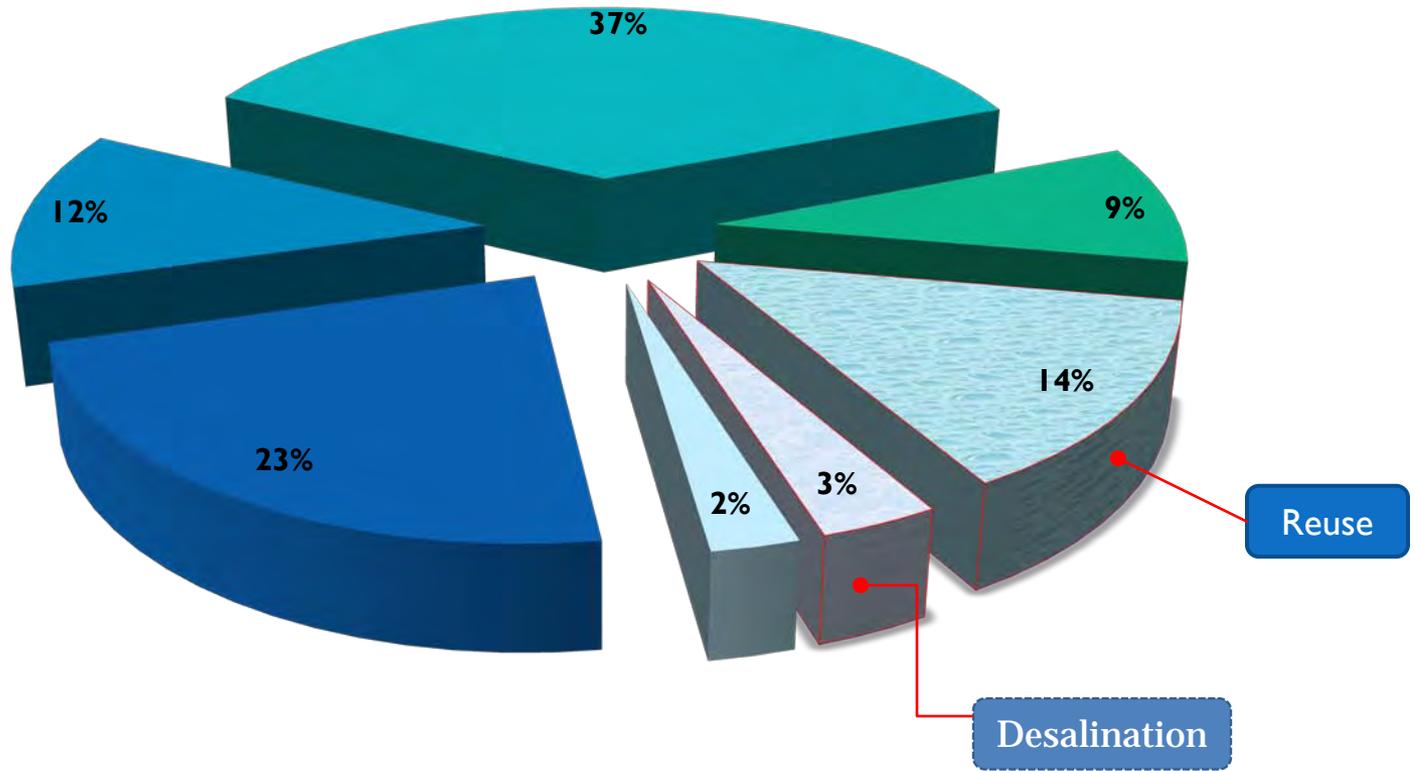
Evolution of Reuse in Texas



Modified from APA presentation at Texas i-Water 2010



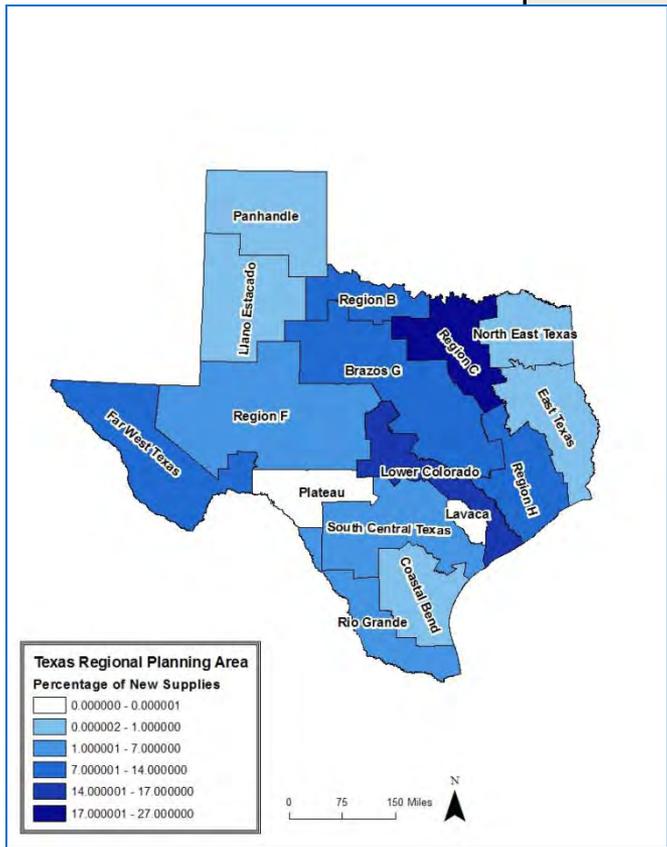
Recommended Water Management Strategies 2060



