REGION H
Water Planning Group

2026 REGIONAL WATER PLAN
INITIALLY PREPARED PLAN

VOLUME 1

Prepared by:
Region H Water Planning Group

Prepared for:
Texas Water Development Board

With assistance from:
Freese and Nichols, Inc.
INTERA, Inc.

March 2025

2026 Regional Water Plan
Initially Prepared Plan

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PELS Reg. No. F-2144

Intera, Inc.

PELS Reg. No. F-4722

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List of Abbreviations

AMI	Automated Metering Infrastructure
AWWA	American Water Works Association
BAWA	Baytown Area Water Authority
BBASC	Basin and Bay Area Stakeholder Committee
BBEST	Basin and Bay Expert Science Team
BEG	Bureau of Economic Geology
BMP	Best Management Practice
BRA	Brazos River Authority
BWA	Brazosport Water Authority
CCI	Construction Cost Index
cfs	cubic feet per second
CHCRWA	Central Harris County Regional Water Authority
CLCND	Chambers-Liberty Counties Navigation District
CLCWA	Clear Lake City Water Authority
COA	Certificate of Adjudication
COH	City of Houston
CRP	Clean Rivers Program
CRU	Collective Reporting Unit
CWA	Coastal Water Authority
CWSRF	Clean Water State Revolving Fund
DCP	Drought Contingency Plan
DFC	Desired Future Condition
DOR	Drought of Record
DWSRF	Drinking Water State Revolving Fund
EPA	Environmental Protection Agency
FBSD	Fort Bend Subsidence District
FSA	Farm Service Agency
FWSD	Fresh Water Supply District
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GCWA	Gulf Coast Water Authority
GMA	Groundwater Management Area
gpcd	gallons per-capita daily
GRP	Groundwater Reduction Plan
HGSD	Harris-Galveston Subsidence District
IFR	Infrastructure Finance Report
IPP	Initially Prepared Plan
IWA	International Water Association
IWRP	Integrated Water Resource Plan
iWUD	Integrated Water Utility Database
LAWA	La Porte Area Water Authority
LNVA	Lower Neches Valley Authority
LSGCD	Lone Star Groundwater Conservation District
LVGUs	Large Volume Groundwater Users
MAG	Modeled Available Groundwater
MCL	maximum contaminant level

mgd	million gallons per day
mg/l	milligrams per liter
msl	mean sea level
MUDs	Municipal Utility Districts
MWP	Major Water Provider
NCWA	North Channel Water Authority
NFBWA	North Fort Bend Water Authority
NHCRWA	North Harris County Regional Water Authority
PDSI	Palmer Drought Severity Index
PWS	Public Water Supply
Region G	Brazos G Regional Water Planning Group
Region I	East Texas Water Planning Group
RHWPG	Region H Water Planning Group
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SAM-Houston	Small Area Model Houston
SDC	State Data Center
SJRA	San Jacinto River Authority
SWIFT	State Water Implementation Fund for Texas
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TTWP	Trans-Texas Water Program
TWC	Texas Water Code
TWDB	Texas Water Development Board
UCM	Unified Costing Model
UHCPP	University of Houston Center for Public Policy
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAM	Water Availability Model
WCP	Water Conservation Plan
WHCRWA	West Harris County Regional Water Authority
WIF	Water Infrastructure Fund
WMS	Water Management Strategy
WRAP	Water Resources Analysis Package
WUD	Water Utility Database
WUG	Water User Group
WWP	Wholesale Water Provider

Water Measurements

Acre-foot (ac-ft) = 43,560 cubic feet = 325,851 gallons

Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day

Gallon per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr

Million gallons per day (mgd) = 1,000,000 gallons per day = 1,120 ac-ft/yr

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ES – Executive Summary

ES.1 INTRODUCTION

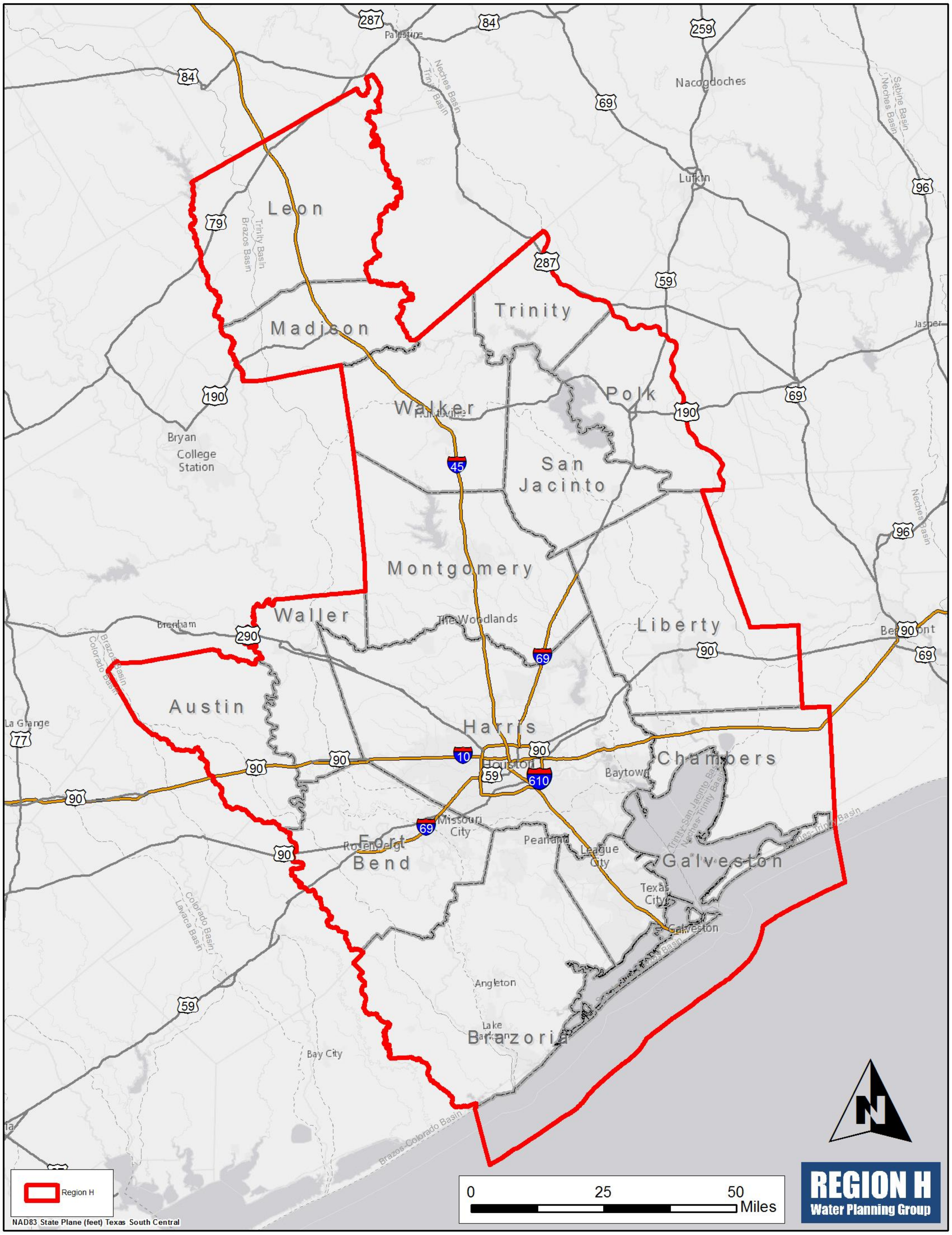
In 1997 the State Legislature, through Senate Bill 1, determined that a Texas State Water Plan for the 2000 to 2050 timeframe would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPGs) that have guided the development of each region's plan. In 2001, a new set of rules and guidelines from TWDB were enacted through Senate Bill 2. The 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional Water Plans (RWPs) and State Water Plans (SWPs) being produced every five years. The 2021 Region H Water Plan and the 2022 State Water Plan were created during the fifth planning cycle and are now being updated as part of the sixth round of regional planning.

Region H encompasses all or part of fifteen counties in southeast Texas and includes the majority of the San Jacinto River Basin and the lower reaches of the Brazos and Trinity River Basins. A location map showing the regional boundaries is included in *Figure ES-1*. The Region H Water Planning Group (RHWPG) consists of 26 voting and 10 non-voting members that represent a diverse range of backgrounds and interests. Additional information about Region H and the RHWPG can be found in ***Chapter 1*** of the 2026 RWP and on the Region H Water website, *http://www.regionhwater.org*. Regional water planning is conducted under the oversight of TWDB. Information on regional water planning and the State Water Plan can be found at the TWDB website, *http://www.twdb.texas.gov*.

Region H is an economic powerhouse crucial to both the Texas and the national economy. Adequate water supplies are essential to continued economic health and to the region's future growth. Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The area provides some of the state's most popular vacation spots that generate hundreds of millions of dollars in annual tourism revenues. The Port of Houston is the second busiest port in the nation. Region H is generally characterized by urbanizing land uses and broad-based economic development. In areas outside of the urban core, agriculture is a major contributor to economic activities.

Any large-scale water supply or conveyance projects will require the close cooperation of political entities in the affected areas. While municipal and county governments are most visible in Region H, there are numerous other governmental and regulatory agencies with jurisdiction over aspects of water supply development in the region. These include fifteen river and water authorities, seven groundwater-regulating entities, three councils of governments, eleven soil and water conservation districts, and hundreds of utility districts and water supply corporations that outnumber any other region in the state.

Figure ES-1 – Region H Location Map



ES.2 PROJECTED POPULATION AND WATER DEMANDS

Population in Region H is projected to grow from approximately 7.3 million in 2020 to approximately 10.8 million in 2080. The strong population growth over the fifty-year planning period represents an annual growth rate of slightly less than one percent.

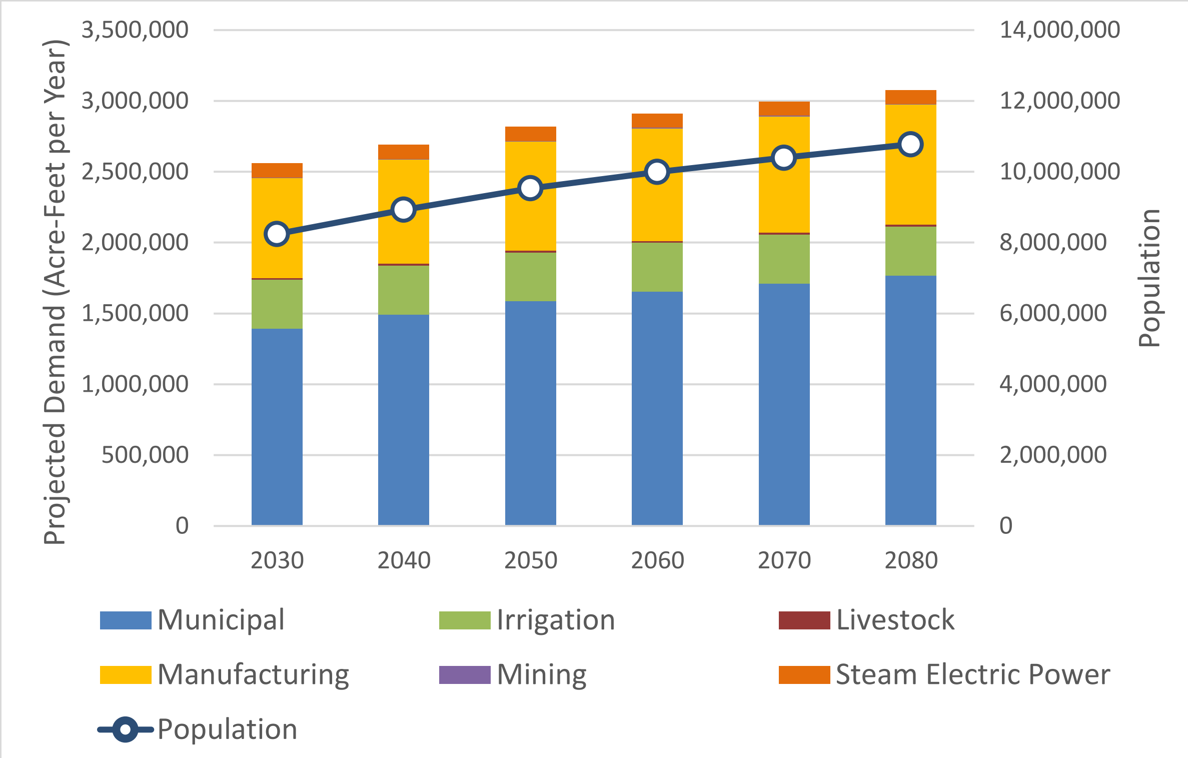
Population data are projected for each of the fifteen counties in the region and at a more refined scale for accounting units known as Water User Groups (WUGs). Defined municipal WUGs are entities serving more than 100 acre-feet per year (ac-ft/yr) for municipal use. All smaller service providers and rural/unincorporated areas of municipal and domestic water use, aggregated at the county level, are considered part of an additional WUG and are referred to as “County-Other” for each county. Within Region H, there are numerous municipal WUGs as well as fifteen County-Other WUGs, each of which are further divided by basin and county.

For the sixth round of regional water planning, TWDB generated WUG-level projections for all RWPGs, which provided feedback to TWDB on potential adjustments to projections. The RHWPG opted to request an exception from these state-generated projections for a portion of the Region and, instead, utilize information developed for a parallel project to evaluate groundwater use within the region for the Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD). This request builds upon similar efforts undertaken by the Region for prior RWP cycles and involved close coordination among the RHWPG, the Subsidence Districts, and TWDB staff. This study was designed to fit with the regional planning process and coordination with TWDB was performed in order to ensure uniformity between the groundwater study and the projection development conducted by TWDB. This request was evaluated and subsequently approved by TWDB. Population-based demands were developed from these population projections based on recorded water use information compiled by TWDB and adjusted for future adoption of passive water conservation measures.

Water use in other sectors also represents significant demand within Region H. This is most notably true for the Irrigation and Manufacturing sectors. Information regarding non-population water use was compiled from a number of sources based on the type of demand considered. Non-population water demand projections consider historical water use from all source types, including demands met through reuse. In each category, projections were initially presented by TWDB and were reviewed and amended by the RHWPG as required. It was noted by the RHWPG that the updated TWDB methodology for projection of Manufacturing demands resulted in a significant increase from the 2021 RWP and addressed a number of concerns raised by the Group during the prior cycle.

Region H population and water demand projections by WUG category are shown in *Figure ES-2*. Additional information regarding the projection of population and demand can be found in ***Chapter 2*** of the 2026 RWP.

Figure ES-2 – Population and Water Demand Projections by WUG Category



ES.3 ANALYSIS OF CURRENT WATER SUPPLIES

The total water supply currently available to Region H from existing water sources within the region is approximately 3.15 million ac-ft/yr in 2030. Of that amount, about two-thirds is surface water. By the year 2080, the available supply will be approximately 3.08 million ac-ft/yr. The reduction in supply between 2030 and 2080 reflects restrictions on the use of the Gulf Coast Aquifer, instituted to combat subsidence in a large part of the region. Reduced reservoir yields due to sedimentation also contribute to the reduction in supply over time. The predominant sources of surface water supply are three reservoirs: Lakes Conroe and Houston within the San Jacinto River Basin and Lake Livingston within the lower Trinity River Basin.

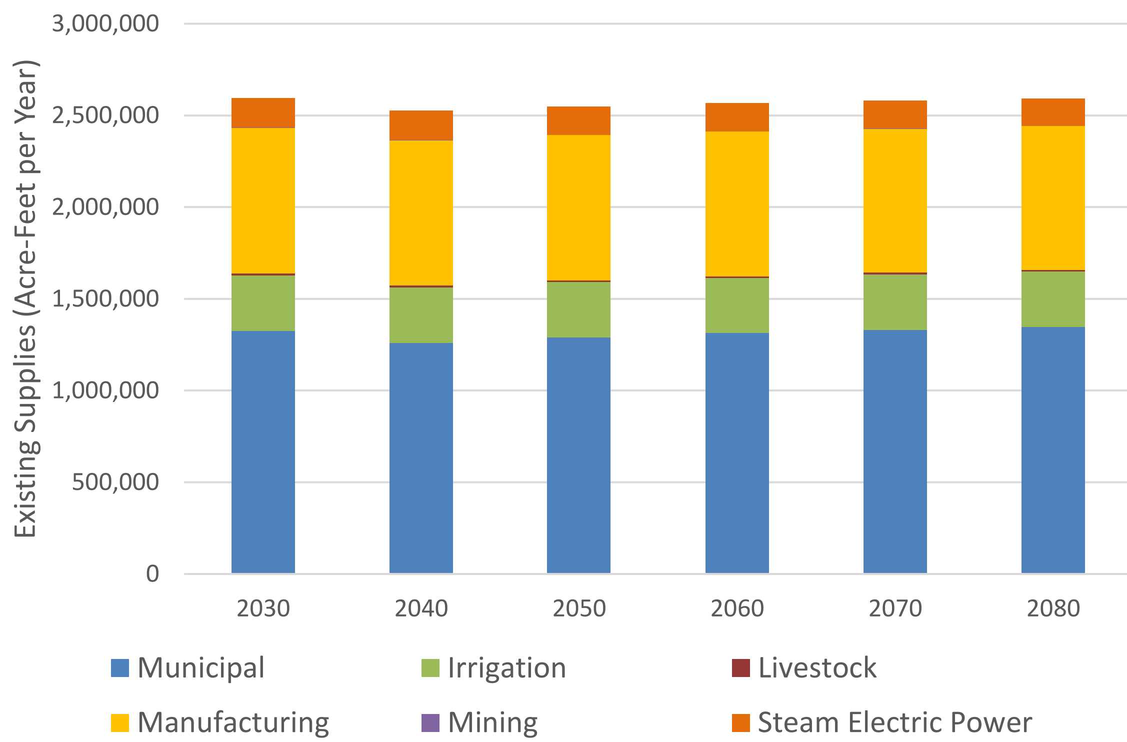
Surface water supply for each river basin and coastal basin was determined using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs), which analyze permitted diversions against the historic rainfall record, including the drought of record period in the 1950s. In the Trinity and Brazos River Basins, limited wastewater return flows were included in the models based on expectations that full reuse would not occur during the planning period. For all other basins, the yields are based upon the no-return-flow scenario used for water rights permitting.

Groundwater supply projections were largely derived from estimates of Modeled Available Groundwater (MAG) that are developed as a result of the Groundwater Management Area (GMA) joint planning process. Regional planning groups are required to use these availabilities when planning for all applicable aquifer formations, with TWDB guidance allowing RWPGs to apply a peaking factor to these volumes to reconcile the differences in the GMA and regional water planning processes and better reflect management by groundwater districts. During the development of the 2026 RWP, the RHWPG coordinated with groundwater-regulating entities in Region H and developed MAG peak factors for some of the formations in Region H.

Direct and indirect reuse of wastewater return flows accounts for a small portion of the existing supplies in Region H. These supplies were estimated based on existing levels of reuse as reported by TWDB and by individual WUGs.

A detailed analysis of the entire water supply is found in ***Chapter 3*** of the 2026 RWP. A summary of available water supply allocated by WUG category is provided in *Figure ES-3*.

Figure ES-3 – Existing Water Supplies by WUG Category and Decade

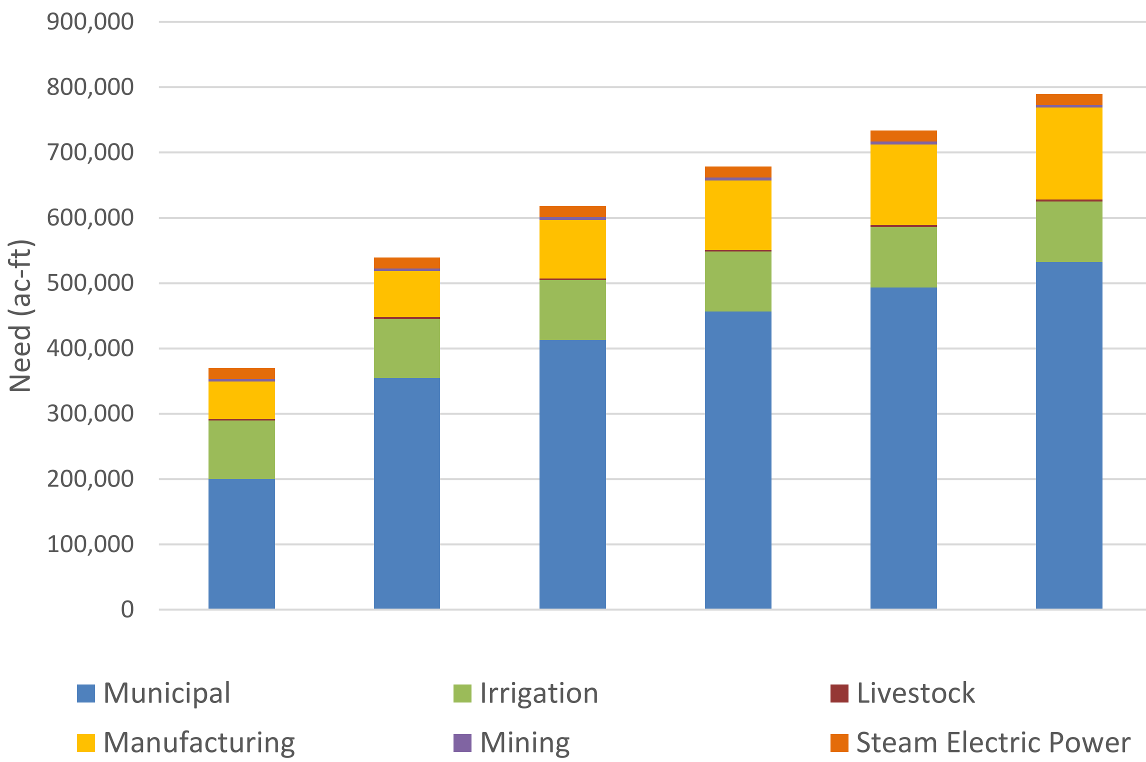


ES.4 ANALYSIS OF NEEDS

Water supplies were compared to projected water demands to determine if any areas in the region are expected to experience water shortages during the planning period. Despite substantial overall water supplies on a regional level through the year 2080, the RHWPG has identified communities and non-municipal water users that will experience water shortages during the planning period under conditions similar to the drought of record unless they take action to increase their supplies. Some of these WUGs will be able to meet their demands simply by extending or increasing existing water supply contracts.

The projected shortages identified in the year 2030 for WUGs wholly or partly within Region H totaled 369,991 acre-feet per year, increasing to as much as 789,995 acre-feet per year in the year 2080. Needs across Region H are shown by water use category in *Figure ES-4*. The projections estimate lower needs compared to the 2021 RWP, largely due to the reduction in projected Municipal demands and the implementation of additional water supply infrastructure subsequent to the 2021 RWP. Needs identified in the 2026 RWP are discussed in further detail in ***Chapter 4***.

Figure ES-4 – Identified Water Needs by WUG Category by Decade



ES.5 WATER MANAGEMENT STRATEGIES

State legislation and TWDB rules specify that RWPGs shall identify potentially feasible Water Management Strategies (WMS) for all WUGs and Wholesale Water Providers (WWPs) with future water supply needs. As a growing region with expanding populations and increasing economic development, Region H projects substantial needs over the 2030–2080 planning horizon. In order to address these needs, consideration was given to a wide range of data when developing recommendations for WMS and associated projects (specific infrastructure or measures used to increase or manage water supplies). Potentially feasible WMS were identified in three ways. First, strategies recommended in the 2021 Region H Water Plan for either implementation or additional study were considered. Next, new strategies were solicited during the scope development period for the 2026 RWP. Finally, entities that conducted independent strategy studies for WMS or projects that they intend to sponsor were able to bring their reports to the planning group and request that they be considered in the plan. The list of potentially feasible WMS and projects considered by the RHWPG is documented in *Table ES-1*.

Table ES-1 – Region H Potentially Feasible WMS and Projects

Conservation
Advanced Municipal Conservation and Water Loss Reduction
Industrial Conservation
Irrigation Conservation
Conveyance
BWA Transmission and Storage Expansion
CHCRWA Transmission and Internal Distribution
City of Houston GRP Transmission
City of Houston Transmission Expansion
CWA Transmission Expansion
East Texas Transfer
LNVA Neches-Trinity Basin Interconnect
Manvel Supply Expansion
NFBWA Phase 2 Distribution Segments
NHCRWA Distribution Expansion
NHCRWA Transmission Lines
Southeast Transmission Line Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Aquifer Storage and Recovery
Brackish Groundwater Development and Groundwater Blending
BWA Brackish Groundwater Development
City of Houston Area 2 Groundwater Infrastructure
City of Houston Repump and Groundwater Plant Improvements
Expanded Use of Groundwater
Fairchilds Supply Infrastructure
GCWA Groundwater Well Development
SJRA Catahoula Aquifer Supplies
Groundwater Reduction Plans
CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land IWRP
Fort Bend County MUD 25 GRP
Fort Bend County WCID 2 GRP
Montgomery County MUDs 8 and 9 Supply Expansion
Montgomery County Supply Expansion
NFBWA GRP
NHCRWA GRP
WHCRWA GRP

Reuse
City of Houston Reuse
City of Pearland Reuse
League City Effluent Reuse
NFBWA Member District Reuse
NHCRWA Member District Reuse
River Plantation Reuse
San Jacinto Basin Regional Return Flows
Texas City Industrial Complex Reuse
Wastewater Reclamation for Industry
Wastewater Reclamation for Municipal Irrigation
Westwood Shores MUD Reuse
Surface Water Development
Allens Creek Reservoir
BWSC Reservoir and Pump Station Expansion
GCWA Coastal Desalination
Lake Somerville Augmentation
Treatment
BAWA East SWTP Expansion
BWA Conventional Treatment Expansion
City of Houston EWPP Enhancement
Harris County MUD 50 Surface Water Treatment Plant[2]
Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant
SEWPP Expansion
Other
Brazos Saltwater Barrier
GCWA Canal Lining and Loss Mitigation
GCWA Shannon Pump Station Expansion
LNVA Devers Pump Station Relocation
Municipal Drought Management
New and Expanded Contracts

Depending on the information available, Region H may adapt data directly from detailed studies developed by project sponsors or develop a high-level analysis of a concept for inclusion in the RWP. In other cases, Region H has performed more in-depth planning studies to evaluate the potential of projects that may yield great regional benefits to water supply. The evaluation of each potentially feasible WMS included assessments of supply quantity and reliability, cost, and impacts to cultural and environmental resources. WMS evaluation and selection for recommendation incorporated a dual-phased selection process, with one phase focused on the applicability of a WMS or project to the needs of individual WUGs and the other phase focused on evaluating a set of criteria applied to the overall WMS or associated projects.

Due to the extensive geographic area within Region H and the diverse nature of demands, a variety of WMS were recommended to meet needs including but not limited to the following approaches:

- water conservation,
- development of conveyance infrastructure and contracts to more fully utilize existing supplies,
- development of groundwater resources within areas with sufficient groundwater availability,
- reuse,
- development of new surface water supplies, and
- development of treatment infrastructure.

Remaining needs after the application of conservation and direct reuse WMS are known as second tier needs. These needs are shown in Figure ES-5. A summary of new source water availability and increased availability from existing sources is shown in *Table ES-2*. *Table ES-3* summarizes the key projects selected as part of recommended WMS along with their total potential volume, capital cost, and decade of implementation. The evaluation and recommendation of WMS and projects in the 2026 RWP are discussed in further detail in **Chapter 5**.

Figure ES-5 – Second Tier Needs After Application of Conservation and Direct Reuse WMS

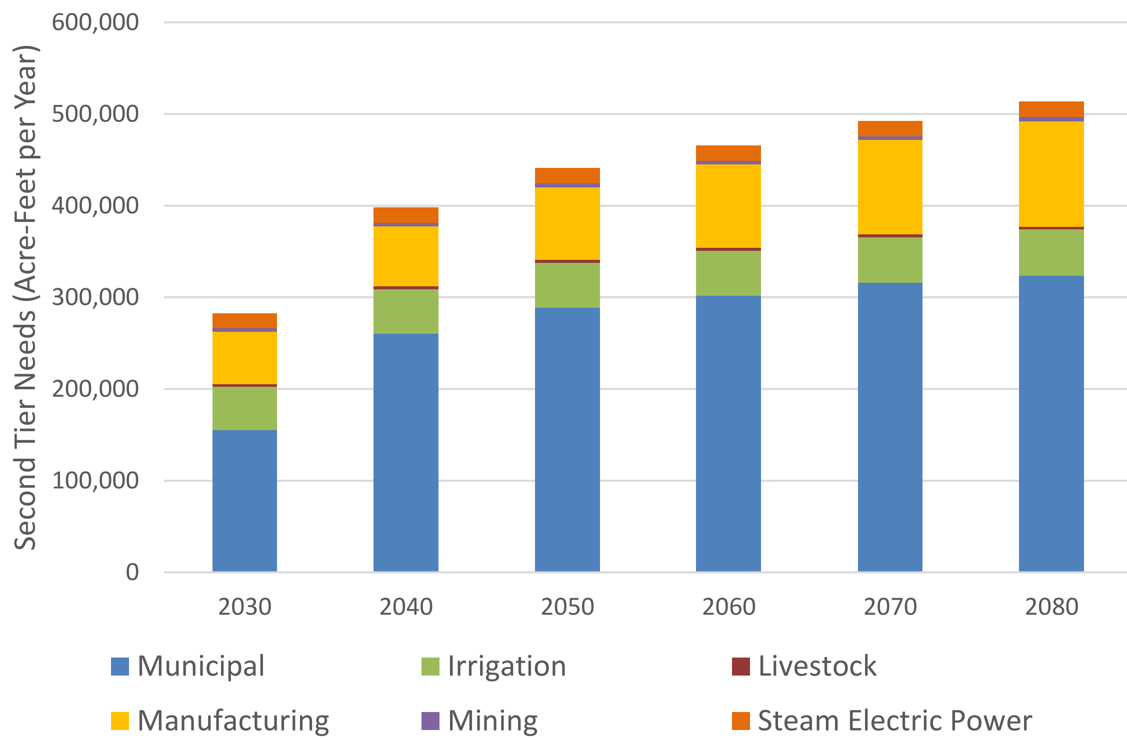


Table ES-2 – New and Increased Source Availability

Source Type	Type	2080 New or Increased Supply (ac ft)
Conservation		
Industrial Conservation	New	43,892
Irrigation Conservation	New	103,799
Municipal Conservation	New	140,597
Water Loss Reduction	New	89,637
Groundwater		
Gulf Coast Aquifer System, Montgomery (Catahoula Formation)	Increased	12,976
Surface Water		
Allens Creek Lake/Reservoir	New	99,650
Brazos Run-of-River, Brazoria	Increased	10,000
Harris Reservoir	New	80,000
Gulf of Mexico Saline	New	22,400
Reuse		
Direct Reuse, County-Other, Montgomery	Increased	2,570
Direct Reuse, Fort Bend County MUD 25	Increased	68
Direct Reuse, Galveston County Industries	New	11,200
Direct Reuse, League City	Increased	11,200
Direct Reuse, Master Planned Communities, Brazoria County	New	313
Direct Reuse, Master Planned Communities, Chambers County	New	771
Direct Reuse, Master Planned Communities, Fort Bend County	New	6,517
Direct Reuse, Master Planned Communities, Harris County	New	3,252
Direct Reuse, Master Planned Communities, Liberty County	New	1,097
Direct Reuse, Master Planned Communities, Waller County	New	619
Direct Reuse, Missouri City	New	804
Direct Reuse, North Fort Bend Water Authority	Increased	4,280
Direct Reuse, North Harris County Regional Water Authority	Increased	300
Direct Reuse, Pearland	New	1,154
Direct Reuse, Quail Valley UD	Increased	188
Direct Reuse, River Plantation MUD	Increased	25
Direct Reuse, Sienna Plantation	Increased	3,092
Direct Reuse, Sugar Land	Existing	2,912
Direct Reuse, Westwood Shores MUD	New	150
Indirect Reuse, Houston	New	165,705
San Jacinto Regional Return Flows	New	100,445

Table ES-3 – Key Project Overview

Project	Potential Volume[1] (ac ft)	Capital Cost ($)	Unit Cost ($/ac ft)		Start Decade
			Start Decade	2080	
Conservation[2]					
Industrial Conservation	43,892	$305,856,311	$540	$247	2030
Irrigation Conservation	103,799	$2,521,185	$157	$155	2030
Municipal Conservation (Advanced Conservation)	140,597	$4,130,874,617	$1,770	$617	2030
Municipal Conservation (Water Loss Reduction)	89,637	$1,647,604,552	$761	$726	2030
Conveyance					
BWA Transmission and Storage Expansion	16,800	$84,794,502	$437	$82	2030
CHCRWA Transmission and Internal Distribution	5,466	$22,717,067	$314	$22	2030
City of Houston GRP Transmission	51,789	$260,640,042	$347	$50	2030
City of Houston Transmission Expansion	483,280	$508,742,379	$83	$11	2030
CWA Transmission Expansion	454,720	$497,255,512	$128	$28	2040
East Texas Transfer	250,000	$591,526,599	$189	$23	2050
LNVA Neches-Trinity Basin Interconnect	67,000	$127,821,515	$165	$31	2040
Manvel Supply Expansion	7,840	$62,235,692	$475	$57	2030
NFBWA Phase 2 Distribution Segments	62,496	$129,366,992	$166	$21	2030
NHCRWA Distribution Expansion	143,360	$1,228,464,604	$346	$60	2030
NHCRWA Transmission Lines	143,360	$453,864,685	$255	$32	2030
Southeast Transmission Line Improvements	57,575	$159,151,172	$213	$18	2030
WHCRWA Distribution Expansion	92,288	$391,325,873	$256	$36	2030
WHCRWA/NFBWA Transmission Line	169,030	$622,459,204	$297	$38	2030
Groundwater Development					
Brackish Groundwater Development[3]	Varies	Varies by project	Varies	Varies	2030
BWA Brackish Groundwater Development	13,440	$74,055,688	$830	$442	2030
City of Houston Area 2 Groundwater Infrastructure	50,400	$150,754,783	$482	$271	2030
City of Houston Repump and GW Plant Improvements	97,440	$173,600,899	$287	$45	2030
Expanded Use of Groundwater[3]	41,178	Varies by WUG	Varies	Varies	2030
Fairchilds Supply Infrastructure	2,128	$103,900,000	$3,337	$862	2030
GCWA Groundwater Well Development	35,840	$28,564,015	$118	$62	2040
SJRA Catahoula Aquifer Supplies	10,500	$22,386,712	$486	$336	2080
Groundwater Reduction Plans					
CHCRWA GRP[4]	5,466	$0	$0	$0	2030
City of Houston GRP[4]	60,766	$0	$0	$0	2030
City of Missouri City GRP	11,200	$58,835,350	$608	$239	2030
City of Richmond GRP	6,720	$85,626,919	$1,252	$355	2030
City of Rosenberg GRP	3,920	$17,081,984	$344	$37	2030
City of Sugar Land IWRP	16,724	$205,801,341	$1,716	$511	2030
Fort Bend County MUD 25 GRP	1,120	$11,567,244	$784	$58	2030
Fort Bend County WCID 2 GRP	6,720	$71,687,468	$1,144	$393	2030
Montgomery County MUDs 8 and 9 Supply Expansion	2,240	$53,547,608	$3,061	$1,379	2030

Project	Potential Volume[1] (ac ft)	Capital Cost ($)	Unit Cost ($/ac ft)		Start Decade
			Start Decade	2080	
Montgomery County Supply Expansion	75,000	$779,670,291	$829	$387	2030
NFBWA GRP[4]	62,496	$0	$0	$0	2030
NHCRWA GRP[4]	143,360	$0	$0	$0	2030
WHCRWA GRP[4]	92,288	$0	$0	$0	2030
Reuse					
City of Houston Reuse	191,139	$820,816,940	$536	$213	2040
City of Pearland Reuse	1,154	$24,161,522	$1,565	$210	2040
League City Effluent Reuse	11,200	$4,686,566	$66	$4	2030
NFBWA Member District Reuse	4,280	$58,450,435	$1,708	$747	2030
NHCRWA Member District Reuse	300	$5,441,580	$2,206	$929	2030
River Plantation Reuse[5]	25	$0	$0	$0	2030
San Jacinto Basin Regional Return Flows[4]	100,445	$0	$0	$0	2030
Texas City Industrial Complex Reuse	11,200	$45,700,000	$344	$57	2040
Wastewater Reclamation for Municipal Irrigation	15,139	$310,466,162	$3,172	$1,458	2030
Westwood Shores MUD Reuse	150	$2,476,273	$2,162	$1,001	2030
Surface Water Development					
Allens Creek Reservoir	99,650	$493,919,561	$279	$47	2040
BWSC Reservoir and Pump Station Expansion	80,000	$452,434,516	$465	$67	2030
GCWA Coastal Desalination	22,400	$283,297,581	$2,207	$1,317	2040
Treatment					
BAWA East SWTP Expansion	13,440	$124,515,458	$868	$217	2030
BWA Conventional Treatment Expansion	8,400	$23,244,186	$400	$205	2030
City of Houston EWPP Enhancement	470,400	$5,000,000,000	$1,492	$744	2040
Harris County MUD 50 Surface Water Treatment Plant	560	$22,804,420	$4,994	$2,129	2030
Northeast Water Purification Plant Expansion	380,800	$2,153,107,392	$649	$355	2030
Pearland Surface Water Treatment Plant	22,400	$261,245,745	$1,170	$349	2030
SEWPP Expansion	134,400	$1,116,248,913	$457	$353	2030
Other Infrastructure					
Brazos Saltwater Barrier	10,000	$77,571,019	$596	$51	2030
GCWA Canal Lining and Loss Mitigation	8,960	$12,393,000	$111	$13	2030
GCWA Shannon Pump Station Expansion	201,600	$81,410,301	$120	$27	2030
LNVA Devers Pump Station Relocation	88,704	$21,337,986	$21	$4	2030

1. *Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.*
2. *It should be noted that costs for municipal water conservation programs represent a total cost for offsetting a unit volume of water at the point of delivery. A number of strategies require multiple projects or project components (source generation, treatment, transmission, etc.) working in conjunction to meet needs at points of use. Therefore, the additive nature of these costs must be considered when they are compared with and contrasted against conservation programs.*
3. *Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.*
4. *Costs, including construction costs, engineering, legal, and permitting fees, land acquisition, and other capital costs, are included under associated infrastructure projects.*
5. *Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.*

Following the application of WMS and key projects, some identified needs were found to remain. Under drought of record conditions, it was determined that needs would persist in the Irrigation, Livestock, and Mining demand sectors within some areas of Region H without the availability of an interruptible water supply to provide a low-cost option for meeting demands. These sectors are particularly sensitive to the cost of water and are also unable to easily develop long-term contracts for water on the firm yield basis that is required for development of water supply projects in the RWP. Each of these sectors will continue to rely on low-cost, interruptible supplies of water as well as local supplies and a balance of groundwater and surface water resources when they are available. However, according to the guidelines for RWP development, these supplies are not permissible for planning purposes and may not be shown in the RWP. For this reason, the needs identified in *Table ES-4* are shown as unmet although, in reality, cost-effective solutions exist that may provide water to these demands. The development of firm yield projects within the RWP may also provide additional interruptible supplies to meet these demands in most, if not all, years.

Table ES-4 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac ft)					
			2030	2040	2050	2060	2070	2080
Irrigation	Brazoria	SJ-B	31,996	32,310	32,402	32,480	32,508	32,526
	Chambers	T	2,904	2,904	2,904	2,904	2,904	2,904
		T-SJ	1,016	1,016	1,016	1,016	1,016	1,016
	Galveston	SJ-B	5,376	5,376	5,376	5,376	5,376	5,376
	Madison	B	45	45	45	45	45	45
		T	70	70	70	70	70	70
Livestock	Brazoria	B	135	140	145	149	152	152
		B-C	21	33	47	55	63	62
		SJ-B	69	105	115	124	127	129
	Galveston	N-T	12	12	12	12	12	12
		SJ-B	184	184	184	184	184	184
	Harris	SJ	499	665	665	665	665	665
		SJ-B	51	51	51	51	51	51
		T-SJ	133	133	133	133	133	133
	Madison	B	111	111	111	111	111	111
		T	860	860	860	860	860	860
Mining	Madison	B	443	443	443	443	443	443
		T	267	267	267	267	267	267

N-T = Neches-Trinity, T = Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B-C = Brazos-Colorado

ES.5.1 Conservation Recommendations

Water conservation plays an important role in meeting future water needs across the State of Texas. Because of this, TWDB guidance requires that RWPs dedicate a subchapter of ***Chapter 5*** to conservation recommendations for each region. This section contains information related, not only to the importance of water conservation implementation, but also to its challenges within Region H and the state as a whole.

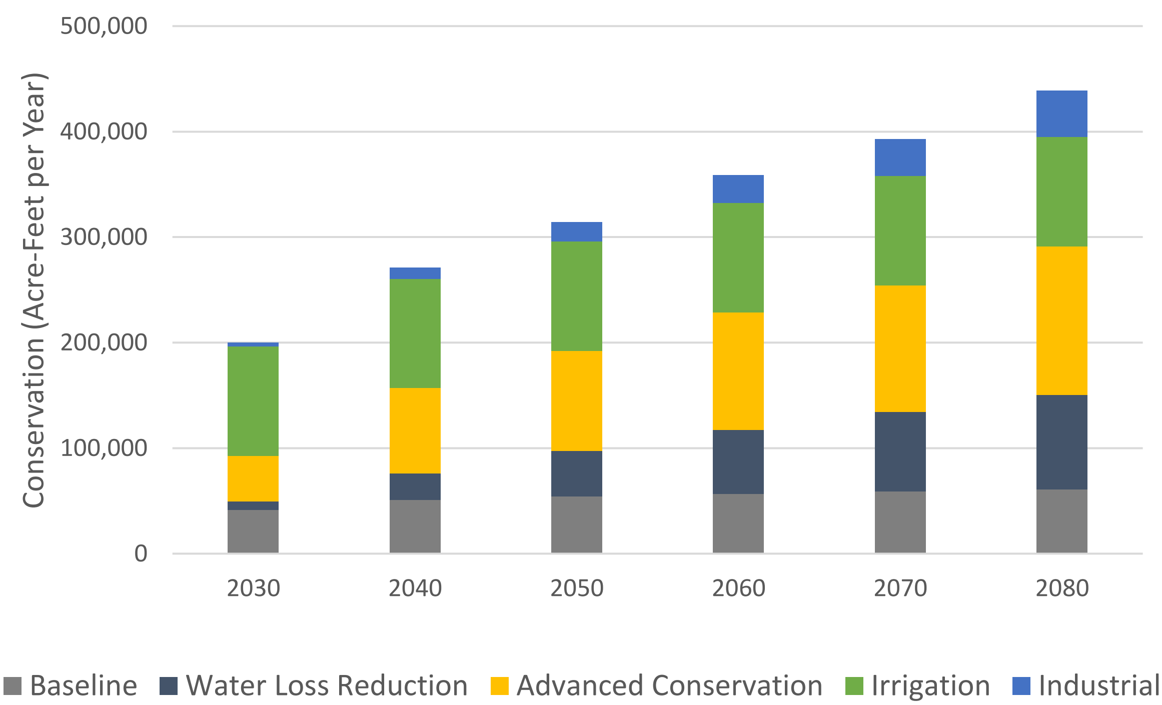
Current conservation efforts were evaluated for the region based on the conservation plans developed by individual water utilities. This analysis demonstrated that Region H focuses much of its conservation resources toward outreach, conservation-oriented rate structures, water system audits, and leak detection and repair.

Water conservation recommendations in the 2026 RWP are based on conservation measures and associated estimated water savings included in the TWDB Municipal Water Conservation Planning Tool (MWCPT). The RHWPG has recommended varying levels of outdoor residential conservation and other measures for nearly all municipal WUGs based on the demand profiles of individual WUGs. Long-term projections for savings attributed to municipal conservation programs were combined with estimates of potential savings related to water loss reduction to provide a comprehensive water conservation program for WUGs in Region H.

Conservation was also applied to Irrigation demands. Region H recommends both on-farm and off-farm measures based on an evaluation of the extent of existing conservation measures in order to prevent overestimation of potential savings. Irrigation conservation practices provide significant potential water savings due to the magnitude of these demands in Region H. Industrial conservation for the Manufacturing demand sector is also recommended.

The comprehensive water conservation applied in the 2026 RWP is summarized in *Figure ES-6*. Additional information related to conservation can be found in ***Chapter 5*** and ***Chapter 5B***.

Figure ES-6 – Total Region H 2021 RWP Conservation



ES.6 IMPACTS OF THE REGIONAL WATER PLAN

Both surface water and groundwater in Region H are generally of good quality and can be used with conventional treatment only. Advanced treatment measures are recommended to develop direct wastewater reuse projects and the utilization of non-traditional water supplies such as brackish groundwater. The management strategies recommended in the plan are not anticipated to directly affect water quality in most basins, although the reduction of instream flows due to full use of water rights may indirectly increase the concentration of some contaminants (by reducing the overall volume of water). However, plan development was guided by the principle that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained. The Brazos Saltwater Barrier is specifically recommended to improve water quality in the lower Brazos Basin by preventing seawater from migrating upstream during periods of low flows. Trinity River water is currently transferred into Harris County in the San Jacinto Basin, with the 2026 RWP including strategies which would increase the volume transferred. Similarly, the East Texas Transfer will also introduce water from basins as far east as the Sabine River into western basins on a path toward the Houston area. The reuse of wastewater and other treatment projects will produce a brine concentrate, which must be judiciously discharged to prevent adverse environmental impacts.

Agricultural areas in Region H are generally served by a combination of groundwater and surface water supplies depending primarily on the location of use and the application. Groundwater use is not projected to change during the planning period. Surface water used for irrigation is typically contracted on a year-to-year basis and often originates from supplies that are not firm during the drought of record. The RHWPG recognizes the sensitivity of agriculture to the availability of less expensive water supplies that are not available on a regular basis during drought-of-record conditions. Although these supplies cannot be used in the RWP per planning guidance, these interruptible supplies will continue to be an important resource in meeting the needs of irrigation users in Region H.

The management strategies recommended in this plan will fully utilize, to the extent applicable to projected needs, the currently available water rights in all basins. Many projects in the plan will require some environmental mitigation due to habitat impacts. However, the plan strives to identify the most feasible projects from standpoints of economics and sustainability. The recommended reuse of wastewater will further reduce instream flows, particularly during drought conditions. Some of this reduction will be mitigated by an overall increase in wastewater discharges beyond the current level and the reduction in need for developing new raw water supplies.

Groundwater use in the region is projected to increase within the sustainable yield of the aquifers or the regulated withdrawal cap, as applicable. The export of groundwater from its county of origin is not recommended in this plan.

Additional information related to impacts of the plan can be found in ***Chapter 6*** of the RWP.

ES.7 DROUGHT RESPONSE

Drought is the primary driver behind water planning in Texas, and the historical drought of record serves as the fundamental basis for evaluating the supplies and needs in the development of each

RWP. As specified in TWDB guidance for RWP development, the 2026 RWP includes material related to preparation for and response to drought conditions.

The drought of record in Region H has consistently been the drought of the 1950s. Although recent dry years have eclipsed the severity of the 1950s drought for short periods of time, the long-term severity of the 1950s drought has, so far, not been exceeded. Current drought contingency plans for surface water supplies in Region H have used the 1950s drought as a basis for assigning triggers and responses to drought conditions. The RHWPG recommends adoption of the triggers and responses prescribed by project owners and sponsors for management of surface water supplies such as reservoirs. For groundwater supplies, identification of drought conditions generally requires evaluation of other factors in order to recognize and respond to drought. For these supplies, Region H recommends that water providers regularly review the Palmer Drought Severity Index (PDSI) as a basis for recognizing drought conditions and taking appropriate measures to respond.

Some drought conditions are of such a severity that they pose risks to life, safety, and the economy. This is particularly true for small water systems that have limited sources of water currently connected, as well as for rural communities that are distant from alternative supplies that may serve to meet needs during emergency conditions. As part of the evaluation of drought responses, Region H proposed a number of emergency measures for these utilities to consider, should drought conditions deem emergency response necessary. These measures include, where viable, the use of additional surface water supplies, development of additional local groundwater or brackish groundwater, or utilization of existing or potential interconnections with neighboring systems. It should be noted that these approaches may become necessary during either hydrologic drought periods or emergency conditions brought about by failure of water source or infrastructure.

Additional information related to drought response can be found in ***Chapter 7*** of the RWP.

ES.8 UNIQUE STREAM SEGMENTS, RESERVOIR SITES, AND OTHER RECOMMENDATIONS

The Texas Water Code guides the RWPGs to adopt recommendations on Unique Stream Segments, Unique Reservoir Sites, and legislative policy. ***Chapter 8*** of the 2026 RWP describes these recommendations in depth, and a summary is provided below.

ES.8.1 Unique Stream Segments

The Texas Water Code offers the opportunity for RWPGs to identify river and stream segments of unique ecological value. Stream segments designated by the Legislature as having unique ecological value cannot be developed as reservoir sites by the State or any political subdivision of the State. Based on the information provided in past RWPs, the RHWPG elected to retain the unique designations for the eight segments designated by the Texas Legislature based on prior consideration and review. These segments are listed in *Table ES-5.* No additional segments were nominated for designation in the 2026 RWP. Additional information is contained in ***Chapter 8***.

Table ES-5 – Recommended Unique Stream Segments

Stream Segment	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Creek Lake	Brazoria
Menard Creek	Liberty and Polk
Oyster Bayou	Chambers

ES.8.2 Unique Reservoir Sites

The Texas Water Code also offers an opportunity for RWPGs to designate sites of unique value for use as surface water supply reservoirs. Designation by the Legislature as a unique reservoir site prevents the State from constructing major infrastructure (such as major highways) within the project limits. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected two major reservoir projects for meeting needs in the 2026 RWP: Allens Creek Reservoir and the expansion of the Harris Reservoir. Region H chose to select Allens Creek Reservoir as a recommendation for any future reaffirmation of Unique Reservoir Sites. This site is described below in *Table ES-6*. Additional information is contained in ***Chapter 8***.

Table ES-6 – Recommended Unique Reservoir Sites

Name	County	General Location
Allens Creek	Austin	1 mile north of the City of Wallis

ES.8.3 Regulatory, Administrative, and Legislative Recommendations

Guidance for regional water planning specifies that RWPGs may develop and include in the RWP regulatory, administrative, and legislative recommendations. These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed toward TCEQ, that administrative recommendations are directed toward TWDB, and that legislative recommendations are directed toward the State of Texas Legislature.

The RHWPG has adopted the following regulatory, administrative, and legislative recommendations:

Regulatory and Administrative Recommendations

- The RHWPG recommends that the TWDB determines, in conjunction with the TCEQ and the Texas Parks and Wildlife Department (TPWD), which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, guidance should be added to the Planning Guidelines, so that Regional Water Planning Groups can reflect the cost of those requirements in their budgets and scope of work. Adding environmental guidelines will also make water plans consistent across the state.

- The RHWPG recommends that TCEQ continue routine updates to Water Availability Models across the state based on a prioritized methodology based on observed climate conditions and the overall limitation on water resources in each basin.
- Work with water utilities and planners to identify the limitations of current planning approaches regarding OneWater management and how these programs may best be reflected in regional plans. This will have the added benefit of promoting these options for comprehensive water management.
- The RHWPG recommends adjusting guidance and implementation procedures for the analysis of potentially infeasible WMS required as part of the RWP cycle, including additional narrowing of scope, adjusted terminology, and adjusted process timing.

Legislative Recommendations

- The RHWPG supports continued usage of the Rule of Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts, and supports creation of groundwater conservation districts, as necessary, by local subarea water interests. These districts provide a unique opportunity for balancing local management with regional planning through the joint planning exercises of Groundwater Management Areas.
- The RHWPG supports funding for research and long-term monitoring infrastructure to advance the state of the science on the Brazos River Alluvium and on groundwater-surface water interaction.
- The RHWPG supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.
- The RHWPG supports water conservation and recommends that the Legislature continue to address and improve water conservation activities in the state, including continued funding of research into advanced conservation technologies.
- The RHWPG recommends that RWP requirements related to the “highest practicable level of water conservation and efficiency achievable” be removed, and where necessary instead reference “considerations necessary for permit requirements” in relation to conservation.
- The RHWPG wishes to recognize the Legislature’s efforts in emphasizing the importance of loss reduction in the RWP process and also recommends expanded funding support for water loss mitigation programs.
- The RHWPG recommends additional funding be provided to TWDB for the 2031 RWP cycle, which occurs between Census cycles, to support the process of reevaluating and redistributing population projections.
- The RHWPG recommends that the Legislature remove the unnecessary and counterproductive barriers to interbasin transfers that exist in current law.
- The RHWPG recommends that the State consider legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.
- The RHWPG recommends establishment of additional and dedicated funding to pursue necessary future efforts of the State’s bay and estuary programs.

<u>Infrastructure Financing Recommendations</u>

- The RHWPG recommends increasing the funding of the State Revolving Funds Program in future decades and expanding the program to include coverage for system capacity increases to meet projected growth for communities.
- The RHWPG supports provision of a mechanism to leverage federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and landowners to facilitate the use of funding programs for property under long-term lease agreements.
- The RHWPG recommends continued state and federal support of the Texas Community Development Program and increasing the allocation of funds for the Small Town Environment Program.
- The RHWPG recommends continued support and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the federal level.
- The RHWPG supports provision of technical assistance grants for the advancement of desalination water supplies and implementation of new desalination technologies available to wholesale and retail water suppliers. Provide resources for identification and feasibility assessment of opportunities for aquifer storage and recovery projects. Continue to fund appropriate demonstration facilities to develop a customer base and pursue federal funding for desalination programs.
- Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, funding opportunities should be made available to these public/private partnerships and to private nonprofit water supply corporations.

Additional information is contained in ***Chapter 8***.

ES.9 IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

Guidance for the development of regional water plans requires that each RWP, beginning with the 2016 plan, include a comparison to the previous plan. As part of this comparison, RWPs should discuss the implementation of WMS and projects recommended in the previous plan, as well as the development of water demands, supplies, and strategies associated with each RWP. A detailed comparison of the 2021 and 2026 RWPs is provided in ***Chapter 9***.

A number of projects in the 2021 RWP were identified as implemented, partially implemented, or in progress at the time of development of the 2026 RWP. Many of the projects currently in development are related to groundwater reduction plans (GRPs) and provide additional alternative water supplies to meet 2025 conversion requirements by subsidence districts. Numerous projects, including GRP projects and others, have received funding from TWDB to facilitate their completion.

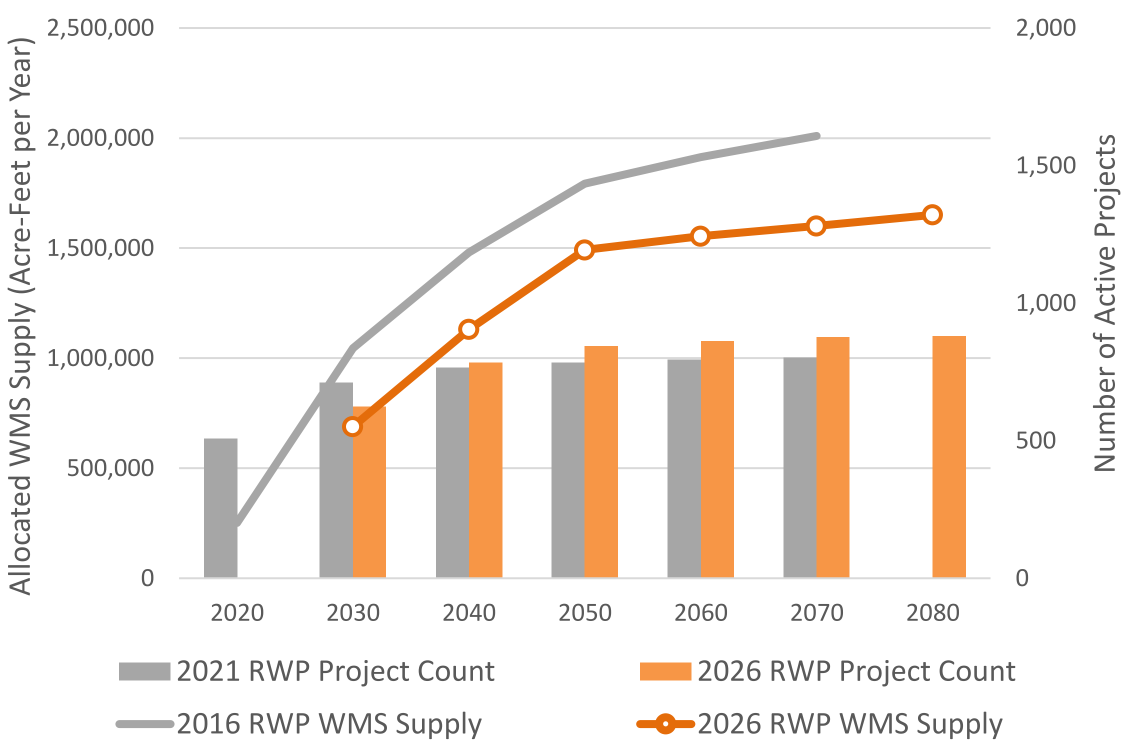
Overall, the two plans differ slightly in relation to water demands. Municipal demands in Region H have remained relatively similar between the two RWPs through approximately 2050, with the 2026 RWP estimating lower municipal demand than the 2021 RWP for subsequent years. While some categories of non-population demand remained very similar to projections in the 2021 RWP, projected demands in the Manufacturing increased dramatically due to the new projection methodology applied by TWDB, which addresses concerns identified by the RHWPG during the 2021 RWP cycle.

The estimated availability of surface water in Region H has remained similar between the 2021 and 2026 RWPs. Slightly lower surface water availability for the 2026 RWP may be attributed to updated modeling assumptions in the WAMs, including data from updated lake bathymetric surveys and sedimentation rate estimates. Estimates of the MAG for each aquifer and county are required for use in development of 2026 RWPs for the majority of counties, with availability estimates for aquifers in Fort Bend, Harris, and Galveston Counties based upon subsidence district regulations. Groundwater availability for the 2026 RWP is higher than those applied for the 2021 RWP due to updates in MAG values as well as demand projections for subsidence district counties.

The identified WUG needs in the 2026 RWP are lower than those identified in the 2021 RWP, primarily due to implementation of recommended WMS and projects from the 2021 RWP as well as the revised methodologies that have projected lower demands in the Municipal category.

In total, the RHWPG has recommended 60 WMSs and 885 projects in the 2026 RWP. This compares to 63 WMSs and 821 capital projects identified in the 2021 RWP. Allocations of WMS supplies in the 2026 RWP differ from those in the 2021 RWP for a number of reasons, including differences in projected WUG demands, establishment of new existing contracts between water providers and WUG customers, implementation of 2021 WMS as existing supplies, changes in recommended WMS, and changes to associated project schedules. A comparison of allocated WMS volume and active project count for the two plans is presented in *Figure ES-7* below.

Figure ES-7 – WMS Supply and Active Projects by Decade



ES.10 ADOPTION OF PLAN AND PUBLIC PARTICIPATION

During the course of developing the 2026 RWP, the RHWPG conducted numerous public meetings corresponding with various phases of plan development. Details of these meetings and comments from the public and interested agencies are provided in ***Chapter 10*** of the RWP.

After the submittal of the Initially Prepared Plan (IPP) to TWDB by March 3, 2025, the RHWPG will also conduct public hearings to receive comment from the public. Details of these hearings and public comments received after the submittal of the IPP will be included in the final, adopted 2026 RWP.

ES.11 ADDITIONAL PLANNING DATA

Additional numerical information related to population and water demand projections, water sources, existing supplies, projected needs, and recommended future WMS and projects are available through TWDB's State and Regional Water Planning Database (DB27) Reports. The following steps can be utilized to access DB27 Reports:

1. Navigate to the TWDB Database Reports application at *https://www3.twdb.texas.gov/apps/SARA/reports/list.*
2. Enter '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans.
3. Click on the report name hyperlink to load the desired report.
4. Enter planning region letter parameter, click view report.

The following DB27 Reports will be accessible through this portal:

1. WUG Population
2. WUG Demand
3. Source Availability
4. WUG Existing Water Supply
5. WUG Needs/Surplus
6. WUG Second-Tier Identified Water Need
7. WUG Data Comparison to 2021 RWP
8. Source Data Comparison to 2021 RWP
9. WUG Unmet Needs
10. Recommended WUG Water Management Strategies
11. Recommended Projects Associated with Water Management Strategies
12. Alternative WUG Water Management Strategies
13. Alternative Projects Associated with Water Management Strategies
14. WUG Management Supply Factor
15. Recommended Water Management Strategy Supply Associated with a new or amended IBT Permit
16. WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended Conservation WMS Supply
17. Sponsored Recommended WMS Supplies Unallocated to WUGs
18. MWP Existing Sales and Transfers
19. MWP WMS Summary

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Chapter 1 – Description of Region

1.1 REGIONAL WATER PLANNING IN TEXAS

In 1997 the State Legislature, through Senate Bill 1, determined that a Texas State Water Plan for the 2000 to 2050 timeframe would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 Regional Water Planning Areas (RWPAs) and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001, a new set of rules and guidelines were enacted through Senate Bill 2. The 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional and State Water Plans produced every five years. The 2021 Region H Water Plan and the 2022 State Water Plan were created during the last planning cycle.

1.2 DESCRIPTION OF REGION H

Region H, located along the upper Texas coast, consists of all or part of 15 counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker, and Waller. The eastern portions of Trinity and Polk counties are included in the Region I planning area. The region spans three river and four coastal basins in southeast Texas. Region H encompasses the San Jacinto River Basin and the lower portions of the Trinity and Brazos River Basins, as well as part or all of the Brazos-Colorado, the San Jacinto-Brazos, the Trinity-San Jacinto, and the Neches-Trinity Coastal Basins. This area includes the Galveston and Trinity Bay estuaries; the urbanized, rapidly growing Houston-Galveston Metropolitan Area encompassing Brazoria, Harris, Galveston, Fort Bend, and Montgomery counties; the coastal port communities of Galveston and Freeport; and agricultural areas in Austin, Chambers, Leon, Liberty, Madison, Polk, San Jacinto, Trinity, Walker, and Waller counties. *Figure 1-1* is a map of the Region H Water Planning Area. The Region H Water Planning Group (RHWPG) is a 26-member committee representing the diverse interests of the region. *Table 1-1* lists the RHWPG membership.

Figure 1-1 – Region H Water Planning Area

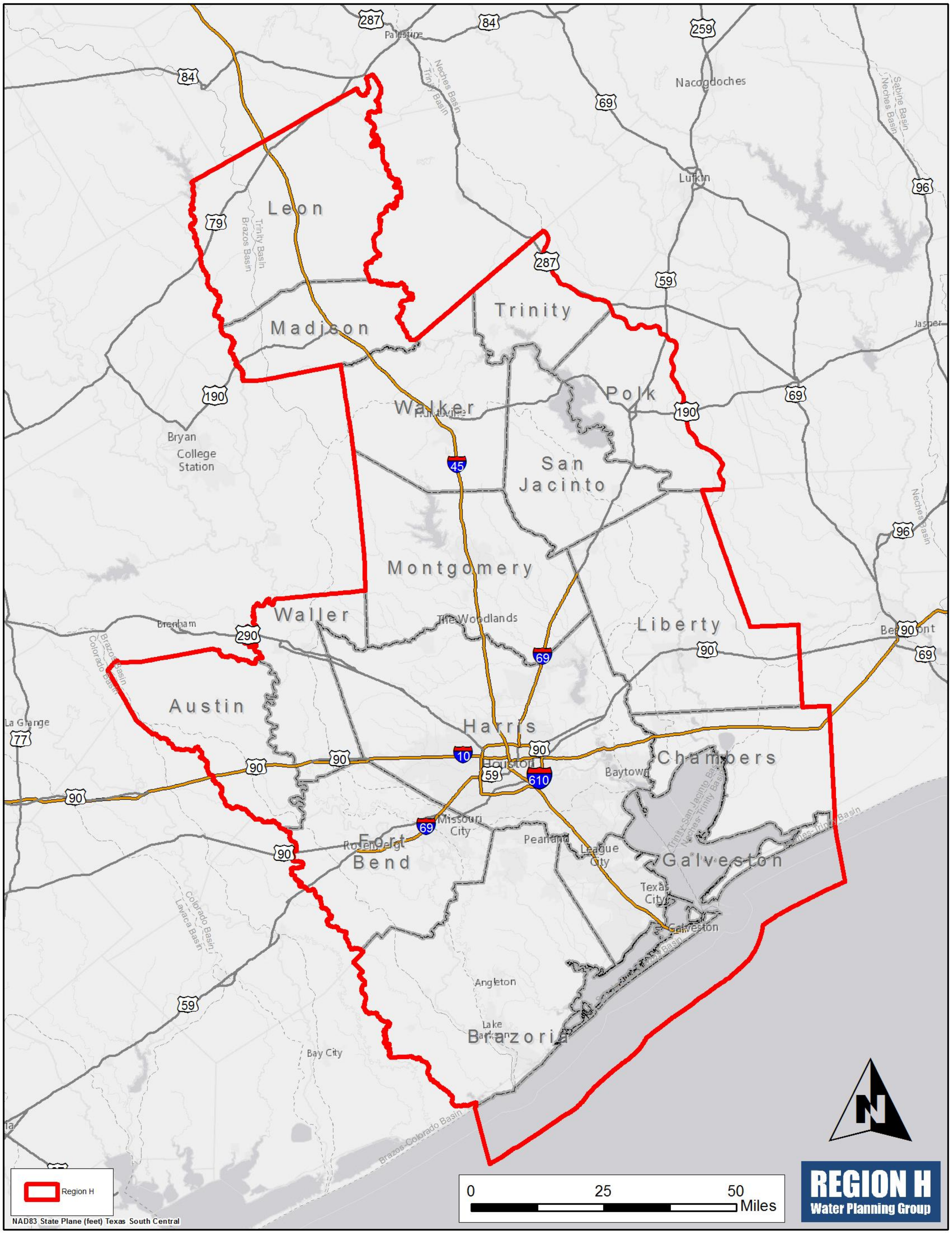


Table 1-1 – Member Information for the Region H Water Planning Group

Executive Committee	
Office	**Incumbent**
Chair	Mark Evans
Vice-Chair	Marvin Marcell
Secretary	John R. Bartos
At-Large	David Bailey
At-Large	Arthur Bredehoft
Administration	
Office	**Organization**
Administrative	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936) 588-1111 Fax: (936) 588-1114
Political Subdivision	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936) 588-1111 Fax: (936) 588-1114

Notes:
Administrative Office manages records.
Political Subdivision is the entity eligible to apply for State grant funds.

Voting Membership		
Category	**Member**	**County (Location of Interest)**
Agriculture	Caleb Cooper 04/2021-Present	Chambers
	Danny Pierce 02/2022-Present	Walker
Counties	Mark Evans 03/1998-Present	Harris
	Byron Ryder 07/2021-Present	Leon
	Loyd Smith 02/2022-Present	Harris
Electric Generating Utilities	Carl Burch 11/2019-Present	Harris
Environmental	John R. Bartos 03/1998-Present	Harris
GMA 12	David Bailey 12/2011-Present	GMA 12 Counties
GMA 14	Gary Ashmore 03/2019-Present	GMA 14 Counties
Industries	Jason Garrard 05/2024-Present	Brazoria
	Cyndi Wagener 10/2023-Present	Harris

Voting Membership		
Category	**Member**	**County (Location of Interest)**
Municipalities	Greg Eyerly 05/2024-Present	Harris
	Robert Istre 07/2003-Present	Galveston
Public	Ken Kramer 02/2022-Present	Region H
River Authorities	Brad Brunett 04/2018-Present	McLennan (service in west and southwest portion of region)
	Aubrey Spear 04/2024-Present	Harris, Montgomery (service in central portion of region)
	J. Kevin Ward 06/2012-Present	Tarrant (service in east and southeast portion of region)
Small Business	W.R. Baker 02/2019-Present	Polk
	Ivan Langford 08/2020 - Present	Galveston
	Mike O'Connell 08/2022-Present	Fort Bend
Water Districts	Jun Chang 02/2021-Present	Harris
	Marvin Marcell 07/1998-Present	Fort Bend
	Michael Turco 02/2016-Present	Harris, Galveston
Water Utilities	Arthur Bredehoft 08/2022-Present	Montgomery
	Alisa Max 05/2023-Present	Harris
	Brandon Wade 07/2020-Present	Brazoria

Non Voting Membership	
Member	**Organization or Interest**
David Alders	East Texas Water Planning Group
Wayne Ahrens, P.E.	West Harris County Regional Water Authority
Joel Clark	Texas State Soil and Water Conservation Board
Matthew L. Froehlich	North Fort Bend Water Authority
Rick Gangluff	South Texas Project Electric Generating Station
Scott Hall	Lower Neches Valley Authority
Kristin Lambrecht	Texas Dept. of Agriculture
Monica Polgar	Texas Parks and Wildlife Department
Heather Rose	Texas Water Development Board
Wayne Wilson	Wilson Cattle Company

1.2.1 Governmental Authorities in Region H

While municipal and county governments are the primary governmental entities, there are three regional councils of government represented in the region. The Houston-Galveston Area Council of Governments represents thirteen counties in the central and eastern part of the planning area and surrounding areas: Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Wharton, Walker, and Waller Counties. The Brazos Valley Council of Governments includes Leon and Madison counties, the two northwestern counties of the region. The Deep East Texas Council of Governments represents Trinity, Polk, and San Jacinto counties located in the northeastern part of Region H.

In addition to these regional councils there are several other entities with regulatory or management authority of importance to long range water planning for the region. The State exercises certain responsibilities over water planning, supply, and quality through the TWDB, the Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). Points of contact for these state agencies are listed in *Table 1-2*. Three river authorities manage surface water supply in the region's three river basins: the Brazos River Authority, the San Jacinto River Authority, and the Trinity River Authority. There are eleven soil and water conservation districts within Region H. Five groundwater conservation districts (GCD) and two subsidence districts in Region H have the authority to regulate groundwater withdrawals. Three groundwater conservation districts were formed in 2001: Lone Star GCD in Montgomery County, Bluebonnet GCD, which includes Austin, Grimes, Walker, and Waller Counties, and the Mid-East Texas GCD, which includes Leon, Madison, and Freestone Counties. In November 2005, the Brazoria County Groundwater Conservation District was confirmed by voters in Brazoria County. The Lower Trinity Groundwater Conservation District in Polk and San Jacinto Counties was confirmed by vote in November 2006. The Harris-Galveston Subsidence District and the Fort Bend Subsidence District were created in 1975 and 1989, respectively, with the authority to regulate groundwater pumpage for the purpose of reducing subsidence. Region H also includes five Regional Water Authorities that provide for regional water infrastructure pursuant to conversion to surface water sources: Central Harris County Regional Water Authority, North Harris County Regional Water Authority, West Harris County Regional Water Authority, North Channel Water Authority, and North Fort Bend Water Authority.

Table 1-2 – State Agencies with Oversight of Water Planning

Texas Water Development Board
Bryan McMath Executive Administrator PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231 (512) 463-7847
Kathleen Ligon Assistant Executive Administrator, Office of Planning PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231 (512) 463-7847
Texas Commission on Environmental Quality (plan review)
Kelly Keel Executive Director 12500 Park 35 Circle, Austin, TX 78753 (512) 239-3900
Texas Parks and Wildlife Department (plan review)
David Yoskowitz Executive Director 4200 Smith School Road, Austin, TX 78744-3291 (512) 389-4802

1.2.2 General Economic Conditions

Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The Port of Houston handles over 200 million tons of cargo annually, contributing billions of dollars to the state economy. In 2024, the Houston area employed over 3.5 million people as estimated by the US Department of Labor. Region H is generally characterized with urbanized land uses and broad-based economic development. In areas outside of the urban core, agriculture is a major contributor to economic activities. The region supports six primary economic sectors: services, manufacturing, transportation, government, agriculture, and fishing.

The service sector employs the greatest number of people in Region H. The most common service industries include: accounting, law, banking, computer software, engineering, healthcare, and telecommunications. Medical specialties are concentrated at the Texas Medical Center in Houston and the University of Texas Medical Branch in Galveston. Tourism is also a major industry for both Galveston and Houston. Galveston alone has drawn as many as seven million tourists a year in recent years.

The region's manufacturing industry is based on the historically important energy industries. Petroleum refining and chemical production are the two largest industries in the region. Technology and biotechnology firms have contributed to the diversification of the region's economic base. Petrochemical, chemical, and pulp and paper industries are major employers outside of the urban core of the region.

The transportation industry includes the Port of Houston and the Houston Ship Channel, the second largest port in the nation based on total tonnage. A well-developed highway system and rail connections support this activity. The Gulf Intracoastal Waterway connects the ports of Freeport, Galveston, Houston, and Texas City.

Government sector jobs are distributed throughout the region. The Johnson Space Center has program management responsibility for the International Space Station, ensuring continued economic importance into the next decade. There are numerous colleges in the region, and local school districts continue to grow and expand as population increases.

The agricultural industry, while providing limited numbers of jobs, contributes significantly to the region's economy. Major agricultural crops in the region include rice, soybeans, vegetables, and hay. Cattle are the principal livestock, followed by horses and hogs.

Fishing, both commercial and sport, within Galveston Bay and other major bodies of surface water including Lake Conroe, Lake Houston, and Lake Livingston are major contributors to the local economic base in addition to their primary role as surface water supply reservoirs. One third of the state's commercial fishing income and one half of the state's expenditures for recreational fishing come from Galveston Bay. Oysters, shrimp, and finfish are important commercial species in the bay.

1.3 POPULATION AND WATER DEMAND IN REGION H

Based on the 2010 Census, the population for Region H was approximately 6,093,969, growing to 7,307,990 by the 2020 Census. According to TWDB estimates, that number grew to 7,678,484 by 2023, reflecting an approximately 20 percent increase over 13 years. Approximately 53 percent reside in cities and towns with populations of over 500 persons. Additionally, Regional Water Authorities and water utilities of over 500 persons accounted for approximately 39 percent of the Region H population.

Population in the Regional Water Plan (RWP) is accounted for on a Water User Group (WUG) basis, with municipal WUGs representing the retail service area of cities, towns, utility districts, and the aggregated service areas within regional water authorities. *Table 1-3* lists the WUGs with estimated year 2020 retail service area populations of over 25,000 persons and the associated reported municipal water use.

Table 1-3 – WUGs with Populations Over 25,000

WUG	2020 Population	2020 Estimated Municipal Use (acre feet)
Alvin	25,127	2,943
Baytown	86,210	9,829
Central Harris County Regional Water Authority	53,218	4,879
Clear Lake City Water Authority	63,474	7,922
Conroe	82,478	10,963
Deer Park	34,519	4,569
Fort Bend County WCID 2	33,348	6,832
Friendswood	41,084	5,933
Galveston	53,594	11,833
Galveston County WCID 1	25,179	2,568
Houston	2,168,306	318,190
Huntsville	47,547	10,189
La Porte	35,121	3,755
Lake Jackson	27,823	3,792
League City	113,333	13,355
North Channel Water Authority	91,880	9,131
North Fort Bend Water Authority	253,577	38,625
North Harris County Regional Water Authority	642,865	93,940
Pasadena	139,651	17,087
Pearland	136,311	16,070
Rosenberg	38,727	4,791
Sienna Plantation	30,958	5,030
Sugar Land	108,695	22,168
Sunbelt FWSD	26,196	2,269
Texas City	52,639	5,965
The Woodlands	93,805	17,025
West Harris County Regional Water Authority	508,943	70,167

Source: The population for Huntsville was obtained from 2020 Census data. All other entity populations are from the Harris-Galveston Subsidence District Joint Regulatory Plan Review (HGSD JRPR).

The year 2020 total county populations and reported municipal water use are listed in *Table 1-4*. Detailed information on local, county, and regional population estimates and projections for the 50-year planning period are included in ***Chapter 2*** of this plan. In 2020, municipal uses accounted for 53 percent of the region's total reported water use, a substantial increase from 41 percent during the first RWP in year 2000.

Table 1-4 – County Population and Municipal Water Demand

County	2020 Population (TWDB Population)	2020 Estimated Municipal Use (acre feet)
Austin	30,167	3,911
Brazoria	372,031	47,665
Chambers	46,571	7,277
Fort Bend	822,779	125,279
Galveston	350,682	52,779
Harris	4,731,145	667,346
Leon	15,719	2,403
Liberty	91,628	10,564
Madison	13,455	2,969
Montgomery	620,443	83,993
Polk[1]	42,239	6,050
San Jacinto	27,402	3,118
Trinity[1]	10,535	1,309
Walker	76,400	13,429
Waller	56,794	7,662
Total[1]	**7,307,990**	**1,035,754**

Source: Texas Water Development Board
[1]Only includes the portion of Trinity and Polk Counties in Region H.

Industrial use accounted for 33 percent of the region’s total use in 2020, with 30 percent associated with Manufacturing and the remaining three percent associated with Steam Electric Power. This is similar to the percentage of regional demand examined in prior years, including 2015 (28 percent) and 2000 (30 percent). Irrigation uses represented approximately 13 percent of the region's total 2020 reported use, a decline from the 22 percent reported in year 2000, although similar to the more recent percent usage estimated for 2015 (12 percent). *Figure 1-2* illustrates the distribution of 2020 water demand by use type. Total non-municipal water demands for each county in 2020 are listed in *Table 1-5*.

Figure 1-2 – Percentage of 2020 Total Water Demand by Use

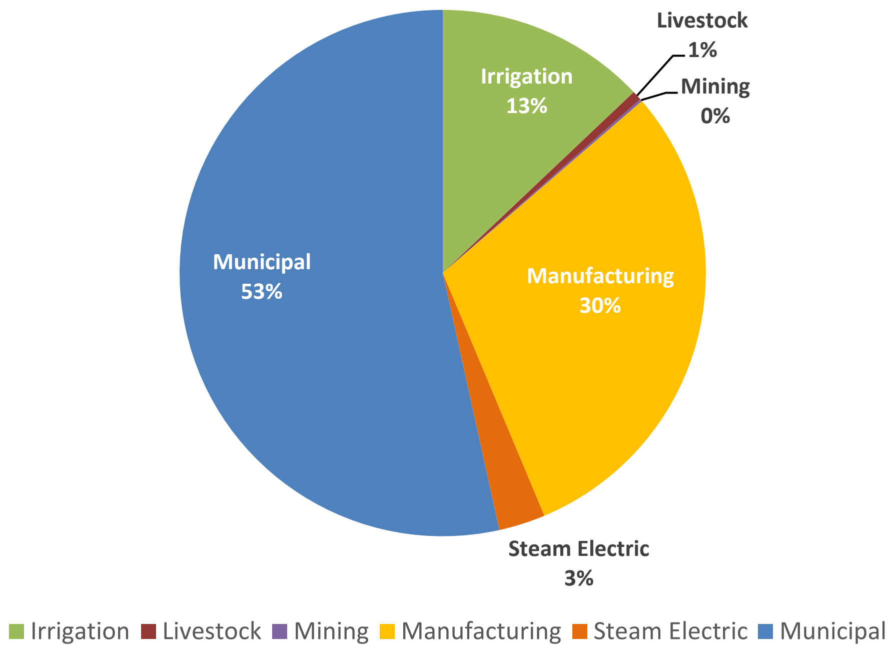


Table 1-5 – Reported 2020 Non-Municipal Water Use (acre-feet)

County	MFR	MIN	POW	IRR	STK	Total
Austin	8	107	0	5,288	1,174	6,577
Brazoria	193,603	364	0	60,801	1,311	256,079
Chambers	30,841	0	6,937	101,235	430	139,443
Fort Bend	2,581	33	23,298	22,889	587	49,388
Galveston	34,012	0	1,398	8,483	208	44,101
Harris	317,615	2,075	20,432	5,386	522	346,030
Leon	858	136	0	408	2,541	3,943
Liberty	151	168	0	28,881	887	30,087
Madison	0	0	0	203	1,016	1,219
Montgomery	1,798	16	3,364	4,651	392	10,221
Polk[1]	6	0	0	106	160	272
San Jacinto	6	0	1	103	274	384
Trinity[1]	0	0	0	33	169	202
Walker	79	0	0	360	752	1,191
Waller	122	0	0	11,772	920	12,814
Total[1]	**581,680**	**2,899**	**55,430**	**250,599**	**11,343**	**755,662**

Source: Texas Water Development Board

Categories: Manufacturing (MFR), Mining (MIN), Steam Electric Power (POW), Irrigation (IRR), and Livestock (STK)

[1] Includes the portion of Trinity and Polk Counties in adjacent Region I.

1.3.1 Major Demand Centers

Major demand centers are locations of water uses that require a significant portion of the region's water supply. In Region H, major demand centers are defined for municipal, manufacturing, and irrigation uses as having a reported use, by use type, exceeding 25,000 acre-feet per year (ac-ft/yr) for counties and 10,000 acre-feet per year for cities.

Houston has the greatest overall water demand in the region, as shown in *Table 1-6*, followed closely by remaining demands in Harris County. The next highest demands are Fort Bend, Montgomery, Galveston, and Brazoria Counties. Harris County and the City of Houston dominate municipal water use in Region H. In addition to the City of Houston, municipalities identified as major demand centers (reported municipal retail service area annual demands in excess of 10,000 acre-feet) for year 2020 include the cities of Pasadena, Sugar Land, Galveston, The Woodlands, Pearland, Huntsville, League City, and Baytown.

Table 1-6 – Major Municipal Demand Centers

County/City*	2020 Estimated Municipal Use (acre feet)
City of Houston	318,190
Harris County (excluding Houston)	357,188
Fort Bend County	125,279
Montgomery County	83,993
Galveston County	52,779
Brazoria County	47,665
Pasadena	17,087
Sugar Land	22,168
Galveston	11,888
The Woodlands	17,025
Pearland	16,070
Huntsville	10,189
League City	13,355
Baytown	9,829

** Values listed for counties include associated city demands except where noted above.*

Source: Texas Water Development Board

The largest manufacturing demand center is Harris County, which used 317,615 acre-feet of water in 2020 (54 percent of the regional total). Brazoria, Chambers, and Galveston Counties also utilized extensive supplies for manufacturing. The principal industries for water use in the region are petroleum refining, chemical production, and pulp and paper mills. The four largest manufacturing demand centers are shown in *Table 1-7*.

Table 1-7 – Major Manufacturing Demand Centers

County	2010 Manufacturing Use (acre feet)	2020 Manufacturing Use (acre feet)
Brazoria	180,319	193,603
Chambers	19,080	30,841
Galveston	20,020	34,012
Harris	254,601	317,615

Source: Texas Water Development Board (Water Use Survey Historical Estimates by County)

The four largest irrigation demand centers are Brazoria, Chambers, Fort Bend, and Liberty Counties. It should be noted that water use for irrigation from an individual year may not be representative of typical use due to year-to-year variability based on available precipitation. *Table 1-8* highlights each county's reported 2010 and 2020 irrigation use, as well as average annual use from 2010 to 2020. The major irrigated crops in the region are rice, soybeans, vegetables, and cotton.

Table 1-8 – Major Irrigation Demand Centers

County	2010 Irrigation Use (acre feet)	2020 Irrigation Use (acre feet)	Average Irrigation Use 2010 to 2020 (ac ft/year)
Brazoria	77,889	60,801	63,034
Chambers	60,300	101,235	93,011
Fort Bend	26,940	22,889	25,126
Liberty	43,200	28,881	22,393

Source: Texas Water Development Board Water Use Survey Historical Summary Estimates

Livestock and mining water use represent smaller demands in the Region H area. Mining water demands in Region H are associated primarily with oil and gas production.

1.3.2 Water User Group WUG Updates

For the 2021 RWPs, TWDB implemented rule changes to streamline the criteria for municipal WUG categorization and to better align the WUG definition, and hence the population and water demand projections, with active retail service areas; this approach has been retained for the 2026 RWPs. Defined WUGs are entities serving more than 100 acre-feet per year for municipal use. All smaller service providers and rural/unincorporated areas of municipal and domestic water use, aggregated at the county level, are considered part of an additional WUG and are referred to as "County-Other" for each county.

Under this revised WUG definition, some smaller WUGs were aggregated into overarching retail providers, while many new WUGs were identified which had, in prior RWPs, been components of other named WUGS or part of County-Other. New named municipal WUGs in Region H are listed in *Table 1-9* by primary county.

Table 1-9 – New WUGs in 2026 Region H Water Plan

WUG Name	Primary County
Ames Minglewood WSC	Liberty
Blaketree MUD 1 of Montgomery County	Montgomery
Brazoria County FWSD 1	Brazoria
Brazoria County MUD 22	Brazoria
Brazoria County MUD 39	Brazoria
Brazoria County MUD 55	Brazoria
C C Water Works	Chambers
Conroe Resort Utilities	Montgomery
Fort Bend County MUD 131	Fort Bend
Grand Oaks MUD	Montgomery
Harris County MUD 494	Harris
Harris County MUD 504	Harris
Harris County WCID 161	Harris
Keenan WSC	Montgomery
Montgomery County MUD 105	Montgomery
Montgomery County MUD 126	Montgomery
Montgomery County MUD 127	Montgomery
Montgomery County MUD 137	Montgomery
Montgomery County MUD 139	Montgomery
Montgomery County MUD 24	Montgomery
Nitsch and Son Utility	Harris
Northeast Harris County MUD 1	Harris
Patton Village	Montgomery
Raywood WSC	Liberty
Westfield Garden Park	Harris
Willow Creek Farms MUD	Waller
Windfern Forest Utility District	Harris
Wood Trace MUD 1	Montgomery
Woodland Oaks Utility	Montgomery
Woodridge MUD	Montgomery

1.4 REGION H WATER SUPPLY SOURCES AND PROVIDERS

Groundwater, surface water captured in reservoirs, and run-of-river sources comprise the majority of the water supply within Region H. Reclaimed water and brackish groundwater are additional supply sources utilized in Region H.

Traditionally, water supplies in Region H have originated from groundwater sources. As development has occurred in the area, communities developed with their own groundwater wells and wastewater services, making them self-contained in meeting their needs from a water resources perspective. This characteristic makes Region H unique among many other urbanized regions who have relied upon regional infrastructure to develop, transmit, and deliver water supplies from regional sources.

This perspective has changed over time as the greater Houston area has coped with groundwater reduction due to the risks of subsidence. In many areas, water providers in Region H have developed regional infrastructure for the use of surface and other water supplies in lieu of groundwater to offset this threat. Therefore, the water supply systems within the region face challenges due to, not only the organic growth of demands over time, but also the conversion from groundwater to alternative supplies.

In addition, these regional infrastructure projects are typically layered in their development. Water users rarely rely upon one project to develop and deliver their water supplies. Instead, users typically rely upon one project that provides for development of raw water, one or more raw water transmission projects, a treatment project, and one or more treated water transmission projects to finally deliver water to the demand center. In addition, there are also costs associated with distribution of this water to retail customers which is outside of the scope of the RWP. This is an important factor to consider when reviewing the way in which projects are presented in the RWP. Regional projects are most often interrelated and require numerous other components in order to provide a comprehensive water supply solution.

1.4.1 Groundwater Sources

Two major aquifers supply groundwater within the Region H area. The aquifer that furnishes the most groundwater within the area is the Gulf Coast Aquifer. This aquifer is composed of the Evangeline, Chicot, Jasper, and Catahoula formations and extends from near the Gulf Coast shoreline to approximately 100 to 120 miles inland, to Walker and Trinity Counties. The other major aquifer in the study area is the Carrizo-Wilcox, which begins 115 to 125 miles inland and extends beyond the northern boundary of the region. There are also four minor aquifers in this part of the state. The Sparta and Queen City Aquifers occur in Leon County, the southern part of Madison County, and northern parts of Walker and Trinity Counties. In Leon and Madison Counties, these aquifers lie above the Carrizo-Wilcox Aquifer. The Yegua Formation and the Jackson Group comprise the Yegua-Jackson Aquifer, located in parts of Madison, Walker, Trinity, and Polk Counties. The Brazos River alluvium occurs along the main stem of the Brazos River as it passes through the region, except in Brazoria County. *Figure 1-3* and *Figure 1-4* illustrate these groundwater sources. Groundwater withdrawals accounted for approximately 34 percent of the total regional water supply in 2000 and approximately 27 percent in 2020.

Groundwater use is regulated in Harris, Galveston, and Fort Bend Counties due to the potential for over-drafting of the Gulf Coast Aquifer and related subsidence and water level impacts. For these areas, the availability of groundwater is determined by the regulatory plans developed for each county or area in accordance with the goals of each regulating entity: the Harris-Galveston Subsidence District and the Fort Bend Subsidence District. In addition, Groundwater Management Plans have been published for Austin, Brazoria, Leon, Madison, Montgomery, Polk, San Jacinto, Walker, and Waller Counties by the Bluebonnet, Brazoria County, Mid-East Texas, Lone Star, and Lower Trinity GCDs. The active GCDs and Subsidence Districts within Region H are shown in *Figure 1-5*.

Region H includes portions of Groundwater Management Areas (GMAs) 11, 12, and 14. Trinity County lies within GMA 11. GMA 12 encompasses Leon and Madison Counties with all other Region H counties falling within GMA 14. All three GMAs have established Desired Future Conditions (DFCs) for their relevant aquifers, which have been used to determine the Modeled Available Groundwater (MAG) for incorporation into planning documents for the GCDs within each GMA. Information on this process and associated reports can be found in ***Chapter 3*** of the RWP.

1.4.2 Surface Water Sources

Surface water sources in Region H are reservoir storage and run-of-river supply for the three rivers in the area: the Trinity, the San Jacinto, and the Brazos. There are no major springs located within Region H, although small springs and seeps supply base flows for some streams. Historically there were numerous small seeps identified throughout the region. Many of these have ceased flowing due to land use changes and groundwater pumping. *Figure 1-6* illustrates the region's surface water sources. A selected bibliography of related references is included in ***Appendix 1-A*.**

Figure 1-3 – Region H Major Groundwater Sources

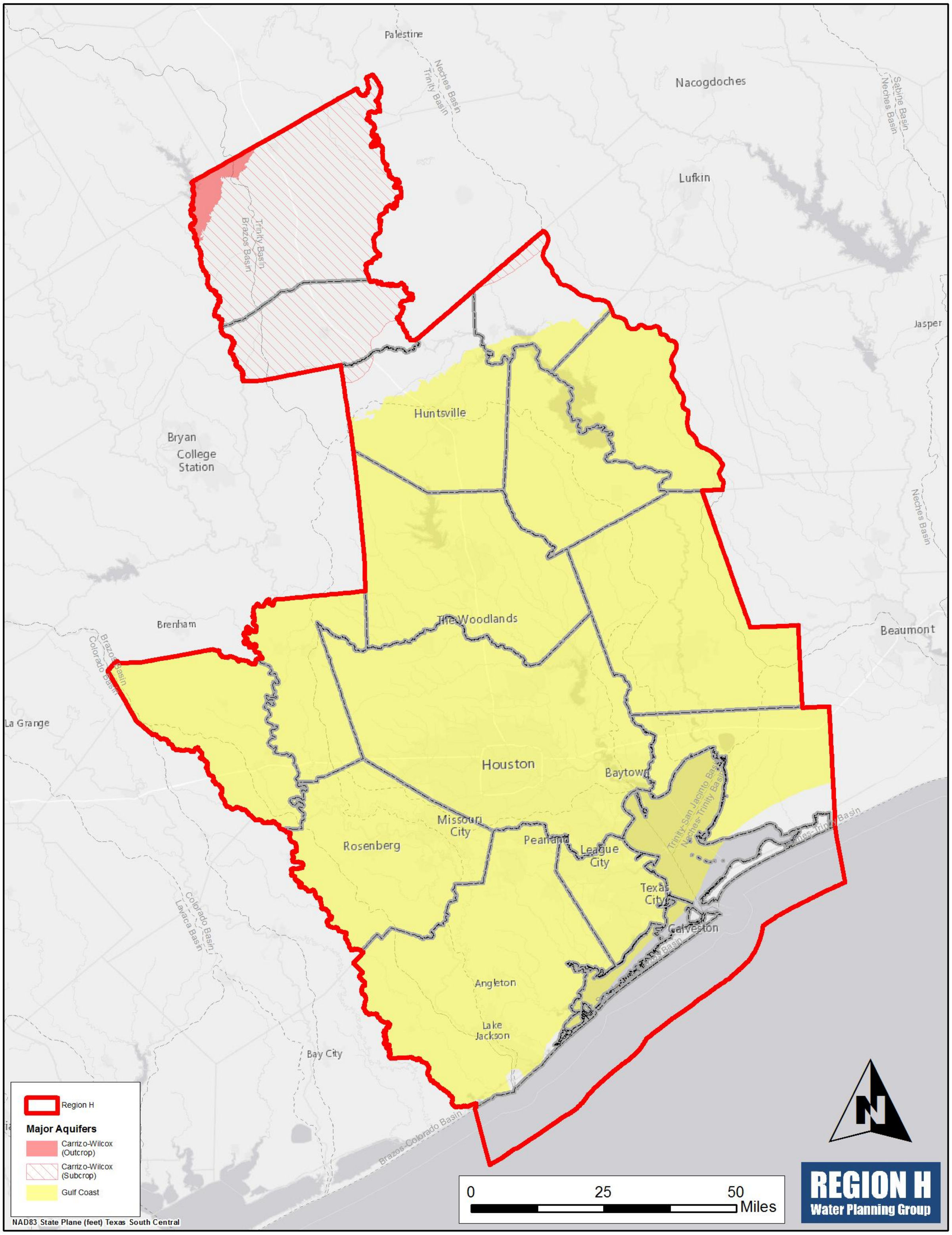


Figure 1-4 – Region H Minor Groundwater Sources

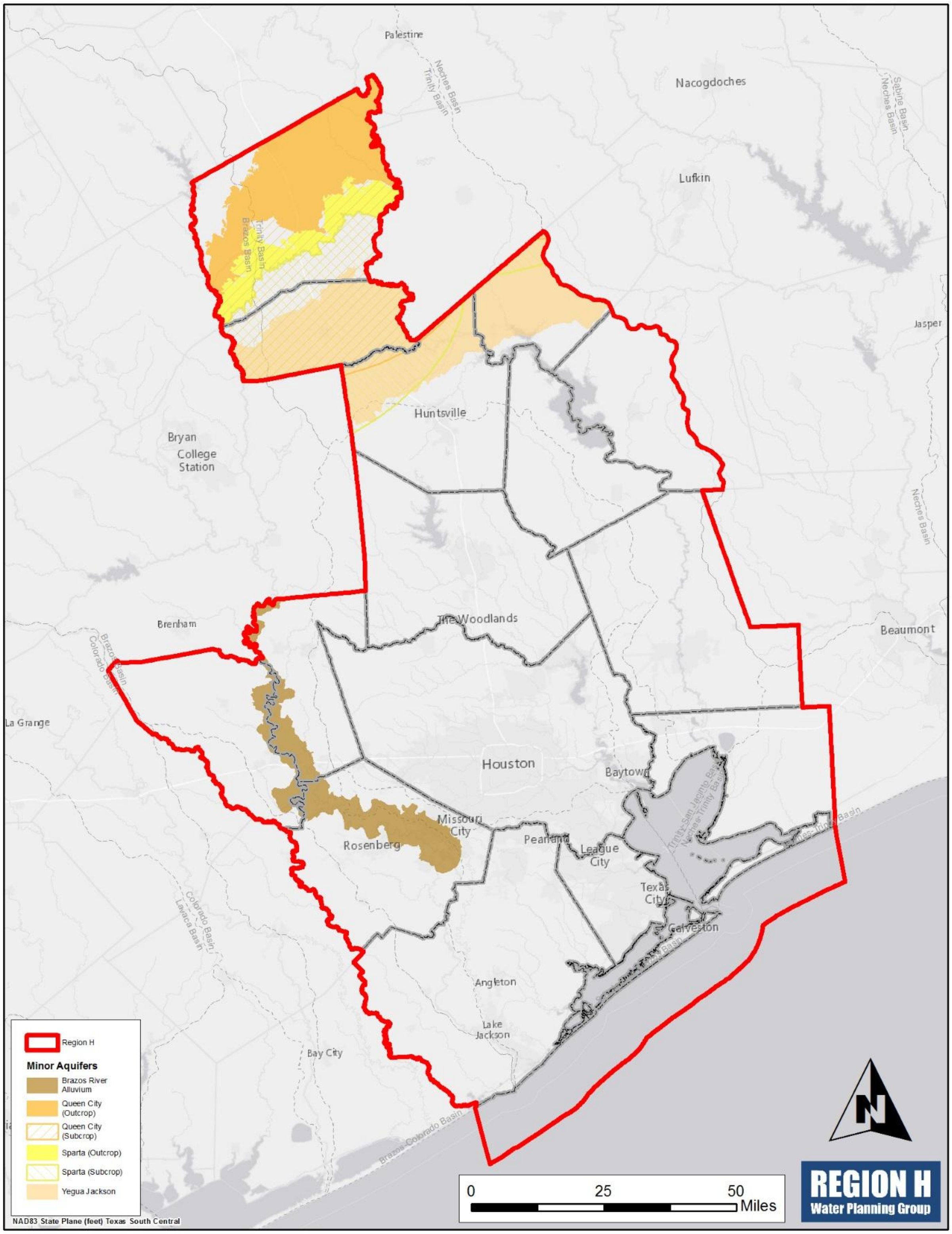


Figure 1-5 – Region H Groundwater Conservation and Subsidence Districts

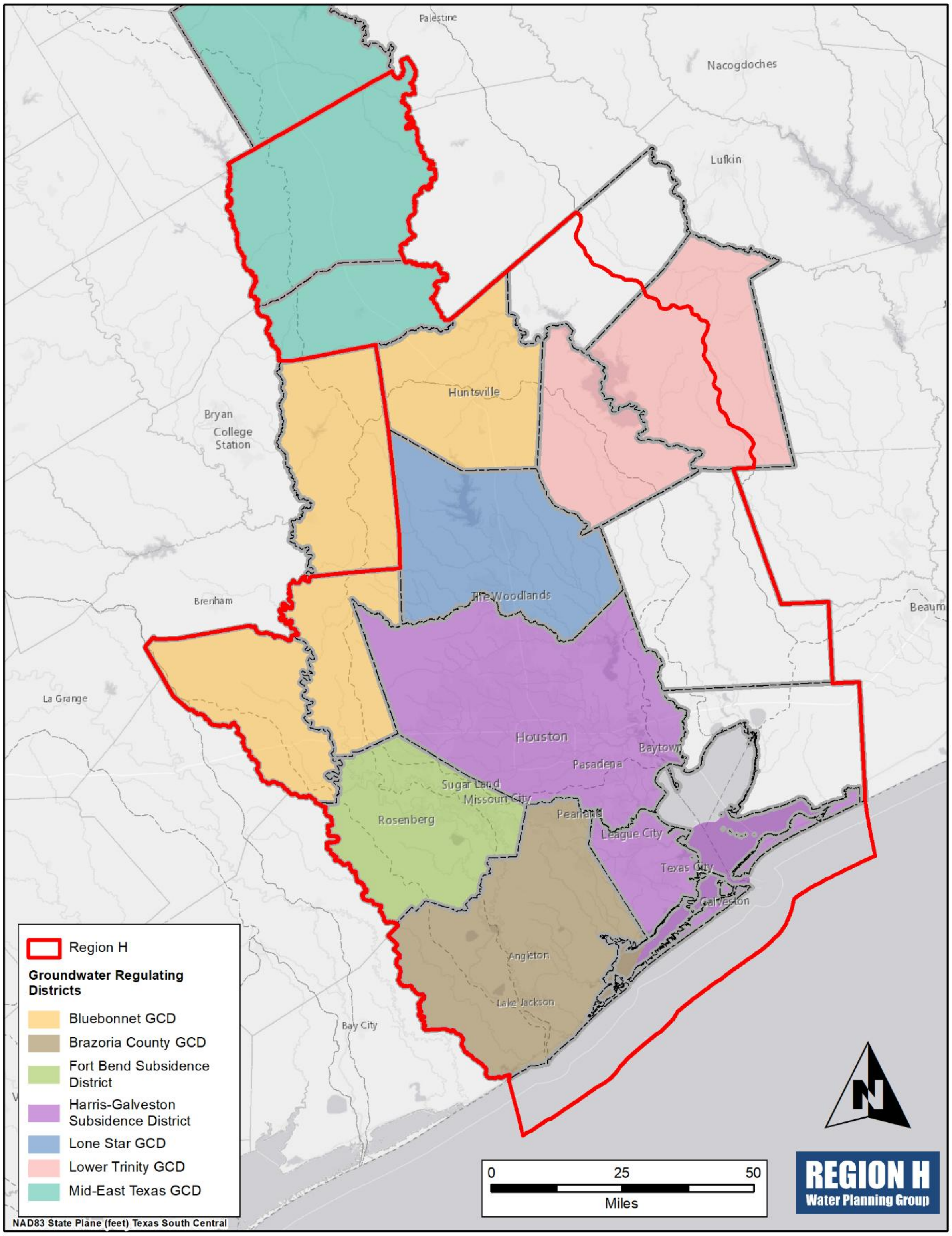
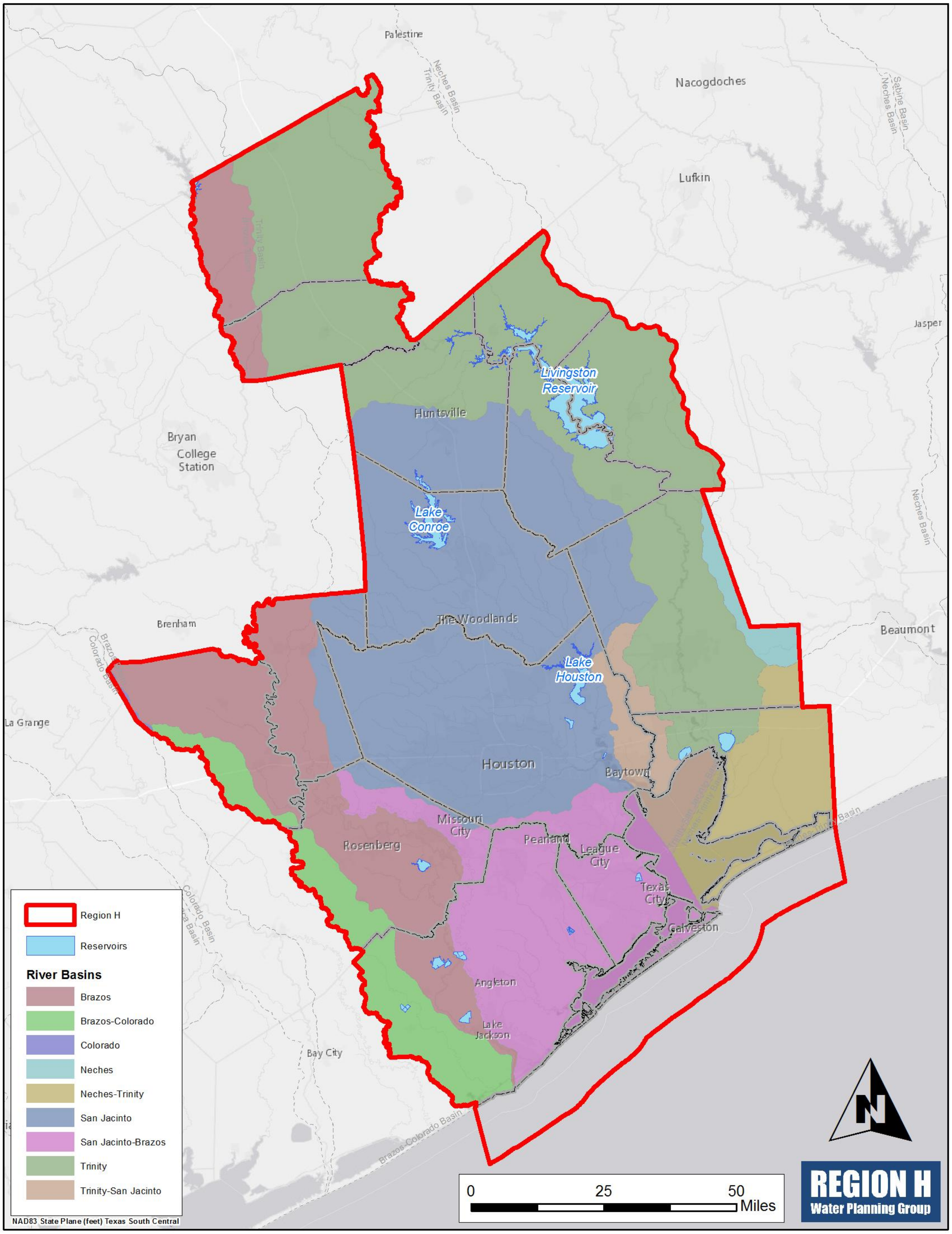


Figure 1-6 – Region H Surface Water Sources



1.4.3 Trinity River Basin

The Trinity River Basin contains two water projects in Region H: Lake Livingston and the Wallisville Saltwater Barrier. The City of Houston (COH) and the Trinity River Authority (TRA) sponsored Lake Livingston's construction. It is operated by the TRA to meet the service demands of the COH and other local users in the Trinity River Basin and in the Neches-Trinity Coastal Basin. These two projects are operated as a system, using Livingston primarily to store water and Wallisville to control the migration of saltwater from Trinity Bay. The combined permitted diversion from the Livingston-Wallisville system is 1,344,000 ac-ft/yr. Additional permitted run-of-river water supplies downstream of Lake Livingston total 220,230 ac-ft/yr. These supplies are associated with the water rights agreements established at the time of Lake Livingston permitting.