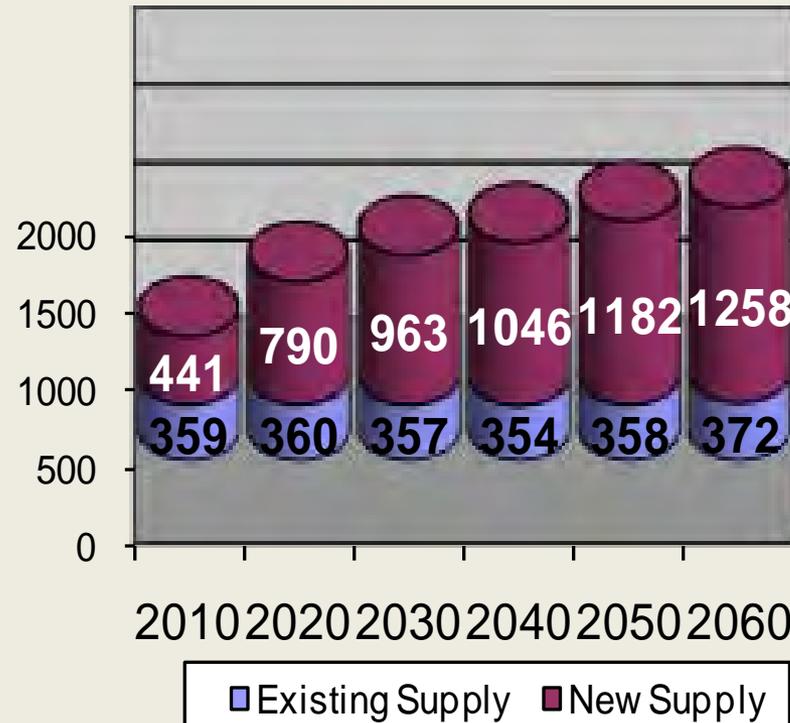
- Conservation
- New Reservoirs
- Other Surface Water
- Groundwater
- Reuse
- Desalination
- Conjunctive Use



Projected water reuse in Texas



Reuse Supplies with Implementation of Water Management Strategies (thousands of acre-feet)



Regulations and Water Rights

Regulations

- ▶ Applications of reused water is regulated by TCEQ as prescribed in 30 TAC Chapter 210.
- ▶ Based on the likelihood that the water would come in contact with humans, Chapter 210 defines 2 types of reused water
 - ❖ Type I reused water - Incidental contact with humans is likely to occur
 - ❖ Type II reused water - Incidental contact with humans is not likely to occur

Water Rights

- ▶ A water right allows water to be diverted at one or more particular points and a portion of the water to be used for one or more particular purposes.
-



Treatment Technologies

Technology	Advantages	Limitations
Pretreatment technologies (racks, screens, grit chambers, oil/water separators)	Reduce downstream maintenance requirements	Cause potential odor problems and is not suitable for the removal of dissolved solids
Detention and retention basins	Recharge aquifer	Potential problems associated with litter scum, algal blooms, nuisance odors
Constructed wetlands	Reduce downstream scour and loss of aquatic habitat	Require dry-weather base flow to maintain the permanent pool
Sand filters	Applicable for treating runoff from highly impervious drainage areas	May get clogged
Bioretention systems	May contribute to groundwater recharge	May contaminate groundwater
Advanced technologies (air floatation, lime softening, UV, GAC, ion exchange, UF, RO, MBR etc.)	Require less land areas and produce better water quality	More expensive and more complex to operate



Advancing Water Reuse in Texas

- TWDB Research Priority Contract
 - History
 - Status
 - Technology
 - Challenges
 - Deliverables
 - Documented history
 - Technology report
 - Research agenda
 - Workshop(s)



<http://www.twdb.state.tx.us/iwt/reuse/projects.asp>

Water for Texas 2007



Resources

▶ **Guidelines:**

- ▶ US EPA guidelines for water reuse (2004)
- ▶ Australian guidelines for water recycling: managing health and environmental risks (2009)

▶ **Manuals:**

- ▶ Manual of practice, how to develop a water reuse program, published by the WaterReuse Association (2009)
- ▶ Recycled water user manual, developed by Los Angeles county Recycled Water Advisory Committee (2005)
- ▶ Reclaimed water for beneficial reuse, published by New Jersey Department of Environmental Protection's Division of Water Quality (2005)

▶ **Regulation:**

- ▶ Title 30 Texas Administrative Code, Chapter 210

▶ **Funding:**

- ▶ US Bureau of Reclamation
 - ▶ WaterReuse Foundation
 - ▶ Water Research Foundation
 - ▶ Federal, state, regional, and local grant and loan support
-





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■ Outreach

- <http://www.twdb.state.tx.us/iwt/>
 - Desalination
 - Water reuse
 - Rainwater harvesting
 - BRACS
- Studies
 - Completed
 - In progress
 - Official documents

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