1.4.4 San Jacinto River Basin

The San Jacinto River Basin has two major public water supply reservoirs: Lake Houston and Lake Conroe. Lake Houston, with a permitted diversion of 168,000 ac-ft/yr, is owned by COH for use in its service area and operated by the Coastal Water Authority (CWA). COH and the San Jacinto River Authority (SJRA) jointly own Lake Conroe, with COH holding two-thirds of the permitted rights (66,667 ac-ft/yr) and SJRA holding one-third (33,333 ac-ft/yr). SJRA manages Lake Conroe, providing supply to Montgomery and Harris Counties. SJRA has an additional run-of-river water right of 55,000 ac-ft/yr and an indirect reuse water right of 14,944 ac-ft/yr that are physically diverted out of Lake Houston. Collectively, COH and SJRA also hold permits for additional yield from Lake Houston as well as an excess flows permit that may be diverted at Lake Houston.

1.4.5 Brazos River Basin

The Brazos River Authority (BRA) manages the water supply resources from 11 reservoirs within this basin. These reservoirs are operated by BRA as a system where commitments made to downstream demands may be met from one or more upstream reservoir using storage available in the system. The U.S. Army Corps of Engineers (USACE) owns eight of these reservoirs and BRA owns three reservoirs within the basin. In addition to the BRA water supply reservoirs, there are several other reservoirs in the basin. While none of these reservoirs are located within the Region H area, supply from the system is committed in Region H. BRA also has contracted additional firm supplies to customers in Region H from the increased availability authorized by a permit associated with system operation. Approximately 241,726 ac-ft/yr of firm supply from the BRA system is contracted for use in the Region H area. Other large surface water suppliers also divert water from the Brazos River Basin to serve needs in the basin or adjoining coastal basins. Dow Inc. diverts surface water from the Brazos River and enhances the reliability of their supplies through the use of off-channel surface reservoirs as well as contracts with BRA for upstream supplies. Gulf Coast Water Authority (GCWA), Brazosport Water Authority (BWA), and NRG also utilize Brazos River Basin supplies.

1.4.6 San Jacinto-Brazos Coastal Basin

There are several significant water users within the San Jacinto-Brazos Coastal Basin, further supported by run-of-river water supplies from the Brazos Basin. Suppliers include the GCWA, which has historically owned water rights on the Brazos River as well as within the coastal basin. GCWA also enhances the reliability of their surface water supplies through the use of off-channel surface reservoirs as well as contracts with BRA for upstream supplies.

1.4.7 Use by Source

TWDB reports that Region H used 1,826,366 acre-feet of water in 2000. Of that, 618,438 acre-feet (34 percent) came from groundwater wells, with the remaining 66 percent from rivers and other surface sources. The TWDB reported that, in 2020, Region H used a total of 1,937,426 acre-feet of water. Groundwater use accounted for 516,598 acre-feet (26.7 percent) of that total. The majority of year 2020 water supply came from surface water sources, at an amount of approximately 1,403,180 acre-feet. The remainder of the water used is attributed to reuse. Average regional water use for years 2000 through 2020 was approximately 1,916,000 ac-ft/yr. *Table 1-10* summarizes the groundwater, surface water, and reuse usage for each county. *Table 1-11* lists the estimated year 2080 reliable yields available from existing sources to Region H. Further information regarding the yield of major surface water rights in Region H is available in ***Chapter 3***.

Table 1-10 – County Water Use by Source

County	2020 Groundwater (acre feet)	2020 Surface Water (acre feet)	2020 Reuse (acre feet)	2020 Total Use (acre feet)
Austin	9,595	883	10	10,488
Brazoria	39,799	255,361	3,056	298,216
Chambers	10,770	135,864	0	146,634
Fort Bend	97,640	74,266	2,909	174,815
Galveston	3,742	97,663	977	102,382
Harris	219,490	781,259	10,189	1,010,938
Leon	3,806	2,507	33	6,346
Liberty	11,192	29,543	0	40,735
Madison	3,273	915	0	4,188
Montgomery	83,909	9,788	439	94,136
Polk [1]	4,386	3,303	0	7,689
San Jacinto	3,283	219	0	3,502
Trinity [1]	1,409	752	0	2,161
Walker	4,363	10,222	35	14,620
Waller	19,941	635	0	20,576
Total	**516,598**	**1,403,180**	**17,648**	**1,937,426**

Source: TWDB Water Use Survey Historical Summary Estimates (Including Reuse) by County

[1]Includes portion of the county in adjacent Region I.

Table 1-11 – Projected 2080 Supplies Available for Use in Region H

Groundwater	Projected Yield (acre feet/year)
Gulf Coast Aquifer[1]	898,647
Carrizo-Wilcox Aquifer	17,668
Queen City Aquifer	1,768
Sparta Aquifer	5,719
Yegua-Jackson Aquifer	7,487
Brazos River Alluvium	19,971
San Bernard River Alluvium	520
San Jacinto River Alluvium	1,450
Trinity River Alluvium	3,913
Subtotal	**957,143**
Reuse	
Direct Reuse	25,580
Indirect Reuse	29,048
Subtotal	**54,628**
Basin/Reservoir/Run of River	
Neches Basin	
Sam Rayburn Contract[2]	66,737
Run-of-River	161
Neches-Trinity Coastal Basin	
Run-of-River	37,475
Trinity Basin	
Lake Livingston/Wallisville	1,142,900
Run-of-River, Lower Basin	137,025
Trinity-San Jacinto Coastal Basin	
Run-of-River	5,539
San Jacinto Basin	
Lake Houston	173,550
Lake Conroe	76,850
Run-of-River	12,627
San Jacinto-Brazos Coastal Basin	
Run-of-River	37,091
Brazos River Basin	
Brazos River Authority System	209,461
Run-of-River, Lower Basin	434,108
Brazos-Colorado Coastal Basin	
Run-of-River	11,730
Subtotal	**2,345,254**
Total	**3,357,025**

[1]*Value includes use from the Catahoula Aquifer.*
[2]*Values based on input from LNVA and Region I.*

1.4.8 Major Water Providers

TWDB rules require the determination of demands associated with each of the Major Water Providers (MWPs) designated by the RHWPG. MWPs are entities which function as critical links in the regional water supply chain. Region H chose to utilize supply volume as the key metric in this designation, with entities with current or anticipated supply volumes of 25,000 ac-ft/yr or greater, including 10,000 ac-ft per year or more provided to others categorized as MWPs. Of the 15 entities categorized as MWPs through this methodology (

Table 1-12), 12 serve users from within the region, while the other three (Brazos River Authority, Lower Neches Valley Authority, and Trinity River Authority) provide supplies to Region H from their primary region. Six of the MWPs in Region H are also WUGs, including cities and regional water authorities which serve their own needs as well as those of their contract customers. It should be noted that while certain entities have been formally categorized as MWPs, all water suppliers are recognized as playing a vital role in meeting the Region's complex and growing water demands.

Table 1-12 – Major Water Providers in Region H

MWP Name	Primary RWPG
Brazosport Water Authority	H
Brazos River Authority	G
Chambers-Liberty Counties Navigation District	H
Dow Inc.	H
Gulf Coast Water Authority	H
Houston	H
Huntsville	H
Lower Neches Valley Authority	I
Missouri City	H
North Fort Bend Water Authority	H
North Harris County Regional Water Authority	H
NRG	H
San Jacinto River Authority	H
Trinity River Authority	C
West Harris County Regional Water Authority	H

1.5 WATER QUALITY AND NATURAL RESOURCES

1.5.1 Water Quality

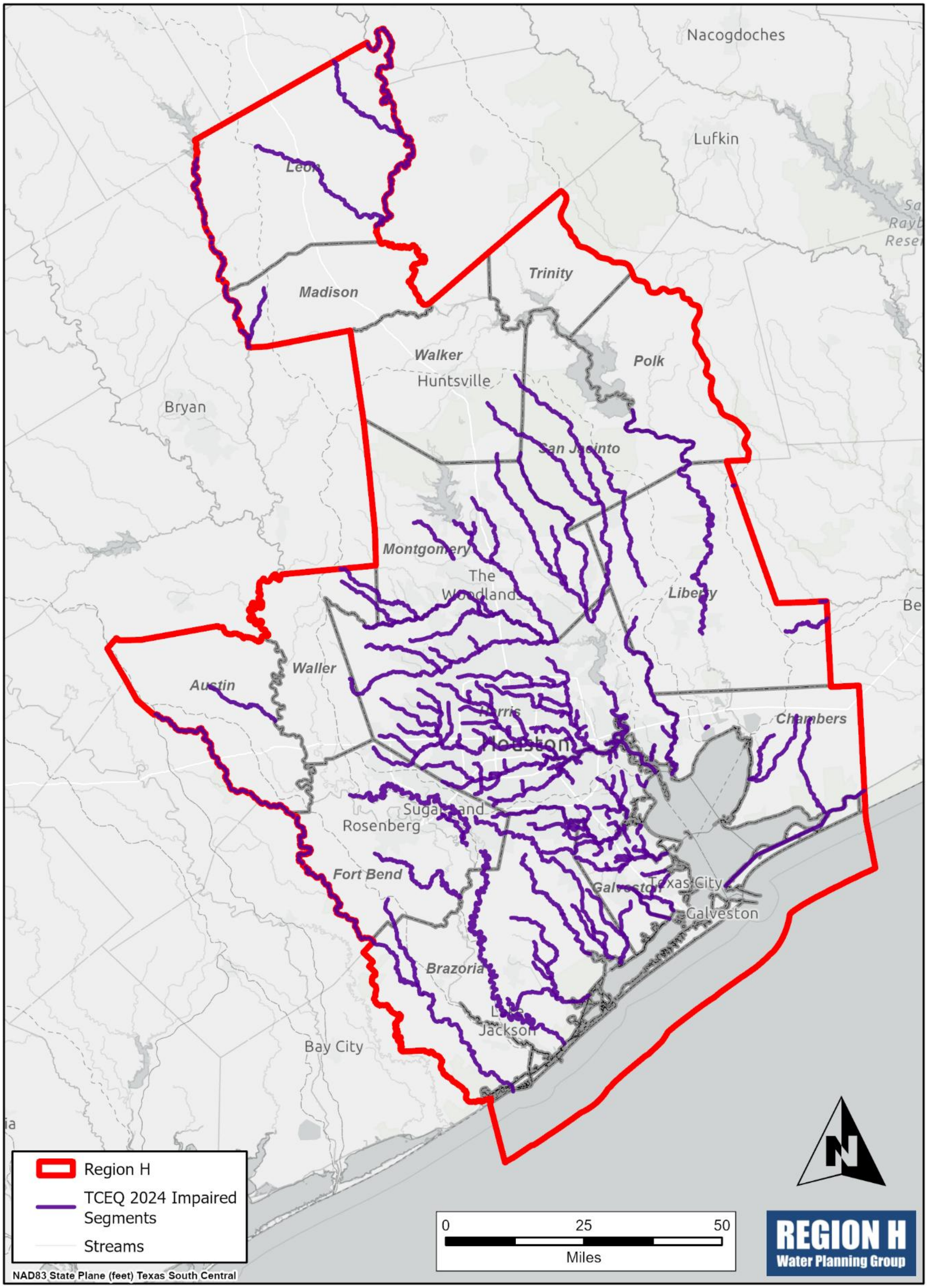
The TCEQ 2024 *Integrated Report of Surface Water Quality* was prepared in compliance with Sections 305(b) and 303(d) of the Federal Clean Water Act. *Figure 1-7* illustrates the impaired stream segments within Region H identified by TCEQ in 2024. The figure was prepared using the 2024 list of impaired segments and GIS data available on the TCEQ website. In addition to water quality data collected by TCEQ, agencies participating in the Texas Clean Rivers Program (CRP) annually compile and publish Regional Water Quality Assessments. In Region H, the Brazos, San Jacinto, and Trinity River Authorities participate in the Texas Clean Rivers Program and have each published reports on the water quality conditions within their respective basins. These reports established the condition of each river and stream segment and identified those segments with water quality concerns for a number of parameters.

Surface water throughout Region H is of sufficient water quality to be treated for municipal use using conventional measures. Contact recreation use is limited in the lower Trinity River due to fecal coliform bacteria levels. Growth in the San Jacinto River Basin has increased nutrient loading and fecal coliform levels in many streams, particularly Buffalo Bayou. Sand mining, in particular, has led to increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels. One concern in the lower Brazos River is the occurrence of periods of low flows during dry years or seasons, which allow the tidal salt-wedge to reach municipal and industrial freshwater intakes.

Groundwater within the region is generally of good quality, with total dissolved solids below 1,000 milligrams per liter (mg/l). Iron is a concern in some portions of the Carrizo-Wilcox Aquifer, and calcium, magnesium, and sulfate cause high total hardness in portions of the Brazos River alluvium. Some groundwater supplies contain arsenic and radon. The current maximum contaminant level (MCL) for arsenic in water used for public supply is 0.01 mg/l set by the Environmental Protection Agency (EPA) in January of 2006. Currently, most groundwater produced within Region H has an arsenic content below the existing MCL. There is a limited area within the northwestern part of Harris County where the concentration of arsenic in some sands of the Gulf Coast Aquifer exceeds 0.01 mg/l. Wells are now constructed to not screen these sands. In some instances, consideration is being given to treating the water from older wells to lower the arsenic content below 0.01 mg/l. Some shallow aquifer contamination has been reported in heavily industrialized areas within the region.

Radon is not a regulated constituent, as a MCL has not been established for it. There are some areas in the western part of Harris County where isolated sands can contain water with higher concentrations of radon. Through geophysical logging to identify these depth intervals and by the use of well construction techniques that isolate the sands, production wells produce water with low levels of radon.

Figure 1-7 – Region H Surface Water Quality



1.5.2 Topography

Region H is located in the Gulf Coastal Plains of Texas. It is primarily made up of two vegetational areas: the Gulf Prairies and the Piney Woods.

The Gulf Prairies make up the majority of the region. They hold marsh and saltwater grasses in tidal areas and bluestems and tall grasses inland. Oaks, elms, and other hardwoods grow in limited amounts. The natural grasses make the region ideal for cattle grazing, and the fertile soils support rice, cotton, wheat, and hay farming. Wildlife in the area includes alligator, river otter, eastern brown pelican, Eskimo curlew, piping plover, and whooping crane. Counties in the Gulf Prairies include Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, and Waller.

The Piney Woods encompass the northeastern portion of Region H, consisting of pine forests interspersed with native and improved grasslands. Longleaf, shortleaf, and loblolly pine are the dominant native species harvested, but slash pine and various hardwood species are cultivated as well. Timber production and cattle are the principal agricultural products in that portion of the region. Wildlife in the area includes bobcat, ringtail, river otter, red-cockaded woodpecker, and bald eagle. Counties in the Piney Woods include Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, and Walker.

1.5.3 Public Lands

Region H contains several hundred thousand acres of state and national forests, supporting hiking, camping, picnicking, and horseback riding. It also contains extensive areas of coastal wildlife refuges for migratory waterfowl, as well as native waterfowl and plant species. It contains a portion of the Big Thicket National Preserve, designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as part of the International Biosphere Reserve. Finally, the region holds approximately 15,834 acres of Texas Wildlife Management Areas, preserved for bird watching in coastal areas and seasonal hunting inland. The area names and locations are presented in *Table 1-13*.

Table 1-13 – Public Lands

Resource Area	Acreage	County
State and National Forests		
W. Goodrich Jones State Forest	1,725	Montgomery
Davy Crockett National Forest	161,842[1]	Total
	67,361	Trinity
Sam Houston National Forest	161,508	Total
	47,609	Montgomery
	59,706	San Jacinto
	54,153	Walker
State and National Preserve		
Big Thicket National Preserve	113,122[1]	Total
National Wildlife Refuges		
Anahuac NWR	34,000	Chambers
Brazoria NWR	44,413	Brazoria
San Bernard NWR	54,000[1]	Brazoria
Trinity River NWR	30,000	Liberty
Texas Wildlife Management Areas		
Candy Cain Abshier	207	Chambers
Atkinson Island	150	Harris
Keechi Creek	1,500	Leon
Justin Hurst	10,311	Brazoria
Nannie M. Stringfellow	3,666	Brazoria

Source: Texas Almanac, Texas Parks & Wildlife Department
[1]Total includes portion of public lands located in counties outside of Region H.

1.5.4 Navigation

Navigation within Region H rivers is generally limited to the lower reaches of the main stems of the Brazos, San Jacinto, and Trinity Rivers including the Houston Ship Channel and Turning Basin. In addition, the Gulf Intracoastal Waterway, an inland canal system that connects ports in the Gulf of Mexico, traverses the Region H coastline through the ports of Galveston and Freeport. There is significant use of rivers, streams, and reservoirs throughout the region by recreational boaters and fishermen. There are no navigation water permits in the Region H area.

1.5.5 Agricultural and Natural Resources

Agricultural interests in Region H are impacted by threats to water supply during drought of record conditions. As in other parts of the state, agricultural interests in water resources are often the first ones limited in times of shortage. Traditionally, Region H has been resistant to these pressures due to its relatively plentiful supply of water. However, in recent years of drought and with the increased utilization of water for other purposes, water supply has become a critical driver in agricultural operations. Most surface water is provided through annual contracts that do not provide certainty in planning long-term water supplies. Additionally, water rights that are held by agricultural interests are often not reliable without storage to provide backup during drought. Because of these issues, many farmers have turned to use of groundwater, where allowable through local regulation, to augment the unpredictable surface water supplies. However, the prospect of developing wells is often only a viable alternative for growers who farm the land that they own. Growers who lease land are typically not able to make long-term commitments to developing groundwater resources or other fixed assets on the property they farm. Region H is also able to meet a portion of agricultural need through irrigation conservation practices, which are most effective for water-intensive crops such as rice. Impacts upon agricultural resources are discussed in detail in ***Chapter 6***. The need for financial assistance to realize the agricultural water conservation goal is addressed in ***Chapter 8***.

The Galveston Bay estuary is the single most significant natural resource in Region H. The estuary is dependent upon freshwater inflows to maintain seasonal salinity ranges for wildlife habitat and fisheries productivity. In addition, the development of wastewater return flows over the years from the growing urban development has provided an important baseflow for preserving the system. The estuary is capable of withstanding natural flood and drought cycles, but the amplified effects of water diversions during a drought may pose a threat to this resource.

Senate Bill 3, passed in 2007 by the 80th Texas Legislature, developed a framework for evaluation and determination of future environmental flows throughout the state including Region H. Region H is home to two separate SB3 processes: the Trinity-San Jacinto Basin working groups in the eastern basins of the region and the Brazos Basin working groups in the western basins. The Trinity-San Jacinto Basin and Bay Expert Science Team (BBEST) submitted their report in November 2009 and the Trinity-San Jacinto Basin and Bay Area Stakeholder Committee (BBASC) concluded its findings in two series of recommendations transmitted in May 2010. TCEQ adopted standards in April 2011 based on these recommendations. In the Brazos River Basin, evaluations were completed by the BBEST and BBASC in March and September 2012, respectively. In turn, final rules for the Trinity-San Jacinto and Brazos systems were formally adopted on May 15, 2011 and March 6, 2014, respectively.

The number of federally and state-listed threatened and endangered species is presented in *Table 1-14.* Threatened and endangered species are further discussed in ***Chapter 6***.

Table 1-14 – Threatened and Endangered Species

County	County Total
Austin	17
Brazoria	45
Chambers	42
Fort Bend	20
Galveston	46
Harris	49
Leon	24
Liberty	23
Madison	24
Montgomery	20
Polk	24
San Jacinto	22
Trinity	24
Walker	23
Waller	18

Source: Texas Parks & Wildlife
Number of species listed as of August 2024.

The strategies recommended in this water plan will have some impacts upon wetlands habitats which may require mitigation. In the 2026 Region H Water Plan, one new reservoir project, the Allens Creek Reservoir, is recommended. However, the potential impacts at this proposed site are less than on the main stem of a river. It should be pointed out that the Allens Creek project was modified by the project sponsor to avoid impacting a wetland segment adjacent to the project site. Remaining reservoir projects recommended in the 2026 Region H Water Plan consist of enhancements to existing impoundments and sites.

Transfers of additional supply to the San Jacinto Basin from Lake Livingston and beyond and transfer of water from Toledo Bend in the East Texas Transfer are recommended in this plan. While the recommended amounts are less than the full yield of the source reservoirs, it will still impact lake levels during dry periods as well as wetlands along the periphery of the source reservoirs, but no permanent impacts to these habitats are foreseen. Substantial portions of associated conveyance are anticipated to occur through existing infrastructure or may be made possible through expansion within or adjoining to an existing right-of-way, thereby reducing potential future impacts on wetlands.

A significant portion of the Planning Area has experienced subsurface compaction and land surface subsidence due to prolonged dependence on groundwater to support growing water demands. Increased utilization of surface water supplies, including many of the strategies recommended in this plan, allows achievement of mandated limits on groundwater production and substantially reduces the rate of subsurface capacity reduction and the negative impacts to the surface environment caused by subsidence.

In developing the RWP, the RHWPG balanced meeting water needs with good stewardship of the water, agricultural, and natural resources within the region. Water conservation is recommended as the first strategy applied to meet projected shortages where appropriate, and yield and environmental impact of projects were given greater consideration than the unit cost of water in the strategy selection process. Consideration of impacts to agricultural and natural resources are further discussed in ***Chapter 6***, as well as in strategy technical memoranda in ***Appendix 5-B***.

1.6 EXISTING WATER PLANNING

1.6.1 Existing Regional and Local Water Management Plans

The first Region H Water Plan was published in 2001 and was incorporated into the State Water Plan in 2002. Since that time, RWPs have been developed at five-year intervals in 2006, 2011, 2016, and 2021 for incorporation into subsequent State Water Plans. The 2021 Region H Water Plan recommended several water management strategies to meet water demands. First, water conservation was recommended for all municipal WUGs for measures like mandatory outdoor watering restrictions, while some measures were not applied for WUGs with extremely low existing per-capita demands or leakage losses, along with irrigation WUGs in certain counties. Next, expanded development of groundwater was recommended where regulatory constraints allowed for additional pumping. The 2021 RWP also included many water supply contracts and ongoing infrastructure projects based on stakeholder input during the regional planning process; both contractual transfers and infrastructure development accounted for a substantial portion of recommended water management strategies.

The Region H area was formerly part of The Trans-Texas Water Program (TTWP): Southeast Area, a comprehensive water resource planning program created to evaluate a full range of water management strategies for a 32-county area of East Texas. This area encompassed all of Region H, plus the lower Sabine River Basin and portions of the middle Brazos River Basin. The Phase I Report (1994) identified a regional long-term shortage by the year 2035. To meet that need, several management techniques were studied further: water conservation, wastewater reclamation, use of existing reservoir surplus supply, coordinated reservoir system operation, interbasin transfers, and contractual transfers.

Technical studies of these management techniques were completed in Phase II of the TTWP. The Phase II Report (1998) determined that the Southeast Area could develop adequate supplies to meet expected regional demands, requiring management strategies to be implemented to accommodate growth in the different geographic areas across the 50-year planning period. Water conservation, wastewater reclamation, and coordinated systems operations strategies would extend the period of adequate supply, allowing additional time to plan and develop new water sources. The Allens Creek Reservoir in the Brazos River Basin was reported as a potentially feasible project. Contractual transfers were identified that would align surface water rights with the owner's service areas, shortening conveyance systems. Finally, sustained interbasin transfers from the Toledo Bend Reservoir in the Sabine River Basin to the Trinity and San Jacinto River Basins were also reported as feasible strategies to meet the growing needs of the region and areas of central Texas.

Other major regional water supply plans include the SJRA Raw Water Supply Master Plan and the Trinity River Basin Master Plan.

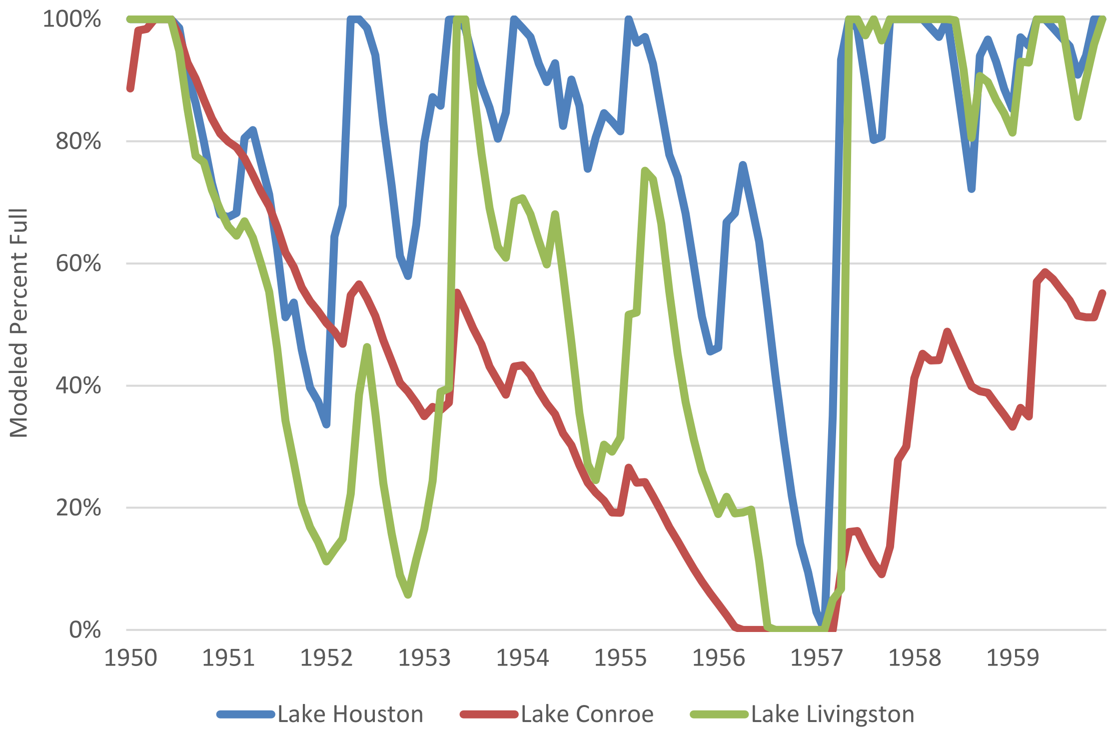
The Harris-Galveston Subsidence District and Fort Bend Subsidence District developed Regulatory Plans to address subsidence through reduced groundwater extraction within their respective regulatory areas. These districts each adopted their most recent regulatory plans in 2013, setting limits on groundwater use as a percentage of total water demand. The most recent amended management plan for Lone Star GCD was adopted in 2023. In addition, the Bluebonnet, Brazoria County, Lower Trinity, and Mid-East Texas GCDs have published management plans although these districts have not proposed limitations on groundwater withdrawals to maintain groundwater resources.

Additional plans are noted in the Region H Bibliography, included as ***Appendix 1-A***.

1.6.2 Drought of Record

Water supplies included in the 2026 Region H RWP are based on drought of record conditions. Specifically, the drought of record condition used in Region H is the drought of the 1950s as recreated in simulation by the Water Rights Analysis Package (WRAP) using the Trinity, San Jacinto, and Brazos River Basin Water Availability Models (WAMs). *Figure 1-8* below represents the percentage full for the three major reservoirs in Region H during the drought of record. Note that this analysis represents the Run 3 WAM for each basin, which does not include any revisions to allowable annual diversions in order to maintain firm yield and assumes no return flows.

Figure 1-8 – Modeled Drought of Record Effects on Region H Reservoirs



1.6.3 Current Preparations for Drought

The amended Title 30, Texas Administrative Code, Chapter 288 became effective on December 6, 2012, and made changes to the drought contingency planning process, including aligning deadlines for drought contingency planning submittals to a five-year cycle. Any new or revised drought plans must be submitted to the TCEQ within 90 days of adoption by the governing body of the entity. For entities serving fewer than 3,300 connections, the plans must be developed and made available upon request by TCEQ.

In the completed drought plans, the predominant response activities are first a public information effort to alert the public to drought conditions and encourage water conservation. If drought conditions persist, many plans impose mandatory water conservation measures, including restrictions on landscape watering and car washing. Water conservation and drought response are discussed in ***Chapter 5***, ***Chapter 5B***, and ***Chapter 7*** of this report.

1.6.4 Water Loss Audits

An important part of a municipal conservation plan is minimizing the amount of water loss in the distribution system. Retail entities that have an active financial obligation with TWDB or have more than 3,300 connections are required to submit water loss audits annually. All retail public water suppliers are required to submit a water loss audit every five years.

The water loss reporting follows a methodology recommended by the International Water Association (IWA) and the American Water Works Association (AWWA) Water Loss Control Committee. The methodology relies on defined water use categories as shown below:

Apparent Losses represent water that was used but not paid for, resulting in lost revenue. Apparent Losses include (but are not limited to):

- Unauthorized consumption,
- Customer meter under-registering, and
- Billing adjustment and waivers.

Real Losses represent water that is physically lost from the water system prior to use, resulting in lost revenue. Real Losses include:

- Main breaks and leaks,
- Storage overflows, and
- Customer service line breaks and leaks.

Table 1-15 details these various components of water use in Region H, as reported in the 2020 Water Loss Audit Report, which included data submitted by 590 entities in Region H. As demonstrated, real losses represent approximately 12.3 percent of the total reported water input to the region, which is slightly lower than the statewide average of 12.6 percent. This data represents a real potential for the reduction of water demand through leak detection and other practices aimed at increasing accountability.

Table 1-15 – Region H 2020 Water Balance (acre-feet per year)

<table>
<tr><td rowspan="9">Totals for
Region H

590 Audit(s) Submitted

Connections (conn)
1,601,168

Population
5,542,127

Length of Main Lines
23,938.70 miles

Median Total GPCD
96

Median GPCD Loss
9

Water Loss Performance
Median Water Loss
26.00 GCD

Median Apparent Loss
4.54 GCD

Median Real Loss
20.37 GCD</td><td rowspan="9">Total System Input Volume
240,605,927,000</td><td rowspan="4">Authorized Consumption
208,139,227,514</td><td rowspan="2">Billed Consumption
200,220,429,552</td><td>Billed Metered
200,035,876,976</td><td rowspan="2">Revenue Water
200,220,429,552</td></tr>
<tr><td>Billed Unmetered
184,552,576</td></tr>
<tr><td rowspan="2">Unbilled Consumption
7,918,797,962</td><td>Unbilled Metered
3,388,799,624</td><td rowspan="7">Non-Revenue Water
40,385,497,448</td></tr>
<tr><td>Unbilled Unmetered
4,529,998,338</td></tr>
<tr><td rowspan="5">Water Loss
32,466,699,486

Median
26.00 GCD

Water Loss Cost
$52,293,365</td><td rowspan="3">Apparent Loss
2,862,171,755

Median
4.54 GCD

Apparent Loss Cost
$15,943,963</td><td>Unauthorized Consumption
708,395,407</td></tr>
<tr><td>Customer Meter Accuracy Loss
2,102,347,681</td></tr>
<tr><td>Data Handling Errors
51,428,667</td></tr>
<tr><td rowspan="2">Real Loss
29,604,527,731

Median
20.37 GCD

Real Loss Cost
$36,349,402</td><td>Reported Breaks and Leaks
17,590,553,759</td></tr>
<tr><td>Unreported Loss
12,013,973,972</td></tr>
</table>

Source: Texas Water Development Board Summary of Water Balance Data by Region

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Chapter 2 – Projected Population and Water Demands

2.1 INTRODUCTION

Statewide estimates indicate that the population of Texas will grow from over 29 million people in 2020 to over 52 million in 2080, an increase of more than 75 percent. Region H is anticipated to make up approximately 21 percent of this 2080 population, or roughly 10.8 million people. In addition to municipal water supply for this growing population, the manufacturing sector accounts for a significant portion of water demand in Region H. Although irrigated agriculture in the region has declined considerably over the past several decades, substantial water demands for irrigated agriculture are still projected within the region, particularly in Brazoria, Chambers, Fort Bend, Liberty, and Waller Counties.

This chapter summarizes the long-term projections for Region H as well as the methodology employed to generate these estimates for development of the 2026 Region H Regional Water Plan (RWP). In this effort, the Region H Water Planning Group (RHWPG) was assisted by the members of the Region H Population and Non-Population Water Demand Committees. Members of these committees are listed below in *Table 2-1*. The results of the analyses described in the following sections can be found in detail within the Texas Water Development Board's (TWDB's) State and Regional Water Planning Database (DB27) Reports. Instructions for accessing these online reports can be found in the Executive Summary in ***Section ES.11***.

Table 2-1 – Region H Committee Members

Non Population Demands Committee	
Member	**Interest Category**
Carl Burch (Chair)	Electric Generating Utilities
Loyd Smith	Counties
Cynthia Wagener	Industries
Jason Garrard	Industries
Arthur Bredehoft	Water Utilities
Mark Evans*	Counties
Population Demands Committee	
Member	**Interest Category**
Marvin Marcell (Chair)	Water Districts
Ivan Langford	Small Business
Robert Istre	Municipalities
Byron Ryder	Counties
Michael Turco	Water Districts
Mark Evans*	Counties

**Non-voting*

2.2 NON-POPULATION WATER DEMANDS

Non-population water demands include water use for Water User Groups (WUGs) that are not associated with domestic purposes. These include Irrigation, Livestock, Manufacturing, Mining, and Steam Electric Power use and are delineated within each Regional Water Planning Area (RWPA) by county and river basin.

2.2.1 Methodology

Information regarding non-population water use was compiled from a number of sources based on the type of demand considered. Non-population water demand projections consider historical water use from all source types, including demands met through reuse. In each category, projections were initially presented by TWDB and were reviewed and amended by the RHWPG as required. The demands, as prepared by TWDB and revised by the RHWPG, were formally adopted by TWDB on November 9, 2023.

2.2.1.1 Irrigation

TWDB's draft Irrigation demand projections were developed by averaging the annual irrigation water use from 2015 to 2019 for each county, with this amount projected to be held constant between years 2030 and 2080. TWDB developed the estimates of historical Irrigation water use by applying an evapotranspiration-based estimated crop water need to irrigated acreage reported by the Farm Service Agency (FSA) to generate water need estimates by county, crop, and year; these estimates were further adjusted based on available surface water release data and availability of groundwater for the portion of irrigation demand estimated to originate from that source.

The RHWPG conducted an assessment of available information and concluded that the second-highest volume of irrigation use from 2010 to 2020 for each county should be used to develop the long-term projections in order to achieve a worst-case demand scenario while omitting a single outlier year in historical usage. Demand projections were held constant from 2030 through 2080 due to the absence of any additional data representing long-term trends in agricultural production.

2.2.1.2 Livestock

Estimates of historical Livestock water use were developed by TWDB by applying a water use coefficient for each livestock category to county level estimates of livestock inventories from the U.S. Department of Agriculture National Agricultural Statistics Service. TWDB used the average of the 2015 through 2019 use for each county as the draft baseline projection. Projected decadal growth rates for projections were retained from the 2021 RWP; in Region H, livestock water demands are projected to remain constant through 2080 in all counties.

The RHWPG conducted a review of the draft projections and factors contributing to livestock water demand and concluded that the maximum historical use from 2015 through 2020 in each county should be used to better reflect dry-year demands in the long-term projections.

2.2.1.3 Manufacturing

TWDB developed draft Manufacturing water demand projections for the 2026 RWP cycle using the maximum 2015 through 2019 demand (plus unaccounted loss estimates) as the baseline demand for each county. Projections for 2030 were based on the recent statewide manufacturing demand trend, and projections beyond 2030 rely on trends in Census Bureau County Business Pattern facility count data from 2010 through 2019. This methodology represents a substantial change from the approach utilized in the 2021 RWP and addresses concerns raised by several planning groups in the prior cycle regarding lack of projected demand growth after 2030.

The RHWPG conducted a review of the draft Manufacturing water demand projections and recommended adjustments based on additional information received from industrial stakeholders, including planned expansions of facilities in Harris County. These expansions were incorporated into revised demand projections.

It was noted by the Planning Group that the potential future expansion of hydrogen production or other emerging technologies could potentially have significant impacts on future industrial water demand for the Region. While uncertainty regarding the future of this production sector precludes incorporation of corresponding projection adjustments for the 2026 RWP, the RHWPG has engaged in preliminary studies of topics surrounding water demand for emerging technologies and will continue to monitor the issue for future planning cycles. A preliminary summary of information on potential water demand for hydrogen production is included in ***Appendix 2-A***.

2.2.1.4 Mining

Mining projections for the 2026 RWP were developed through a detailed study of current and potential future mining water use demands performed by the Bureau of Economic Geology in cooperation with TWDB and the United States Geological Survey (USGS). Predecessor studies published in 2011 and 2012 had informed the 2016 and 2021 RWPs.

During a review of the draft Mining water demand projections, the RHWPG recommended reclassification of certain water users as manufacturing entities instead of mining. Manufacturing and mining projections were updated accordingly.

2.2.1.5 Steam Electric Power

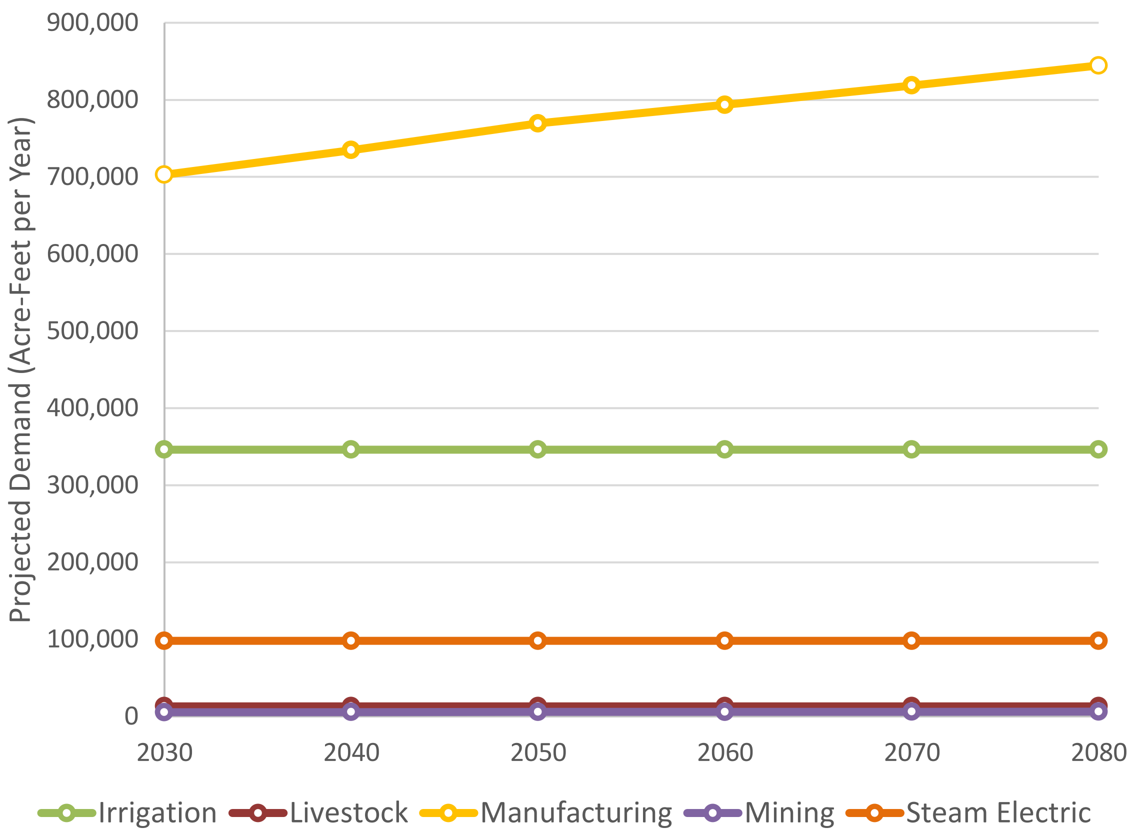
TWDB developed draft Steam Electric Power water demand projections by using the highest single-year water use from 2015 to 2019 on a county basis, held constant between 2030 and 2080, and adjusted for planned near-term facility additions and retirements. The steam electric water use estimates were intended to be reflective of the consumptive portion of water use, with the portion of water that is returned to the source excluded from the estimate. TWDB draft projections also included anticipated water use of future facilities listed in state and federal reports as well as deductions in use for facilities scheduled for retirement as reflected in state and federal reports.

Upon review, the RHWPG determined that steam electric water demand projections should be based on the maximum historical use from year 2015 through 2019 for each facility and summing the maximum values by county. The RHWPG was also able to identify a portion of demand from cogeneration facilities which represent a manufacturing rather than steam electric category and were removed by the RHWPG from its revised projections.

2.2.2 Demand Projections

The resulting projections demonstrate growth of non-population demands from approximately 1.17 million acre-feet per year in 2030 to 1.31 million acre-feet per year of demand in 2080. Increases in non-population demand are primarily attributed to the Manufacturing sector, with additional slight growth in the Mining Category. Irrigation, Livestock, and Steam Electric demand projections remain static. These patterns are demonstrated in *Figure 2-1.* Detailed non-population demand information can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 2-1 – Projected Non-Population Demand Growth



2.3 POPULATION WATER DEMANDS

Population water demands are associated with municipal and domestic use. In accordance with TWDB guidance intended to align projections with active retail service areas, population water demand projections have been estimated to align with utility-based WUGs for the sixth round of regional planning. Defined WUGs are entities serving more than 100 acre-feet per year (ac-ft/yr) for municipal use and include:

- Privately-owned utilities,
- Water systems serving state or federal government-owned institutions or facilities,
- Any other publicly owned retail utilities, and

- Collective Reporting Units (CRUs) consisting of grouped retail public utilities having a common association.

All smaller service providers and rural/unincorporated areas of municipal and domestic water use, aggregated at the county level, are considered part of an additional WUG and are referred to as “County-Other” for each county.

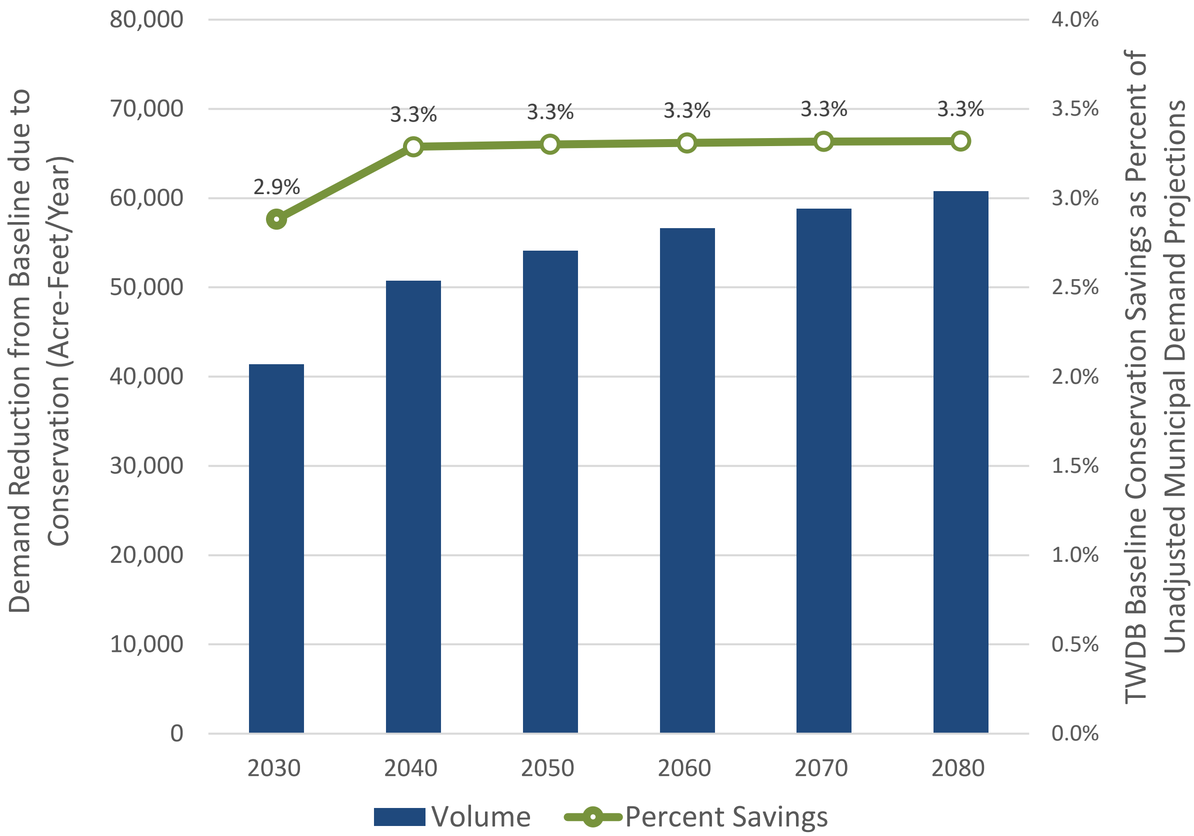
2.3.1 Methodology

For the sixth round of regional water planning, 2020 U.S. Census data was made available for use in assessing current population and forecasting long-term trends. This information was used by the Texas Demographic Center (TDC) and TWDB to generate WUG-level projections for all Regional Water Planning Groups (RWPGs). RWPGs were provided with data for multiple migration scenarios utilized in developing projections and provided feedback to TWDB on potential scenario selection by county for use in projection development.

The RHWPG opted to request an exception from these state-generated projections for a portion of the Region and, instead, utilize information developed for a parallel project to evaluate groundwater use within the region for the Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD). This request builds upon similar efforts undertaken by the Region for prior RWP cycles and involved close coordination among the RHWPG, the Subsidence Districts, and TWDB staff. This study was designed to fit with the regional planning process and coordination with TWDB was performed in order to ensure uniformity between the groundwater study and the projection development conducted by TWDB. The result was a detailed depiction of population growth in Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties for use in both the groundwater study and Region H planning. This request was evaluated and subsequently approved by TWDB. A detailed description of the methodology utilized to develop these projections is provided in ***Appendix 2-B***.

Water demands were calculated for the WUG populations by TWDB using data from the water use survey to identify a baseline per capita demand level for dry year conditions. For the majority of WUGS, the estimated year 2011 per capita demand for the WUG was utilized, corresponding to the extreme drought conditions at that time. Demands for new municipal WUGs for the 2026 RWP were based primarily upon year 2018 per-capita demand estimates. The effective per-capita demand for each decade was adjusted from this baseline according to anticipated conservation savings due to plumbing code enforcement and the proliferation of water-efficient appliances. This reduction in overall demands resulted in a reduction of year 2080 water demands of 60,804 acre-feet annually, or approximately 3.3 percent from projected 2080 demands. The decadal increase in conservation savings factored into the demand projections is shown in *Figure 2-2*.

Figure 2-2 – Demand Reduction through Baseline Conservation



2.3.2 Demand Projections

The resulting projections demonstrate growth of population water demands from approximately 1.39 million acre-feet per year in 2030 to 1.77 million ac-ft/yr of demand in 2080. Overall increases in demand volume are greatest in Fort Bend, Harris, and Montgomery Counties (131,195 acre-feet, 80,663 acre-feet, and 84,838 acre-feet, respectively); Chambers County demonstrates the greatest relative growth with a 177 percent increase in demand during the planning period. These patterns are demonstrated below in *Figure 2-3*. Detailed population water demand information can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 2-3 – Projected Population Water Demand Growth

2.4 MAJOR WATER PROVIDER DEMANDS AND CONTRACTUAL OBLIGATIONS

TWDB rules require the determination of demands associated with each of the Major Water Providers (MWPs) designated by the RHWPG. MWPs are entities which function as critical links in the regional water supply chain. Region H elected to utilize supply volume as the key metric in this designation, with entities with current or anticipated supply volumes of 25,000 ac-ft/yr or greater, including 10,000 ac-ft/yr or more provided to others, categorized as MWPs. Of the 15 entities categorized as MWPs through this methodology (*Table 2-2*), 12 serve users from within the region, while the other three (Brazos River Authority, Lower Neches Valley Authority, and Trinity River Authority) provide supplies to Region H from their primary region. Six of the MWPs in Region H are also WUGs, including cities and regional water authorities which serve their own needs as well as those of their contract customers. It should be noted that while certain entities have been formally categorized as MWPs, all water suppliers are recognized as playing a vital role in meeting the region's complex and growing water demands. Water demands associated with MWPs are summarized by category of water use in ***Appendix 2-C***.

Table 2-2 – Major Water Providers in Region H

MWP Name	Primary RWPG
Brazosport Water Authority	H
Brazos River Authority	G
Chambers-Liberty Counties Navigation District	H
Dow Inc.	H
Gulf Coast Water Authority	H
Houston	H
Huntsville	H
Lower Neches Valley Authority	I
Missouri City	H
North Fort Bend Water Authority	H
North Harris County Regional Water Authority	H
NRG	H
San Jacinto River Authority	H
Trinity River Authority	C
West Harris County Regional Water Authority	H

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Chapter 3 – Analysis of Current Water Supplies

3.1 INTRODUCTION

Region H occupies a location on the Texas Gulf Coast which provides a wealth of water resources, with many aquifer formations capable of rapid recharge and with a number of surface water catchments with generally large flows. However, the region is also home to approximately a quarter of the State's population and is projected to experience significant growth over the next 50 years. This large population, and the region's status as a major industrial area, generates extremely large water demands.

A key component in addressing these growing demands is understanding the reliability and ownership of existing water supplies, which are those supplies both legally and physically available. This chapter summarizes the results of Task 3, and describes the resources available to the region and their allocation to Water User Groups (WUGs) throughout Region H. In this effort, the Region H Water Planning Group (RHWPG) was assisted by the members of the Region H Groundwater Supply Committee and Surface Water Supply Committee. Members of these committees are listed below in *Table 3-1*.

Table 3-1 – Region H Committee Members

Groundwater Supply Committee	
Member	**Interest Category**
Mike Turco (Chair)	Water Districts
Gary Ashmore	GMA 14
David Bailey	GMA 12
Carl Burch	Electric Generating Utilities
Cynthia (Cyndi) Wagener	Industries
Mark Evans*	Counties
Surface Water Supply Committee	
Member	**Interest Category**
J. Kevin Ward (Chair)	River Authorities
Brad Brunett	River Authorities
Jun Chang	Water Districts
Greg Eyerly	Municipalities
Ivan Langford	Small Business
Aubrey Spear	River Authorities
Brandon Wade	Water Utilities
Mark Evans*	Counties

***The Region H chair is an ex-officio (non-voting) member of all committees.*

Also, to provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as DB27. The results of the analyses described below can be found in detail within the DB27 Reports (see ***Section ES.11*** of the Executive Summary). The following sections describe water resources available to the region, procedures for estimating reliable availability, description of major water providers, and procedures for assigning available water supplies to users in the Plan.

3.2 GROUNDWATER SOURCES

3.2.1 Groundwater Aquifer Overview

Groundwater resources in Region H consist of two major aquifers and four minor aquifers. The two major aquifers are the Gulf Coast Aquifer and the Carrizo-Wilcox Aquifer (*Figure 3-1*). The four minor aquifers present are the Sparta, Queen City, Yegua-Jackson, and Brazos River Alluvium (*Figure 3-2*). The Carrizo-Wilcox is used primarily in Leon and Madison Counties, the Sparta Aquifer system in Madison, Walker, and Trinity Counties, and the Gulf Coast Aquifer system in the central and southern sections of the region. Smaller amounts of water are provided by the Queen City, Yegua-Jackson, and Brazos River Alluvium Aquifers. Individual aquifers are described in greater detail in the following subsections.

3.2.2 Major Aquifers

3.2.2.1 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox is the main aquifer in the northern part of Region H in Leon County and the northern portion of Madison County. The Carrizo-Wilcox Aquifer was deposited in a manner that resulted in a sequence of geologic formations of interbedded sand, silt, clay, and shale having a thickness of about 2,000 feet in the northern part of the region. The Carrizo Sand is one of two principal water-producing units of the Carrizo-Wilcox Aquifer, and it is about 100 to 200 feet thick. It is a generally uniform, well sorted sand that contains a few very thin beds of clay; the aquifer dips downward to the southeast at about 70 to 100 feet per mile. The Wilcox Group is composed of alternating beds of sand, sandy clay, and clay with locally interbedded gravel, silt, clay, and lignite. The Simsboro Sand is the major water-producing unit in the Wilcox and is about 200 to 400 feet thick. The Carrizo and Wilcox formations are weakly connected hydraulically and are generally described as one major aquifer. Water from the aquifer contains less than 1,000 milligrams per liter (mg/l) of total dissolved solids, but water from the Carrizo Sand can contain elevated levels of iron that require sequestering or treatment for removal for water used for most municipal and industrial purposes.

Figure 3-1 – Region H Major Groundwater Sources

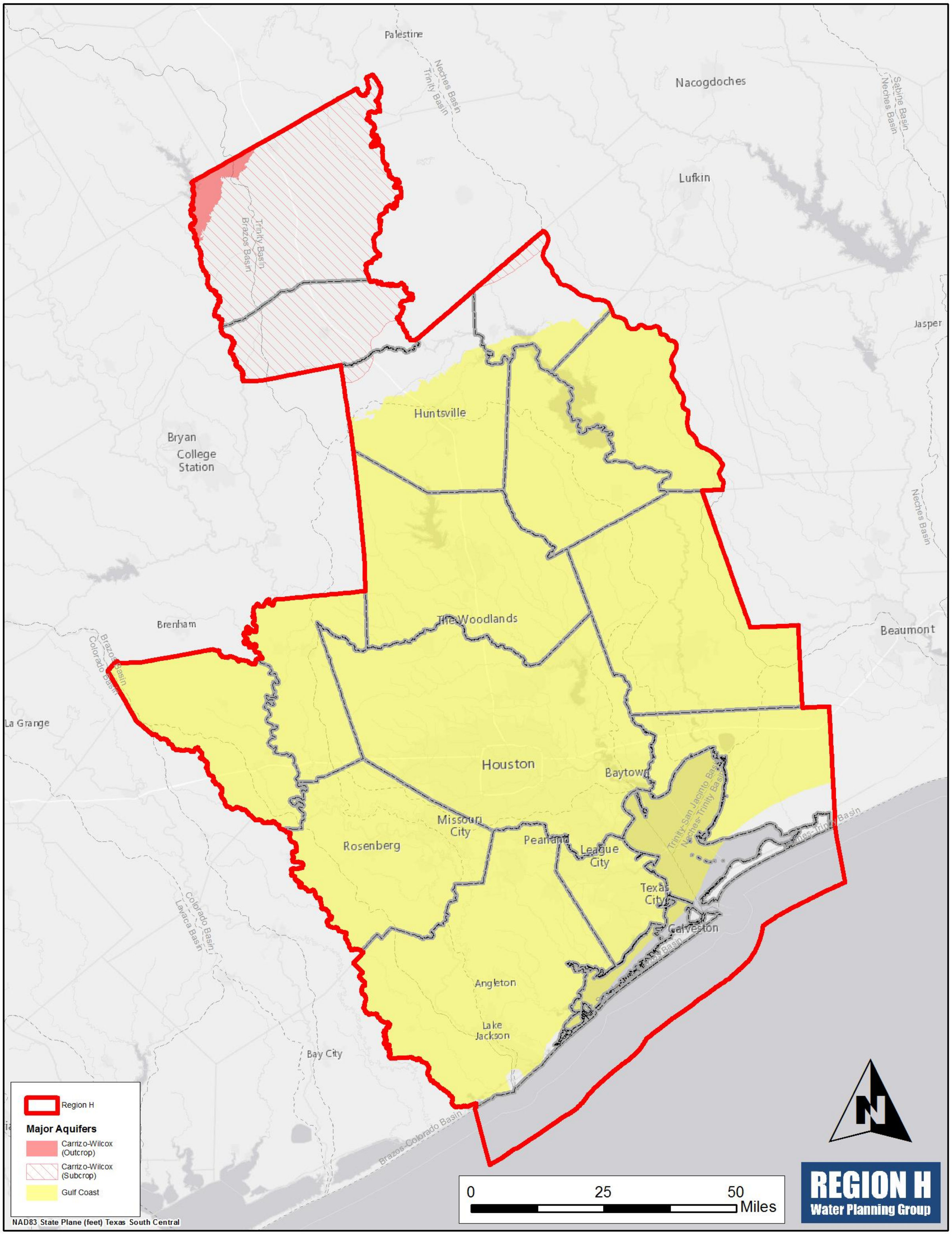
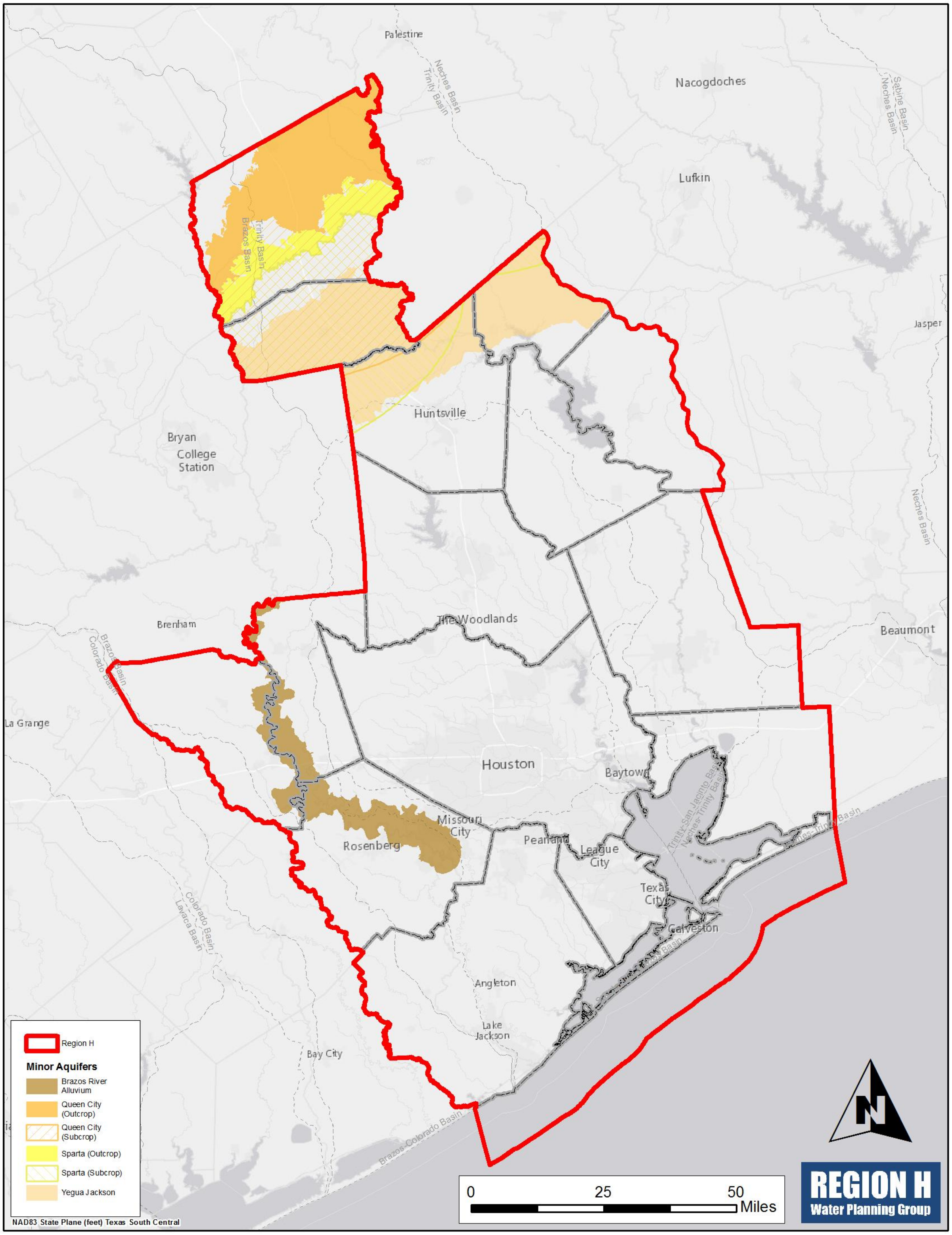


Figure 3-2 – Region H Minor Groundwater Sources



3.2.2.2 Gulf Coast Aquifer

The Gulf Coast Aquifer extends from the Gulf Coast to approximately 100 to 120 miles inland into Walker and Trinity Counties. The Gulf Coast Aquifer consists of four general water-producing units. The geologically youngest unit is the Chicot Aquifer, followed by the Evangeline Aquifer, the Jasper Aquifer, and the Catahoula Formation. The Chicot and Evangeline Aquifers are the more prolific water-producing units in the Gulf Coast Aquifer followed by the Jasper Aquifer and the Catahoula Formation. The units are composed of alternating beds of sand, silt, and clay; shale can occur at deeper depths at and below the base of the Evangeline Aquifer. The Gulf Coast Aquifer has sand thicknesses ranging from about 200 to 500 feet in the central and southern parts of the region with the sands containing freshwater decreasing in thickness as the aquifers approach within about 30 to 40 miles of the Gulf Coast. Formation beds vary in thickness and composition and the areal extent of individual beds normally cannot be traced over extended distances. Total aquifer sand thickness varies and can be as great as several hundred feet. The lower unit of the aquifer, the Catahoula Sandstone, is screened by wells for the City of Huntsville and other wells in Walker and Montgomery Counties. To the south, in Galveston County, the Chicot unit is screened in wells used by the City of Galveston. The aquifer is capable of yielding larger quantities of water in the central and southern parts of Region H and has been utilized over the past 100 years to provide part of the water supply, although heavy usage has also resulted in land surface subsidence and its use is now restricted in Fort Bend, Galveston, and Harris Counties for this reason.

3.2.3 Minor Aquifers

3.2.3.1 Queen City Formation

The Queen City Formation is a minor aquifer that occurs in central and southeastern Leon County and in the northern part of Madison County. The Queen City Formation is composed of sand and loosely cemented sandstone with interbedded shale layers occurring throughout. The Queen City Formation ranges in thickness from 250 to 400 feet with approximately 60 to 70 percent of the total thickness being sand according to *Texas Water Commission Bulletin 6513* (1965), *Availability and Quality of Ground Water in Leon County, Texas*. Groundwater in small to moderate quantities is provided by the Queen City Formation for domestic, municipal, and agricultural uses in Leon and Madison Counties.

3.2.3.2 Sparta Formation

The Sparta Formation or Sparta Sand occurs in southeastern Leon County, all of Madison County, northwestern Walker County, and northeastern Trinity County. The Sparta Formation consists of sand and interbedded clay, with the lower portion of the aquifer containing massive unconsolidated sands with a few layers of shale. The Sparta Formation ranges in thickness from 150 to 300 feet in Leon County and Madison County (*Texas Water Commission Bulletin 6513*). Groundwater from the aquifer is provided for domestic, municipal, and agricultural uses in Leon County and for domestic, municipal, manufacturing, and agricultural uses in Madison County. The Sparta Formation is the groundwater source for the Town of Madisonville and for some water supply corporations in the area.

3.2.3.3 Yegua-Jackson Aquifer

The Yegua Formation and Jackson Group make up a minor aquifer, designated as the Yegua-Jackson Aquifer, which occurs within the region in parts of Madison, Walker, Trinity, and Polk Counties. The Yegua Formation consists of sand, interbedded clay, and scattered lignite. The Jackson Group includes all strata between the Yegua Formation and the Catahoula Sandstone and consists of sand, clay, sandstone, and siltstone. The Yegua Formation ranges in thickness from 1,000 to 1,500 feet; the Jackson Group is approximately 1,100 feet thick, according to *Texas Board of Water Engineers Bulletin 5003* (1950), *Geology and Ground-Water Resources of Walker County, Texas*. Small to moderate quantities of groundwater are provided by the Yegua-Jackson Aquifer for domestic, municipal, industrial, and agricultural uses.

3.2.3.4 Brazos River Alluvium

The Brazos River Alluvium occurs in the floodplain and terrace deposits of the Brazos River in Austin, Fort Bend, and Waller Counties. The Quaternary alluvial sediments consist of clay, silt, sand, and gravel according to *TWDB Report 345* (1995), *Aquifers of Texas*, with the more permeable sand and gravel present in the lower part of the aquifer. The saturated thickness of the sediments is as much as 85 feet and the width of the alluvium ranges from less than one mile to approximately seven miles, with the Brazos River located within the width of the alluvial deposits. The Brazos River Alluvium supplies limited amounts of groundwater for domestic and agricultural purposes in Fort Bend and Waller Counties. In Austin County, it supplies a limited amount of groundwater for domestic, manufacturing, and agricultural uses. The aquifer may contain water with total dissolved solids that approach 1,000 mg/l and have a high total hardness due to the amounts of calcium, magnesium, and sulfate in the aquifer water.

3.2.4 Groundwater Availability

Region H relies on a significant portion of supply from groundwater-based sources. Historically, the coastal counties within the region have been significant users of groundwater, such that initiatives to assess the reliable yield from groundwater supplies and offset excess groundwater demand to alternative sources began long before these initiatives began in other parts of the State because of recognized issues with subsidence. For this reason, the issue of groundwater reliability is a mature topic within the study area and of vital importance to overall water supply planning.

3.2.4.1 Groundwater Regulation in Region H

Region H contains the entirety or portions of seven entities that have authority over groundwater resources. Of these seven, two are subsidence districts with the remaining five being groundwater conservation districts (GCDs) governed under Chapter 36 of the Texas Water Code (TWC). Of the seven entities of various types, two of these have engaged in regulatory plans that involve the restriction of groundwater pumpage for the sake of preserving groundwater resources or preventing undue harm to other natural resources as a result of excess groundwater withdrawal. In effect, these plans and regulations represent the availability of groundwater in these counties for practical purposes.

The Harris-Galveston Subsidence District (HGSD) was created in 1975 to “end subsidence” in those counties at the threat of impacts resulting from excess use of groundwater. Prior to that time, it was observed that subsidence had increased the risk from coastal flooding in those counties and threatened to further increase the potential for inundation along the coast and in inland areas. Through a series of regulatory plans, HGSD has curtailed impacts from subsidence since its inception. In 2013, HGSD adopted a District Regulatory Plan that maintained existing limits on groundwater production in its three Regulatory Areas and set future reductions for Regulatory Area 3 located in north and west Harris County. These reductions are applied to water users on a basis of a percentage of their total water demand. These percentages are developed based on detailed study of long-range population and water demand projections and groundwater modeling for the region. In addition, entities are allowed to enter into Groundwater Reduction Plans (GRPs) that allow for aggregated compliance with groundwater regulation to maximize efficiency in goal attainment. Limits to the maximum annual percentage of groundwater use must be achieved on an annual basis to prevent dewatering of clay layers which causes subsidence and the incurring of disincentive fees on the part of groundwater users.

The Fort Bend Subsidence District (FBSD) was created in 1989 to address similar issues of subsidence that posed a risk to flood-prone areas within the county. In 2013, FBSD approved a District Regulatory Plan that maintained groundwater reductions for areas in the more urbanized northern and eastern portions of the county. Like the limitations placed on pumping by HGSD, these restrictions are applied as a percentage of total water demand and allow for compliance through GRPs.

3.2.4.2 MAG and MAG Peak Factors

Groundwater Management Areas (GMAs) were created by the 74th Texas Legislature to facilitate a number of groundwater management goals including conservation and protection of groundwater. The GMAs, which were delineated by the TWDB and represented by the GCDs within their boundaries, engage in a cyclical joint planning process for groundwater resources. In 2021, the GMAs across Texas submitted their third round of Desired Future Conditions (DFCs) to the TWDB for the purpose of developing estimates of Modeled Available Groundwater (MAG) as described under Section 36.108 of the TWC. The GCDs adopting DFCs are required to develop management plans that include goals that are consistent with achieving the DFCs, per Section 36.1085 of the TWC.

In recent cycles of regional water planning, TWDB has endeavored to bring the efforts of the Regional Water Planning Groups (RWPGs) and GMAs together through the language in the planning rules. Whereas early RWPs allowed for considerable discretion of the RWPGs in assigning groundwater availability, starting in the 2016 round of RWP development the TWDB took a different approach. Per Section 16.053(e)(2-a) of the TWC, regional plans must be "consistent with the desired future conditions…" as developed by the GMAs. Going a step further, Title 31 of the Texas Administrative Code (TAC) Section 357.32 (d) dictates that, for regional planning, RWPGs "shall use Modeled Available Groundwater volumes for groundwater availability" unless there is no MAG volume.

During the development of the 2016 RWPs, it became apparent that strict adherence to the MAG as a limit on groundwater availability in the RWPs can present a number of issues to the RHWPG as well as other RWPGs in other regions of the State. The perspectives of the GMA and RWP processes are inherently different, with the Regional Plans built around "dry-year" demand and minimum supply to represent worst-case conditions, while the GMA process is focused on the study of groundwater resources which must be evaluated over long-term averages and broad scales of time. Further, the TWC, while listing the MAG as one of a number of considerations for GCDs, does not necessarily limit GCDs to strict adherence to the MAG. Some GCDs have rules and regulatory structures which allow for short-term peak pumping while still complying with the DFC on a long-term basis. In these cases, application of the MAG to the RWP process excludes this regulatory flexibility and may place unnecessary limitations upon supplies used for planning purposes, thus underrepresenting the water supply available to meet short-term peak demands.

In order to address these challenges while maintaining the valuable technical dialog between different planning processes, TWDB integrated the concept of a MAG Peak Factor into subsequent RWPs to bridge the gap between groundwater joint planning and regional planning perspectives. MAG Peak

Factors are multipliers greater than 100 percent applied to MAG values to estimate dry-year availability; they are not intended to adjust the long-term supply as derived from the DFCs developed through joint planning process for groundwater, but are instead intended to make the regional planning process consistent with regulations by local groundwater districts and patterns of permitted and exempt water use. RWPGs are not required to use Peak Factors but are given the option to apply them where deemed appropriate on a county-aquifer basis, with proposed factors subject to a multi-stage approval process involving the RWPG, applicable GCDs and GMAs, and TWDB. Approved Peak Factors for Region H are shown in *Table 3-2*, with more detailed information of the Peak Factor process available in ***Appendix 3-A***. At the time of Initially Prepared Plan (IPP) development, the proposed MAG Peak Factor for Brazoria County was recently granted after TWDB review. It is anticipated that the MAG Peak Factor will be incorporated into analyses for the final 2026 RWP.

Table 3-2 – MAG Peak Factors

County	Aquifer	GCD	GMA	MAG Peak Factor
Brazoria	Gulf Coast	Brazoria County GCD	14	129.89%

3.2.4.3 Groundwater Availability Development

As described previously, annual volumes of groundwater available for supply in the 2026 Region H RWP are based on the MAG and any approved MAG Peak Factor for all geographic aquifer units for which a DFC has been adopted. Groundwater formations that have been deemed by a GMA to be non-relevant for the purpose of joint planning may be assigned an annual yield based on the judgment of an individual RWPG. The RHWPG has estimated the available groundwater in Fort Bend, Galveston, and Harris Counties based on projected demands in the 2026 RWP and allowable percentages of demand as specified in the FBSD and HGSD District Regulatory Plans.

For all other counties, Region H has historically recognized existing studies of groundwater availability as the source of information for planning purposes. At a public meeting on October 4, 2023, the RHWPG elected to investigate if more reliable estimates of availability for these sources had been developed since the 2022 SWP. It was subsequently determined that the 2026 RWP would retain the yield values included in the 2022 State Water Plan as the available yield of all other non-MAG formations in the 2026 RWP. These non-MAG formations and the references used as a basis for estimated availability are summarized in *Table 3-3*. The magnitude of usage from these sources in the 2026 RWP is relatively small within Region H, constituting approximately 0.5 percent of the total estimated existing groundwater supply and 0.08 percent of total existing supply considering all water source types. Further, due to the limited use of these supplies under real-world conditions and uncertainty regarding long-term reliability estimates, the combined allocations from existing supply in the RWP are well below the recommended availability, and the corresponding sources are not associated with recommended future Water Management Strategies (WMS) for the Region.

Availability of existing water supplies can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Table 3-3 – Non-MAG Groundwater Formations

Aquifer	County	Basin	Reference
Brazos River Alluvium	Austin	Brazos	TWDB GTA Aquifer Assessment 10-30 MAG
Brazos River Alluvium	Waller	Brazos	TWDB GTA Aquifer Assessment 10-30 MAG
Carrizo-Wilcox	Walker	Trinity	TWDB GAM Run 10-052 MAG Version 2
Catahoula Aquifer	Montgomery	San Jacinto	2021 RWP permitted production
Gulf Coast Aquifer System	Trinity	Trinity	TWDB GAM Run 16-024 MAG
Queen City	Trinity	Trinity	TWDB GAM Run 10-016 MAG Version 2
Queen City	Walker	Trinity	TWDB GAM Run 10-053 MAG Version 2
San Bernard River Alluvium	Austin	Brazos-Colorado	TWDB GTA Aquifer Assessment 10-30 MAG
San Jacinto River Alluvium	Walker	San Jacinto	TWDB GTA Aquifer Assessment 10-30 MAG
Sparta	Walker	San Jacinto	TWDB GAM Run 10-054 MAG Version 2
Sparta	Walker	Trinity	TWDB GAM Run 10-054 MAG Version 2
Trinity River Alluvium	Walker	Trinity	TWDB GTA Aquifer Assessment 10-30 MAG
Yegua-Jackson	Polk	Trinity	TWDB GAM Run 10-055 MAG Version 2
Yegua-Jackson	Trinity	Trinity	TWDB GAM Run 10-016 MAG Version 2
Yegua-Jackson	Walker	San Jacinto	TWDB GAM Run 10-055 MAG Version 2
Yegua-Jackson	Walker	Trinity	TWDB GAM Run 10-055 MAG Version 2

3.3 SURFACE WATER SOURCES

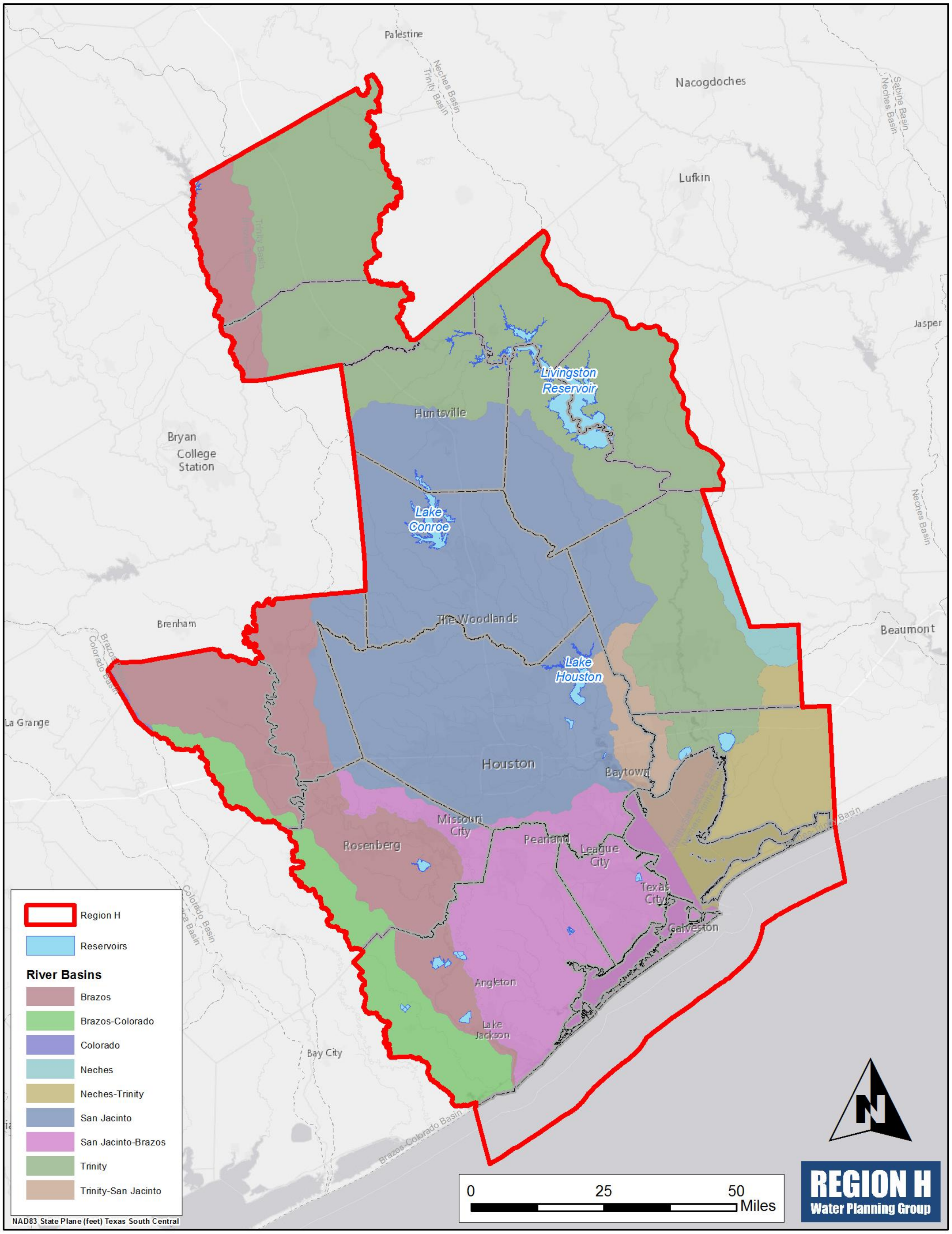
3.3.1 Surface Water Overview

Surface water in Texas is based on a prior appropriation water right system, wherein individuals or entities are granted rights to use surface water, with more senior rights having priority over junior rights. Senior rights are allowed the opportunity to fully satisfy their allowable diversion volume before more junior rights can divert. In practice these priorities are of limited concern in many basins for most years, due to an abundance of available surface water adequate to meet surface water demands. However, in drier portions of the State or during times of drought, priorities play an important role in determining ownership of limited surface water supplies. Water rights in the State are administered through a system of water right permits and Certificates of Adjudication issued by the Texas Commission on Environmental Quality (TCEQ). These permits specify water right ownership, the allowable amounts of water which can be diverted, the locations of diversion, the allowable uses and basins of use, any special conditions or limitations on the permit, and a priority date establishing the right's seniority. Certain basins within the state, including the Brazos River Basin within Region H, are also under the jurisdiction of a Watermaster program which facilitates the prior appropriation system by monitoring streamflow, water use, and other parameters and coordinating surface water diversions.

Surface water supply planning in Texas, and with limited exceptions the State's surface water rights permitting system, is based on the concept of "firm yield". The firm yield of a particular surface water source is defined as the amount of water that can be provided each year including during drought-of-record hydrologic conditions, assuming full utilization and consumption of existing water rights and assuming that any applicable environmental flow requirements are fully satisfied (e.g., instream flows, bay and estuary inflow). The concept of firm yield, as applied in water supply planning and water rights permitting, represents a very conservative approach to surface water availability and allocation that is intended to provide a high degree of water supply reliability.

Region H encompasses parts of three major river basins, four adjoining coastal basins, and three major water supply reservoirs as shown in *Figure 3-3*. The following sections discuss the surface water available to Region H from these sources, other surface water sources used in the region, and determination of supply reliability.

Figure 3-3 – Region H Surface Water



3.3.2 Major Region H Reservoir Supplies

3.3.2.1 Lake Livingston / Wallisville Saltwater Barrier

Lake Livingston, which was completed in 1971 by the Trinity River Authority (TRA) and the City of Houston (COH), is located on the Trinity River in Polk, San Jacinto, and Trinity Counties; the dam is located approximately seven miles southwest of the City of Livingston. The reservoir is impounded by an earthen dam and concrete spillway and has a drainage area of over 16,500 square miles. At the conservation pool elevation of 131 feet above mean sea level (MSL), the reservoir has a volume of 1,603,504 acre-feet and a water surface area of 77,729 acres (approximately 121 square miles). The reservoir and dam are owned and operated by the TRA. The Wallisville Saltwater Barrier is located on the Trinity River downstream of Lake Livingston near the town of Wallisville.

Storage and diversions from Lake Livingston/Wallisville system are authorized under Certificate of Adjudication (COA) 08-4248 and COA 08-4261. Total permitted yield from the system is 1,344,000 acre-feet per year (ac-ft/yr). TRA is authorized to divert 403,200 ac-ft/yr for multiple uses. It should be noted that physical diversions are not made from Lake Wallisville, but the combined yield of Lake Livingston is increased when operated in conjunction with the Wallisville Saltwater Barrier. The remaining yield is owned by the COH. A portion of this supply is currently conveyed westward to the COH service area.

3.3.2.2 Lake Conroe

Lake Conroe is located on the West Fork of the San Jacinto River in Montgomery County, approximately seven miles west of the City of Conroe. The reservoir, which was completed in 1973 by COH and the San Jacinto River Authority (SJRA), is impounded by an earthen dam and concrete spillway and has a drainage area of 450 square miles. At the conservation pool elevation of 201 feet above MSL, the reservoir has a volume of 417,605 acre-feet and a water surface area of 19,894 acres (approximately 31.1 square miles). Lake Conroe is operated by SJRA. COA 10-4963 authorizes 100,000 ac-ft/yr in permitted water rights from the Lake, with one third (33,333 ac-ft/yr) owned by SJRA and the remaining two thirds owned by the COH. SJRA holds an option contract to purchase water from the COH's portion of the yield of Lake Conroe. The reservoir is permitted for municipal, industrial, irrigation, mining, and recreation uses.

3.3.2.3 Lake Houston

Lake Houston, which was completed in 1954 by COH, is located on the San Jacinto River in northeastern Harris County, approximately 15 miles from downtown Houston. The lake, which is impounded by an earthen dam and concrete spillway, has a drainage area of 2,828 square miles and is operated by COH and the Coastal Water Authority (CWA). At the conservation pool elevation of 42.38 feet above MSL, the reservoir has a volume of 136,119 acre-feet and a water surface area of 11,443 acres (approximately 17.9 square miles).

COA 10-4965, held by the COH, authorizes storage in the lake as well as 168,000 ac-ft/year of permitted diversions. Priority dates for the right are May 7, 1940 for the first 112,000 ac-ft/yr and February 26, 1944 for the remaining 56,000 ac-ft/yr. Authorized uses include municipal, industrial, irrigation, and recreation purposes. COA 10-4965 also authorizes storage of water diverted from the Trinity River Basin in Lake Houston for subsequent diversion and use. Permit 10-5807 authorizes diversion of an additional 28,200 ac-ft/yr from Lake Houston for municipal and industrial purposes.

The permitted amount is divided evenly between the COH and SJRA. Water diverted under Permit 10-5807 may be used in Harris, Fort Bend, Galveston, and Montgomery Counties within the San Jacinto River Basin, and in portions of Brazoria and Chambers Counties within the Trinity-San Jacinto Coastal Basin, Trinity River Basin, and San Jacinto-Brazos Coastal Basin.

3.3.3 Run-of-River and Contractual Surface Water Supplies

3.3.3.1 Brazos-Colorado Coastal Basin

Region H includes the Brazos-Colorado Coastal Basin in Brazoria and Fort Bend Counties, including Jones Creek and the lower reach of the San Bernard River. Fifteen water rights are associated with the Region H portion of the basin, with total permitted run-of-river and off-channel reservoir diversions of 66,199 ac-ft/yr. Permitted uses include irrigation, industry, mining, and habitat maintenance.

3.3.3.2 Brazos River Basin

The Brazos River Authority (BRA) stores water in 11 water supply and flood control reservoirs in the middle and upper portions of the Brazos River Basin. BRA owns Possum Kingdom, Granbury, and Limestone Reservoirs, with the remainder owned by the U.S. Army Corps of Engineers. While BRA does not currently own or operate any major reservoirs within Region H, these upstream reservoirs provide water to entities in Region H through multiple water supply contracts. BRA currently has long term supply agreements with eight entities in Region H for supplies from these reservoirs, totaling 241,726 ac-ft/yr. BRA also holds Permits 12-5166 and 12-5167, which authorize the diversion of 850,000 ac-ft/yr of interruptible excess flows in Fort Bend County. Because these are non-priority water rights and are therefore not firm, their associated supplies are not included as reliable existing supplies in DB27. In late 2016, BRA was also granted Permit 12-5851 authorizing diversion of additional supply made available through coordinated reservoir system operation and contracted, in part, to Region H entities.

Several entities located in Region H hold large water rights in the basin. Dow Inc. holds COA 12-5328, which authorizes 305,656 ac-ft/yr of diversions from the Brazos River, Oyster Creek, and Buffalo Camp Bayou for municipal, industrial, irrigation, and recreation purposes. The permit also authorizes storage in Dow's Harris Reservoir and Brazoria Reservoir. Dow Inc. is also responsible for diverting water used by Brazosport Water Authority (BWA).

Gulf Coast Water Authority (GCWA) holds multiple water rights in the basin. COA 12-5168 authorizes 99,932 ac-ft/yr in diversions from the Brazos River for municipal, industrial, and irrigation use, as well as 7,373 acre-feet of storage in two small reservoirs. COA 12-5171 authorizes the diversion of 125,000 ac-ft/yr from the Brazos River for municipal, industrial, irrigation, and mining purposes. GCWA also holds COA 12-5322, which authorizes 864 acre-feet of storage and the diversion of 155,000 ac-ft/yr from the Brazos River for municipal, industrial, and irrigation use.

COA 12-5325, held by NRG, authorizes storage in Smithers Lake and industrial use of 28,711 ac-ft/yr of flows from the Dry Creek tributary of Big Creek. NRG is also granted 40,000 ac-ft/yr of water rights from the Brazos River by COA 12-5320 for industrial and irrigation use.

BWA holds COA 12-5366, which authorizes the diversion of 45,000 ac-ft/yr from the Brazos River in Brazoria County for municipal use. As described above, these supplies are diverted from the Brazos River by Dow Inc.

3.3.3.3 San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos Coastal Basin includes a combination of dense urban development, irrigated agriculture, and industry in Brazoria, Fort Bend, Harris, and Galveston Counties. Total run-of-river water rights in the basin total approximately 288,407 ac-ft/yr, excluding an authorization for Dow Inc. to divert 4,209,000 ac-ft/yr of saline water from the Freeport Harbor Channel. There are several major run-of-river water rights within the basin. The City of Sugar Land holds COA 11-5170, which authorizes diversion of 18,159 ac-ft/yr from Jones and Oyster Creeks for municipal, industrial, irrigation, and recreation uses. GCWA holds COA 11-5169, which authorizes 12,000 ac-ft/yr of diversion and approximately 8,925 acre-feet of storage. COA 11-5357, also held by GCWA, authorizes 57,500 acre-feet of diversion from Chocolate, Mustang, and Halls Bayous in Brazoria County. Both of these rights include provision for municipal, industrial, irrigation, and recreational uses.

3.3.3.4 San Jacinto River Basin

The San Jacinto River Basin includes a number of run-of-river water rights in addition to the rights associated with the storage and yield of Lakes Conroe and Houston. While the majority of these rights authorize diversions of 1,000 ac-ft/yr or less, there are 17 rights for authorizations exceeding this amount. The largest of these is COA 10-3994 held by OxyVinyls LP, which authorizes diversion of 140,000 ac-ft/yr for industrial use. The COH holds Permit 10-5826, (the Houston Bayous Permit), which authorizes the diversion of 130,000 ac-ft/yr of run-of-river supplies from Sims, Brays, Buffalo, and White Oak Bayous for municipal and industrial purposes. The Excess Flows Permit (Permit 10-5808) authorizes diversion of 80,000 ac-ft/yr of run-of-river flows at Lake Houston for municipal and industrial purposes; the permitted diversion amount is divided evenly between the COH and SJRA. COA 10-4964, also held by SJRA, authorizes diversion of 55,000 ac-ft/yr of run-of-river supply at Lake Houston for municipal, industrial, and irrigation use. This water right serves as the primary supply for the SJRA Highlands Canal System, which serves industrial users in eastern Harris County.

3.3.3.5 Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto Coastal Basin includes run-of-river water rights totaling approximately 44,474 ac-ft/yr for industrial and irrigation uses. The largest of these authorizations, COA 09-3926, is for 30,000 ac-ft/yr and is associated primarily with saline water at NRG's Cedar Bayou power generation facility.

3.3.3.6 Trinity River Basin

In addition to the yield of Lake Livingston, several entities within the Region H portion of the basin hold large water rights. COA 10-4261 grants the COH 45,000 ac-ft/yr of run-of-river rights from the Trinity River and the Old River tributary for municipal, industrial, and power generation use. COH also holds COA 10-4277, authorizing 38,000 ac-ft/yr of diversions for municipal, industrial, irrigation, and mining use. The Chambers-Liberty Counties Navigation District (CLCND) is authorized under COA 08-4279 to divert up to 112,947 ac-ft/yr from Turtle Bayou (Lake Anahuac) for municipal, industrial, irrigation, and mining uses. The right additionally authorizes 30,000 ac-ft/yr of diversion by SJRA.

SJRA also holds 56,000 ac-ft/yr in water rights through partial ownership of COA 08-5271. The remaining 2,500 ac-ft/yr from COA 08-5271 is permitted to the Lower Neches Valley Authority (LNVA).

3.3.3.7 Neches-Trinity Coastal Basin

The portion of the Neches-Trinity Coastal Basin located within Region H includes run-of-river water right permits totaling 70,175 ac-ft/yr in permitted diversions. The largest individual right included (COA 07-4296) is the U.S. Fish and Wildlife Service water right for the Anahuac National Wildlife Refuge, which has a right for 21,000 ac-ft/yr. The remaining permits are authorized for irrigation, recreation, and wetland habitat uses.

3.3.3.8 Neches River Basin

Lake Sam Rayburn is located on the Neches River approximately 11 miles northwest of the City of Jasper in Region I. The lake is owned by the U.S. Army Corps of Engineers and operated by LNVA. Several entities in Region H receive supplies from the lake through contracts with LNVA, including the Trinity Bay Conservation District, Bolivar Peninsula SUD, and irrigators in Chambers and Liberty Counties. Region H receives run-of-river surface water from two small rights permitted for irrigation use in the Neches River Basin.

3.3.4 Local Supplies

Local supplies (stock ponds, small catchments, etc.) are currently used in Region H to meet a portion of livestock and mining demands. The TCEQ allows a landowner to impound up to 200 acre-feet of water without obtaining a water right, and therefore these supplies cannot be tied to specific water rights. Because these individual sources are generally undocumented and are typically unreliable under drought-of-record conditions, the Region H water plan does not include these local supplies in its analysis of existing surface water supplies.

3.3.5 Surface Water Availability

3.3.5.1 Surface Water Availability Modeling

Surface water availability was estimated using the TCEQ Water Availability Models (WAMs) for the river basins within Region H. The WAMs use the Water Rights Analysis Package (WRAP), developed at Texas A&M University, to simulate water right diversions using historical rainfall and evaporation data. The WAMs are not intended to serve as predictive tools but rather simulate the behavior of included water rights under a repeat of a certain period of historical hydrology. The model simulates a set of monthly diversion targets attempted annually against a historical inflow dataset, which is typically 50 years long and varies each year. The drought of record (DOR) for most of Texas occurred in the 1950s and is reflected in the historic dataset for each basin. Water diversions are modeled according to the parameters of each particular water right and are taken in priority order, such that the most senior water rights are satisfied before junior rights are allowed to divert water. It is important to note that the TCEQ WAMs are based on historic hydrologic data to account for rainfall and evaporation losses. While the model provides an approximation of water right availability during the DOR, the model does not predict water right availability in future droughts which may have different hydrologic conditions. The models generally do not include return flows that often increase the reliability of downstream water rights. The models also contain assumptions in the internal modeling routines that affect the accuracy of results. Currently, the models are also not able to simulate the interaction between groundwater and surface water supplies.

For the RWP, the modeled reliability of water rights that rely on reservoir storage is also based on assumed sedimentation rates that are projected through the planning period. While this assumption is reasonable for planning purposes, it may not reflect current near-term sedimentation rates. The process of estimating future sedimentation for the 2026 Region H RWP was based primarily on available lake survey data, typically from TWDB's Hydrographic Survey Program, which provided information on drainage area, long-term average sedimentation rates, and recent surface area, capacity, and elevation parameters. Projected sedimentation for each RWP timestep was then calculated based on the drainage area, unit average annual sedimentation rate for the drainage area, and the number of years between the survey and the timestep. Projected future area and capacity curves for use in modeling were then developed by applying the sediment loss to the surveyed area-capacity-elevation data. These calculations were made using both trapezoidal and conic section approximations of the impoundment at 0.1-foot intervals and selecting the method with the lowest root mean square error for each reservoir to estimate future reservoir shape parameters.

There were originally eight WAM scenarios (referred to as model runs) simulated under the TCEQ program. TWDB's Second Amended General Guidelines for Regional Water Plan Development requires the use of WAM Run 3, reflecting full authorized diversion of current water rights with no return flows, when determining the supply available to the region. Run 3 represents a conservative approach, since not all rightholders attempt to divert their full permit amount every year and diversions for municipal and manufacturing users typically return a portion of diverted water to streams as treated wastewater effluent. However, the majority of water rights do not address return flows to source streams, implying a right to full consumptive use. For this reason, and because the planning period extends 50 years into the future, use of a model reflecting full consumptive diversion by all rights is appropriate for long-term planning.

Output files are compared by reviewing the statistical frequency of meeting diversion amounts or target instream flow levels. For purposes of regional water planning, supply availability for a water right is limited to its firm yield, the amount of water that can be diverted every year of the WAM simulation period without shortage. Regional planning groups may elect to constrain availability of a water right to a value lower than the firm yield based on stakeholder or rightholder input, to maintain an added margin of safety for reservoir supplies, or for other considerations relevant to the supply.

While availability of surface water rights is determined on a right-by-right basis, the method of representing surface water supplies in DB27 is dependent on the nature of the right. Multiple reservoirs operated as a system are treated as a single source in the database, with supplemental information showing the contribution of firm yield associated with each component reservoir. Non-system reservoirs are listed individually. Run-of-river rights are typically aggregated into a single source for each county and river or coastal basin. The availabilities of these rights are based on the sum of the monthly diversions in the year of least availability. This approach reflects the way in which run-of-river rights in Region H are typically combined as part of an overall water portfolio that allows the use of these supplies with other more firm rights to provide a greater overall firm yield. Many water rights are modeled in the TCEQ WAMs as run-of-river rights without storage although storage is in place for these supplies to guard against the risks of low-flow conditions on critical water supplies. Often, these rights are also backed up with firm contracts from upstream reservoirs.

Specific information on modeling procedures and availability results for each basin in Region H are described in greater detail in the following subsections. Availability of existing water supplies can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary). Additional reference information regarding the models executed for surface water availability estimation, including documentation of hydrologic modeling variances, is available in ***Appendix 3-B***. A comprehensive list of water rights used as a basis for determining the availability of surface water in Region H is contained in ***Appendix 3-C***.

3.3.5.2 Brazos-Colorado Coastal Basin

Surface water supplies for the Brazos-Colorado Coastal Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the Colorado and Brazos-Colorado basins (October 1, 2023 TCEQ release). Region H identified several opportunities to adjust model code to facilitate determination of firm yield and reflect annual streamflow diversion limits as specified in water right permits. These changes included modeling of complex multi-cell off-channel reservoir facilities as composite storage, application of streamside diversion limits where applicable to off-channel storage, and application of iterative firm yield analysis to a large off-channel impoundment. A variance to apply these modifications to the Region H RWP analysis was requested by the RHWPG and approved by TWDB.

A total of 11,730 ac-ft/yr within the Region H portion of the basin were determined to be firm for regional planning purposes. An additional 136 acre-feet of firm yield held by the US Fish and Wildlife Service was not included, as the wetlands maintenance use specified for the permit is likely outside of the demand projected for Region H.

3.3.5.3 Brazos River Basin

Surface water supplies for the Brazos River Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the Brazos and San Jacinto-Brazos Basins developed by the Brazos G Regional Water Planning Group (Region G). Brazos G developed models for year 2030 and year 2080 conditions, which include modifications to extend the modeled period of record, reflect existing subordination agreements, and incorporate some return flows, as well as other changes. Revision of the TCEQ WAM by Brazos G was approved by TWDB. Due to the importance of maintaining consistency in availability analyses for the basin, the RHWPG requested and received from TWDB a variance to use the modified Brazos G model as a basis for evaluation of surface water in Region H. Supplies were assessed for years 2030 and 2080 conditions, with results used to linearly interpolate availabilities for years 2040 through 2070. The firm portion of run-of-river diversions was found to be 446,244 ac-ft/yr for year 2030 conditions and 434,108 ac-ft/yr for year 2080 conditions. Additionally, eight entities in Region H receive supplies through non-interruptible water supply contracts with BRA, with a reliable year 2080 yield of 209,461 ac-ft/yr.

3.3.5.4 San Jacinto-Brazos Coastal Basin

Surface water supplies for the San Jacinto-Brazos Coastal Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the Brazos and San Jacinto Brazos Basins developed by Region G, as discussed in *Section 3.3.5.3*. Supplies were assessed for years 2030 and 2080 conditions, with results used to linearly interpolate availabilities for years 2040 through 2070. 37,091 ac-ft/yr of run-of-river supply was found to be firm for year 2030 through year 2080 conditions. Of this yield, 21,568 ac-ft/yr is associated with multi-use permits held by GCWA and the City of Sugar Land, with the rest of the firm yield coming from a number of irrigation water rights.

3.3.5.5 San Jacinto River Basin

Surface water supplies for the San Jacinto River Basin were analyzed using the most recent version of the TCEQ Run 3 WAM for the basin (October 1, 2023 TCEQ release). A total of 12,627 ac-ft/yr of run-of-river supply was found to be firm. The San Jacinto River Basin also includes major reservoir supplies associated with Lake Conroe and Lake Houston. Reservoirs reduce the velocity of the streams they impound, causing suspended soil particles to settle; over time, storage volume is lost due to this accumulation. Therefore, sedimentation rates were determined and applied to Lake Houston and Lake Conroe to calculate estimated year 2030 through year 2080 storage volumes at ten-year intervals. For each sedimentation condition, the target diversion for each reservoir was iteratively reduced until a firm yield was determined, with the diversion target for the other reservoir modeled at its permitted amount. The modeled available yield of Lake Houston was 182,500 ac-ft/yr for year 2030 conditions, decreasing to 173,550 ac-ft/yr for year 2080 conditions due to sedimentation. The modeled firm yield of Lake Conroe was 80,000 ac-ft/yr for year 2030 sedimentation, decreasing slightly to 76,850 ac-ft/yr for year 2080 conditions.

3.3.5.6 Trinity-San Jacinto Coastal Basin

Surface water supplies for the Trinity-San Jacinto Coastal Basin were analyzed using the TCEQ Run 3 WAM for the basin (October 1, 2023 TCEQ release). Of the 14,474 ac-ft/yr in permitted run-of-river rights included in the WAM, 5,539 ac-ft/yr were found to be firm under DOR conditions. An additional 30,000 ac-ft/yr permitted by COA 09-3926 is excluded from the WAM and from availability for regional planning purposes as the diversion point is subject to salinity impacts due to tidal influence.

3.3.5.7 Trinity River Basin

Surface water supplies for the Trinity River Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the basin (October 1, 2023 TCEQ release) developed by the Region C Regional Water Planning Group (Region C) and subsequently adapted to Region H. The models developed by Region C include code adjustments to reflect operation of groups of reservoirs as systems, adjustment of pool elevations where appropriate, adjustment of complex reservoir code to facilitate firm yield determination where applicable, as well as other changes. Revision of the TCEQ WAM by Region C was approved by TWDB. Due to the importance of maintaining consistency in availability analyses for the basin, the RHWPG requested and received from TWDB a variance to use the modified Region C model as a basis for evaluation of surface water in Region H.

The RHWPG has adopted the use of a modified Run 3 model for determining firm yield in the lower Trinity River Basin in the 2001, 2006, 2011, 2016 and 2021 RWPs. These models included a limited quantity of return flows in the upper basin expected to be available for future conditions as determined through correspondence with the Region C Planning Group. The RHWPG therefore requested and received from TWDB variance to include a limited quantity of return flows in the Trinity River Basin for evaluation of firm reservoir diversions. Return flows were not incorporated into the analysis of reliable run-of-river availability in the basin.

A total of 137,025 ac-ft/yr in run-of-river water was determined to be firm under DOR conditions. A small portion of this yield (1,111 ac-ft/yr) is held by irrigators and state agencies in Leon, Liberty, Madison, and Walker Counties. The remainder is associated with large water rights owned by the COH, SJRA, and CLCND. The modeled firm yield of Lake Livingston, which included estimated future sedimentation, was 1,210,300 ac-ft/yr for year 2030 sedimentation, decreasing slightly to 1,142,900 ac-ft/yr for year 2080 conditions.

3.3.5.8 Neches-Trinity Coastal Basin

Surface supplies in the Neches-Trinity Coastal River Basin were modeled using the TCEQ WAM Run 3 model for the basin (October 1, 2023 TCEQ release). Of the water right permits totaling 70,175 ac-ft/yr from the Neches-Trinity Coastal Basin in Region H, 37,481 ac-ft/yr were reliable during the DOR. Approximately one-third of this firm total is the U.S. Fish and Wildlife Service water right for the Anahuac National Wildlife Refuge.

3.3.5.9 Neches River Basin

Surface supplies in the Neches River Basin were modeled using the TCEQ WAM Run 3 model for the basin (October 1, 2023 TCEQ release). Of the water right permits totaling 1,604 ac-ft/yr from the Neches River Basin in Region H, 161 ac-ft/yr were reliable during the DOR. Entities in Region H also utilize contractual supplies originating in the Neches River Basin outside of the Region H boundary, including water from the Lake Sam Rayburn / B.A. Steinhagen Reservoir System. Surface water availability for the remaining Neches River Basin and the Lake Sam Rayburn / B.A. Steinhagen Reservoir System was determined by the East Texas Regional Water Planning Group (Region I). Applicable supplies utilized by entities in Region H are reflected in DB27 as the contract amounts between LNVA and individual WUGs.

3.4 REUSE SOURCES

3.4.1 Reuse Overview

The reuse of existing water sources allows entities to increase their available supply portfolio and, in some cases, replace or defer more expensive projects to develop new supplies. Reuse, or reclaimed supply, is typically classified as either direct or indirect. Direct reuse infrastructure diverts return flows from a wastewater treatment facility at some point in the treatment train and conveys the water to points of use. The required infrastructure and level of treatment are dependent upon the intended use. Indirect reuse typically involves discharge of treated wastewater from one facility into a receiving body, with the receiving stream used to convey the treated water for subsequent diversion at a downstream point.

The permitting process and regulatory requirements for reuse in the State are dependent on whether the water is for municipal or industrial purposes, the intended use, and if the supply is direct or indirect. Permitting of reclaimed supplies is administered by TCEQ. All types of reuse are subject to the requirements of 30 TAC §210. If an indirect reuse supply is to be discharged into a State watercourse, it will also require a water right authorization similar to other surface water sources and will be subject to water rights restrictions and subject to the prior appropriation system.

3.4.2 Reuse Availability

Determination of the reliable availability of reclaimed supplies presents several challenges. Permitted reuse amounts cannot be assumed to be fully reliable as existing supplies, as permitted volumes may exceed current return flow levels and permitted indirect reuse is subject to curtailment during times of drought. Even in communities or industries with longstanding direct reuse programs, the amount of reclaimed water utilized can vary considerably from year to year based on hydrologic conditions, patterns of indoor versus outdoor water use, or industrial facility production. Reuse potential also changes over time with population. Existing reuse water supplies were estimated for Region H based on data provided by TWDB, stakeholder input, and known infrastructure limitations. In order to estimate appropriate reliable reuse supplies, the following procedure was applied as the primary method for identifying reuse availability:

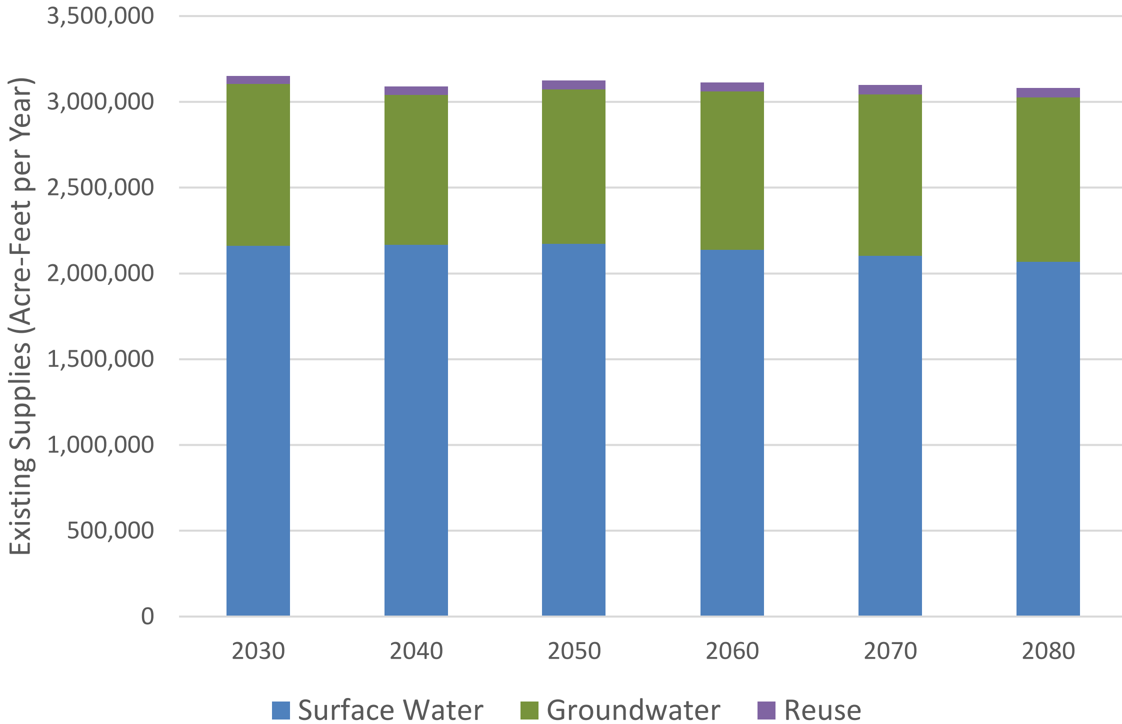
- Year 2010 through 2022 data was extracted from the TWDB Water Use Survey for entities in Region H with reclaimed supplies, and each entity was associated with the appropriate WUG.
- For each WUG, volumes of self-supplied reuse were calculated by year for direct and indirect reuse sources.
- For WUGs with no reported reuse in the last several years of the dataset, reuse supplies were assumed to not be firm.
- For Manufacturing WUGs with reported reuse supplies in recent years, reuse availability was estimated as the maximum value from years 2010 through 2022. Due to the dependence of recorded volumes on the number of entities reporting in a given year and the overall growth in manufacturing in the region, this is intended to provide a conservative estimate of manufacturing reuse availability.
- For WUGS with recently developed reuse supplies or with longer-term utilization without frequent supply declines, reuse availability was estimated as the maximum value from years 2010 through 2022.

Consideration was also given to other data sources, as available, including records of reclaimed water sales and analyses from the 2021 Region H RWP. Several municipal WUG reuse supplies were also identified from stakeholder responses to a Region H survey of municipal WUGs.

3.5 TOTAL REGIONAL WATER AVAILABILITY

Combined, the availability of water supplies within Region H is adequate to provide for a large number of existing demands. However, it is noteworthy that the availability of supply at the source level does not necessarily translate to availability at the WUG level. The applicability of these supplies to meeting specific demands based on contracts and existing infrastructure are considered in *Section 3.6*. The total supply availability from sources originating in Region H is shown in *Figure 3-4*. Availability of existing water supplies can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 3-4 – Total Regional Water Availability by Source Type



3.6 MAJOR WATER PROVIDERS AND MAJOR SUPPLY CONTRACTS

Region H depends on a large number of supply contracts among entities ranging from small utility districts to large river authorities and other wholesale water providers (WWPs) to meet the demands of both municipal and non-municipal users. As part of the evaluation process for the RWP and in accordance with TWDB requirements, the RHWPG developed a methodology to identify Major Water Providers (MWPs), entities which function as critical links in the regional supply chain. Region H elected to utilize supply volume as the key metric in this designation, with consideration given to existing self-supply and contractual transfers as well as potential future supplies from recommended Water Management Strategies (WMS). Entities with current or anticipated supply volumes of 25,000 ac-ft/yr or greater, including 10,000 ac-ft/yr or more provided to others, were categorized as MWPs. Of the 15 entities categorized as MWPs through this methodology, 12 serve users from within the region, while the other three (BRA, LNVA, and TRA) provide supplies to Region H from their primary region. Six of the MWPs in Region H are also WUGs, including cities and regional water authorities which serve their own needs as well as those of their contract customers. It should be noted that, while certain entities have been formally categorized as MWPs, all water suppliers are recognized as playing a vital role in meeting the region's complex and growing water demands. The MWPs supplying Region H are discussed in greater detail in the following subsections.

3.6.1 Brazos River Authority

BRA operates multiple reservoirs and holds a substantial portion of the water rights in the Brazos River Basin. BRA provides raw surface water to the following WUG and WWP entities:

- City of Manvel
- City of Richmond
- City of Rosenberg
- City of Sugar Land
- Dow Inc.
- GCWA
- Irrigation in Waller County (Brazos River Basin)
- Manufacturing in Brazoria County (Brazos and San Jacinto-Brazos Basins)
- Manufacturing in Galveston County (San Jacinto-Brazos Basin)
- NRG
- Pecan Grove MUD 1

3.6.2 Brazosport Water Authority

BWA's service area includes treated water customers in the southern portion of Brazoria County including seven municipalities, Dow Inc., and two prison units. It also serves demand in Fort Bend County. BWA is supplied by its own water right through the Harris and Brazoria Reservoirs. BWA provides raw surface water to the following WUG and WWP entities:

- City of Angleton
- City of Brazoria
- City of Clute
- City of Freeport
- City of Lake Jackson
- City of Oyster Creek
- City of Richwood
- City of Rosenberg (treats raw water for transmission to Rosenberg)
- Dow Inc.
- Texas Department of Criminal Justice Ramsey Area

3.6.3 Chambers-Liberty Counties Navigation District

The CLCND provides raw water through its canal system to the City of Anahuac, the Trinity Bay Conservation District, and irrigators in Chambers County. CLCND is supplied through its own water rights from the Trinity River and Lake Anahuac.

3.6.4 City of Houston

The COH is the most populous WUG in Region H. Major surface water supplies held by COH include majority ownership of the firm yield of Lakes Conroe, Houston, and Livingston. COH also owns run-of-river water rights. In the Trinity River Basin, COH holds two major water rights permitted for industrial, irrigation, and other uses. COH also holds water rights authorizing withdrawals from several bayous in the San Jacinto Basin and diversion of excess run-of-river flows at Lake Houston (through a shared permit with SJRA). Additional permitted sources include both direct and indirect reuse. COH also produces groundwater, which is primarily used to meet its own demands but also makes up a small portion of the supply to other customers through either direct supply of groundwater or blending with other supply sources. COH's WUG and WWP customers include:

- Baybrook MUD 1
- Baytown Area Water Authority
- City of Bellaire
- City of Bunker Hill Village
- City of Deer Park
- City of Friendswood
- City of Galena Park
- City of Hilshire Village
- City of Humble
- City of Jacinto City
- City of Jersey Village
- City of League City
- City of Pasadena
- City of Pearland
- City of South Houston
- City of Southside Place
- City of Spring Valley
- City of Webster
- City of West University Place
- Central Harris County Regional Water Authority
- Chimney Hill MUD
- Clear Brook City MUD
- Clear Lake City Water Authority
- County-Other in Harris County (multiple utility districts)
- Greenwood Utility District
- Harris County MUDs 5, 6, 8, 23, 49, 55, 96, 148, 278, 321, 344, 372, 412, and 420
- Harris County WCIDs 50, 89, 96, and Harris County WCID-Fondren Road
- Irrigation in Chambers and Liberty Counties
- La Porte Area Water Authority
- Manufacturing in Chambers County (Trinity-San Jacinto Basin) and Harris County
- Memorial Villages Water Authority
- Montgomery County MUD 98
- North Channel Water Authority
- North Fort Bend Water Authority
- North Harris County Regional Water Authority
- NRG
- Parkway MUD
- Pine Village PUD
- Rolling Fork PUD
- Sagemeadow Utility District
- SJRA
- Southwest Harris County MUD 1
- Steam-Electric Power in Chambers and Harris Counties
- Sunbelt FWSD
- West Harris County Regional Water Authority

3.6.5 City of Huntsville

The City of Huntsville provides water to its own municipal service area as well as surrounding communities in the County-Other WUG in Walker County. The city's water demands are met partially with self-supplied groundwater. Huntsville also receives surface water from a contract with TRA through the Huntsville Regional Water Supply System, of which a portion is conveyed to manufacturing demands outside of Region H. The city also provides indirect reuse supplies to Montgomery County MUDs 8 and 9.

3.6.6 City of Missouri City

The City of Missouri City supplies water to customers within its own boundaries as well as to numerous other municipal water providers in Fort Bend County. Missouri City utilizes self-supplied groundwater as well as water purchased from GCWA.

3.6.7 Dow Inc.

Dow Inc. is supplied primarily by its own water rights on the lower Brazos River, with the ability to receive a smaller amount of water through a contract with BRA. Dow supplies manufacturing demands in Brazoria County, including its own facilities.

3.6.8 Gulf Coast Water Authority

GCWA is a major water provider to municipal, manufacturing, and irrigation users in the San Jacinto-Brazos and lower Brazos Basins. GCWA provides raw water to users in Fort Bend, Brazoria, and Galveston Counties through an extensive canal network. Treated water is also supplied through a pipeline system to a number of users in Galveston County. GCWA is primarily supplied by its own rights on the Brazos River, with additional supplies purchased through contracts with BRA. WUGs with supply contracts from GCWA include:

- Bacliff MUD
- Bayview MUD
- City of Galveston
- City of Hitchcock
- City of La Marque
- City of League City
- City of Missouri City (raw)
- City of Pearland (raw)
- City of Sugar Land (raw)
- City of Texas City
- Fort Bend County WCID 2 (raw)
- Galveston County FWSD 6
- Galveston County MUD 12
- Galveston County WCIDs 1, 8, and 12
- Irrigation in Brazoria, and Galveston Counties (raw)
- Manufacturing in Brazoria, Fort Bend, and Galveston Counties (raw)
- Pecan Grove MUD 1 (raw)
- San Leon MUD

3.6.9 Lower Neches Valley Authority

LNVA holds rights to both reservoir yield and run-of-river supplies in the Neches River Basin and serves customers through an extensive canal system in Jefferson, Chambers, and Liberty County. LNVA also owns a portion of the water rights from the former Devers Canal Company. LNVA customers in Region H include:

- Bolivar Peninsula SUD
- Irrigation in Chambers County (Neches-Trinity Basin)
- Irrigation in Liberty County (Neches-Trinity Basin)
- Trinity Bay Conservation District

3.6.10 North Fort Bend Water Authority

North Fort Bend Water Authority (NFBWA) provides water supply to communities in northern Fort Bend County and a small portion of western Harris County. Member districts of NFBWA are partially supplied through their own groundwater production. NFBWA also purchases water from the COH to meet demands within its service area.

3.6.11 North Harris County Regional Water Authority

North Harris County Regional Water Authority (NHCRWA) provides water supply to communities in northern and northwestern Harris County north of the COH. Member districts of NHCRWA are partially supplied through their own groundwater production. NHCRWA also purchases water from the COH to meet demands within its service area.

3.6.12 NRG

NRG operates several steam electric power generation facilities within Region H, as well as providing water supply to other power generation and irrigation water users. In the eastern portion of the region, NRG is supplied largely by its own water right in the Trinity-San Jacinto Basin and by groundwater, as well as through contract with COH. In Fort Bend County, NRG is supplied through a combination of its own Brazos River Basin rights, groundwater, and a contract with BRA. WUGs served by NRG include:

- Irrigation in Fort Bend County (Brazos Basin)
- Steam-Electric Power in Chambers County (Trinity-San Jacinto Basin)
- Steam-Electric Power in Fort Bend County (Brazos Basin)
- Steam-Electric Power in Harris County (San Jacinto Basin)

3.6.13 San Jacinto River Authority

SJRA acts as a major water provider in Harris and Montgomery Counties. SJRA holds partial ownership of the Lake Conroe water right, which it uses to serve irrigation and power generation customers as well as participants in the SJRA Joint GRP in Montgomery County. SJRA serves as the water provider to The Woodlands, supplying the community's demands through a combination of groundwater and surface water. SJRA also holds run-of-river rights in the San Jacinto and Trinity Basins and a portion of Lake Houston reservoir supply, which are used to meet municipal, manufacturing, and irrigation demands in Harris County through SJRA's Highlands Canal system. SJRA's customers include:

- City of Conroe
- City of Oak Ridge North
- Crosby MUD
- Harris County MUD 50
- Irrigation in Harris County (San Jacinto Basin)
- Irrigation in Montgomery County (San Jacinto Basin)
- Manufacturing in Harris County (Trinity-San Jacinto Basin)
- Montgomery County MUD 99
- Montgomery County WCID 1
- MSEC Enterprises
- Newport MUD
- Rayford Road MUD
- Southern Montgomery County MUD
- Steam-Electric Power in Montgomery County
- The Woodlands

3.6.14 Trinity River Authority

TRA holds a number of water rights in the Trinity River Basin and provides supply to several planning areas, including Region H. Contracts from TRA to entities in Region H are associated exclusively with TRA's share of the Lake Livingston permit. Supplied entities in Region H include:

- City of Groveton
- City of Houston
- City of Huntsville
- City of Livingston
- City of Trinity
- County-Other in Polk County (Trinity Basin)
- Glendale WSC
- Irrigation in Chambers County (Neches-Trinity Basin)
- Irrigation in Liberty County (Trinity and Neches-Trinity Basins)
- Irrigation in San Jacinto County (Trinity Basin)
- Lake Livingston WSC
- Memorial Point UD
- Mining in Polk County (Trinity Basin)
- Riverside SUD
- San Jacinto SUD
- Trinity Rural WSC
- Waterwood MUD 1
- Westwood Shores MUD

3.6.15 West Harris County Regional Water Authority

West Harris County Regional Water Authority (WHCRWA) provides water supply to communities in western and northwestern Harris County. Member districts of WHCRWA are partially supplied through their own groundwater production. WHCRWA also purchases water from the COH to meet demands within its service area.

3.7 ASSIGNMENT OF SOURCES

The assignment of existing available water supplies to WWPs and WUGs within Region H requires consideration of many potential sources of information and the application of multiple supply allocation processes to account for differences in physical, contractual, and regulatory constraints across the region. The processes associated with allocation of reuse supplies and assignment of water right yield to owning entities can be applied in a simple and consistent manner across the region. Contractual supply arrangements vary in complexity from simple, single-source agreements with a defined volume to more complex arrangements with open-ended commitments, potential for source blending, indirect rearrangement of supplies, or contracts limited by source availability. Assignment of groundwater resources is particularly complex as groundwater available to an individual WUG is not driven by a set of water rights, but rather can be influenced by local groundwater regulation, WUG pumping capacity, and overall availability of groundwater in an area relative to the demand for the resource. The procedures applied in assigning existing water supplies, along with the information considered in each process, are discussed in greater detail in the following subsections. Existing water supplies assigned to each WUG can be found within the TWDB DB27 reports (see ***Section ES.11*** of the Executive Summary). Water supplies provided by MWPs to each category of water use are summarized in ***Appendix 3-D***.

3.7.1 Groundwater

Due to the complexity of groundwater supplies in Region H, including the use of several groundwater formations and the presence of multiple entities with regulatory authority, assignment of groundwater resources in the Regional Plan cannot follow a single rigid methodology for all counties. While some counties have the ability to meet much or all of their projected demand with groundwater, others are limited by hydrogeological conditions or regulatory factors. As such, the process of assignment of existing groundwater supplies to individual WUGs was performed on a county-by-county basis and included consideration of a broad variety of factors, including TWDB-supplied MAG values, historical water use, groundwater production capacity, projected water demand, regulatory requirements of GCDs or subsidence districts, and ongoing implementation of GRPs. Groundwater allocation strategies are discussed in greater detail in the following subsections.

3.7.1.1 Counties within Subsidence Districts

As noted in the section on groundwater availability, allowable groundwater pumpage in Fort Bend, Harris, and Galveston Counties is determined by the regulatory requirements established by the FBSD and the HGSD. These Districts have established several regulatory sub-areas, with allowable groundwater pumpage within these sub-areas limited to a certain percentage of an entity's overall water use. For certain sub-areas, these percentages also reduce over time. Entities are allowed to enter into GRPs that allow for regional compliance with groundwater regulation to maximize efficiency in goal attainment. Multiple entities may participate together in a joint GRP, with some converting wholly or partially to alternative water sources and allowing others to continue growth on groundwater so long as the composite use by participating entities meets regulatory restrictions. These regulations served as the primary driver of the following groundwater allocation procedure:

1. A geospatial analysis was performed to determine the sub-area(s) associated with each WUG. Each WUG county-basin split was assigned the sub-area in which it had the greatest coverage. The majority of WUGs were in a single regulatory sub-area.
2. Certain large WUG county-basin splits were determined to be of such size that assignment of a single sub-area was inadequate to capture regulatory availability correctly. In these cases, a further spatial analysis of the projected Census block level population within each regulatory sub-area was performed, with population used to develop ratios of demand for subsets of the WUG county-basin split. This methodology was applied for the COH in Harris County, County-Other in Harris County, and County-Other within the Brazos Basin for Fort Bend County.
3. Projected water demands for each WUG county-basin split were multiplied by the percentage of allowable groundwater for the appropriate regulatory sub-area to calculate a preliminary value of allowable groundwater pumpage.
4. For WUGs which do not produce their own groundwater but rather purchase groundwater supplies from another entity, allowable groundwater pumpage volumes were reassigned from the purchasing WUG to the supplying WUG.
5. Allowable groundwater pumpage amounts were reassigned among joint GRP participants. If specific volumes of conversion or allowed groundwater expansion for currently implemented GRP stages were known, these values were used. Otherwise, for participants continuing growth on groundwater sources, the difference between projected demand and allowable pumpage was calculated and then deducted from allowable pumpage for entities converting to alternative water supplies.
6. Allowable groundwater pumpage amounts were further constrained by existing groundwater production capacities. Because of the historical reliance of the coastal counties in Region H on groundwater and a longer history of urbanization, this impacted a limited number of WUGs, primarily in Fort Bend and Galveston counties. These WUGS tended to be either non-municipal uses with limited historical use of groundwater and newer or smaller municipal developments anticipated to experience substantial growth in demand in the future.

3.7.1.2 Other Counties

In accordance with TWDB requirements, groundwater availability for other areas within the region were set equal to the MAG, or in the case of counties and formations for which a MAG Peak Factor was approved, to the peaked MAG. Availabilities for aquifers deemed non-relevant for the GMA process were set by the RWPG as described in *Section 3.2.4*. The following procedure was applied in the allocation process:

1. WUGs with groundwater infrastructure were identified from TWDB's Historical Groundwater Use records, the TCEQ Water Utility Database (WUD), responses to the Region H WUG Survey, or other information as available.
2. Identification of the source groundwater formation or formations for each WUG within the county was determined using data from TWDB's Historical Groundwater Use records. In cases where source formation was listed as unknown or information on the WUG was unavailable, source formation was estimated from WUG location.
3. Maximum existing groundwater production capacity for each WUG was estimated. Available sources of information on production capacity varied by WUG, with the least restrictive

(highest estimated groundwater production capability) applied as the WUG limit. Primary references included Region H WUG Survey responses, listed production capacities from TCEQ's WUD and TCEQ Drinking Water Watch (DWW), or maximum historical pumpage for years 2000-2020 calculated from TWDB's Historical Groundwater Use records.

4. In the event that adequate data was not available from the preferred data sources, groundwater production capacity was assumed to be equal to estimated year 2030 demands under drought conditions. This situation was most commonly associated with Irrigation, Livestock, and Mining WUGs for which records of reported pumpage are often unable to capture all users and hence the full extent of existing infrastructure capacity. In a few cases with minimal projected demand growth after year 2030, existing groundwater production was assumed to fully meet WUG demand.
5. For WUGs with both surface and groundwater supplies, available surface water was deducted from the portion of projected demand assigned to groundwater.
6. Groundwater from the appropriate source formation was allocated to each WUG in an amount not to exceed the lesser of the projected demand for each decade and the estimated groundwater production capacity. In the limited number of cases of a WUG selling groundwater to another, consideration was given to the demands of the customer WUG as well.
7. In cases where the estimated demand or capacity as described in the preceding steps exceeded the MAG, available groundwater supplies were allocated to individual WUGS using a ratio of their limiting factor (discussed in step 6 above) to that for all WUGs in the County in aggregate.

3.7.2 Surface Water

Surface water sources included as existing supplies in the Regional Plan are associated with permanent water rights granted by the TCEQ. As such, reliable (firm) supplies from both reservoir and run-of-river sources were allocated to specific right holders in accordance with the terms of each water right. Large water rights in the region are typically held by WWPs or named WUGs; smaller rights are generally held by non-municipal entities (irrigation, manufacturing, etc.) and were allocated to the appropriate non-municipal WUG based on use type and location of demand. For purposes of the Regional Planning process, run-of-river water rights are also grouped in the Plan by basin and county of origin. Total run-of-river diversions assigned as existing supplies in the 2026 RWP are listed by county, basin, and use type in ***Appendix 3-E***.

3.7.3 Reuse

The existing reliable yield of reuse sources in Region H were determined in accordance with the procedures previously described in the section regarding reuse availability. The majority of existing reuse supplies in the region are direct reuse systems and were therefore allocated to their originating WUG. Indirect reuse sources currently in place were also assumed to be used to meet demands within the originating WUGs or its customers.

3.7.4 Contracts

Contractual supplies were assigned in accordance with the most recent available information regarding contractual relationships, contract volume or maximum, limitations on existing conveyance infrastructure, and source. Sources of information included the Region H WUG survey, stakeholder correspondence, available information on service area boundaries, and the 2021 Region H RWP. The majority of contracts reflected in the Plan consist of the transfers as discussed in *Section 3.6* among major and wholesale providers and from these entities to WUGs. While contractual supply agreements among utility districts and similar entities are common in Region H, only a relatively small number are reflected in the Plan as the majority of these transfers occur internal to either a regional water authority WUG or County-Other WUG and therefore do not need to be reflected separately in the plan.

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Chapter 4 – Analysis of Needs

4.1 INTRODUCTION

Identification of entities with projected water needs (shortages) and quantification of those needs is a key component of the Regional Planning process, facilitating evaluation and recommendation of water management strategies of the appropriate location and magnitude. Due to its geographic extent, large population, diverse economic base, and complex water supply portfolio, projected needs in Region H occur for a broad range of locations and water use categories. Although some of these needs are associated with the development of new water supplies that produce new sources of raw water, many of the shortages identified require only the development of infrastructure to finish water to the required level of quality (water treatment) or transmission infrastructure to deliver it to the point of demand (conveyance).

4.2 IDENTIFICATION OF NEEDS

4.2.1 Methodology

Projected water demands for all Water User Groups (WUGs) within Region H were assessed as part of Task 2 of the 2026 Regional Water Planning (RWP) process. Identification and allocation of existing water supplies was performed under Task 3, with volumes reflecting source availability, legal and regulatory limits, and contractual arrangements. Needs or surpluses were then determined by comparing existing supplies to projected demands on a WUG-by-WUG basis, with values for each WUG further characterized by county and river basin. This process was executed by Texas Water Development Board (TWDB) based on data entered into the DB27 planning database. Information from DB27 was also used to compile projected needs by Major Water Provider (MWP). Projected shortages for a WUG or other provider may occur for a number of reasons. Reliability of existing supplies is a significant factor in determining needs, as the RWP only considers the fully reliable (firm) availability of sources to enable appropriate planning for meeting demands under drought conditions. Additionally, access to the reliable portion of an existing source may be limited by water rights, regulatory constraints, contracts, or the existing infrastructure in place to extract, convey, or treat supplies. For many WUGs, needs are also impacted by projected growth in demand which exceeds current supply availability. In some cases, needs may also be influenced by declining availability of a supply over time due to regulation (for example, regulations limiting groundwater pumpage to a certain percentage of demand) or physical factors (declining quality, reservoir sedimentation, etc.).

4.2.2 Summary of Needs

Projected needs for MWPs are summarized in ***Appendix 4-A,*** and projected needs and surpluses for all WUGs in Region H can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary). Projected needs by water use type are summarized in *Table 4-1* and *Figure 4-1*, with needs by river basin summarized in *Table 4-2 and Figure 4-2*. Note that the values shown in these tables represent total needs, with any surpluses reflected as zero. Also, please note that the values for Polk and Trinity Counties only reflect the portions of those counties within Region H. The geographic location and magnitude of needs throughout the region are shown in *Figure 4-3* through *Figure 4-8*.

Figure 4-1 – Projected Needs by Water Use Type

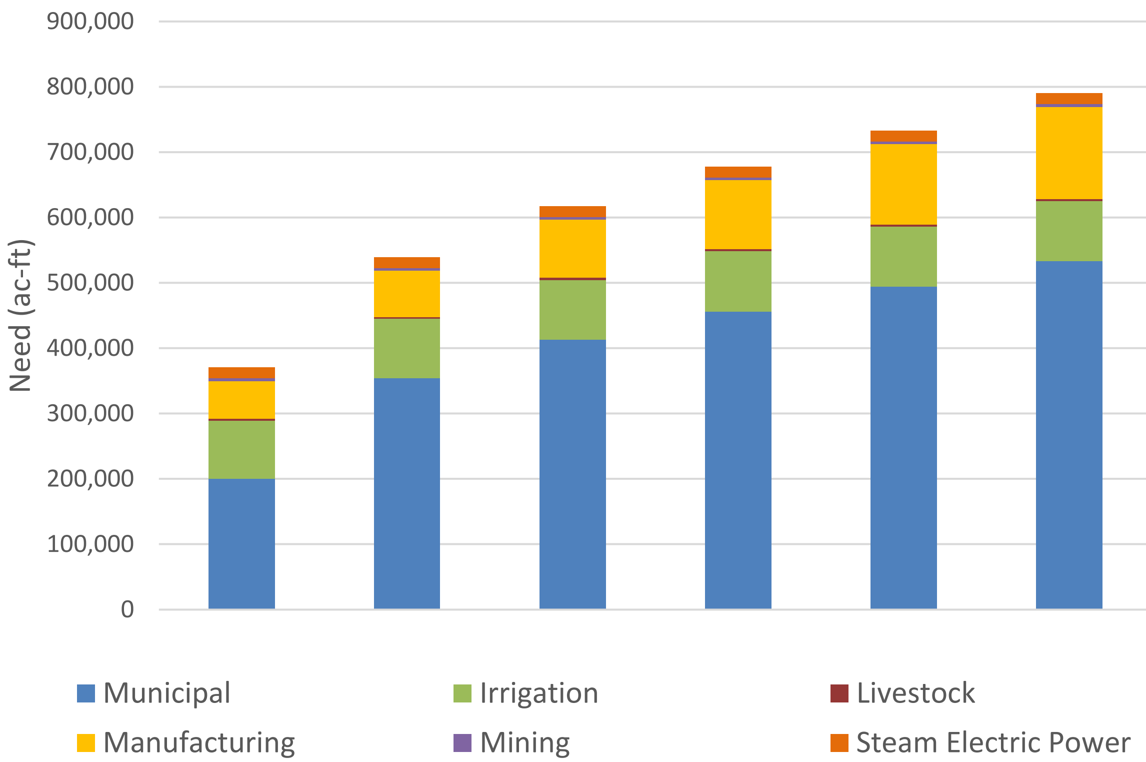


Figure 4-2 – Projected Needs by Basin

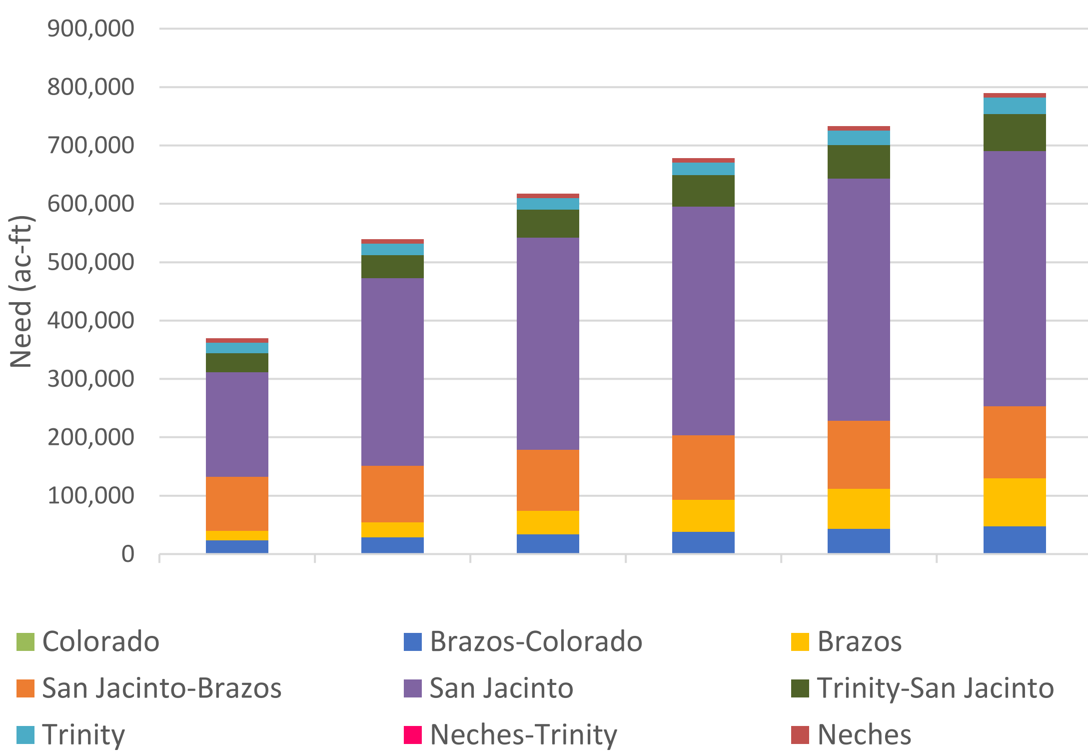


Table 4-1 – Projected Needs by County and Water Use Type (acre-feet per year)

	2030	2040	2050	2060	2070	2080
Austin						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	38	46	56	67	78	91
Municipal	0	0	0	0	0	0
Steam Electric Power	888	888	888	888	888	888
Total	926	934	944	955	966	979
Brazoria						
Irrigation	59,268	59,800	60,121	60,341	60,506	60,522
Livestock	225	278	307	328	342	343
Manufacturing	23,039	29,120	39,124	49,451	60,146	71,158
Mining	332	396	459	526	598	675
Municipal	6,357	8,896	11,046	12,265	13,349	14,234
Total	89,221	98,490	111,057	122,911	134,941	146,932
Chambers						
Irrigation	12,572	12,572	12,572	12,572	12,572	12,572
Livestock	0	0	0	0	0	0
Manufacturing	5,388	5,814	6,255	6,712	7,186	7,678
Mining	0	0	0	0	0	0
Municipal	1,080	2,735	4,076	6,718	10,173	14,197
Steam Electric Power	0	0	0	0	0	0
Total	19,040	21,121	22,903	26,002	29,931	34,447
Fort Bend						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	1,504	1,576	1,650	1,726	1,807	1,890
Mining	0	0	0	0	0	0
Municipal	39,677	56,702	71,753	83,999	95,567	106,600
Steam Electric Power	0	0	0	0	0	0
Total	41,181	58,278	73,403	85,725	97,374	108,490

	2030	2040	2050	2060	2070	2080
Galveston						
Irrigation	7,818	7,818	7,818	7,818	7,818	7,818
Livestock	196	196	196	196	196	196
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	2,728	3,085	3,415	3,984	4,473	4,958
Total	10,742	11,099	11,429	11,998	12,487	12,972
Harris						
Irrigation	0	0	0	0	0	0
Livestock	683	849	849	849	849	849
Manufacturing	26,942	32,895	40,749	46,214	51,845	57,677
Mining	2,709	2,737	2,763	2,789	2,815	2,841
Municipal	141,853	255,044	274,701	283,949	288,996	295,113
Steam Electric Power	14,835	14,835	14,835	14,835	14,835	14,835
Total	187,022	306,360	333,897	348,636	359,340	371,315
Leon						
Irrigation	2	2	2	2	2	2
Livestock	76	76	76	76	76	76
Manufacturing	0	35	71	108	147	187
Mining	0	0	0	0	0	0
Municipal	8	11	13	15	18	21
Total	86	124	162	201	243	286
Liberty						
Irrigation	9,218	9,218	9,218	9,218	9,218	9,218
Livestock	523	523	523	523	523	523
Manufacturing	0	0	0	0	0	0
Mining	79	97	115	133	149	165
Municipal	27	249	556	900	1,446	2,017
Total	9,847	10,087	10,412	10,774	11,336	11,923
Madison						
Irrigation	115	115	115	115	115	115
Livestock	971	971	971	971	971	971
Mining	710	710	710	710	710	710
Municipal	507	192	35	33	34	37
Total	2,303	1,988	1,831	1,829	1,830	1,833

	2030	2040	2050	2060	2070	2080
Montgomery						
Irrigation	167	943	1,485	1,820	2,019	2,200
Livestock	17	96	151	185	205	223
Manufacturing	924	1,199	1,418	1,586	1,724	1,861
Mining	1	7	12	18	22	28
Municipal	7,368	26,395	44,814	59,876	71,457	82,908
Steam Electric Power	315	501	631	711	758	801
Total	8,792	29,141	48,511	64,196	76,185	88,021
Polk						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	26	27	28	29	30	30
Municipal	0	0	0	0	0	141
Total	26	27	28	29	30	171
San Jacinto						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	25	25	25	25	25	25
Municipal	0	0	0	0	0	4
Total	25	25	25	25	25	29
Trinity						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	0	0	0	0	0	0
Total	0	0	0	0	0	0
Walker						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	221	172	140	269	2,159	4,245
Total	221	172	140	269	2,159	4,245

	2030	2040	2050	2060	2070	2080
Waller						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	559	1,305	2,728	4,477	6,343	8,352
Total	559	1,305	2,728	4,477	6,343	8,352
Region H Total						
Irrigation	89,160	90,468	91,331	91,886	92,250	92,447
Livestock	2,691	2,989	3,073	3,128	3,162	3,181
Manufacturing	57,797	70,611	89,237	105,767	122,824	140,420
Mining	3,920	4,045	4,168	4,297	4,427	4,565
Municipal	200,385	354,786	413,277	456,485	494,015	532,827
Steam Electric Power	16,038	16,224	16,354	16,434	16,481	16,524
Total	369,991	539,151	617,470	678,027	733,190	789,995

Table 4-2 – Projected Needs by County and River Basin (acre-feet per year)

	2030	2040	2050	2060	2070	2080
Austin						
Brazos	926	934	944	955	966	979
Brazos-Colorado	0	0	0	0	0	0
Colorado	0	0	0	0	0	0
Total	926	934	944	955	966	979
Brazoria						
San Jacinto-Brazos	63,924	66,687	68,732	69,878	70,831	71,686
Brazos	1,679	6,433	15,051	23,934	33,130	42,593
Brazos-Colorado	23,618	25,370	27,274	29,099	30,980	32,653
Total	89,221	98,490	111,057	122,911	134,941	146,932
Chambers						
Neches-Trinity	0	0	0	0	57	167
Trinity	15,632	16,982	17,733	19,609	22,160	25,053
Trinity-San Jacinto	3,408	4,139	5,170	6,393	7,714	9,227
Total	19,040	21,121	22,903	26,002	29,931	34,447
Fort Bend						
San Jacinto	17,557	26,321	29,910	32,808	35,078	37,378
San Jacinto-Brazos	10,423	10,794	13,837	16,501	19,346	22,164
Brazos	13,201	18,205	23,178	27,046	30,474	33,694
Brazos-Colorado	0	2,958	6,478	9,370	12,476	15,254
Total	41,181	58,278	73,403	85,725	97,374	108,490
Galveston						
Neches-Trinity	12	12	12	12	12	12
San Jacinto-Brazos	10,730	11,087	11,417	11,986	12,475	12,960
Total	10,742	11,099	11,429	11,998	12,487	12,972
Harris						
Trinity-San Jacinto	29,430	35,843	42,655	46,424	50,208	54,105
San Jacinto	150,227	262,557	281,349	290,204	295,281	301,305
San Jacinto-Brazos	7,365	7,960	9,893	12,008	13,851	15,905
Total	187,022	306,360	333,897	348,636	359,340	371,315
Leon						
Trinity	76	112	147	184	223	263
Brazos	10	12	15	17	20	23
Total	86	124	162	201	243	286

	2030	2040	2050	2060	2070	2080
Liberty						
Neches	7,493	7,493	7,493	7,493	7,493	7,493
Neches-Trinity	116	116	116	116	116	116
Trinity	398	414	431	447	462	477
Trinity-San Jacinto	56	56	56	56	56	56
San Jacinto	1,784	2,008	2,316	2,662	3,209	3,781
Total	9,847	10,087	10,412	10,774	11,336	11,923
Madison						
Trinity	1,645	1,344	1,198	1,197	1,197	1,199
Brazos	658	644	633	632	633	634
Total	2,303	1,988	1,831	1,829	1,830	1,833
Montgomery						
San Jacinto	8,792	29,141	48,511	64,196	76,185	88,021
Total	8,792	29,141	48,511	64,196	76,185	88,021
Polk						
Trinity	26	27	28	29	30	171
Total	26	27	28	29	30	171
San Jacinto						
Trinity	25	25	25	25	25	29
San Jacinto	0	0	0	0	0	0
Total	25	25	25	25	25	29
Trinity						
Trinity	0	0	0	0	0	0
Total	0	0	0	0	0	0
Walker						
Trinity	184	132	83	82	429	824
San Jacinto	37	40	57	187	1,730	3,421
Total	221	172	140	269	2,159	4,245
Waller						
San Jacinto	354	723	1,441	2,301	3,216	4,198
Brazos	205	582	1,287	2,176	3,127	4,154
Total	559	1,305	2,728	4,477	6,343	8,352

	2030	2040	2050	2060	2070	2080
Region H Total						
Neches	7,493	7,493	7,493	7,493	7,493	7,493
Neches-Trinity	128	128	128	128	185	295
Trinity	17,986	19,036	19,645	21,573	24,526	28,016
Trinity-San Jacinto	32,894	40,038	47,881	52,873	57,978	63,388
San Jacinto	178,751	320,790	363,584	392,358	414,699	438,104
San Jacinto-Brazos	92,442	96,528	103,879	110,373	116,503	122,715
Brazos	16,679	26,810	41,108	54,760	68,350	82,077
Brazos-Colorado	23,618	28,328	33,752	38,469	43,456	47,907
Colorado	0	0	0	0	0	0
Total	369,991	539,151	617,470	678,027	733,190	789,995

Figure 4-3 – Location of Identified 2030 WUG Needs

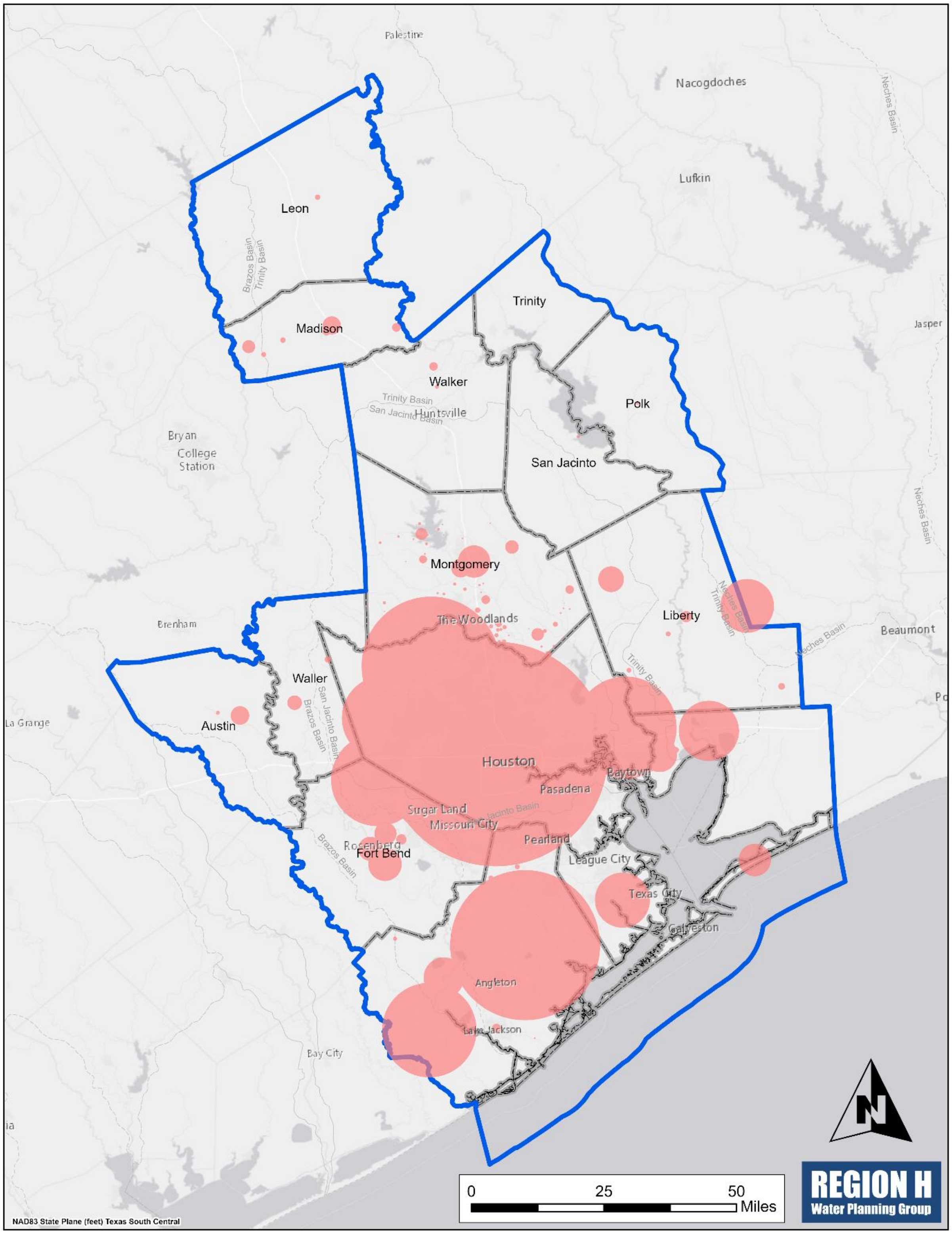


Figure 4-4 – Location of Identified 2040 WUG Needs

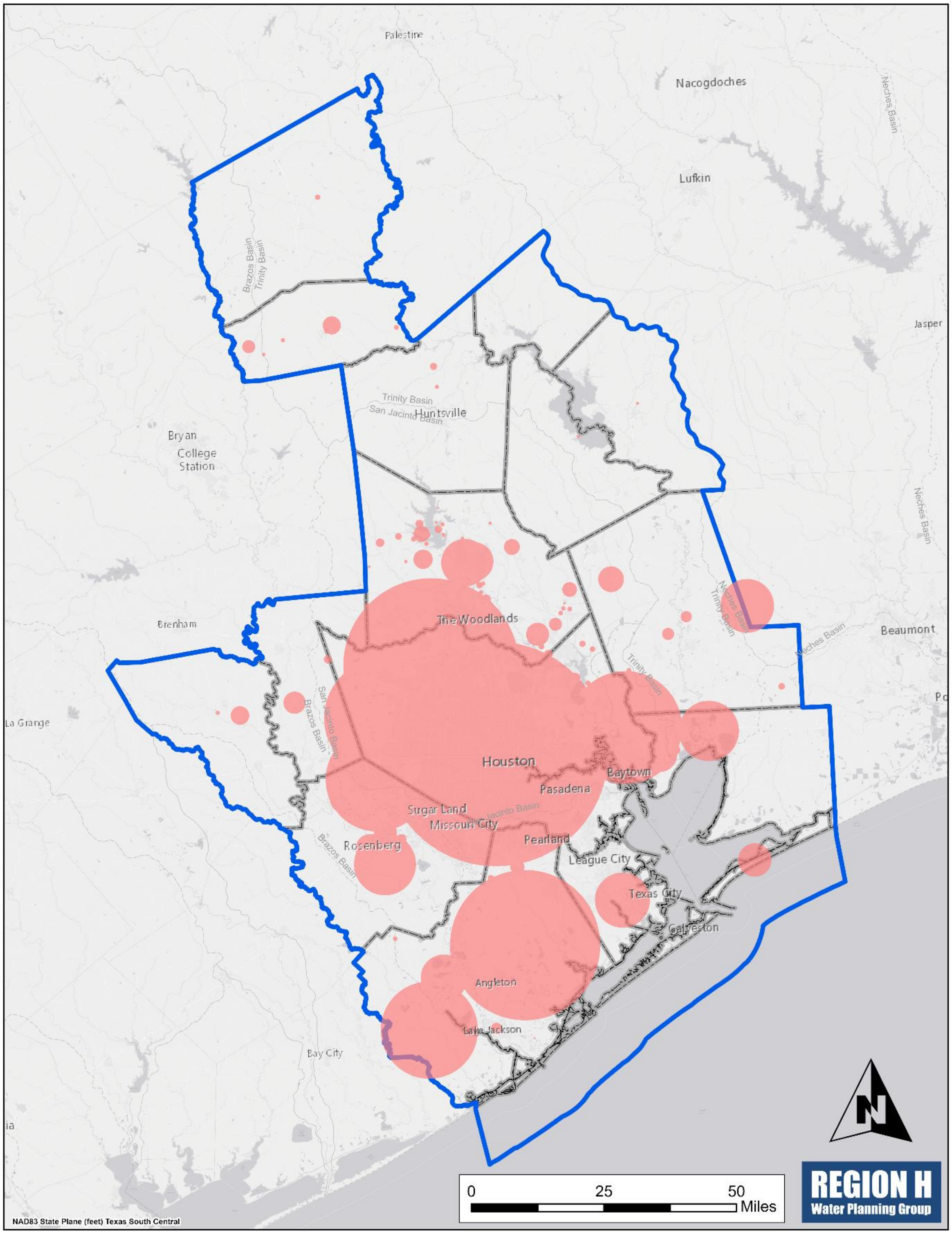


Figure 4-5 – Location of Identified 2050 WUG Needs

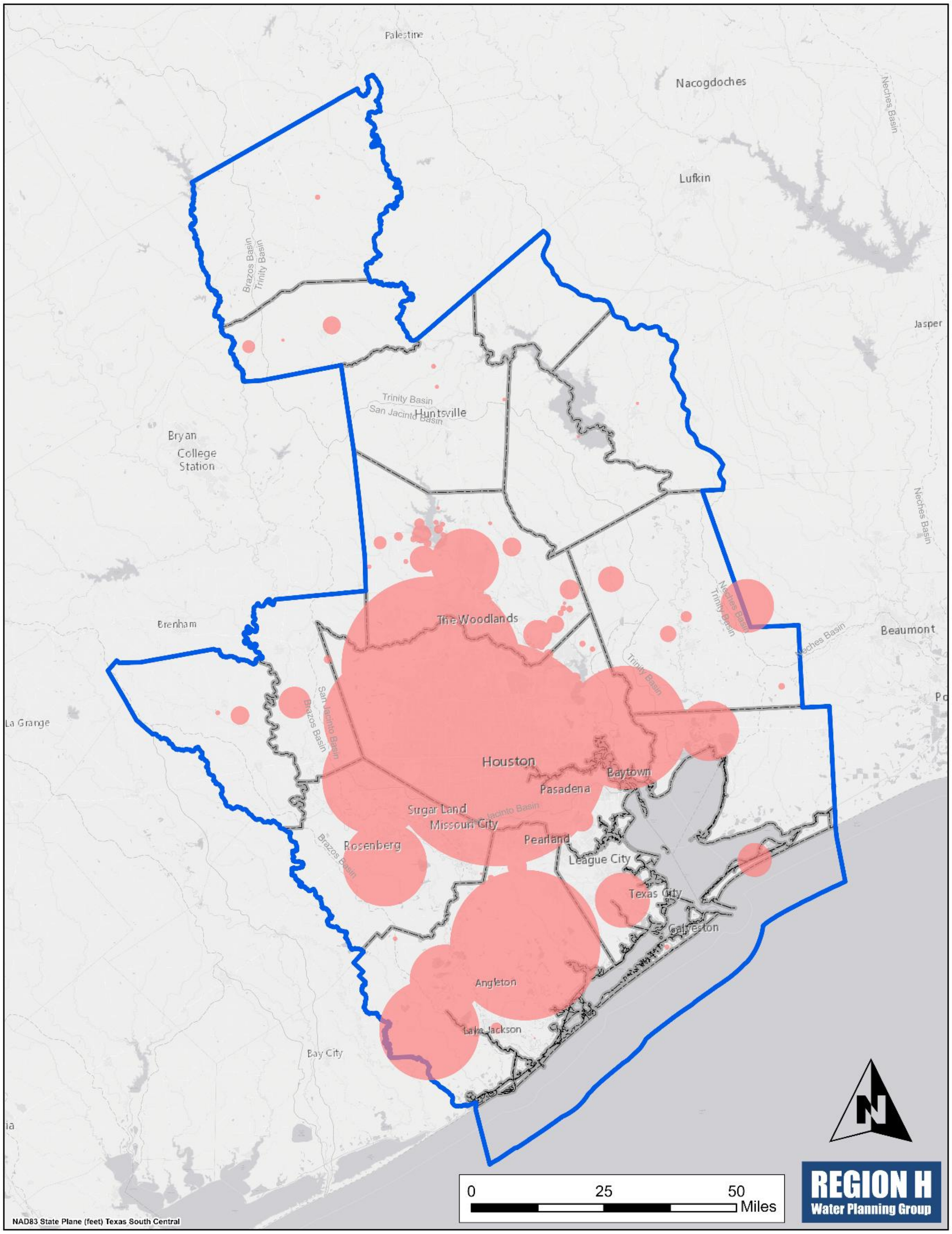


Figure 4-6 – Location of Identified 2060 WUG Needs

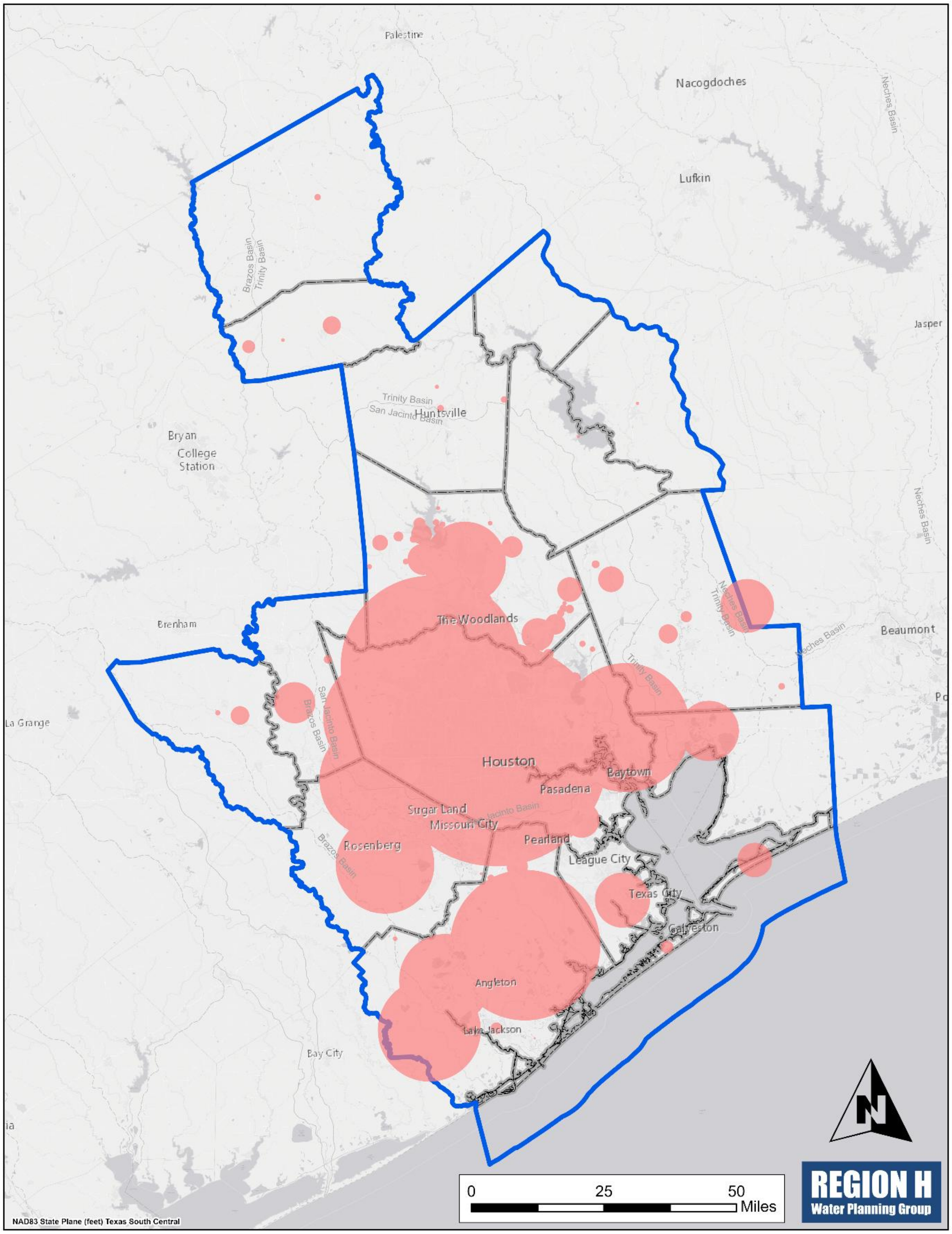


Figure 4-7 – Location of Identified 2070 WUG Needs

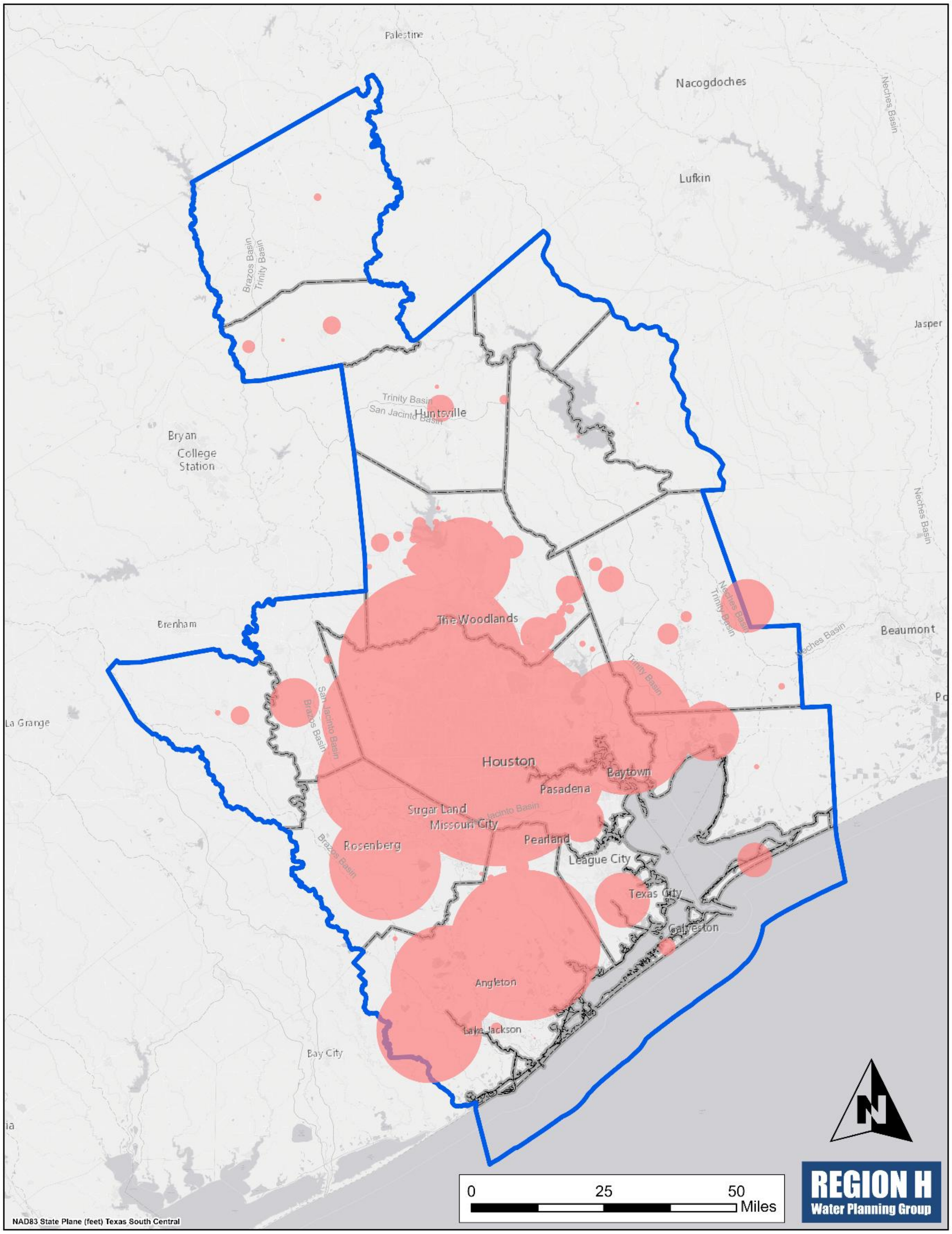
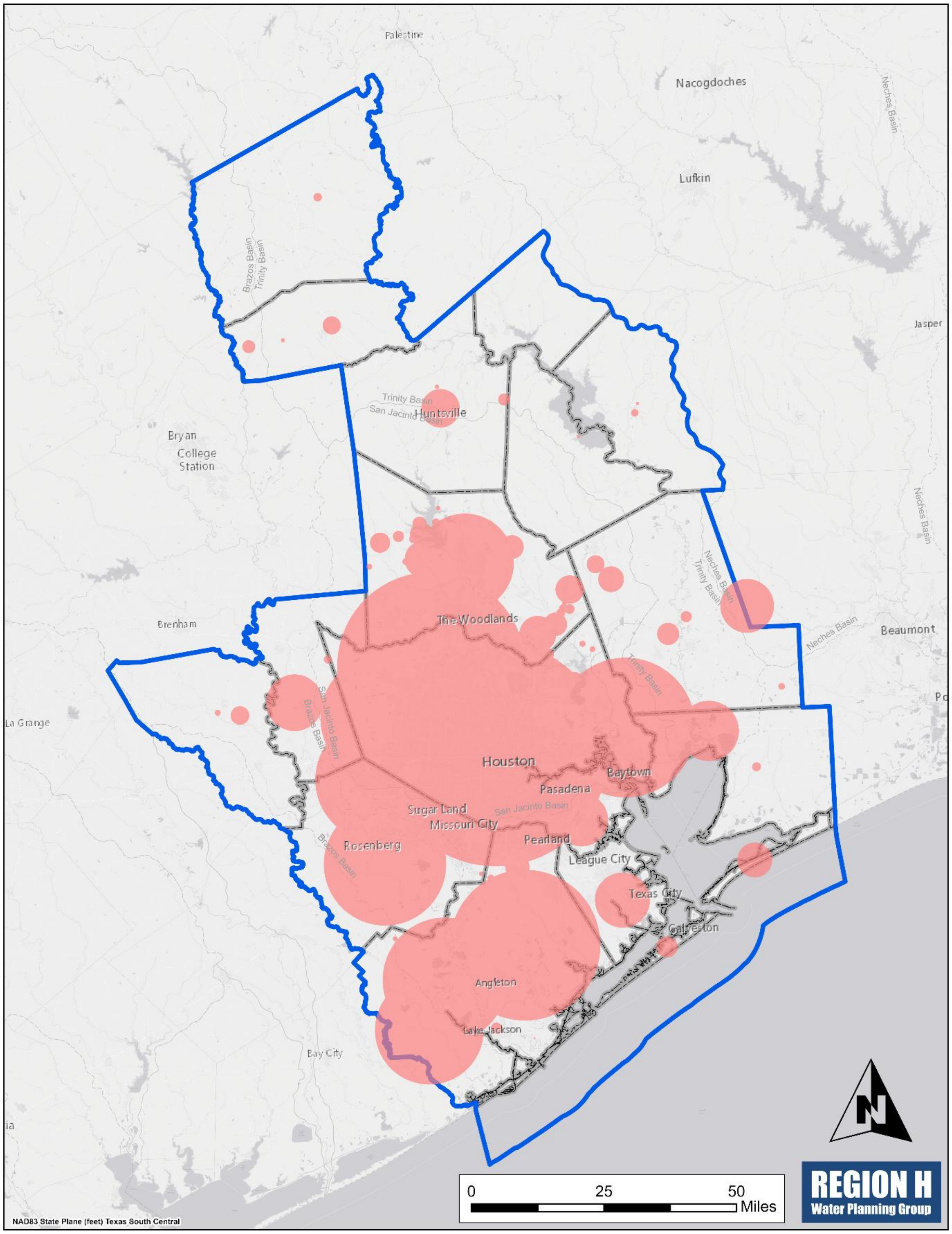


Figure 4-8 – Location of Identified 2080 WUG Needs



4.3 SECOND-TIER NEEDS

In addition to quantifying projected first-tier water needs after application of existing supplies, the RWP process also examines second-tier water needs, defined as the projected need remaining after application of recommended conservation and direct reuse Water Management Strategies (WMS). Evaluations and recommendations of WMS, including first-tier conservation and direct reuse strategies, are discussed in ***Chapter 5*** and ***Subchapter 5B***. ***Appendix 5-A*** includes a numerical summary of second-tier water needs after application of recommended first-tier WMS.

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Chapter 5 – Water Management Strategies

5.1 INTRODUCTION

As a growing region with expanding population and increased economic development, Region H projects substantial needs over the planning horizon through the 2080 decade. However, through the application of Water Management Strategies (WMS), critical needs can be met through conservation, development of infrastructure, and operational approaches to ensure a safe, reliable water supply for decades to come.

This chapter examines approaches to meeting the needs identified in ***Chapter 4*** of this Regional Water Plan (RWP). The WMS evaluated in this chapter are applied on a Water User Group (WUG)-level basis in order to collectively meet the needs of the region. This evaluation is primarily intended to compile the individual planning efforts for near-term projects that are being implemented by Wholesale Water Providers (WWPs) and WUGs and to verify their consistency with regional goals. Subsequent to the assessment of projects currently planned by sponsors, this analysis aims to evaluate options for meeting long-term needs that are outside of the near-term focus of regional providers.

The Region H Water Planning Group (RHWPG) was assisted in this effort by the members of the Region H Water Management Strategy Committee. Members of this committee are listed below in *Table 5-1*.

Table 5-1 – Region H Water Management Strategy Committee Members

Water Management Strategy Committee	
Member	**Interest Category**
John Bartos (Chair)	Environmental
Arthur Bredehoft	Water Utilities
Brad Brunett	River Authorities
Jun Chang	Water Districts
Mark Evans (non-voting)	Counties
Greg Eyerly	Municipalities
Ken Kramer	Public
Ivan Langford	Small Business
Aubrey Spear	River Authorities
Michael Turco	Water Districts
Brandon Wade	Water Utilities
Cynthia Wagener	Industries
J. Kevin Ward	River Authorities

Also, to provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) requires the incorporation of this data into a standardized online database referred to as DB27. The results of the analyses described below can be found in detail within DB27 reports (see ***Section ES.11*** of the Executive Summary). Summaries of these parameters are attached to the RWP in ***Appendix 5-A***. The following sections describe procedures for evaluation of WMS, potentially feasible WMS, and recommended and alternative WMS applied to WUG needs in Region H.

5.2 REQUIREMENTS

Regional Water Planning Groups (RWPGs) shall identify and evaluate potentially feasible WMS for each WUG and WWP where future water supply needs exist (as required by statute and administrative rules Title 31 Texas Administrative Code (TAC) §357.34; 357.35). A need for water is identified when existing water supplies are less than projected water demands for a given WUG within any planning decade. If no potentially feasible WMS are identified or recommended, the RWP shall document the reason.

As required by Texas Water Code (TWC) 16.053(e)(5), the regional water plans shall consider, but not be limited to, the following potentially feasible water management strategies for all identified water needs:

- improved conservation;
- reuse;
- management of existing water supplies;
- conjunctive use;
- acquisition of available existing water supplies;
- development of new water supplies;
- developing regional water supply facilities or providing regional management of water supply facilities;
- voluntary transfer of water within the region using, but not limited to, regional water banks, sales, leases, options, subordination agreements, and financing agreements;
- emergency transfer of water under Section 11.139; and
- developing large-scale desalination facilities for marine seawater and/or brackish groundwater.

The RWP shall include:

- the documented process used by the RWPG to identify potentially feasible WMS; and,
- the list of all identified WMS that were considered potentially feasible for meeting a need in the region per 31 TAC 357.12(b). Potentially feasible WMS shall include those listed above and may also include, but are not limited to, those listed in 31 TAC 357.34(c).

All potentially feasible WMS must be evaluated in accordance with 31 TAC 357.34.

This information shall be included in Chapter 5 of the RWP along with additional narrative description and other relevant materials and documentation associated with the RWPG's identification of potentially feasible WMS considered for the region.

As necessary, RWPGs shall update or redevelop any previous WMS evaluations (e.g., developed for other RWPs) to: meet current rule and guidance requirements, reflect changed physical or socioeconomic conditions that have since occurred, reflect changes in water project configurations or conditions, consider newly identified WUGs or WWPs, or to accommodate changes in identified water needs.

Beginning with the fourth cycle of RWP development, the concept of a “project” has been used to describe specific demand management programs or infrastructure used to increase or manage water supplies. Projects may be associated with one or more WMS and, similarly, a WMS may leverage one or more projects. The methodology discussed below for the evaluation of WMS is equally applicable to projects and has been used as such.

5.3 STRATEGY EVALUATION METHODOLOGY

Evaluation of WMS and associated projects for inclusion in the Region H RWP requires consideration of a wide range of data from a number of sources. Depending on the information available, Region H may adapt information directly from detailed studies developed by project sponsors or develop a high-level analysis of a concept for inclusion in the RWP. In other cases, Region H has performed more in-depth planning studies to evaluate the potential of projects that may yield great regional benefits to water supply. Each of these approaches requires adherence to applicable standards set forth in guidance for regional planning.

5.3.1 Supply Quantity and Reliability

Water supply volumes should take into account the supply conditions set forth in the guidance for RWP development. For groundwater sources, this includes the use of estimates of Modeled Available Groundwater (MAGs) for appropriate formations that have been assigned a Desired Future Condition (DFC) through the Groundwater Management Area (GMA) process. Groundwater availability for formations with a DFC may be augmented by MAG Peak Factors applied to MAG values based on analysis by the RHWPG and contingent on approval by the associated Groundwater Conservation District (GCD) and GMA, as well as TWDB. These peak factors reflect increased pumping in a drought year that is still consistent with meeting the DFCs, as compared to the long-term average represented by the MAG.

Surface water resources are evaluated using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) Run 3 for each basin. These versions of the WAMs assume maximum permitted diversions and no return flows. Where applicable, the models are to include environmental flow provisions in the determination of firm yield supplies.

Supplies are required to be firm under drought of record (DOR) conditions. Therefore, interruptible supplies and local supplies that are not firm during drought are not available for use in meeting needs.

It is required that supply volumes associated with strategies be exclusive and that multiple projects do not rely on the same volume of water. Water losses should be factored into supplies. In many cases, these losses are considered in the per-capita demands for some WUGs with water supplies that originate directly from raw water sources although they must be considered separately in other cases.

5.3.2 Cost Development Methodology

Project costs include the capital costs, debt service, and annual costs associated with implementing and operating a project. Guidance for the 2026 round of regional planning specifies that all costs be adjusted to September 2023 values using approved indices such as the Engineering News Record Construction Cost Index (CCI) and the U.S. Bureau of Labor Statistics Producer Price Index (PPI).

Project costs are often provided by project sponsors as a result of their own specific studies. In these cases, the costs may be adapted for the RWP by adjusting with cost indices to reach representative September 2023 values.

For development of project costs based on general criteria, TWDB sponsored the development of a Unified Costing Model (UCM) that provides capital, finance, and annual costs for a wide range of project types. Region H adapted this tool for use in development of the 2026 RWP and the documentation for this tool serves as the basis for Region H cost estimates. The resulting Region H tool uses the same unit costs and methodologies as the UCM but presents the information in a manner consistent with the values presented in previous RWPs. These tables can be found for the evaluated projects in ***Appendix 5-B*** of this chapter.

In many cases the information provided by a project sponsor may be incomplete but may account for some aspects of project cost. In these cases, appropriate regional planning assumptions and methods are applied to fill in any remaining information.

For each project, costs have been adapted or developed for the following categories:

- Capital Costs
    - Construction costs
    - Interest during construction
    - Engineering and feasibility studies, legal assistance, financing, bond counsel, and contingencies
    - Permitting and mitigation
    - Land purchase and easement costs
    - Purchase of water supplies
- Debt Service
    - Based on a rate of 3.5 percent for 20 years or 40 years for reservoir projects
- Annual Operating and Maintenance Costs
    - Annual costs
    - Energy costs
- Unit Costs of Water
    - Developed based on project yield and total annual project costs

It should be noted that Region H typically excludes the purchase cost of water from WMS costing analyses unless specifically requested for inclusion by the project sponsor. The future purchase cost of water may be influenced by a number of factors, including specific source portfolio and project timing, existing system rate contributors, and the negotiated contract terms with customers at the time of sale, as well as other factors. Given this uncertainty, purchase cost is omitted from WMS analyses to allow greater consistency in evaluating and comparing projects.

Certain cost categories, which are associated with maintenance or improvement of existing infrastructure but which do not increase supply, are excluded from Regional Water Plans except for limited cases associated with conservation strategies or distribution line replacement to address water loss. Excluded categories include:

- Facilities associated with retail distribution networks
    - Retail internal distribution facilities

  - Water storage facilities associated with retail distribution
  - Wastewater collection system components associated with direct reuse
- Water system improvements to address quality or pressure compliance issues
- Replacement and maintenance of existing facilities without supply increase
  - New wells which simply replace existing aging wells
  - Maintenance or upgrades to existing facilities that do not increase supply volumes
  - Preventive measures to protect against future water loss or degradation

5.3.3 Strategy Impacts

In evaluating strategies and their associated projects, planning groups are directed to provide a quantitative report of how cultural and environmental resources may be affected. This includes environmental water needs, wildlife habitats, cultural resources, and the effects of upstream development on the bays, estuaries, and arms of the Gulf of Mexico. Information from project sponsors is used, where possible, to identify these concerns. For other projects that lack this level of study at this point, assumptions are used based on the type, scope, and location of a project or strategy. Strategy impacts are discussed in project technical memoranda in ***Appendix 5-B***, as well as in ***Chapter 6***.

5.3.4 Region H Strategy Selection Process

Pursuant to 31 TAC 357.12(b), the RHWPG is required to prepare a summary of its process for identifying and selecting WMS for development of the 2026 RWP. This process shall be presented to the public for comment at a public meeting. The methodology described below was presented in a regular public meeting of the RHWPG on December 6, 2023 and adopted by the group in that same meeting. This evaluation methodology has also been applied by the RHWPG to evaluate "projects" which, for the purposes of regional planning, refer to specific demand management programs or infrastructure used to increase or manage water supplies. It is recognized that WMS may include one or more projects that can each be scored individually in the selection process.

Potential WMS are defined based on a determination of needs developed from a comparison of projected demands and existing supplies. These strategies are analyzed at the WWP or WUG levels. A detailed technical memorandum has been prepared for each of the management strategies and projects that were selected and considered to be overarching key strategies or projects.

The regional water planning process begins with identifying current and projected future water demands. After water demands are identified for all WUGs, water supplies available to Region H are identified and allocated to WUGs and WWPs based on current usage and contracts. By matching the supplies and the demands, projected surpluses and shortages are determined. Major Water Provider (MWP) supplies and contracts are also reviewed to determine their respective surplus or need during the planning period.

The selection of WMS begins with the identification of certain "general WMS" that are readily available. Such alternatives can provide simple, cost-effective solutions to shortage without the development of new, major water projects. These strategies include the reduction of demand through water conservation, the use of groundwater where available, and the expansion or extension of existing contracts for water supplies between WUGs and WWPs.

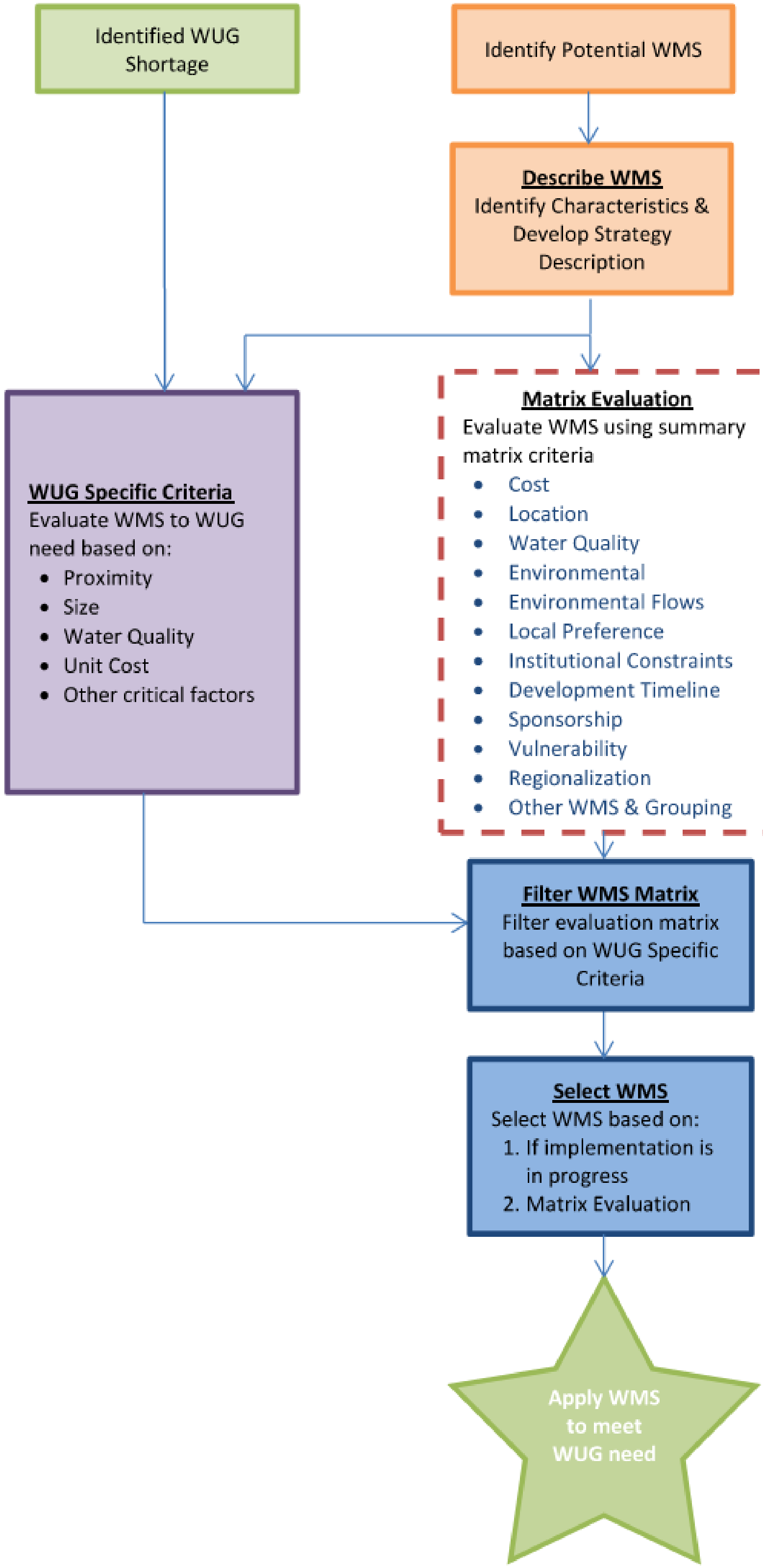
In evaluating the general WMS, the RHWPG makes three assumptions. First, the RHWPG assumes that every municipal WUG with a projected shortage would, where feasible, utilize conservation before developing additional groundwater supplies, seeking out or increasing a WWP contract, or pursuing any other strategies to increase supply. This is pursuant to the language of 31 TAC 357.34(g).

Secondly, WUGs would continue to develop groundwater until it is fully utilized. This is based upon the observed pattern of development in the region, where the Gulf Coast Aquifer is available in all of the southern counties. The supply of groundwater will not be allocated in excess of regulations set forth by subsidence or groundwater conservation districts or other entities that have regulatory power over the consumption of groundwater.

Finally, those WUGs currently receiving water from WWPs would be able to increase their contract amounts until the WWP supplies were fully allocated. This assumes the use of existing supplies conveyed through existing infrastructure wherever possible.

For the development of the 2026 RWP, a dual-phased WMS selection process was proposed. Inputs into the dual-phase process include the identified WUG needs (after the application of general WMS) and the potential WMS. The output is the application of one or more WMS(s) to meet a WUG need. *Figure 5-1* presents a flow chart of the proposed WMS selection process.

Figure 5-1 – Region H WMS Selection Methodology Process



Prior to the dual phases, the proposed strategies will be described in detail. Within the dual phases, the first phase (the WUG Specific Criteria phase) focuses on the WUG, as it aims to evaluate the WMS for a specific WUG need. During this phase, questions such as the following must be addressed for a given WMS to be considered acceptable to apply to meet a WUG need:

- Is the strategy within reasonable proximity to location of water need?
- Is the strategy right-sized or easily paired with another WMS?
- Is the expected water quality produced by the strategy significantly different from existing water quality at the WUG?
- Is the unit cost (and capital if no WWP is present) supportable by the target WUG?
- Has any other flaw relating to the WMS and WUG been identified?

The second phase (the Matrix Evaluation phase) focuses on the evaluation of the WMS. In this phase, each WMS will be evaluated based on the matrix criteria presented in *Table 5-2*. Each WMS will be given a score from one to five for each analysis criterion, and the phase will ultimately develop a matrix of rated WMS. The analysis criteria include the following:

- Cost – Evaluates the unit cost of the water produced by the strategy.
- Location – Evaluates the degree of interbasin transfer or conveyance required to move the water to significant demand centers within Region H.
- Water Quality – Evaluates the strategy's impact on water quality.
- Environmental Land & Habitat – Evaluates the degree of environmental land impacts and the degree of public opposition expected by the strategy.
- Environmental Flows – Evaluates the degree of impact to environmental flows to bays and estuaries. This evaluation is independent of the application of adopted environmental flow standards that are required to be enforced upon new water right appropriations. Projects that are found to reduce flows are not necessarily in violation of these standards just as compliance with the adopted standards does not mean a project will not reduce instream flows.
- Local Preference – Evaluates the local preference and likelihood for public support or opposition created by the strategy.
- Institutional Constraints/Risk of Implementability – Evaluates the potential for factors such as permitting and land acquisition to affect the strategy.
- Development Timeline – Evaluates the amount of time necessary to implement the strategy.
- Sponsorship – Evaluates whether a sponsor has been identified and is committed to implementing the strategy.
- Vulnerability – Evaluates the risk from natural or man-made disasters such as hurricanes, climate change, or terrorism to impact the strategy's ability to deliver water.
- Regionalization – Evaluates the degree to which the strategy supports or expands regionalization through serving multiple water systems, water providers, or a broad geographic area.
- Impacts on Other WMS – Evaluates the likelihood of the strategy to impact other WMS and the potential for the strategy to be applied in coordination with other WMS.

After the dual-phase description, the emphasis of the methodology shifts to the identification and selection of Water Management Strategies to meet the needs of a particular WUG of interest. To accomplish this process, the evaluation matrix is filtered for each WUG need, such that all WMS that meet the WUG Specific Criteria are available for selection.

Selection of the WMS will first occur by selecting any strategies that are already in progress. This is intended to make the planning process parallel with ongoing developments within Region H while still allowing for thorough quantitative evaluation of each strategy under consideration. Subsequent selections of WMS will be made, as needed, based on the filtered Matrix Evaluation. After WMS selection, the selected WMS are applied to meet WUG needs.

Table 5-2 – Region H WMS Rating Criteria

Category	Rating Criteria				
	1	2	3	4	5
Cost	>$1,200/ac-ft	$900 to $1,200/ac-ft	$600 to $900/ac-ft	$300 to $600/ac-ft	<$300/ac-ft
Location	IBT required, long distance or outside Region H.	IBT & Conveyance required for use to meet significant needs.	IBT required for some need centers. Conveyance required.	Some conveyance required to need centers.	No IBT required. Relatively near centers of high demand.
Water Quality	Quality of supply is reduced significantly.	Quality of supply is reduced.	No known water quality issues.	Quality of supply is improved.	Existing water quality problems are reduced.
Environmental Land & Habitat	Significant environmental issues and opposition.	Some environmental issues and opposition.	Environmental impacts can be mitigated. Limited concerns.	Minimal mitigation of impacts needed. Minimal concerns.	Limited or no known impacts.
Impacts on Environmental Flows	Significantly reduces instream or B&E flows.	Reduces instream or B&E flows.	No impact.	Increases instream or B&E flows.	Significantly increases instream or B&E flows.
Local Preference	No local support. Significant opposition.	Minimal local support. Some opposition.	Some local support. Limited opposition.	Local support. Minimal opposition.	Widespread local support. Multi-use benefits likely.
Institutional Constraints / Risk of Implementability	Permits opposed. Significant property required.	Some permit opposition. Some property acquisition necessary.	Permits expected with minimal problems. Property available.	Permit application in progress. Property acquired or under acquisition.	Permits issued. Facilities or land owned. Water available.
Development Timeline	>35 years	25-35 years	15-25 years	5-15 years	0-5 years
Sponsorship	No sponsor readily identifiable.	Sponsor identifiable, but uncommitted.	Sponsor(s) identified; commitment level uncertain.	Sponsor(s) are identified and committed to strategy.	Sponsors identified and strategy is in development.
Vulnerability	Significant risk from natural and man-made disasters.	Substantial risk from natural and man-made disasters.	Moderate risk from natural and man-made disasters.	Slight risk from natural and man-made disasters.	Minimal risk from natural and man-made disasters.
Regionalization	Sponsored by and serving single system.	Serves limited number of systems	Serves multiple water systems and may have multiple sponsors	Serves extensive area and/or multiple WWPs, supports existing regional systems	Serves extensive area and/or multiple WWPs, creates major new regionalization opportunity
Impacts on Other Management Strategies	Significant negative impacts.	Some negative impacts and/or little chance of grouping.	No impact.	Some positive impacts, potential synergistic effects.	Significant positive impacts, synergy achieved.

5.4 POTENTIAL WATER MANAGEMENT STRATEGIES AND PROJECTS

Potentially feasible WMS were identified in three ways. First, strategies recommended in the 2021 Region H RWP for either implementation or additional study were considered. Next, new strategies were solicited during the scope development period for the 2026 RWP. Finally, entities that conducted independent strategy studies for WMS or projects that they intend to sponsor could bring their reports to the planning group and request they be considered in the plan. As examples, the 2026 RWP includes new projects being developed by the Village of Fairchilds and the Baytown Area Water Authority which were identified by the sponsors since the completion of the 2021 RWP.

A summary of identified WUG needs and considered and potential WMS types is included in ***Table 5-A1*** of ***Appendix 5-A***.

It should also be noted that an alternative to WMS implementation that is always an available option is the choice to not meet identified needs. Socio-economic impacts of this option are discussed in ***Section 5.4.5*** as well as ***Chapter 6***. Although not a WMS or a project in the traditional sense, this does serve as an alternative for addressing needs in Region H. The RHWPG has not pursued this option except for some agricultural needs that lack an economically viable alternative. However, a detailed study on the potential of using drought management strategies to reduce demands rather than meeting needs with additional supply is discussed in ***Section 5.4.3***, ***Chapter 7***, and a technical memorandum in ***Appendix 5-B***.

5.4.1 Studies by the RHWPG and Others

Potential WMS were defined based on the determination of needs described above. Strategies were updated and configured to address the specific types and nature of identified shortages. Several key projects were identified and either studied or summarized as part of this process. A list of the potentially feasible WMS and projects considered by the RHWPG are shown in *Table 5-3*.

Table 5-3 – Region H Potentially Feasible WMS and Projects

Conservation
Advanced Municipal Conservation and Water Loss Reduction
Industrial Conservation
Irrigation Conservation
Conveyance
BWA Transmission and Storage Expansion
CHCRWA Transmission and Internal Distribution
City of Houston GRP Transmission
City of Houston Transmission Expansion
CWA Transmission Expansion
East Texas Transfer
LNVA Neches-Trinity Basin Interconnect
Manvel Supply Expansion
NFBWA Phase 2 Distribution Segments
NHCRWA Distribution Expansion
NHCRWA Transmission Lines

Southeast Transmission Line Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Aquifer Storage and Recovery
Brackish Groundwater Development and Groundwater Blending
BWA Brackish Groundwater Development
City of Houston Area 2 Groundwater Infrastructure
City of Houston Repump and Groundwater Plant Improvements
Expanded Use of Groundwater
Fairchilds Supply Infrastructure
GCWA Groundwater Well Development
SJRA Catahoula Aquifer Supplies
Groundwater Reduction Plans
CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land IWRP
Fort Bend County MUD 25 GRP
Fort Bend County WCID 2 GRP
Montgomery County MUDs 8 and 9 Supply Expansion
Montgomery County Supply Expansion
NFBWA GRP
NHCRWA GRP
WHCRWA GRP
Reuse
City of Houston Reuse
City of Pearland Reuse
League City Effluent Reuse
NFBWA Member District Reuse
NHCRWA Member District Reuse
River Plantation Reuse
San Jacinto Basin Regional Return Flows
Texas City Industrial Complex Reuse
Wastewater Reclamation for Industry[1]
Wastewater Reclamation for Municipal Irrigation
Westwood Shores MUD Reuse
Surface Water Development
Allens Creek Reservoir
BWSC Reservoir and Pump Station Expansion
GCWA Coastal Desalination
Lake Somerville Augmentation

Treatment
BAWA East SWTP Expansion
BWA Conventional Treatment Expansion
City of Houston EWPP Enhancement
Harris County MUD 50 Surface Water Treatment Plant[2]
Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant
SEWPP Expansion
Other
Brazos Saltwater Barrier
GCWA Canal Lining and Loss Mitigation
GCWA Shannon Pump Station Expansion
LNVA Devers Pump Station Relocation
Municipal Drought Management
New and Expanded Contracts

For each of these projects, a detailed technical memorandum is provided in ***Appendix 5-B***. Not all of the strategies evaluated are based on developing additional water. For instance, several projects consist of water transfer facilities only (e.g., Regional Water Authority transmission strategies). Expanded use of groundwater addresses the requirements to fully develop existing groundwater supplies, with consideration given to the regulatory guidelines set by groundwater conservation districts. Other strategies involve the contractual exchange of water supplies between various water suppliers. These strategies recognize the need to transfer supplies from areas of excess to the specific areas of need, mainly within the western and lower portions of the region. In many cases, there are aspects of a particular project that cross categories. The major categories these projects are listed under are meant to represent the general nature of each project or strategy only.

5.4.2 Conservation

Water conservation has always been a key component of the Region H RWP. For the development of the 2026 RWP, the RHWPG examined potential municipal conservation in the context of both water loss reduction and the application of other advanced methods in addition to the baseline conservation applied by TWDB. Advanced conservation methods were applied to WUGs based on the methodology used in the TWDB Municipal Water Conservation Planning Tool, which was developed in 2018 to guide water utilities in planning conservation programs and determining the potential costs and benefits of such programs. The RHWPG assessed conservation for all municipal WUGs. Water loss reduction was applied to municipal WUGs with water loss levels of greater than 10 percent.

Conservation practices for agricultural irrigation and some manufacturing sectors are also a significant source of savings throughout the region. The RHWPG did not apply conservation to Livestock, Mining, or Steam-Electric Power WUGs, as adequate information was not available to reasonably apply conservation for these demand categories.

Detailed information regarding the analysis and application of conservation strategies may be found in ***Appendix 5-B***. Additional information may be found in ***Chapter 5B*** of this plan.

5.4.3 Drought Management

Pursuant to 31 TAC 357.34(g), guidelines for regional water planning require that drought management strategies be considered for each identified need. If drought management is not selected as a strategy, current TWDB policy for regional water supply planning requires that reasons for its exclusion must be documented. Drought management strategies may include water demand management.

The supply and demand values used for this plan are based on estimated DOR conditions. Under non-drought conditions, many entities in the region will have an overall surplus of supply. However, this surplus does not coexist with the growing demand areas. A significant portion of available supply is in Lake Livingston, which is in the Trinity Basin. The majority of the demand growth is occurring in Brazoria, Fort Bend, Harris, and Montgomery Counties which are in the Brazos and San Jacinto Basins and the San Jacinto-Brazos Coastal Basin. To meet the demands where they occur, additional supply must be transferred into the San Jacinto River Basin. Once that infrastructure is constructed, it is not "drought-susceptible" in the context of the RWP, because the supply volume applied in the RWP does not exceed the modeled firm DOR record yield of the underlying water rights.

Municipalities and water providers throughout the region have published drought contingency plans (DCPs). In general, these plans are designed to address short-term periods of limited water availability through public notice and outdoor water use restrictions. In 2009, the RHWPG conducted a study to assess the impact of DCP implementation on reservoir supplies. The study indicated that the duration of impacts on lake levels could be reduced by implementing drought response measures, but that the benefits of such measures to a reservoir are relatively limited in terms of an annual increase in supply. During the development of the 2026 RWP, the RHWPG considered drought management as a potential water management strategy (WMS) and performed a broader region-wide analysis to assess the potential benefits of implementing mandatory drought response measures outlined in DCPs in Region H. This study is discussed in more detail in ***Chapter 7*** and within a dedicated memorandum in ***Appendix 5-B***.

Due to the short-term nature of drought response measures and the variability of benefits based on levels of customer compliance, implementing DCPs cannot be considered to provide a firm volume of demand reduction analogous to a physical source. Furthermore, the RHWPG recognizes that implementation of DCPs is a mandated curtailment of demands rather than a strategy to provide supply or reduce demands on a long-term basis, and thus the costs associated with short-term drought management represent economic impacts of not meeting demands. Also, utilization of DCPs as tools to prepare for known droughts prevents them from providing additional protection in the face of a drought worse than the DOR. Although drought contingency planning is a critical component of water supply management and may provide short-term benefits during severe drought conditions, the RHWPG does not recommend drought management as a replacement for long-term water management strategies.

This does not preclude some WUGs from electing to use drought management in lieu of a recommended strategy. The best example of this is for irrigation. Region H recommends irrigation conservation as a management strategy in those counties with substantial water demands related to rice production, as rice irrigation typically has the most potential for demand reduction. However, portions of the irrigation demands in those and other counties are often met today through the use of water rights which are not fully reliable, backed up by one-year contracts for reliable supply as needed. Irrigators holding interruptible water rights may choose not to implement conservation (at an annual cost), but instead choose to reduce their irrigated acreage during a drought year (for a discrete cost), or enter into long-term contracts for reliable surface water from a wholesale supplier (which will be available in the eastern counties). That is an individual economic decision, and the Region H plan recognizes the flexibility of these irrigators to exercise that option.

5.4.4 Interruptible Supplies

TWDB guidelines require the water supply sources that are recommended in the regional water plans to meet future needs to be firm supplies. Firm water supplies are those supplies predicted to be 100 percent reliable during DOR conditions, and this guidance applies to supplies for any category of water use. While this planning criterion represents a sound and conservative approach for water users that require supplies with a high degree of reliability, such as municipal and manufacturing demands, some types of water uses such as irrigated agriculture may be able to utilize surface water supplies that are less than fully dependable during a DOR by suspending irrigation in favor of dry-land crops during these periods. These supplies, which are less than 100 percent reliable, are called “interruptible” supplies. Although these supplies are vital to providing cost-effective water to agriculture, they do not qualify as a potential supply under the current guidance for RWP development and, therefore, have not been included as potential strategies in the 2026 RWP. It is expected that the unmet needs identified in this RWP for irrigation are routinely met during wet and typical years with these supplies.

5.4.5 Impacts of Not Meeting Identified Needs

One alternative for addressing needs identified in the RWP is the choice to not meet the shortages. However, this alternative is associated with extremely high costs and social impacts due to losses in economic revenue, population growth, and tax base. An analysis of these factors will conducted by TWDB following the entry of existing supplies into DB27 and discussed in greater detail in ***Chapter 6***. This analysis will be performed after publication of the Initially Prepared Plan and will be incorporated into the final RWP.

5.4.6 Combined Supply and Flood Management Benefit

In accordance with TWDB requirements, the RHWPG performed an assessment of potentially feasible WMS and projects for water supply which could potentially provide non-trivial flood mitigation benefits or be candidates for combination with flood mitigation features. Due to the occurrence at various times of damaging major floods and droughts for much of the state, and the substantial cost of infrastructure to address each of these challenges, any combined solutions which could be identified could offer substantial economic efficiencies.

Historically, projects with dual supply and flood management benefit have been limited within Region H. This is due primarily to the opposing operational philosophies necessary to implement each use. Water supply requires operation to focus on availability and reliability of source water. For example, for reservoir sources the storage within the yield-generating portion of the reservoir is generally kept full to the extent possible as a buffer against dry conditions and reduced inflows in order to maintain supply reliability. The opposite is true for flood control detention and retention basins, which are kept empty a majority of the time in order to accept large volumes during rainfall events, and typically subsequently emptied in a relatively rapid manner. Achievement of supply and flood benefit within the same project therefore typically requires a large impoundment, with dedicated pools or elevation bands dedicated for each use and operated accordingly.

Subsequent to the technical analyses of potentially feasible WMS and projects as documented in corresponding technical memoranda in ***Appendix 5-B**,* each was examined for the potential for benefits to flood management. None of the considered WMS or projects were found to offer non-trivial flood management benefit. The RHWPG also examined the findings of the Regional Flood Plans for flood planning regions overlapping Region H, including Regions 3 (Trinity), 5 (Neches), 6 (San Jacinto), 8 (Lower Brazos), and 10 (Lower Colorado-Lavaca). As part of the development of the 2023 Regional Flood Plans, each of these regions examined their recommended projects and strategies to determine if any held the potential for supply benefit. No recommended strategies or projects for flood planning purposes were found to have significant supply benefit. It is therefore determined that the potential for projects with combined benefit within Region H is currently limited.

5.5 RECOMMENDED WATER MANAGEMENT STRATEGIES

5.5.1 New and Increased Supply Availability

The development of WMS and associated projects have the potential to either optimize the use of existing water sources, increase the availability from existing sources, or provide water from new sources. In total, the WMS recommended in the 2026 RWP provide as much as 919,613 acre-feet per year (ac-ft/yr) of additional supply and conservation savings by 2080 through increased source availability, newly developed water, and long-term demand management. These increases in overall supply for the region are detailed in ***Table 5-A2*** in ***Appendix 5-A***.

Additional supply has not been included to provide for water loss. It is assumed that the demands, as developed in ***Chapter 2*** of this plan, include appropriate levels of water loss that are consistent with current system performance. Therefore, supplies and projects identified for meeting these demands are already accounting for current levels of water loss without additional consideration. In reality, the RHWPG hopes that future projects will be developed and maintained in a responsible manner such that these water losses will actually be reduced below the level recognized today. This reduction itself is contained within the water loss reduction component of the municipal conservation strategy.

5.5.2 Project Scoring

The RHWPG conducted a scoring process for the key projects identified during the planning process. This followed the methodology described in ***Section 5.3.4***. The results of this scoring evaluation are included in each technical memorandum in ***Appendix 5-B*** along with an explanation of how the score for each criterion was selected. Finally, ***Table 5-A3*** in ***Appendix 5-A*** summarizes the scores for all key projects for easy comparison.

5.5.3 Selected WMS and Projects

A number of WMS and projects were selected for meeting the needs identified within Region H. As noted previously, WMS represent general approaches to water supply that are accomplished through a number of projects. *Table 5-4* below represents the relationship between recommended WMS and the key projects required to implement them. A complete list of projects associated with each WMS is included as ***Table 5-A4*** in ***Appendix 5-A***.

Table 5-4 – WMS and Key Project Relationships

Water Management Strategy*	WMS Project Name
Additional Supply from BRA	Allens Creek Reservoir
Additional Supply from GCWA	Allens Creek Reservoir
	GCWA Canal Lining and Loss Mitigation
	GCWA Shannon Pump Station Expansion
BAWA East SWTP Expansion	BAWA East SWTP Expansion
Brackish Groundwater Supplies	WUG Infrastructure Expansion (WUG-level projects)
Brazos Saltwater Barrier	Brazos Saltwater Barrier
BWSC Reservoir and Pump Station Expansion	BWA Conventional Treatment Expansion
	BWA Transmission and Storage Expansion
	BWSC Reservoir and Pump Station Expansion
CHCRWA GRP	CHCRWA Transmission and Internal Distribution
	Northeast Water Purification Plant Expansion
City of Houston Area 2 Groundwater Development	City of Houston Area 2 Groundwater Infrastructure
City of Houston GRP	City of Houston EWPP Enhancement
	City of Houston GRP Transmission
	City of Houston Repump and Groundwater Plant Improvements
	City of Houston Transmission and Distribution Expansion
	CWA Transmission Expansion
	Northeast Water Purification Plant Expansion
	SEWPP Expansion
City of Houston Reuse	City of Houston Reuse
City of Pearland Reuse	City of Pearland Reuse
East Texas Transfer	East Texas Transfer
Expanded Use of Groundwater	Expanded Use of Groundwater (WUG-level projects)
Fairchilds Supply Infrastructure	Fairchilds Supply Infrastructure
Fort Bend MUD 25 GRP	Fort Bend MUD 25 GRP
Fort Bend WCID 2 GRP	Fort Bend WCID 2 GRP
GCWA Coastal Desalination	GCWA Coastal Desalination
	GCWA Shannon Pump Station Expansion
GCWA Groundwater Well Development	GCWA Groundwater Well Development
Harris County MUD 50 SWTP	Harris County MUD 50 SWTP
Industrial Conservation	Industrial Conservation
Irrigation Conservation	Irrigation Conservation
League City Effluent Reuse	League City Effluent Reuse
LNVA Devers Pump Station Relocation	LNVA Devers Pump Station Relocation
LNVA Neches-Trinity Basin Interconnect	LNVA Neches-Trinity Basin Interconnect
Manvel Supply Expansion	Manvel Supply Expansion
Missouri City GRP	City of Missouri City GRP
Montgomery County MUDs 8 and 9 Supply Expansion	Montgomery County MUDs 8 and 9 Supply Expansion
Montgomery County Supply Expansion	Montgomery County Supply Expansion

Water Management Strategy*	WMS Project Name
	SJRA Catahoula Aquifer Supplies
Municipal Conservation	Adv. Municipal Conservation (WUG-level projects)
New / Expanded Contract with BWA	BWA Brackish Groundwater Development
	BWA Transmission and Storage Expansion
New / Expanded Contract with City of Houston	City of Houston EWPP Enhancement
	City of Houston Repump and Groundwater Plant Improvements
	City of Houston Reuse
	Northeast Water Purification Plant Expansion
New / Expanded Contract with GCWA	Allens Creek Reservoir
	GCWA Canal Lining and Loss Mitigation
	GCWA Shannon Pump Station Expansion
New / Expanded Contract with Regional Providers	WUG Infrastructure Expansion (WUG-level projects)
NFBWA GRP	City of Houston Reuse
	NFBWA Phase 2 Distribution Segments
	Northeast Water Purification Plant Expansion
	WHCRWA/NFBWA Transmission Line
NFBWA Member District Reuse	NFBWA Member District Reuse Infrastructure
NHCRWA GRP	City of Houston Reuse
	NHCRWA Distribution Expansion
	NHCRWA Transmission Lines
	Northeast Water Purification Plant Expansion
NHCRWA Member District Reuse	NHCRWA Member District Reuse Infrastructure
Pearland SWTP	Pearland Surface Water Treatment Plant
Richmond GRP	Allens Creek Reservoir
	City of Richmond GRP
Rosenberg GRP	BWA Conventional Treatment Expansion
	City of Rosenberg GRP
Southeast Transmission Line Expansion	SEWPP Expansion
	Southeast Transmission Line Improvements
Sugar Land IWRP	Sugar Land Advanced Demand Management
	Sugar Land IWRP
Texas City Industrial Complex Reuse	Texas City Industrial Complex Reuse
Wastewater Reclamation for Municipal Irrigation	Wastewater Reclamation for Municipal Irrigation
Water Loss Reduction	Water Loss Reduction (WUG-level projects)
Westwood Shores MUD Reuse	Westwood Shores MUD Reuse
WHCRWA GRP	City of Houston Reuse
	Northeast Water Purification Plant Expansion
	WHCRWA Distribution Expansion
	WHCRWA/NFBWA Transmission Line

**WMS and project names included in the TWDB Regional Planning database (DB27) may vary slightly from those shown in this summary table where necessary due to the DB27 data structure and to properly reflect project phasing and project type.*

For many WUGs within the region, conservation and direct reuse projects are considered first-tier options for addressing projected needs; an assessment of need remaining (second-tier) after applying these project types but before applying other projects or WMS is included in ***Tables 5-A5*** through ***5-A7*** in ***Appendix 5-A.*** The compilation of all recommended projects results in as much as 1,651,000 ac-ft/yr for Region H. These allocations are detailed in ***Table 5-A8*** in ***Appendix 5-A***. A summary of water source supply balance after allocation of WMS supplies is shown in ***Table 5-A9*** in ***Appendix 5-A.*** *Table 5-5* below summarizes the key projects selected as part of recommended WMS along with their total potential volume, capital cost, and decade of implementation. These key projects represent substantial supply volumes, large expenditures, or important nodes in WMS supply relationships. Recommended WMS supply volume allocations by general source type are summarized in *Figure 5-2*.

Table 5-5 – Key Project Overview

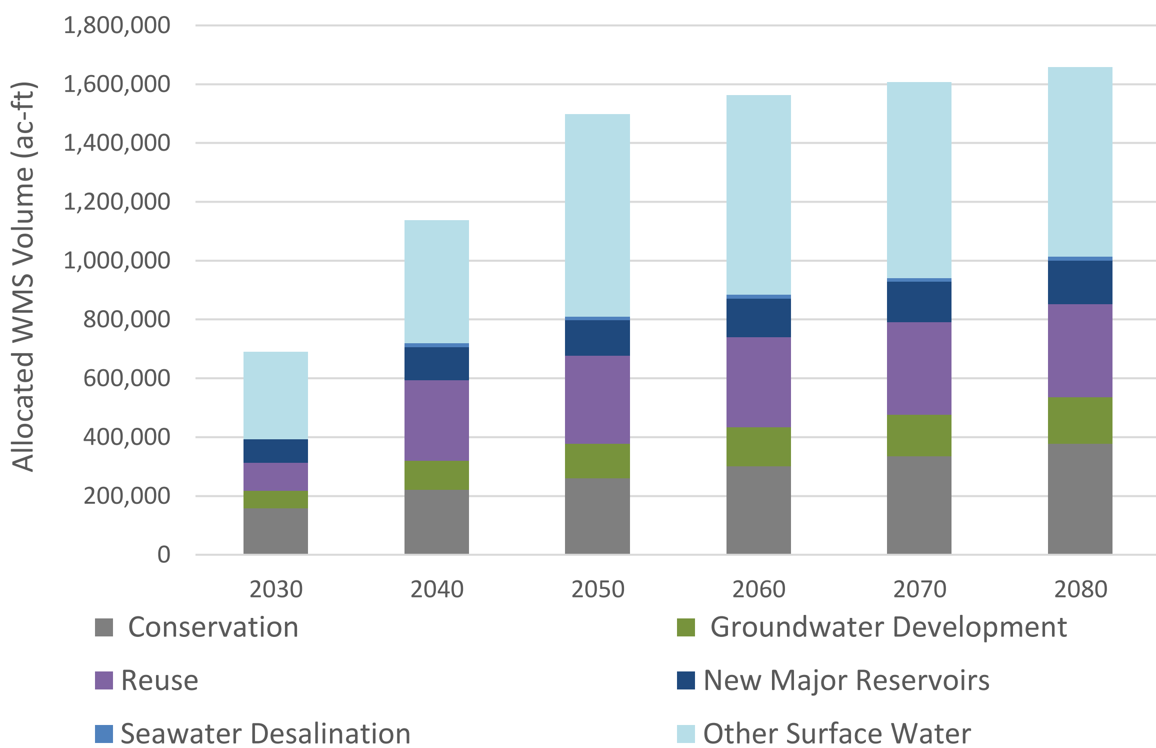
Project	Potential Volume[1] (ac ft)	Capital Cost ($)	Unit Cost ($/ac ft)		Start Decade
			Start Decade	2080	
Conservation[2]					
Industrial Conservation	43,892	$305,856,311	$540	$247	2030
Irrigation Conservation	103,799	$2,521,185	$157	$155	2030
Municipal Conservation (Advanced Conservation)	140,597	$4,130,874,617	$1,770	$617	2030
Municipal Conservation (Water Loss Reduction)	89,637	$1,647,604,552	$761	$726	2030
Conveyance					
BWA Transmission and Storage Expansion	16,800	$84,794,502	$437	$82	2030
CHCRWA Transmission and Internal Distribution	5,466	$22,717,067	$314	$22	2030
City of Houston GRP Transmission	51,789	$260,640,042	$347	$50	2030
City of Houston Transmission Expansion	483,280	$508,742,379	$83	$11	2030
CWA Transmission Expansion	454,720	$497,255,512	$128	$28	2040
East Texas Transfer	250,000	$591,526,599	$189	$23	2050
LNVA Neches-Trinity Basin Interconnect	67,000	$127,821,515	$165	$31	2040
Manvel Supply Expansion	7,840	$62,235,692	$475	$57	2030
NFBWA Phase 2 Distribution Segments	62,496	$129,366,992	$166	$21	2030
NHCRWA Distribution Expansion	143,360	$1,228,464,604	$346	$60	2030
NHCRWA Transmission Lines	143,360	$453,864,685	$255	$32	2030
Southeast Transmission Line Improvements	57,575	$159,151,172	$213	$18	2030
WHCRWA Distribution Expansion	92,288	$391,325,873	$256	$36	2030
WHCRWA/NFBWA Transmission Line	169,030	$622,459,204	$297	$38	2030
Groundwater Development					
Brackish Groundwater Development[3]	Varies	Varies by project	Varies by WUG	Varies by WUG	2030
BWA Brackish Groundwater Development	13,440	$74,055,688	$830	$442	2030
City of Houston Area 2 Groundwater Infrastructure	50,400	$150,754,783	$482	$271	2030
City of Houston Repump and GW Plant Improvements	97,440	$173,600,899	$287	$45	2030
Expanded Use of Groundwater[3]	41,178	Varies by WUG	Varies by WUG	Varies by WUG	2030
Fairchilds Supply Infrastructure	2,128	$103,900,000	$3,337	$862	2030

Project	Potential Volume[1] (ac ft)	Capital Cost ($)	Unit Cost ($/ac ft)		Start Decade
			Start Decade	2080	
GCWA Groundwater Well Development	35,840	$28,564,015	$118	$62	2040
SJRA Catahoula Aquifer Supplies	10,500	$22,386,712	$486	$336	2080
Groundwater Reduction Plans					
CHCRWA GRP[4]	5,466	$0	$0	$0	2030
City of Houston GRP[4]	60,766	$0	$0	$0	2030
City of Missouri City GRP	11,200	$58,835,350	$608	$239	2030
City of Richmond GRP	6,720	$85,626,919	$1,252	$355	2030
City of Rosenberg GRP	3,920	$17,081,984	$344	$37	2030
City of Sugar Land IWRP	16,724	$205,801,341	$1,716	$511	2030
Fort Bend County MUD 25 GRP	1,120	$11,567,244	$784	$58	2030
Fort Bend County WCID 2 GRP	6,720	$71,687,468	$1,144	$393	2030
Montgomery County MUDs 8 and 9 Supply Expansion	2,240	$53,547,608	$3,061	$1,379	2030
Montgomery County Supply Expansion	75,000	$779,670,291	$829	$387	2030
NFBWA GRP[4]	62,496	$0	$0	$0	2030
NHCRWA GRP[4]	143,360	$0	$0	$0	2030
WHCRWA GRP[4]	92,288	$0	$0	$0	2030
Reuse					
City of Houston Reuse	191,139	$820,816,940	$536	$213	2040
City of Pearland Reuse	1,154	$24,161,522	$1,565	$210	2040
League City Effluent Reuse	11,200	$4,686,566	$66	$4	2030
NFBWA Member District Reuse	4,280	$58,450,435	$1,708	$747	2030
NHCRWA Member District Reuse	300	$5,441,580	$2,206	$929	2030
River Plantation Reuse[5]	25	$0	$0	$0	2030
San Jacinto Basin Regional Return Flows[4]	100,445	$0	$0	$0	2030
Texas City Industrial Complex Reuse	11,200	$45,700,000	$344	$57	2040
Wastewater Reclamation for Municipal Irrigation	15,139	$310,466,162	$3,172	$1,458	2030
Westwood Shores MUD Reuse	150	$2,476,273	$2,162	$1,001	2030
Surface Water Development					
Allens Creek Reservoir	99,650	$493,919,561	$279	$47	2040
BWSC Reservoir and Pump Station Expansion	80,000	$452,434,516	$465	$67	2030
GCWA Coastal Desalination	22,400	$283,297,581	$2,207	$1,317	2040
Treatment					
BAWA East SWTP Expansion	13,440	$124,515,458	$868	$217	2030
BWA Conventional Treatment Expansion	8,400	$23,244,186	$400	$205	2030
City of Houston EWPP Enhancement	470,400	$5,000,000,000	$1,492	$744	2040
Harris County MUD 50 Surface Water Treatment Plant	560	$22,804,420	$4,994	$2,129	2030
Northeast Water Purification Plant Expansion	380,800	$2,153,107,392	$649	$355	2030
Pearland Surface Water Treatment Plant	22,400	$261,245,745	$1,170	$349	2030
SEWPP Expansion	134,400	$1,116,248,913	$457	$353	2030

Project	Potential Volume[1] (ac ft)	Capital Cost ($)	Unit Cost ($/ac ft)		Start Decade
			Start Decade	2080	
Other Infrastructure					
Brazos Saltwater Barrier	10,000	$77,571,019	$596	$51	2030
GCWA Canal Lining and Loss Mitigation	8,960	$12,393,000	$111	$13	2030
GCWA Shannon Pump Station Expansion	201,600	$81,410,301	$120	$27	2030
LNVA Devers Pump Station Relocation	88,704	$21,337,986	$21	$4	2030

1. *Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.*
2. *It should be noted that costs for municipal water conservation programs represent a total cost for offsetting a unit volume of water at the point of delivery. A number of strategies require multiple projects or project components (source generation, treatment, transmission, etc.) working in conjunction to meet needs at points of use. Therefore, the additive nature of these costs must be considered when they are compared with and contrasted against conservation programs.*
3. *Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.*
4. *Costs, including construction costs, engineering, legal, and permitting fees, land acquisition, and other capital costs, are included under associated infrastructure projects.*
5. *Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.*

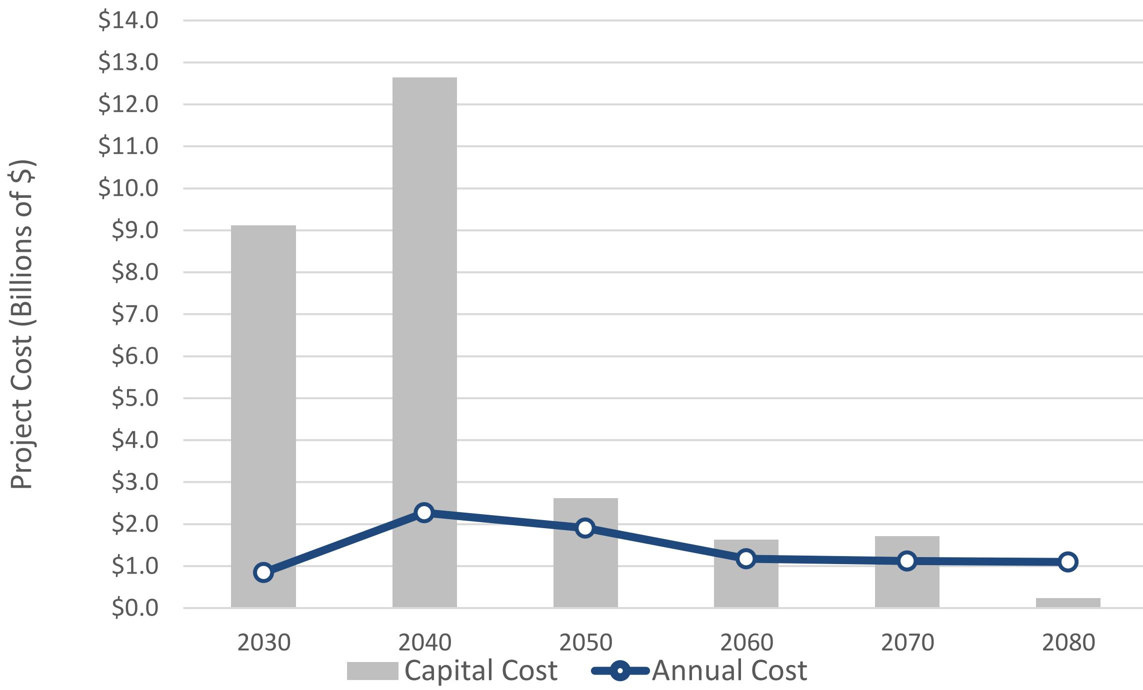
Figure 5-2 – Region H Allocated WMS Volumes by Supply Type



5.5.4 Selected WMS and Project Costs

The total capital costs identified for the 2026 Region H RWP total $27,915,966,646. These costs are distributed over the planning period as shown in *Figure 5-3*. *Figure 5-3* also includes the annual costs anticipated over each decade of the plan. Detailed costs are shown by project in ***Table 5-A10*** and ***Table 5-A11*** in ***Appendix 5-A***.

Figure 5-3 – Region H Capital and Annual Costs



5.5.5 Contractual Relationships

Contracts for raw or treated water represent a major strategy for providing water supply in Region H and other regions that rely on a large number of WWPs in order to facilitate the transfer of developed water to demands. In addition to meeting demands, WWPs are obligated to provide water under the terms of their contracts to customers. These contractual demands are often in excess of actual demands as water providers aim to plan for long-term demands when they acquire new water supplies. Contractual commitments and expansions are detailed in ***Table 5-A12*** of ***Appendix 5-A***.

5.5.6 Management Supply Factor

Guidance for development of the 2026 RWPs includes a requirement for consideration of a Management Supply Factor. This factor represents the quantity to which a WUG is over- or under-supplied based on a multiple of 1. A WUG with all of its demands met with no additional surplus would be represented by a factor of 1.0. WUGs with supplies exceeding or below their demand level would receive a factor above or below 1.0, respectively. The Management Supply Factors for Region H WUGs as a result of applying identified WMS are shown in ***Table 5-A13*** and ***Table 5-A14*** of ***Appendix 5-A***.

5.6 IMPLEMENTATION STATUS OF CERTAIN RECOMMENDED WMS

In accordance with 31 TAC 357.34(g), the RHWPG has summarized available information on the status of implementation of WMS and associated projects recommended in this RWP. These include the following types of strategies:

- any reservoir,
- seawater desalination,
- direct potable reuse providing greater than 5,000 ac-ft/yr in any planning decade,
- brackish groundwater providing greater than 10,000 ac-ft/yr in any planning decade,
- aquifer storage and recovery strategies providing greater than 10,000 ac-ft/yr in any planning decade,
- water transfers to or from out of state, and
- any innovative technology strategies deemed appropriate for evaluation by the RWPG.

The 2026 Region H RWP includes four recommended strategies and projects associated with reservoirs, seawater desalination, or development of large brackish groundwater supplies. The implementation status of these strategies and projects is described in *Table 5-6*. For strategies and projects recommended in earlier decades, sponsors are actively engaged and investigating various aspects of the recommended strategies and projects. In many cases, specific dates are currently uncertain due to the individual development stages of the projects and the uncertainty associated with timelines for permitting and stakeholder coordination. The large-scale development of brackish groundwater supplies by the San Jacinto River Authority is shown by the RWP beginning in the 2080 planning decade, so specific project timelines have not yet been developed. The RHWPG has not recommended any strategies involving interstate transfers, aquifer storage and recovery, nor direct potable reuse in the 2026 RWP, as other strategies identified and evaluated through the Region's process or included in sponsor plans were recommended to meet projected needs without inclusion of these strategy types. However, these options will continue to be examined by the RHWPG in future planning cycles.

The RHWPG has developed conceptual project timelines for the strategies and projects shown in *Table 5-6*, as illustrated in *Figure 5-4*. It should be noted that these are estimates for purposes of the RWP and based upon currently available data and regional planning level assumptions. It is anticipated that actual timing and duration of individual project development phases may vary from that shown as the corresponding projects are designed and implemented. Based on the current status of each project and the associated timeline, it is feasible for each of the strategies and projects shown in *Table 5-6* to be developed by the online decade recommended in this RWP.

Table 5-6 – Implementation Activities Status and Dates of Selected WMS and Projects

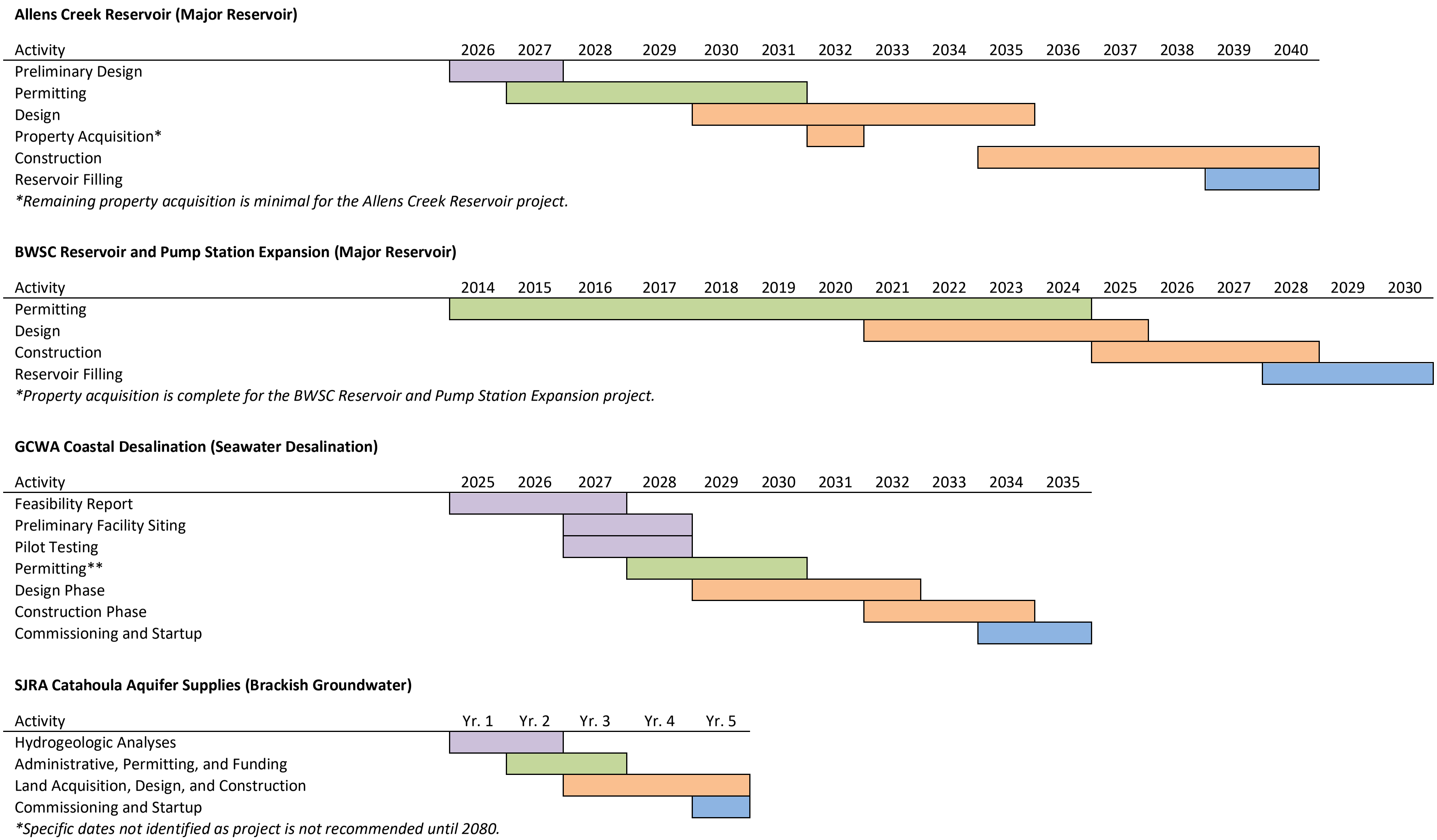
	Project Name:[1,2]	Allens Creek Reservoir	BWSC Reservoir and Pump Station Expansion	GCWA Coastal Desalination	SJRA Catahoula Aquifer Supplies
Regional Water Plan WMS/Project Data	**Associated Water Management Strategy Name**	Multiple WMS	BWSC Reservoir and Pump Station Expansion	Additional Supply from GCWA - Coastal Desalination	Montgomery County Supply Expansion - Other Brackish Supplies
	Project Sponsor(s)	Brazos River Authority	Brazosport Water Authority; Dow Inc	Gulf Coast Water Authority	San Jacinto River Authority
	WMS Project Sponsor Region	H	H	H	H
	Online Decade	2040	2030	2040	2080
	Capital Cost	$493,919,561	$452,434,516	$283,297,581	$22,386,712
	Anticipated Footprint Acreage (acres)	7,000	2,000	< 10	< 5
	Date(s) that the sponsor took an affirmative vote or other action to make expenditures necessary to construct or file applications for state or federal permits (date(s))	4/19/2022 - BRA Board approval to acquire the reservoir project's entire rights from TWDB and the City of Houston, establishing BRA as the project's sole developer and owner.	5/13/2024: submission of application for SWIFT funding for planning, acquisition, design, and construction	No permitting or construction actions to date.	No permitting or construction actions to date.

	Project Name:[1,2]	Allens Creek Reservoir	BWSC Reservoir and Pump Station Expansion	GCWA Coastal Desalination	SJRA Catahoula Aquifer Supplies
Anticipated or Actual Dates Associated with State Water Right Status	Anticipated (or actual) TCEQ application filed	10/19/1999	9/19/2014	Unknown	Unknown
	Anticipated (or actual) state water right permit administratively complete	Unknown	Unknown	Unknown	Unknown
	Anticipated (or actual) draft state water right permit issued	Unknown	Unknown	Unknown	Unknown
	Anticipated (or actual) date final state water right permit issued	2/2/2000	8/24/2015	Unknown	Unknown
Anticipated or Actual Dates Associated with Federal 404 Permit Status	Anticipated (or actual) application for permit filed	Unknown	3/29/2018 (date of public notice)	Unknown	N/A
	Anticipated (or actual) permit issuance	Unknown	11/27/2023	Unknown	N/A
Anticipated or Actual Dates Associated with Desalination Permit Status	Anticipated (or actual) diversion permit issued	N/A	N/A	Unknown	Unknown
	Anticipated (or actual) discharge / disposal permit issued	N/A	N/A	Unknown	Unknown
Other Key Permits	Status of Other Key Permits	Unknown	Unknown	Unknown	Lone Star GCD permit(s) required for well(s). Bed and banks authorization and diversion authorization may be required if brackish groundwater is discharged into a surface water reservoir.

	Project Name:[1,2]	Allens Creek Reservoir	BWSC Reservoir and Pump Station Expansion	GCWA Coastal Desalination	SJRA Catahoula Aquifer Supplies
Status of Geotech / Design Activities	**Description of types and percentage completed of geotechnical/ reconnaissance/ engineering feasibility or other technical, testing, and/or design work etc. performed to date**	0%	Unknown	Sponsor is currently performing a feasibility study.	0%
Status of Land Acquisition	**Percent Land Acquisition Completed**	99%	100%	0%	0%
	Anticipated land acquisition completion date	Unknown	12/2/2011	Unknown	Unknown
Construction Status	**Anticipated start of construction**	9/1/2035	1/2/2025	Unknown	Unknown
	Percent construction completed	0%	0%	Unknown	Unknown
	Anticipated construction completion date	9/1/2040	5/31/2028	Unknown	Unknown
Total Funds Expended to Date	**Rough approximation of the total expenditures, to date, on all activities related to project implementation to date (millions of $s)**	$68.5 million	Unknown	Unknown	Unknown
Other Activities	**Other Significant Activities Completed**	BRA is currently negotiating a contract for professional services to support engineering and permitting efforts, which are anticipated to commence in 2025.	TWDB approved funding for this project through the TWDF and the SWIFT program in June 2024 and July 2024, respectively.	N/A	Unknown

(1) Any date entered that is prior to adoption of the Regional Water Plan is assumed to be an actual date. Other dates indicate anticipated schedule.
(2) "N/A" indicates the permit or activity is not applicable to the strategy / project. "Unknown" indicates that the permit or activity may be applicable, but detailed or date-specific information is not currently available.

Figure 5-4 – Potential Implementation Timeline of Selected Projects



5.7 ALTERNATIVE WATER MANAGEMENT STRATEGIES AND PROJECTS

The RHWPG has not elected to recommend any WMS or projects as Alternative Water Management Strategies.

5.8 REMAINING UNMET NEEDS

Following the development of WMS for the 2026 RWP, certain needs identified in ***Chapter 4*** of the RWP remain unmet. That is, either no WMS was found suitable to apply to these needs, or the application of actual supplies is not allowable under the guidance for RWP development. After the application of WMS recommended by the RHWPG, the needs identified for Irrigation, Livestock, and Mining in a small number of counties in Region H are the only needs which remain unmet. Factors related to agricultural needs, including cost sensitivity, recommendation of irrigation conservation, and potential solutions for agriculture during drought that are not compatible with the guidance for WMS inclusion in a RWP are discussed in ***Chapter 6*** of the RWP. Remaining unmet needs in the 2026 RWP following application of identified WMS and projects are shown below in *Table 5-7*, as well as in in ***Table 5-A15*** and ***Table 5-A16*** of ***Appendix 5-A***.

Table 5-7 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac ft)					
			2030	2040	2050	2060	2070	2080
Irrigation	Brazoria	SJ-B	31,996	32,310	32,402	32,480	32,508	32,526
	Chambers	T	2,904	2,904	2,904	2,904	2,904	2,904
		T-SJ	1,016	1,016	1,016	1,016	1,016	1,016
	Galveston	SJ-B	5,376	5,376	5,376	5,376	5,376	5,376
	Madison	B	45	45	45	45	45	45
		T	70	70	70	70	70	70
Livestock	Brazoria	B	135	140	145	149	152	152
		B-C	21	33	47	55	63	62
		SJ-B	69	105	115	124	127	129
	Galveston	N-T	12	12	12	12	12	12
		SJ-B	184	184	184	184	184	184
	Harris	SJ	499	665	665	665	665	665
		SJ-B	51	51	51	51	51	51
		T-SJ	133	133	133	133	133	133
	Madison	B	111	111	111	111	111	111
		T	860	860	860	860	860	860
Mining	Madison	B	443	443	443	443	443	443
		T	267	267	267	267	267	267

N-T = Neches-Trinity, T = Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B-C = Brazos-Colorado

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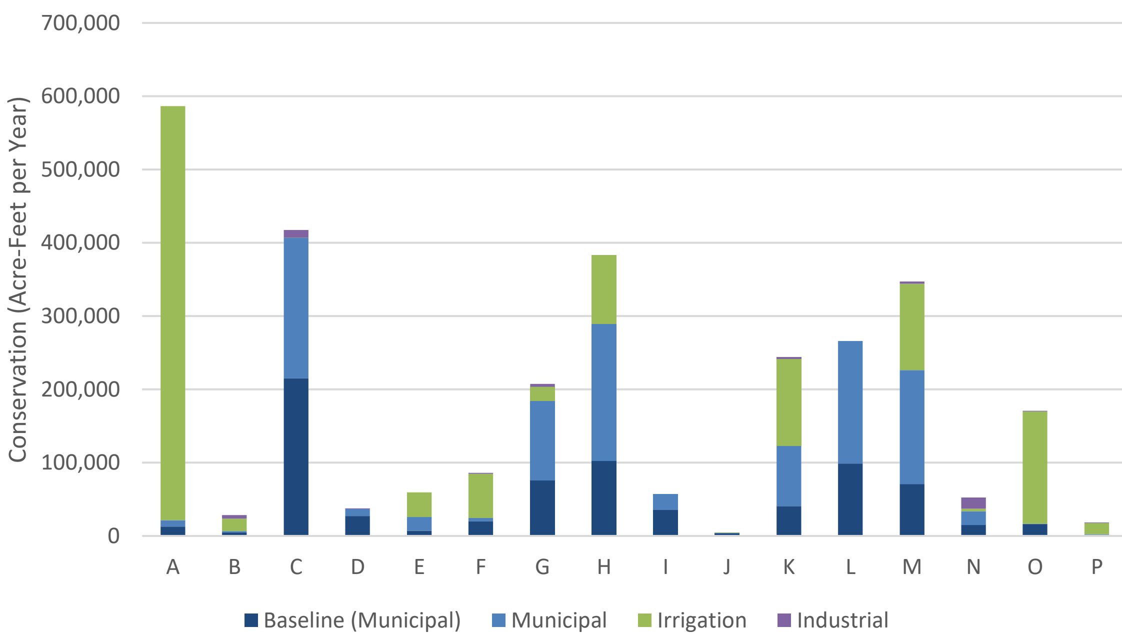
Chapter 5B – Conservation Recommendations

5B.1 INTRODUCTION

Water conservation plays an important role in meeting future water needs across the State of Texas. The 2022 State Water Plan (SWP) identified approximately 977,000 acre-feet of water that could be conserved annually through municipal practices and another 1.2 million acre-feet associated with irrigation use. These savings, along with over 44,000 acre-feet of savings in the industrial sector, were applied above approximately 889,000 acre-feet of baseline annual savings applied by the Texas Water Development Board (TWDB) in the initial development of demand projections. These savings for all regions are shown below in *Figure 5B-1*.

Figure 5B-1 – 2022 State Water Plan Year 2070 Conservation by Region



Conservation has been a prime project choice for regions throughout Texas due to the low cost and scalability of the approach. As Water Management Strategies (WMS) grow more expensive over time, the avoided cost of developing new infrastructure projects becomes more attractive. This is made all the more attractive by the minimal environmental impacts brought about by conservation projects compared to other strategies. Conservation can also be implemented at nearly any level because virtually all communities and demand centers have some potential for enhanced water use efficiency. It is important to note that water conservation in this context is distinctly different from demand curtailment as a part of drought response. The objective of water conservation is to achieve lasting, long-term reductions in water use through improved water use efficiency, reduced waste, and through reuse and recycling. By contrast, demand curtailment is focused on temporary reductions in water use in response to temporary water supply shortages or other water supply emergencies, such as equipment failures caused by excessively high peak water demands.

Senate Bill 1094, enacted by the Texas Legislature in 2003, created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. Members of the Task Force, which were appointed by the TWDB, were a volunteer group of persons with experience in and commitment to using water more efficiently. The Task Force developed *TWDB Report 362 – Water Conservation Best Management Practices Guide*, which outlines specific water conservation best management practices (BMPs) for various water uses. The Task Force was a temporary group, but it has been succeeded by the state Water Conservation Advisory Council, created by the Legislature in 2007. Among its other responsibilities, the Council updates the BMP Guide as needed.

5B.1.1 Challenges

Various challenges exist for the implementation of water conservation practices. Perhaps the most significant is the lack of information regarding the effectiveness of various practices. Traditionally, per-capita demand levels have not been tracked closely, and even when demand levels have been recorded, these values can be difficult to make use of due to the number of variables that may affect per-capita demand. For example, shifts in climate may dramatically influence outdoor water use. The only way to mitigate this data gap is the routine annual collection of data to provide metrics on long-term benefits from conservation practices. This need for data carries over to the regional planning process as well. It is difficult for a Regional Water Planning Group (RWPG) to identify and recommend conservation practices for various Water User Groups (WUGs) within its region without knowledge of incorporated practices and the observed, realized benefits from conservation.

As interest in conservation has increased over time, driven in part by the challenge of procuring new water supplies and the experience of extreme drought, more information on conservation efficacy has become available. Multiple state agencies, including TWDB and the Texas Commission on Environmental Quality (TCEQ), have engaged in extensive efforts to promote water conservation and have greatly expanded the knowledge base available to water systems through studies, development of BMPs, and distribution of educational materials. Recognizing the difficulties involved in quantifying conservation, TWDB and the Water Conservation Advisory Council have prepared a guidance document, titled *Guidance and Methodology for Reporting on Water Conservation and Water Use*, to aid water suppliers in calculating and reporting water use over time. TWDB has engaged in a number of other activities promoting conservation, including:

- The Statewide Water Conservation Quantification Project to evaluate savings of conservation practices in relation to recommended conservation goals in the 2017 SWP.
- Administration of a detailed annual water use survey of municipal and industrial entities within the state, with the data obtained further utilized to develop per-capita usage estimates for WUGs.
- Development of a Municipal Water Conservation Planning Tool (MWCPT) to assist water systems in developing conservation plans.

Other organizations have also enhanced the knowledge base regarding conservation within Texas. The Texas Living Waters Project has examined the outdoor water use characteristics of single-family residential development for the 16 Regional Water Planning Areas in its report *Water Conservation by the Yard: A Statewide Analysis of Outdoor Water Savings Potential*. The Goldwater Project coordinated closely with numerous water systems to quantify water conservation efforts in Region H and contributed substantial information to the assessment of recommended municipal conservation WMS in the 2016 Region H Regional Water Plan (RWP).

There are also challenges associated with the implementation of water conservation at the regional level due to the fragmentation of the water supply system. Regional planning groups are responsible for planning and have no power to enforce or incentivize the recommendations resulting from the planning process. Therefore, producing meaningful results from water conservation requires buy-in at the WUG level from hundreds of entities. When compared to traditional projects that can be sponsored by one or a handful of major stakeholders to produce significant results, conservation is often difficult to form partnerships around.

A lack of buy-in at the lowest levels is often associated with the lack of incentives to conserve. Although the total cost of water delivery, such as treatment and pressure maintenance, is driven by the total volume of water delivered, in many cases the actual cost of water is independent of the volume consumed. In Region H, take-or-pay contracts are typical, and although they are easy to implement, they tend to offer little benefit to customers who conserve water. It is not until additional water must be purchased beyond the existing take-or-pay contract that a WUG would be financially compelled to conserve water to limit the need for contracting additional supply. While municipal conservation should save the utility capital expenses on new or expanded water and/or wastewater projects, there might need to be short-term rate increases depending on how much those rate structures are reliant on base fees.

5B.1.2 Importance of Conservation

Despite the obstacles to implementing conservation projects for mitigating regional demands, the potential benefits make such programs incredibly valuable. Routinely, water conservation programs show up in the regional planning process as some of the lowest-cost strategies available. This avoidance of major infrastructure projects through reducing demands has the potential to delay or even eliminate much more costly programs in the regional plans. For every unit of conservation achieved, there is need for one less unit of raw water, conveyance, treatment, storage, and distribution infrastructure required, causing the cost benefits to add up quickly. Robust conservation efforts can also increase overall system resiliency to challenging conditions, and in some cases may reduce or delay the need for short-term drought contingency response measures during dry conditions.

The benefits of conservation within Region H do not exist merely as hypothetical assumptions, and many water systems that have embraced conservation efforts have seen reductions in per-capita water usage. The Woodlands township has reduced its single-family residential water use by nearly 25 percent between 2009 and 2020, driven by aggressive conservation planning, a defined twice-per-week watering schedule, and enthusiasm for conservation among residents. Similarly, the City of Sugar Land, which has a strenuous conservation program and is embracing additional efficiency measures such as automated metering infrastructure, has reduced per-capita demands by approximately 15 percent between 2016 and 2021. Regional Water Authorities, which encompass large areas in Harris and Fort Bend Counties, have developed robust conservation education and outreach resources which have helped many of their member districts to use water more efficiently. Through the use of advanced technology to assist in leak detection and repair, the City of League City has reduced water loss by over 9 percent. A recent loss reduction initiative by Harris County Fresh Water Supply District 1A saved the system 3.5 million gallons of water in the first six months following leak repairs. These and many other local conservation success stories highlight the importance of conservation measures for the Region's future.

Conservation is a scalable approach that can be applied to WUGs of any size. Typically, larger WUGs with larger water needs can also benefit the most from conservation programs. However, conservation programs have the opportunity to mitigate the need for additional water for virtually all WUGs.

The TWDB has placed a major emphasis on conservation through the implementation of its funding programs. Under the State Water Implementation Fund for Texas (SWIFT), TWDB has set aside at least 20 percent of the program's available funding for projects related to conservation and reuse. Furthermore, the rules adopted regarding the program provide consideration for "entities that have demonstrated water conservation or projects which will achieve water conservation, including preventing the loss of water" and provides opportunities for municipalities to demonstrate this through historical reduction in per-capita demand or water loss. Agricultural projects may also demonstrate successful conservation through proposed projects.

5B.1.3 Continuous Process

Where most water development projects are discrete efforts that result in making a new water supply available, conservation is a continuous process. Conservation benefits are recognized gradually over time and, while this does not allow for rapid implementation of these projects, the long-term impact yields great value for water supply management.

This characteristic of conservation programs is ideally suited to the regional water planning process. As regional planning occurs on a cyclical basis, conservation programs can be continually examined, and projections adjusted to account for trends in past performance. By design, each round of regional water planning examines trends in per-capita demands and therefore benefits from the conservation already implemented at the WUG level. Successful implementation of conservation programs would mean that future rounds of planning could see needs diminishing without the implementation of projects simply due to the reduced demands.

However, in order to achieve these goals, the process requires routine and robust data collection and analysis. This information is required at the regional level to accurately ascertain the extent of conservation benefits and to responsibly guide future projections. At the utility level, it is required to provide metrics of program performance and cost and to give an understanding of what works and what changes need to be made.

5B.2 CONSERVATION IN REGION H

Recognizing the obvious benefits of responsible water management, Region H assigns high priority to the application of water conservation projects. Utilities within Region H are already taking advantage of a wide range of conservation practices, although the level of effort and the associated benefits vary throughout the region. In the scope of regional planning process, conservation projects are applied before other strategies in the RWP and, where appropriate, for WUGs regardless of identified need.

5B.2.1 Recommended Municipal Conservation

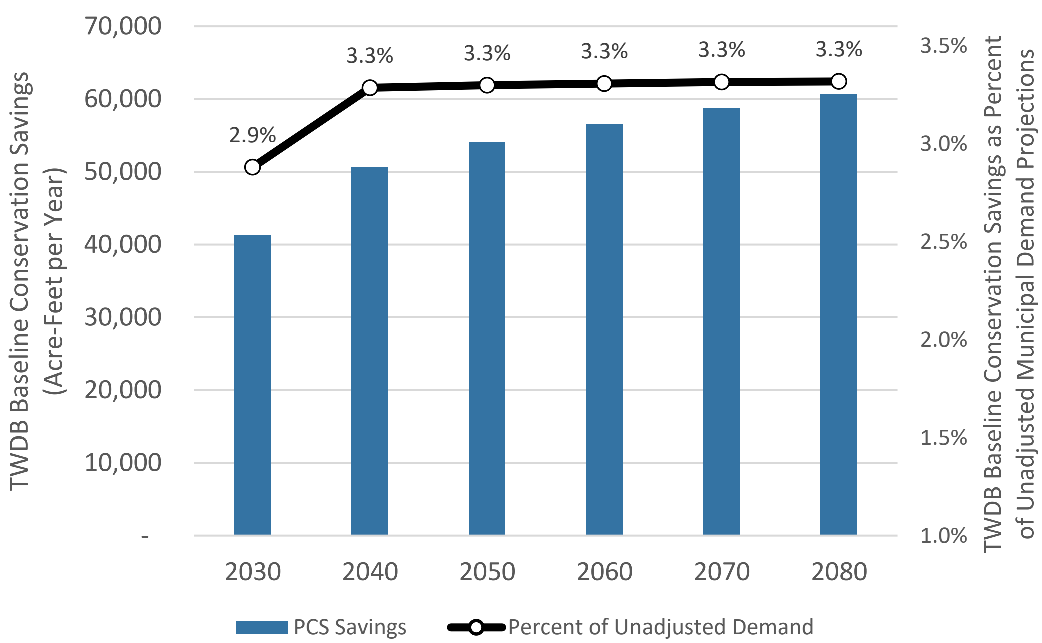
In the 2026 RWP, municipal conservation is divided into Baseline Conservation, Water Loss Reduction, and Advanced Conservation.

5B.2.1.1 Baseline Conservation

Baseline Conservation is developed and applied to total water demands by TWDB staff in the early stages of RWP development. This conservation is described as conservation that is anticipated due to factors outside of the projects identified in regional planning. For instance, there are water savings that are projected to occur due to implementation of plumbing code requirements that favor water-efficient fittings and fixtures. Future savings from replacing faucets and dishwashers were not considered necessary for this current planning cycle, where they had been included in past plans. Given the effective year of plumbing code standards and the lifespan of these items, water efficiency savings from replacements and new installations are expected to be fully realized by 2030. Over time, the projected impacts of plumbing code savings will decline with the adoption of more efficient appliances and fixtures, with full adoption anticipated by 2040.

As older communities age, the legacy fixtures are replaced with more water-efficient ones. Additionally, the availability of higher-efficiency appliances is another factor that may reduce net water demand in the future. TWDB's baseline conservation includes these efficiency enhancements over time by default. Region H has adopted the TWDB recommendations, with limited approved changes, in every cycle of regional water planning. Baseline Conservation savings for Region H are shown in *Figure 5B-2*. It should be noted that Baseline Conservation is not included in WMS recommendations but rather is incorporated into the demand projections for the regional planning process.

Figure 5B-2 – Region H 2026 RWP Baseline Conservation



5B.2.1.2 Water Loss Reduction

Estimates of potential savings as a result of water loss reduction were developed using data from the Water Loss Audit Reports prepared by TWDB for years 2018 through 2022. These reports identified by utility the estimated losses of various types calculated from production and sales records, including apparent losses due to unbilled or unmetered usage, metering accuracy limitations, and other causes as well as real losses from line breaks and leakage. *Figure 5B-3* details these various components of water use in Region H as reported in the 2022 Water Loss Audit Report, which includes data from 187 submitted audits. As demonstrated, real losses represent over 16 percent of the total water input to the region. The 2020 Water Loss Audit Report included data from 590 submitted audits in Region H. The data represented in the 2020 report indicated a lower percentage of overall water loss in Region H than the 2022 report, with real losses accounting for more than 12 percent of water input to Region H.

Figure 5B-3 – Region H Summary from 2022 Water Loss Audit Report

Totals for Region H 187 Audit(s) Submitted Connections (conn) 1,733,912 Population 4,335,462 Length of Main Lines 16,200.09 miles Median Total GPCD 102 Median GPCD Loss 11 **Water Loss Performance** Median Water Loss 33.75 GCD Median Apparent Loss 5.20 GCD Median Real Loss 26.68 GCD	**Total System Input Volume** 201,420,231,104	**Authorized Consumption** 164,208,724,001	**Billed Consumption** 158,638,057,008	**Billed Metered** 158,515,825,458	**Revenue Water** 158,638,057,008
				Billed Unmetered 122,231,550	
			Unbilled Consumption 5,570,666,993	**Unbilled Metered** 3,776,982,838	**Non-Revenue Water** 42,782,174,096
				Unbilled Unmetered 1,793,684,155	
		Water Loss 37,211,507,103 Median 33.75 GCD Water Loss Cost $64,144,543	**Apparent Loss** 4,309,714,279 Median 5.20 GCD Apparent Loss Cost $28,620,668	**Unauthorized Consumption** 396,582,047	
				Customer Meter Accuracy Loss 3,507,628,299	
				Data Handling Errors 405,503,933	
			Real Loss 32,901,792,824 16.3% Median 26.68 GCD Real Loss Cost $35,523,875	**Reported Breaks and Leaks** 1,418,549,280	
				Unreported Loss 31,483,243,544	

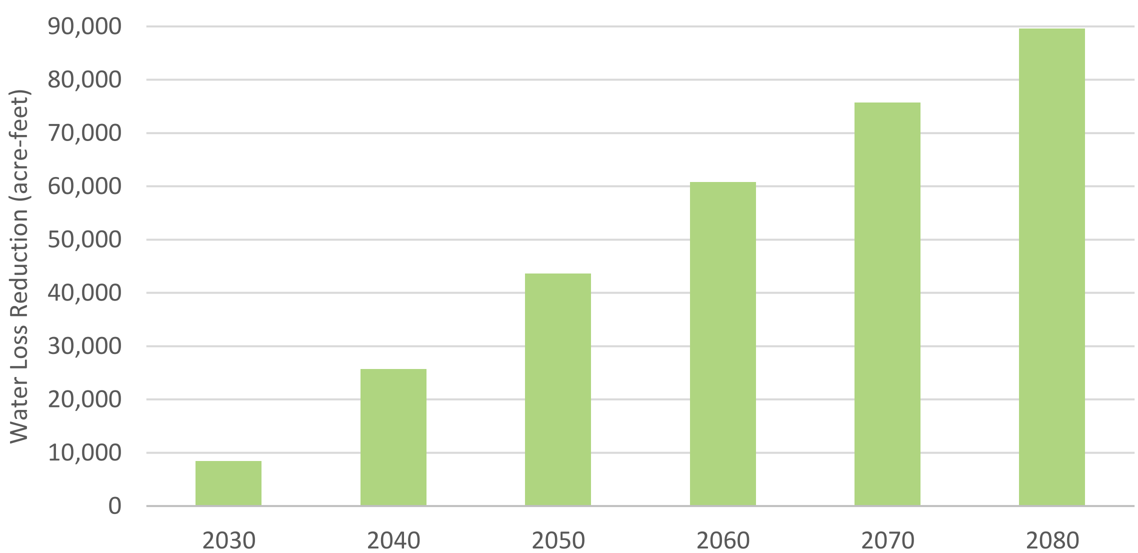
For the 2026 RWP, the Region H Water Planning Group (RHWPG) identified utilities with real losses greater than 10 percent as potential targets for water loss reduction. Utilities meeting this criterion were assumed to reduce the fraction of their demands attributable to real loss by one percent annually throughout the planning period or until they reached the threshold level of 10 percent real loss. No additional water loss reduction was applied to utilities with water loss identified at or below 10 percent. For the utilities which were identified as potential targets, reductions in water loss from this methodology would reduce per-capita demands, expressed in gallons per-capita daily (GPCD), for individual WUGs as shown in *Table 5B-1*. The total volume of potential savings from this methodology are shown below in *Figure 5B-4*, and a detailed summary of savings by individual WUGs can be found in **Appendix 5B-A**.

It should be noted that the recommended water loss reduction values presented in the 2026 RWP are intended to reflect a conservative estimate of potential savings and are not intended to depict a 10 percent real loss rate or one percent per year reduction in loss rate as ideal system performance. Systems may wish to consider more aggressive implementation of loss reduction programs than the conservative recommendation reflected in the RWP, including higher per-year reductions or implementation or continuation of reduction efforts below a 10 percent real loss rate. More aggressive programs would facilitate greater overall water savings, with particularly notable additional benefits in early decades. It should also be noted that systems may structure water loss targets in many potential ways besides as a percentage-based goal, such as loss per connection; in recent years, TWDB's water loss audit reporting has focused largely on total and per-connection losses, and this data is available to water systems to assist them in their planning. The RHWPG recommends that all utilities perform regular system audits, aggressively strive to reduce the inefficient and costly leakage loss of water, and establish procedures to rapidly address line breaks. Additional resources on auditing and guidance on best practice can be found on TWDB's website at *https://www.twdb.texas.gov/conservation/municipal/waterloss/index.asp*.

Table 5B-1 – Impact of Water Loss Reduction on Per-Capita Demands for Individual WUGs

Reduction in Per Capita Demand (GPCD)	2030	2040	2050	2060	2070	2080
Minimum WUG Savings	0	0.1	0.1	0.1	0.1	0.1
Median WUG Savings	1.2	3.6	5.8	7.5	8.7	9.5
Average WUG Savings	1.5	4.2	6.6	8.6	10.2	11.5
Maximum WUG Savings	5.6	16.1	25.6	34.3	42.0	49.1

Figure 5B-4 – Region H 2026 RWP Water Loss Reduction



5B.2.1.3 Advanced Conservation

In the 2026 RWP, Region H identifies Advanced Conservation as methods for municipal demand reduction beyond Baseline Conservation, excluding those applied as part of Water Loss Reduction. The estimated water savings from Advanced Conservation methods were developed using the Region H Municipal Regional Conservation Tool (MRCT), which is based largely on the methods, savings, and cost assumptions in the MWCPT, developed in 2018 by TWDB to assist utilities in water conservation planning and reporting. The MRCT was adapted to account for local water use characteristics and additional information specific to Region H. Because Baseline Conservation savings attributed to residential plumbing codes are already embedded in RWP water demand projections, the analysis for Advanced Conservation focused primarily on measures to reduce outdoor water use, which is a major driver of overall local municipal demand. Most of these measures are expected to reduce demand by single-family customers of water suppliers through measures such as rebate programs and distribution of home water reports, among others. Consideration was also given to some advanced indoor measures for commercial facilities. Additionally, mandatory outdoor watering restrictions were applied to municipal WUGs with the exception of the Woodlands, which already utilizes permanent outdoor watering restrictions. A 2018 report by the Texas Living Waters Project estimates that restrictions on outdoor municipal watering could save two percent to 11 percent of total municipal water use, depending on the amount of education and enforcement implemented by a water utility. Projected savings for the 2026 Region H RWP were based on the assumption that all connections would implement a twice-per-week watering restriction, resulting in overall savings of two percent of demand. In order to account for the potential for different levels of implementation and water system customer compliance, particularly in the early stages of a watering restriction program, estimates for Region H apply the lower end of the savings spectrum identified by the Texas Living Waters Project; utilities that implement conservation programs early on with a significant amount of education and enforcement could see even greater savings of water.

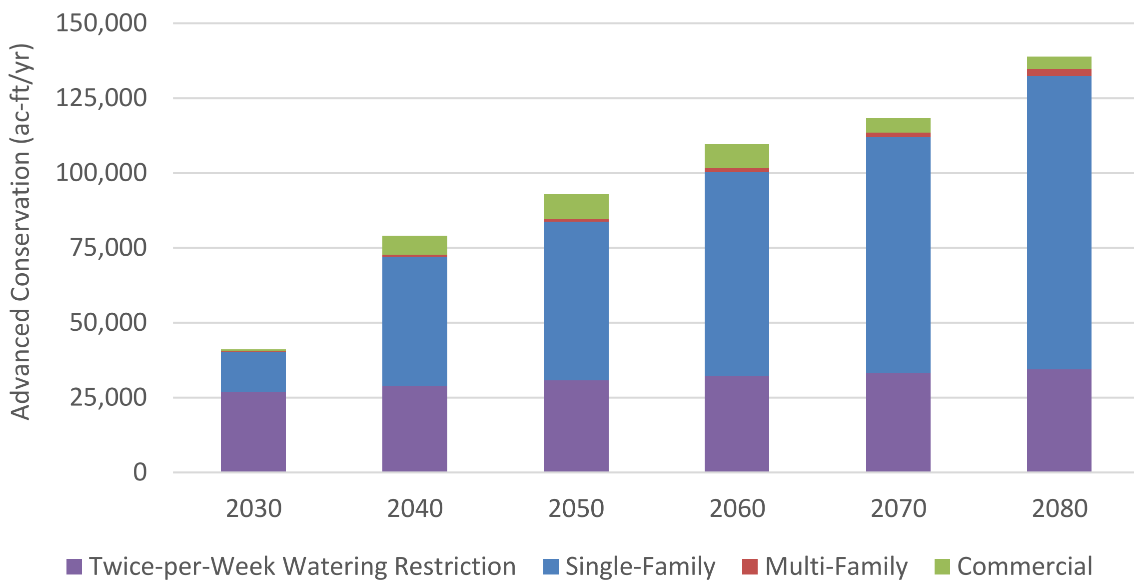
While mandatory outdoor watering restrictions were applied to all municipal WUGs in Region H, other measures were implemented at varying levels for different WUGs. Because the financial resources and savings potential varies widely among WUGs, municipal WUGs were grouped into three categories (small, medium, and large) based upon population, with these further divided into categories of low, mid, and high savings potential based upon per-capita demand after the inclusion of baseline savings assumed by TWDB each decade. This categorization acknowledges that larger WUGs would likely have greater resources available to implement a broader range of measures at a more aggressive rate, while smaller WUGs may be limited to more gradual programs. Additionally, WUGs with higher per-capita demands offer the greatest potential for conservation savings, while those with low per-capita demands may have limited savings potential or, through existing proactive conservation programs, have already substantially reduced water use. Population thresholds of 10,000 and 100,000 persons served were used to categorize WUGs by size, and per-capita demand thresholds of 120 GPCD and 220 GPCD were used to indicate the WUG’s potential for conservation savings. This methodology is discussed in more detail in the technical memorandum for Municipal Conservation found in **Appendix 5-B**.

Table 5B-2 describes the impact on per-capita demands of individual WUGs by the advanced conservation measures recommended by Region H. The resulting savings are shown below in *Figure 5B-5*, and a detailed summary of savings by individual WUGs can be found in **Appendix 5B-B**.

Table 5B-2 – Impact of Advanced Conservation on Per-Capita Demands for Individual WUGs

Reduction (GPCD)	2030	2040	2050	2060	2070	2080
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Median	4.2	6.5	7.0	7.9	8.4	9.5
Average	4.6	7.2	7.9	8.8	9.2	10.3
Maximum	18.9	26.9	31.8	34.9	34.8	39.1

Figure 5B-5 – Region H 2026 RWP Advanced Conservation

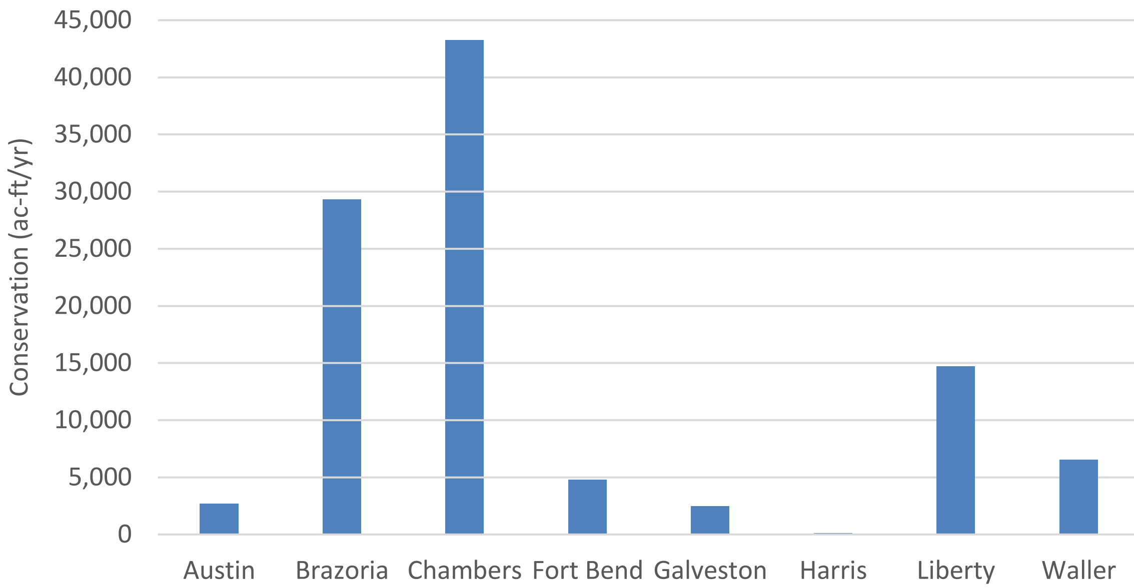


5B.2.2 Recommended Non-Municipal Conservation

In addition to being a major population center, Region H is also filled with competing, non-municipal water demands that may also benefit from water-efficient practices. Irrigation users have limited opportunity to fund substantial infrastructure projects to develop new water supplies. For these WUGs, conservation presents an affordable opportunity to maximize limited water supplies during drought of record conditions. Irrigation conservation methods recommended in the 2026 RWP include off-farm techniques (lining canals) as well as the incorporation of on-farm BMPs (laser leveling, reduced levee intervals, etc.) in eight counties. The potential savings from irrigation conservation are shown below in *Figure 5B-6*, for a total of 103,799 ac-ft/yr in all planning decades. TWDB provides extensive information on agency resources for agriculture and associated agricultural conservation BMPs at *https://www.twdb.texas.gov/conservation/BMPs/Ag/index.asp*.

Region H is also a major industrial nexus, not only within Texas, but on a global scale, and as a result exhibits a large water demand for multiple manufacturing sectors. Industries within the Region already exercise water efficiency practices, including extensive process water recycling. The detailed analysis of per-facility usage performed as part of the analysis of industrial conservation for Region H showed that ongoing water efficiency efforts by local industries have already had positive results. As demands grow over time, identifying and implementing opportunities for additional industrial water efficiencies will be important. The 2026 RWP recommends industrial conservation through changes in manufacturing processes, industrial audits, system submetering, loss reduction, efficient fixture upgrades, or other measures. The associated water savings is estimated to be approximately an additional 43,892ac-ft/yr by 2080. TWDB provides extensive information on agency resources for industrial conservation BMPs at *https://www.twdb.texas.gov/conservation/BMPs/index.asp*.

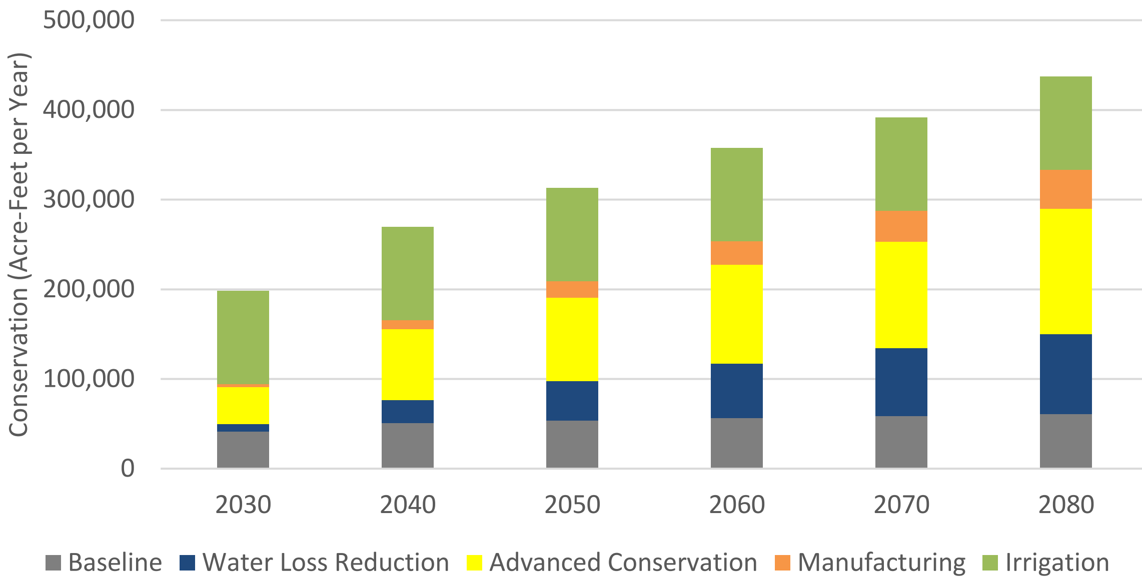
Figure 5B-6 – Region H 2026 RWP Non - Municipal Conservation



5B.2.3 Total Impact of Recommended Conservation in Region H

Collectively, conservation represents a major water management strategy for Region H. The total amount of recommended conservation exceeds the level applied in the 2021 RWP. In particular, more aggressive rates of implementation of advanced municipal conservation in early decades and inclusion of additional measures such as automated meter infrastructure are being recommended in the 2026 RWP, as compared to the implementation approach in the previous plan. Industrial conservation, which was not recommended in the 2021 RWP due to concerns regarding the manufacturing projections for that cycle, is included as a recommended strategy in the 2026 RWP. Recommended conservation for the 2026 Region H RWP is summarized in *Figure 5B-7*.

Figure 5B-7 - Total Region H 2026 RWP Conservation



As Baseline Conservation is applied to total water demand rather than the net water demands generally discussed in plan development, it is necessary to describe the impact of these demand reductions in terms of total demand. Meanwhile, Water Loss Reduction and Advanced Conservation are applied to the net demand after Baseline Conservation is applied, meaning their impacts can be compared against the net demand. The actual impacts of all municipal conservation methods are described below in *Table 5B-3*.

Table 5B-3 – Summary of Municipal Conservation Impacts by Decade

Conservation Metric	Basis	2030	2040	2050	2060	2070	2080
Baseline Conservation	% of Total Demand	2.9%	3.3%	3.3%	3.3%	3.3%	3.3%
Water Loss Reduction	% of RWP Net Demand	0.6%	1.7%	2.8%	3.7%	4.4%	5.1%
Advanced Conservation		3.0%	5.3%	5.9%	6.7%	6.9%	7.9%
Total Additional Conservation (Water Loss + Advanced		*3.6%*	*7.0%*	*8.6%*	*10.3%*	*11.4%*	*12.9%*
Total Conservation Methods (Baseline + Water Loss + Advanced	**% of Total Demand**	**6.4%**	**10.1%**	**11.6%**	**13.3%**	**14.3%**	**15.8%**

Based on the projected Baseline Conservation, net per-capita demands in the RWP decrease slightly with each decade for most municipal WUGs. The RWPG anticipates that most WUGs will experience some reduction in average per-capita water use over the 50-year planning horizon, and per-capita demand goals reflect the expectation that WUGs will, at a minimum, achieve the reduction in water use projected by TWDB as part of Baseline Conservation. Additionally, the RWPG strongly encourages water providers to actively pursue methods to reduce per-capita water demand, such as Water Loss Reduction and the measures recommended in the Advanced Conservation strategies. The projected per-capita demand after implementation of such strategies may be considered as the target gallons per-capita daily goal for municipal WUGs in Region H. However, the ability of individual utilities to implement recommended strategies may vary, and the RHWPG recognizes that actual conservation may result in future per-capita demands that are smaller or larger than these goals. Additionally, the per-capita demand targets recommended in Region H are specifically related to the drought-of-record conditions assessed throughout the RWP. Demands in an average year may be greater or less than dry-year demands, depending on the specific nature of water use within each utility's service area. As a result, these recommendations are not intended to be compared to the demand goals set by many entities in their water conservation plans, as discussed in the following sections. Actual per-capita demands will also vary among individual utilities represented by County-Other municipal WUGs. The per-capita demand goals for each municipal WUG in Region H can be found in **Appendix 5B-C**.

5B.2.4 Current Conservation Efforts in Region H

Conservation efforts vary across Region H. It is noted that different utilities take various levels of interest in effectively developing, deploying, and measuring their conservation programs. The variation between utilities is demonstrated in the numerous approaches to water conservation plans (WCPs) prepared by Region H water suppliers. In current conservation efforts, Region H water suppliers commonly adopted variations of BMPs recommended by TWDB within their WCPs. BMPs are measures that water users can choose to implement in order to achieve water conservation goals and benchmarks. BMPs are voluntary measures intended to save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specific time frame. The TWDB has extensive resources describing water conservation BMPs applicable to various water use sectors (agricultural, commercial/institutional, industrial, municipal, and wholesale) that entities can choose to apply in their water conservation efforts.

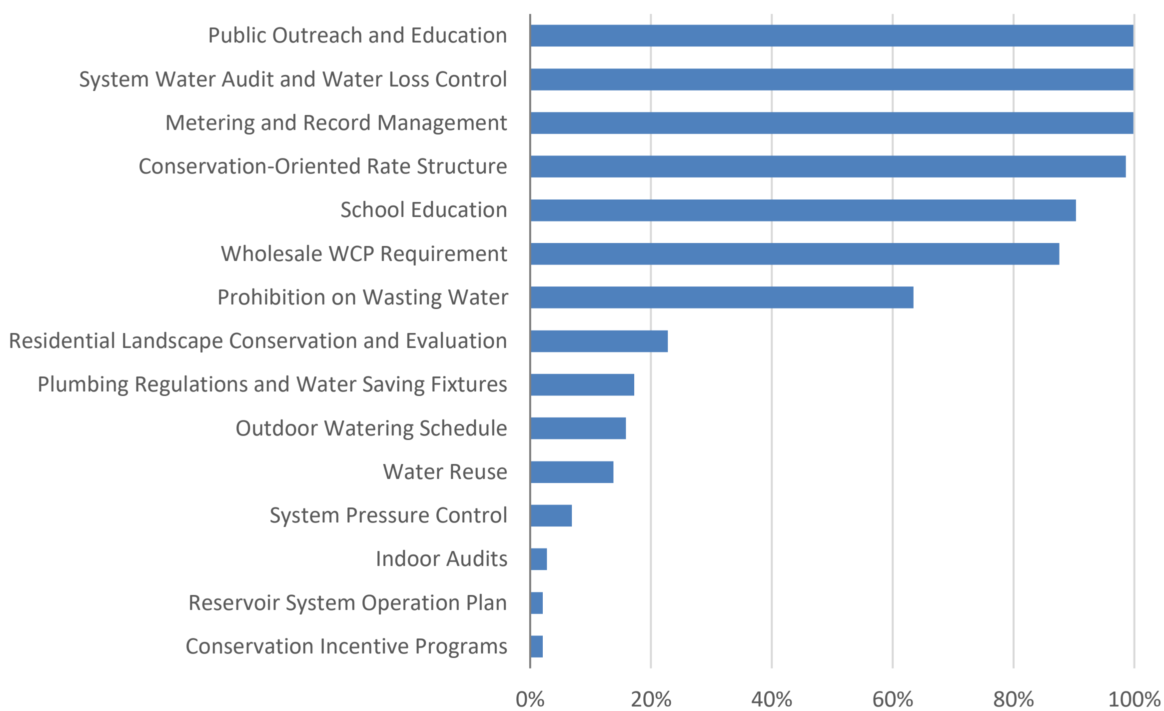
In order to quantify current conservation efforts within Region H, WCPs adopted by 145 water systems in Region H during the period 2020 to 2024 (inclusive) and provided to the RWPG were reviewed to assess water conservation practices and water savings goals. Based on this review, 15 common water conservation practices were identified, of which 12 were recommended by at least five percent of water systems. These practices primarily correspond to the TWDB water conservation BMPs; however, they have been adapted to fit the specific needs of entities within Region H. *Table 5B-4* includes a list and description of these practices.

Table 5B-4 – Common Conservation Practices in Water Conservation Plans Within Region H

Conservation Practice	Description
Metering and Record Management	Master metering to measure and account for the amount of water produced or received from the source(s) of supply, universal metering of customers and public use, and maintenance of a detailed record management system of water deliveries.
System Water Audit and Water Loss Control	Programs to determine unaccounted for uses of water, including periodic visual inspections along distribution lines, annual or monthly audits of the water system to determine illegal connections, investigation of abandoned services, and continuous programs of leak detection, repair, and water loss.
Conservation-Oriented Rate Structure	Adoption of conservation-oriented water rate structures that encourage water conservation and discourage excessive use and waste of water, such as an increasing block rate.
Conservation Incentive Programs	Incentivized programs offered to customers that promote water conservation, including funding opportunities for upgrading infrastructure or irrigation systems, as well as rebates for irrigation system upgrades and evaluations.
Indoor Audits	Programs to identify areas of water use inefficiency and loss within the home that could be mitigated through repair or adjustment.
Residential Landscape Conservation and Evaluation	Use of water conserving landscape techniques (e.g., "Water Wise" landscape design), irrigation system updates, or residential landscape evaluations offered by licensed irrigators.
School Education	Informational programs conducted at local schools to educate students about water conservation.
Public Outreach and Education	Educational programs implemented to promote water conservation to the general public, including publication of water conservation literature, distribution of educational materials to water customers on-line or through mail, and education programs for users at a public place.
Plumbing Regulations and Water Saving Fixtures	Adoption of plumbing codes and ordinances; implementation of plumbing retrofit programs, water-conserving plumbing fixtures installed in new construction and in the replacement of plumbing in existing structures.
Prohibition on Wasting Water	Enforcement of ordinances prohibiting water theft and wasteful water use activities.
Water Reuse	Direct or indirect water reuse efforts are implemented in the current system or reuse adoption is encouraged and/or supported by the utility.
Outdoor Watering Schedule	Voluntary or mandatory outdoor watering restrictions in effect on designated days and times during a week.
System Pressure Control	Programs for pressure control and/or reduction in the distribution system, adequate operational pressure determined for the system.
Wholesale WCP Requirement	Wholesale water provider requires and/or supports that customers develop and submit a water conservation plan with all applicable rules of the TCEQ.
Reservoir System Operation Plan	Use of reservoir operation plan to conserve water support conservation by related customer entities.

Based on the analysis of WCP documents submitted to the RHWPG, the adoption rates of various practices in WCPs within Region H are summarized in *Figure 5B-8*. Popular approaches to conservation (those with an adoption rate of greater than 80 percent) include metering and record management, system auditing and water loss control, conservation-oriented rate structures, application of wholesaler WCP requirements, public outreach and education, and school education. Prohibitions on wasting water are also included in more than 50 percent of WCPs. Water reuse, outdoor watering schedules, implementation of plumbing regulations and water saving fixtures, and residential landscape conservation and evaluation have also been adopted, although at a less consistent rate (10 to 50 percent of WCPs). Water system control, indoor audits, reservoir system operation plans, and conservation incentive programs are rarely prescribed (less than 10 percent of WCPs). Furthermore, in the majority of WCPs, wholesale water providers (WWPs) require their customers to develop and submit a WCP in accordance with the rules of TCEQ and TWDB. The RWPG encourages WWPs to coordinate with their customers on developing and implementing their WCP and water conservation measures.

Figure 5B-8 – Percentage of Common Practices in Region H Water Conservation Plans



Over 90 percent of the 145 water systems that submitted WCPs established five and ten-year goals for water savings. *Table 5B-5* shows a statistical summary of the five- and ten-year water savings goals from the submitted WCPs. Common water savings goals include targets for GPCD, total GPCD reduction, residential GPCD, and water loss (GPCD and / or percentage). Many entities developed these goals based on the historic water use and non-revenue water (water losses) within their individual systems, which differ in scale and demand type. As a result, the water savings goals set by the different water systems vary significantly.

Table 5B-5 – Summary of Water Conservation Goals in Region H Water Conservation Plans

Water Savings Goal Type	Number of WCPs that Set Goal Type	5 Year			10 Year		
		Min	Average	Max	Min	Average	Max
Target GPCD (GPCD)	103	39	134	780	38	133	750
Target Reduction (GPCD)	24	1	4	10	1	10	40
Water Loss Goal (%)	126	0%	6%	29%	0%	6%	23%

5B.2.5 Water Conservation Planning

The RHWPG recognizes the benefits of conservation as part of a diverse water management portfolio. For this reason, the RHWPG recommends water providers take special care in preparation of conservation programs which include the development of useful, comprehensive water conservation plans.

The RHWPG recommends the conservation plan development process begin with the templates developed by the TCEQ. These templates have been developed for specific types of water providers and users and form a strong basis for development of conservation plans. The templates and other resources related to conservation planning may be found at the following location:

https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html.

The RHWPG also recognizes and would like to stress that conservation efforts do not end at the development of conservation plans. It is imperative that conservation planning go beyond the statutory requirements to develop plans and perform required reporting. It is essential that utilities seek to identify and apply effective, meaningful conservation practices that are suited to their specific needs and customer base. In addition, regular review of conservation progress and performance is required in order to accurately adjust plans and practices in order to achieve meaningful goals. The RHWPG encourages water providers to consider specific end uses of water, as well as land use, within their systems both in the development of conservation programs and in monitoring the efficacy of those programs. Conservation plans should be regularly reviewed even between required submittal deadlines and adjusted, as necessary, to optimize programs on a cost-benefit basis.

One factor that should be considered when examining a water conservation strategy is the cost of water. Developing an effective, meaningful water rate structure can not only encourage responsible water use but can also aid in the funding of future projects. There are many resources available to assist in this process. One resource has been developed by the Sierra Club in conjunction with the University of North Carolina and can be found online:

http://texaslivingwaters.org/wp-content/uploads/2014/03/Texas-Rate-Report-2014-Final-1.pdf.

The Alliance for Water Efficiency has also developed a handbook on designing water rate structures, which can be accessed online as well:

https://www.financingsustainablewater.org/tools/building-better-water-rates-uncertain-world.

Finally, it is absolutely essential to distinguish the purposes of water conservation plans and drought contingency plans. Each of these documents serves an important purpose in managing water resources but they are often confused and improperly associated in planning efforts. Utilities should remember to consider water conservation practices that encourage long-term reductions in water use that can be continued on a sustainable basis. Effective conservation plans should promote gradual and consistent reduction in water use over the life of the plan. Short-term measures that curtail water use to meet emergency drought conditions are discussed in greater detail in ***Chapter 7***.

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Chapter 6 – Impacts of the Regional Water Plan

6.1 IMPACTS OF WATER MANAGEMENT STRATEGIES AND PROJECTS ON KEY WATER QUALITY PARAMETERS IN THE STATE AND IMPACTS OF MOVING WATER FROM AGRICULTURAL AND RURAL AREAS

The development of the Region H Regional Water Plan (RWP) is part of a consensus-based planning effort to include local concerns in the statewide water supply planning process. This chapter addresses:

- Impacts of Water Management Strategies (WMS) and Projects on Key Parameters of Water Quality,
- Impacts of Moving Water from Rural and Agricultural Areas,
- Descriptions of How Regional Water Plans Are Consistent With The Long-Term Protection of The State's Water, Agricultural, and Natural Resources, and
- Socio-Economic Impacts of Not Meeting Identified Needs

As defined by the rules and guidance for regional water plan development, the concept of a "project" refers to specific infrastructure that is used to increase or manage water supplies. Projects may be associated with one or more WMS and, similarly, a WMS may consist of one or more projects. References in the discussion below to WMS should be considered inclusive of the associated concept of projects.

6.1.1 Impacts of Water Management Strategies and Projects on Key Parameters of Water Quality

The potential impacts that WMS and associated projects may have on water quality are discussed in this section, including the identified water quality parameters which are deemed important to the use of the water resources within the region. Under the Clean Water Act, Texas must define designated uses for all major water bodies and, consequently, the water quality standards that are appropriate for that designated water body use. The water quality parameters which are listed for Region H below were selected based on the *TCEQ Water Quality Inventory for Designated Water Body Uses* as well as the water quality parameters identified in the Texas Commission on Environmental Quality (TCEQ) 303d list of impaired water bodies. For reference purposes, ***Appendix 6-A*** contains the TCEQ 303d list of impaired waters within the region. Throughout this process, plan development was guided by the principle that the designated water quality parameters and related water uses as shown in the state water quality management plan shall be improved or maintained.

Key surface water parameters identified within Region H fall into two broad categories:

Nutrients and non-conservative substances:

- Bacteria
- pH
- Dissolved Oxygen
- Total Suspended Solids (TSS)
- Temperature
- Nutrients (Nitrogen, Phosphorus)

Minerals and conservative substances:

- Total Dissolved Solids (TDS)
- Chlorides
- Mercury
- Salinity
- Sediment Contaminants

Non-conservative substances are those parameters that undergo rapid degradation or change as the substance flows downstream, such as nutrients which are consumed by plant life. Nutrient and non-conservative loading to surface water originates from a variety of natural and man-made sources. One significant source of these loads is wastewater treatment facilities. As population increases, the number and size of these wastewater discharges will likely increase as well. Stormwater runoff from certain land use types constitutes another significant source of nutrient loading to the region's watercourses, including agricultural areas, golf courses, residential development, and other landscaped areas where fertilizers are applied. Nutrient loads in Region H are typically within the limits deemed acceptable for conventional water treatment facilities and are therefore not considered a major concern as related to source of supply.

Conservative substances are those that do not undergo rapid degradation or do not change in water as the substance flows downstream, such as metals. Mineral and other conservative substance loading to surface water generally originates from three sources: (1) non-point source runoff or groundwater seepage from mineralized areas, either natural or man-made, (2) wastewater discharges, and (3) sea water migration above estuaries. Region H is fortunate in that the first category is not typical of this area except for the Brazos River, which has several natural salt-contributing areas; fortunately, flows in the lower basin generally are sufficient to dilute these sources to easily manageable concentrations. Wastewater discharges, and industrial discharges in particular, have improved over historical levels due to enforcement and the implementation of projects compliant with appropriate standards. If local concentrations of conservative contaminants beyond an acceptable standard are identified, they are remediated by the appropriate agency. Salinity migration above estuaries is controlled in the Trinity River by the Wallisville Saltwater Barrier and in the San Jacinto River by the Lake Houston Dam. The 2026 Regional Water Plan recommends a saltwater barrier be added above the Brazos estuary to protect water quality in that reach of the Brazos River as well. Additionally, sediment contaminants can provide particulate matter that can encourage the growth of blue-green algae (cyanobacteria). Sand mining in particular has led to increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels.

Groundwater in Region H is generally of good quality with no usage limitations. Quality parameters of interest include Total Dissolved Solids (TDS), metals, and hardness. Portions of the Carrizo-Wilcox Aquifer can contain levels of iron that require sequestering or removal through treatment facilities. The Brazos River Alluvium is directly recharged from the base flow in the Brazos River and has the potential to reflect any contaminant loading of the Brazos River. Portions of the aquifer currently experience elevated TDS and hardness.

Water quality of the Gulf Coast Aquifer is generally good throughout the region. The Chicot and Evangeline formations are capable of yielding moderate to large amounts of fresh water in most of the region. Fresh water is overlain and underlain by saline water in coastal areas, and the coastal deposits are not capable of yielding fresh water. Deeper formations throughout the region are able to supply limited freshwater and slightly saline water in updip areas.

Some localized sites within the region have the potential to cause contamination of the aquifer under adverse conditions. These sites formerly generated surface water pollution which, if not properly handled, could cause contamination of local soils or shallow groundwater supplies. Except for the northern areas of the region, the thickness of the near-surface clay soils located over much of the region provide an effective barrier to deeper aquifer contamination due to normal infiltration. As a consequence, the primary risk for groundwater contamination in the Gulf Coast Aquifer occurs if there are improperly designed or inadequately sealed wells which are exposed to this surface contamination. Localized shallow alluvial aquifers primarily located along the major streams such as the Brazos River are at greater risk for contamination from these sites as a result of the more direct travel paths for potential contaminated water to reach these areas, especially if they are being pumped by small household or livestock wells. At this time, there are no recorded incidents of contaminated groundwater in the region as a result of these sites.

The WMS and projects selected by the Region H Water Planning Group (RHWPG) were evaluated to determine their impacts on water quality. This evaluation used the data available to compare current conditions to future conditions with Region H management strategies in place. The key recommended management strategies, as described in ***Chapter 5*** of this report and used in this evaluation, are listed below in *Table 6-1*.

Table 6-1 – Key Recommended Water Management Strategies and Projects

Conservation
Advanced Municipal Conservation
Industrial Conservation
Irrigation Conservation
Water Loss Reduction
Conveyance
BWA Transmission and Storage Expansion
CHCRWA Transmission and Internal Distribution
City of Houston GRP Transmission
City of Houston Transmission Expansion
CWA Transmission Expansion
East Texas Transfer
LNVA Neches-Trinity Basin Interconnect

Manvel Supply Expansion
NFBWA Phase 2 Distribution Segments
NHCRWA Distribution Expansion
NHCRWA Transmission Lines
Southeast Transmission Line Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Brackish Groundwater Development and Groundwater Blending
BWA Brackish Groundwater Development
City of Houston Area 2 Groundwater Infrastructure
City of Houston Repump and Groundwater Plant Improvements
Expanded Use of Groundwater
Fairchilds Supply Infrastructure
GCWA Groundwater Well Development
SJRA Catahoula Aquifer Supplies
Groundwater Reduction Plans
CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land IWRP
Fort Bend County MUD 25 GRP
Fort Bend County WCID 2 GRP
Montgomery County MUDs 8 and 9 Supply Expansion
Montgomery County Supply Expansion
NFBWA GRP
NHCRWA GRP
WHCRWA GRP
Reuse
City of Houston Reuse
City of Pearland Reuse
League City Effluent Reuse
NFBWA Member District Reuse
NHCRWA Member District Reuse
River Plantation Reuse
San Jacinto Basin Regional Return Flows
Texas City Industrial Complex Reuse
Wastewater Reclamation for Municipal Irrigation
Westwood Shores MUD Reuse

Surface Water Development
Allens Creek Reservoir
BWSC Reservoir and Pump Station Expansion
GCWA Coastal Desalination
Treatment
BAWA East SWTP Expansion
BWA Conventional Treatment Expansion
City of Houston EWPP Enhancement
Harris County MUD 50 Surface Water Treatment Plant
Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant
SEWPP Expansion
Other
Brazos Saltwater Barrier
GCWA Canal Lining and Loss Mitigation
GCWA Shannon Pump Station Expansion
LNVA Devers Pump Station Relocation

The following paragraphs discuss the impacts of each key project on the chosen water quality parameters.

Water Conservation, including municipal, industrial, and agricultural conservation, can have both positive and negative impacts on water quality. Water that is being processed through a wastewater treatment plant typically has acquired additional dissolved solids prior to discharge to the waters of the state. Conventional wastewater treatment reduces suspended solids but does not reduce dissolved solids in the effluent. Water conservation measures will reduce the volume of water passing through the wastewater plants without reducing the mass loading rates (a 1.6-gallon flush carries the same waste mass to the plant that a 6-gallon flush once carried). This may result in slightly increased conservative contaminant loads in the stream. However, it should be noted that, during low flow conditions, the wastewater effluent in a stream may represent water that helps to augment and maintain the minimum stream flows. Tail water is the term used to describe that water returned to the stream after application to irrigated cropland. Tail water carries nutrients, sediments, salts, and other pollutants from the farmland. This return flow can have a negative impact on water quality, and by implementing conservation measures which reduce tail water losses, the nutrient and sediment loading can be reduced. It should be noted that this return flow tends to be introduced into the receiving stream during normally dry periods so it may have a net beneficial effect in terms of maintaining minimum stream flow conditions. Furthermore, the loss of the return flows could be offset by a reduction in irrigation diversions resulting in no net effect on the stream flow.

Interbasin Transfer projects have the potential to alter the water chemistry and instream flows in both source and receiving basins, creating potential impacts to habitat, biological function, and recreational uses. Additionally, water transfers could act as potential routes by which exotic or invasive species such as zebra mussels, giant salvinia, or water hyacinth are introduced into another basin. The introduction of exotic or invasive species could negatively impact aquatic habitat and the native or established species in the receiving basin, as well as impacting recreational use of lakes and streams. Some non-native species, particularly zebra mussels, are also capable of encrusting or obstructing water supply intakes and other infrastructure and necessitating increased maintenance. Environmental challenges presented by water transfer projects in the Region H RWP would be examined for opportunities to avoid or mitigate potential impacts during the detailed project development process. Specific environmental issues associated with conveyance infrastructure would be considered during routing studies of proposed alignments. Development of interbasin water transfers also requires extensive permitting and coordination with state and federal agencies to address and mitigate potential project impacts.

The East Texas Transfer has the potential to introduce Neches and Sabine River water into the Trinity, San Jacinto, San Jacinto-Brazos, and Brazos Basins. This strategy therefore has the potential to result in changes in water chemistry, temperature, nutrients, organic particulates, and sediment in the Neches and Trinity Basins and possibly in receiving basins, depending on how the water is received and utilized. Instream flows in the lower Sabine River will also be reduced by the additional diversion of water from the Sabine River Basin. Instream flows in portions of the Neches, Trinity, and San Jacinto Rivers will increase slightly. Water transferred from the Sabine to the San Jacinto Basin will be used to meet demands primarily in the San Jacinto, Brazos, and San Jacinto-Brazos Basins. This may be accomplished by using the imported water in lieu of Trinity water from Lake Livingston to meet demands in Harris County. Additional infrastructure would be required to convey water from the San Jacinto Basin to meet demands in the Brazos and San Jacinto-Brazos Basins. Because zebra mussels have been identified as established in Lake Livingston in the Trinity River Basin, project studies and development may need to consider mitigation opportunities to prevent the transfer of zebra mussels and other invasive or exotic species.

The LNVA Neches-Trinity Basin Interconnect would allow the movement of Neches River water westward toward the upper reaches of the Devers Canal system and potentially back into the Trinity River, with some potential for changes in water chemistry and other parameters. Non-consumptive use of a portion of the water by agriculture could also result in an increase in return flows in the receiving basin.

Other Conveyance and Treatment projects, including those related to Groundwater Reduction Plans (GRPs), Southeast Transmission Line Improvements, and the GCWA Shannon Pump Station Expansion are not expected to have any direct impact on key water quality parameters. However, they do facilitate the implementation of other projects that may have impacts. The LNVA Devers Pump Station Relocation will increase the capacity of an existing transfer to an agricultural canal system and is not expected to have a direct impact on key water quality parameters. The BAWA East SWTP Expansion will increase the usable quantity of an existing contractual transfer through canal infrastructure and is not expected to have a direct impact on key source water quality parameters. The City of Houston EWPP Enhancement will develop increased treatment infrastructure capacity to facilitate use of supply from existing water rights and contracts and does not develop new surface water sources.

Projects such as BWA Brackish Groundwater Development and the general Brackish Groundwater Development sometimes utilize dilution and discharge to deal with brine concentrated during treatment processes. This can result in an elevated level of TDS in streams used as receiving waters as well as other water quality impacts depending upon the characteristics of the groundwater formation. Alternative brine disposal methods, such as deep well injection, may also be considered for some projects as an alternative to surface water discharge to avoid or reduce impacts to water quality and habitats. The SJRA Catahoula Aquifer Supplies project is conceptualized as utilizing the bed and banks of Lake Conroe to convey raw groundwater and this may, similarly, impact water quality.

Groundwater projects, including GCWA Groundwater Well Development, Fairchilds Supply Infrastructure, and general Expanded Use of Groundwater projects are not expected to have significant environmental effects. Groundwater within the region is generally of good quality and available at the point of use. Increases in well pumping will also contribute to return flows in all river basins in Region H. The return flows will increase in proportion to increased groundwater use and significantly contribute to flows into Galveston Bay. Increased groundwater pumping in the region will continue to be monitored by groundwater regulatory agencies since excessive pumping can lead to land subsidence and exacerbate flooding and drainage problems.

Wastewater Reuse projects will potentially reduce instream flows, thus concentrating any instream contaminants. However, the reuse process should remove a portion of the waste load discharged from these facilities, either through the secondary treatment process or simply by the rerouting of effluent. Much of this reuse is not projected to occur until a time when the overall water use of the region has increased. Wastewater return flows will increase proportionally, so that the reuse of this portion will not constitute a significant reduction below current return flows.

Allens Creek Reservoir and the BWSC Reservoir and Pump Station Expansion will modify downstream flow regimes but potentially have positive impacts on water quality. These off-channel reservoirs will be operated as “scalping reservoirs”. During times of high flow, water quality in the Brazos River is often poor in terms of suspended solids due to increased sediment loads, but lower levels of dissolved solids due to dilution. The water that is diverted and stored in reservoirs would allow sediments to settle and accordingly water released from the reservoir would potentially have less sediment concentration. However, reduced sediment loads may have negative impacts on habitats relying on sediments downstream of the proposed reservoirs. Nutrients such as nitrogen and phosphorous are often attached to fine sediment particles that settle in reservoirs, reducing nutrient loads to downstream aquatic species. Water that is released from the reservoirs during low flow conditions would have a beneficial effect by diluting the low flow salt concentration in the river. GCWA Coastal Desalination does not affect other WMSs and impacts only the salinity levels in the area of discharge. The discharge water will be blended with and diluted by other water before discharge.

The Brazos Saltwater Barrier project would help maintain water quality in the lower Brazos Basin during low flow periods. Currently, during low flow periods the Dow Inc. and Brazosport Water Authority lower intakes are compromised due to saltwater intrusion. Increased use of Brazos River supplies will extend this seasonal condition upstream unless a barrier or other control measure is implemented.

6.1.2 Impacts of Moving Water from Rural and Agricultural Areas

Currently, the water used in rural and agricultural areas represents approximately 12 percent of the total water used in Region H. From the year 2000 to 2021, agricultural water use declined approximately 15.7 percent, and this trend is projected to continue as overall production is reduced. For the purposes of this plan, irrigation and livestock sector demands were held constant throughout the planning period as a conservative measure. Water management strategies, along with current sources of reliable and interruptible supplies, are available to agricultural users throughout the planning period. However, these projects often come at a price that cannot be supported by agriculture.

The potential impacts of moving water from rural and agricultural areas are mainly associated with socio-economic impacts to third parties. The potential impetus for moving water is expected to occur from two possible drivers: (1) the cost of raw water may become too great for the local irrigator to afford, and the irrigator may elect to voluntarily leave the industry for economic reasons; or (2) the value of the raw water for municipal or industrial purposes may create a market for the wholesale owner to redirect the sale of the water making it unavailable to the irrigator. In some cases, it may be feasible for a third-party, such as a water wholesaler, to pay for conservation measures and then utilize the saved water for their own needs (through recontracting or other agreements) and allow the irrigator to remain in business. However, there are few contractual and institutional measures in effect to allow this trade-off to occur at this time. The intent of this plan is to provide water or the conservation means to meet all projected water demands throughout the planning period.

In many cases, drought-of-record climate conditions bring about economic conditions where agriculture is left without a reasonable water supply. Throughout the region, irrigation usage is already met almost entirely through interruptible water supplies that do not have the benefit of storage and drought protection as a result of the overall cost of water. Livestock supplies are often sourced from local supplies and stock ponds that do not have reliable supplies under drought conditions. In both of these cases, agricultural users often turn to additional groundwater pumpage to close the gap in need. Often these supplies are outside of the Modeled Available Groundwater (MAG) used for planning and, therefore, are outside of this planning process.

6.2 DESCRIPTIONS OF HOW REGIONAL WATER PLANS ARE CONSISTENT WITH THE LONG-TERM PROTECTION OF THE STATE'S WATER, AGRICULTURAL, AND NATURAL RESOURCES

The Region H Water Planning Group balanced meeting water needs with good stewardship of the water, agricultural, and natural resources within the region to promote a balance of economic, social, aesthetic, and ecological viability. The RHWPG recommended water conservation as the first strategy applied to meet projected shortages where appropriate. During the WMS selection process, the yield and environmental impact of projects were given greater consideration than the unit cost of water. The Region H strategy selection and evaluation process, described in ***Chapter 5***, included application of rating criteria for impacts to environmental land and habitat, instream flows, and bay and estuary inflow. The results of this process are summarized in ***Appendix 5-A***. Detailed information for each key WMS and project is included in ***Appendix 5-B***. Additional quantitative reporting of impacts to agricultural and natural resources is included in ***Appendix 6-B***.

The RHWPG believes that local groundwater conservation districts are best suited to manage groundwater resources in the areas which the individual districts have the responsibility to regulate. This plan recommends using groundwater up to the local sustainable yield or to the restrictive limit established under subsidence district regulations to meet local demands. This plan does not recommend the exportation of groundwater from its county of origin. The effects of the recommended WMS on specific resources are discussed in further detail within this chapter.

6.2.1 Water Resources within Region H

Water resources available within Region H are detailed below by respective basin.

6.2.1.1 Neches-Trinity Coastal Basin

The Neches-Trinity Coastal Basin has numerous creeks and bayous that flow into East Bay. Many of these creeks and bayous provide water for irrigation and it is expected that this irrigation use will continue. Additional supplies are transferred into the Neches-Trinity Basin by the Lower Neches Valley Authority from the Sam Rayburn Reservoir and B.A. Steinhagen Lake System and by the Chambers-Liberty Counties Navigation District (CLCND) from the Trinity River. This plan recommends increased use from existing sources. Additional supplies from the Trinity River are not recommended, which would affect the discharge location of return flows within Galveston Bay. No other impacts by these strategies are foreseen.

Groundwater supplies within the Neches-Trinity Basin originate from the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

6.2.1.2 Trinity River Basin

The Trinity River serves both Regions C and H. Within Region H, the Lake Livingston and Wallisville Saltwater Barrier System represents approximately one half of the available regional surface water supply. This plan recommends allocating additional firm yield from this system in addition to the use of water rights downstream of Lake Livingston. Achieving the full yield of Lake Livingston is dependent upon return flows from the upper basin. Region C is recommending wastewater reuse as a WMS in the upper basin, which will limit these flows, but is also recommending the import of new supplies into the upper basin. In combination, both strategies are predicted to have a long-term neutral effect on the Lake Livingston supply.

This plan recommends transferring much of the lower Trinity River supply west into the adjacent coastal basin and the San Jacinto Basin. This will result in decreased flows in the lower Trinity Basin during drought periods. Senior water rights below Lake Livingston are protected by the lake's operating rules. Return flows from these transfers will still reach Galveston Bay but will return via the San Jacinto Basin.

Groundwater in the lower Trinity Basin is largely sourced from the Gulf Coast Aquifer as well as from the Carrizo-Wilcox, the Sparta, the Queen City, and the Yegua-Jackson Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this area. In addition, the other aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan.

6.2.1.3 Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto Coastal Basin is relatively small, with Cedar Creek being the most significant stream within the basin. There are several surface water rights for irrigation within the basin along with a substantial saline water right for cooling water from Galveston Bay. Both of these uses are expected to continue throughout the planning period. This plan recommends expanded use of existing supply sources, including increasing the transfer of water from the Trinity River to meet the projected demands, which will affect the discharge location of return flow within Galveston Bay. No other impacts from the transfers are foreseen.

The groundwater supply source within this basin is the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin. In Harris County, the Harris-Galveston Subsidence District regulations further restrict the use of groundwater to address land subsidence. These groundwater pumpage restrictions are reflected in the plan.

6.2.1.4 San Jacinto River Basin

The San Jacinto River Basin contains Lakes Houston and Conroe. These reservoirs make up approximately one tenth of the total surface water available in the region. This plan recommends utilizing the yield of these reservoirs and other surface water rights within the San Jacinto Basin. In addition, the plan calls for the movement of supply from the Trinity River to meet projected demands. Full use of the existing water rights will reduce stream flows during drought conditions. However, this will be mitigated by increased return flows, including those from imported supply.

Wastewater reuse is a recommended WMS in the basin. This includes major indirect reuse projects such as San Jacinto Basin Regional Return Flows and City of Houston Reuse. Other, smaller direct reuse projects are also included. Overall, these projects have the impact of reducing instream flows. However, provisions have been put into place in existing permits to protect flows necessary for stream and bay health.

The groundwater supply source in the San Jacinto Basin is the Gulf Coast Aquifer. The current regional water plan reflects using but not exceeding the sustainable yield of the aquifer in this basin. In Harris and Fort Bend Counties, the Harris-Galveston and Fort Bend Subsidence District regulations further restrict the use of groundwater to address land subsidence. These groundwater pumpage restrictions as well as the MAG estimates derived from joint groundwater planning performed by Groundwater Management Areas (GMAs) are reflected in the plan.

6.2.1.5 San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos Coastal Basin encompasses most of Galveston and Brazoria Counties, as well as portions of Harris and Fort Bend Counties. The coastal basin contains numerous streams and bayous which flow into Galveston Bay and West Bay. Major bayous contributing to Galveston Bay include Clear Creek, Dickinson Bayou, and Chocolate Bayou. Bastrop Bayou, located at the western edge of the basin, flows into Christmas Bay. There are numerous surface water rights for irrigation, mining, and manufacturing within the basin, and these uses are expected to continue throughout the planning period. Water from the Brazos River is transferred into the coastal basin to meet current demands. The Gulf Coast Water Authority (GCWA) maintains and operates canals and off-channel reservoirs within the coastal basin.

This plan recommends increasing the transfer of water from the Brazos River to meet the projected growth in demands of Brazoria and Galveston Counties, which will increase the return flows to Galveston Bay. This transfer would be further facilitated by a number of infrastructure enhancement projects which would allow increased utilization of existing sources as well as future supplies.

Finally, seawater desalination is included as a recommended strategy to meet demands in Galveston County. This strategy will meet a portion of the demands and will potentially increase stream flows, since the return flows from desalination are not associated with a diversion from the source streams. No other surface water impacts are foreseen.

The groundwater supply source in the San Jacinto-Brazos Basin is the Gulf Coast Aquifer. The plan reflects utilizing but not exceeding the sustainable yield of the aquifer in this basin. In Fort Bend, Galveston, and Harris Counties, regulations enacted by the Fort Bend Subsidence District and the Harris-Galveston Subsidence District further restrict the use of groundwater to address land subsidence. These groundwater pumpage regulations are reflected in the plan.

6.2.1.6 Brazos River Basin

The Brazos River Basin is the second largest basin in the state (after the Rio Grande), primarily serving Regions O, G, and H. The Brazos River Authority (BRA) operates a system of reservoirs within the middle and upper portions of the basin which provide a portion of the lower basin supply. There are also numerous water rights on the Brazos River and its tributaries which provide water for various uses. This plan recommends increased use of the existing water rights in the lower basin in addition to developing new sources of supply. BRA also holds a permit for additional yield that can be realized by operating its reservoirs as a system. This allows the Brazos River Authority to divert flows to meet customer needs when these flows are available in lieu of releasing water from reservoir storage. During drought periods, more stored water would then be available, thus increasing the total yield of the BRA system. These supplies have been committed to various entities, including a number of water providers in Region H. Use of this additional reliable availability is associated in the Regional Plan with existing supply as well as a number of recommended strategies and projects. Utilization of this supply would reduce the peak flows in the lower Brazos River due to the increase in diversions. However, when base flows are below the median value, the BRA would release flows to meet customer demands. This would result in increased flows in the river segments above the customer diversion points and should have no effect below those diversions.

The recommended Allens Creek Reservoir is located in Austin County and will generate firm yield through the diversion and storage of interruptible peak flows. In addition, an expansion to the Harris Reservoir will store water diverted using existing water rights and will be used to meet manufacturing and municipal demands in Brazoria County. This will reduce the net flow within the basin, but the impacts during drought or seasonal low flow periods would be limited.

The construction of a saltwater barrier is recommended to protect water quality in the lower Brazos River Basin, particularly at the diversion points serving the southwestern portion of Brazoria County. Protection from the seasonal tidal influence of saltwater is currently provided by a temporary saltwater barrier structure. Basin salinity modeling performed by the TWDB has shown that the saltwater influence will move farther upstream under full use of water rights. This project would mitigate that effect and still allow flows to pass into the small Brazos River estuary.

Groundwater within this basin is predominantly sourced from the Gulf Coast Aquifer as well as the Carrizo-Wilcox, Brazos Alluvium, Sparta, and Queen City Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this area. The Carrizo-Wilcox, Sparta, and Queen City Aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan. In Fort Bend County, regulations enacted by the Fort Bend Subsidence District further restrict the use of groundwater from the Gulf Coast Aquifer to address land subsidence. These regulations are reflected in the plan.

6.2.1.7 Brazos-Colorado Coastal Basin

The Brazos-Colorado Coastal Basin contains the San Bernard River and its tributary streams. There are several surface water rights along the San Bernard River for manufacturing and irrigation uses. Both of these uses are expected to continue. Needs for other sources of water appear early in the planning horizon. It is recommended that the large manufacturing demands in this basin utilize imported supplies from the neighboring Brazos River Basin to meet needs during extreme droughts.

Groundwater supply in the Brazos-Colorado Basin is predominantly sourced from the Gulf Coast Aquifer, with limited supplies also available from the San Bernard Alluvium. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this basin.

6.2.2 Agricultural Resources within Region H

Region H has approximately three million acres of land in farms, with about one quarter of that land in production during any given year. Total farm acreage has declined in recent years and, over time, the crops and water usage within those farms that remain have changed. Data from the USDA Census of Agriculture is provided in ***Appendix 6-C***. The data shows that, since 1997, irrigated acreage within Region H has declined by six percent. This decline is driven by a number of economic factors, among which is the cost of water supply. Rural land information obtained from the Texas Agri-Life Extension at Texas A&M University and summarized in ***Appendix 6-C*** indicates that rural land use is decreasing across the region, including large reductions in cropland acreage due to urbanization in the southern and central parts of the Region. While total rural land and cropland have decreased, the coverage of grazing land has increased in Brazoria, Chambers, Leon, and Liberty Counties due to repurposing of former row crop acreage and conversion of native rangeland to improved, non-irrigated pasture. Use of rural land for wildlife management has also increased across the Region.

This plan holds the projected irrigation demand constant over the planning period at 346,104 acre-feet per year. Region H is able to meet a portion of those demands from a combination of existing supplies and conservation. The need for financial assistance to realize the conservation goal is addressed in ***Chapter 8*** under legislative recommendations. Access to an affordable water supply is necessary to mitigate economic threats to agriculture. Providing interruptible water is expected to preserve local agricultural resources by providing irrigators with water at a more affordable rate when surface water supplies are available. Many irrigators in Region H contract water on a year-to-year basis. The water provided under these contracts is generally less expensive than contracts for firm water supplies. However, guidance for the development of regional water plans precludes the incorporation of such projects. Therefore, many agricultural needs go unmet in the plan as there are years of drought when agriculture does not have access to reliable water supplies and must limit production.

6.2.3 Natural Resources within Region H

Region H contains many natural resources, and the WMS recommended in this plan are intended to protect those resources while still meeting the projected water needs of the region. Potential project impacts are expected to be evaluated and mitigated during planning, design, and construction of each recommended WMS. Project sponsors may need to coordinate with the TPWD, TCEQ, and other state or federal agencies as appropriate during project development to identify opportunities to avoid impacts to resources. The impacts of recommended strategies on specific resources are discussed below, as well as in ***Appendix 6-B***.

6.2.3.1 Threatened and Endangered Species

Region H has abundant habitat areas within the Sam Houston National Forest, the Big Thicket Nature Preserve, several National Wildlife Refuges, and significant undeveloped areas. Numerous native and migratory species live within these habitats, including over ten threatened and endangered aquatic species (listed in ***Appendix 6-D***).

The WMS recommended in this water plan will have some impacts upon wetlands habitats. In the 2026 Region H Water Plan, one new reservoir project is recommended. Allens Creek Reservoir has the potential to impact wetlands habitat. However, the potential impacts at this proposed site are less than on the main stem of a river. At the Allens Creek site in Austin County, habitats for the White-faced Ibis, Wood Stork, and Houston Toad may be inundated and require mitigation. It should be noted that the Allens Creek project was modified by the project sponsor to avoid impacting Alligator Hole, a wetland segment adjacent to the project site. The current plan includes the Allens Creek Reservoir as a recommended WMS. Remaining reservoir projects recommended in the 2026 Region H Water Plan consist of enhancements to existing impoundments.

The transfer of supply to the San Jacinto Basin from Lake Livingston and beyond is recommended in this plan. While the recommended amount is less than the full yield of the source reservoirs, it will still impact lake levels during dry periods as well as wetlands along the periphery of the source reservoirs. Habitats for the Wood Stork and Alligator Snapping Turtle may be affected during drought periods, but no permanent impacts to these habitats are foreseen. Conveyance from the Trinity to the San Jacinto Basin is anticipated to occur primarily through existing canal infrastructure including the CWA Canal and the Luce Bayou Interbasin Transfer, thereby reducing potential future impacts to wetlands.

The conveyance of water from Toledo Bend in the East Texas Transfer is expected to have similar impacts in some locations. However, significant portions of this route are already developed to the point that capacity either already exists or may be made possible through expansion within or adjoining to an existing right-of-way.

6.2.3.2 Parks and Public Lands

As described in ***Chapter 1***, Region H contains over 350,000 acres of state and national forests, over 100,000 acres of coastal wildlife refuges, and over 15,000 acres of Texas wildlife management areas. The transfer of supply from Lake Livingston into the San Jacinto Basin has the potential to reduce flows through the Trinity River National Wildlife Refuge during drought periods.

6.2.3.3 Water Transfers

The Region H RWP recommends a number of water transfers, including contractual supply transfers from wholesale providers to customers through existing and future conveyance infrastructure, as well as larger scale interbasin transfers. In addition to these direct transfers, water may be indirectly transferred from one surface water source to another or from groundwater to surface water through return flows from points of use. This movement of water has the potential to alter water chemistry in both the source and receiving basins. In addition, there is the potential for transfers of surface water from one stream or impoundment to another to introduce exotic or invasive species into the receiving area.

Environmental challenges presented by water transfer projects in the Region H RWP are expected to be evaluated and mitigated during detailed project planning, design, and construction. Project development should consider water quality and chemistry, wildlife habitat, and other environmental conditions present in both the source basin and receiving basins. Coordination with local, state, and federal agencies, such as TPWD and the U.S. Fish and Wildlife Service (USFWS), may be required to mitigate potential environmental impacts. It is anticipated that, where applicable, existing infrastructure corridors will be used to prevent or limit impacts including the disturbance of habitat or the introduction of exotic or invasive species. Any specific environmental obstacles of a water transfer project will be identified during routing studies of proposed alignments.

6.2.3.4 Impacts of Water Management Strategies on Unique Stream Segments

Region H recommended retaining eight previously designated unique stream segments in the 2026 RWP. These streams are:

- Armand Bayou in Harris County,
- Austin Bayou in Brazoria County,
- Bastrop Bayou in Brazoria County,
- Big Creek in Fort Bend County,
- Big Creek in San Jacinto County,
- Cedar Lake Creek in Brazoria County,
- Menard Creek in Polk and Liberty Counties, and
- Oyster Bayou in Chambers County.

All of these segments occur within riparian conservation areas, and there are no WMSs that divert additional water from or above these streams. Additionally, terrestrial strategies such as brush control or salt cedar removal are not recommended within Region H, so the riparian habitats should not be affected. Finally, there is some concern that overuse of groundwater would impact spring flows within the Sam Houston National Forest. Region H does not recommend the export of groundwater from any county, and the RHWPG encourages the formation of groundwater conservation districts to actively manage these resources. The western portion of the National Forest lies in Walker and Montgomery Counties, which both have active groundwater conservation districts. The southern portion of the National Forest is in San Jacinto and Liberty Counties, the latter of which does not currently have a groundwater-managing district in place.

The current unique stream segments and an analysis of all proposed stream segments are provided in ***Chapter 8***.

6.2.3.5 Protection of Galveston Bay

The Galveston Bay estuary is arguably the most significant natural resource within Region H, providing habitat for a rich diversity of permanent and migratory species, recreational and tourism use, employment for fishermen and the tourism industry, and serving as the gateway to the second busiest port in the nation.

Galveston Bay is affected by the water plans for both Region C (in the Upper Trinity River Basin) and for Region H (in the Lower Trinity and San Jacinto River Basins). The Galveston Bay Freshwater Inflows Group has defined target frequencies for inflows to the estuary, based upon salinity and harvest models developed by the TCEQ and TPWD. These investigations provided a platform for the efforts of the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area Stakeholder Committee (BBASC) and Basin and Bay Expert Science Team (BBEST). The results of the BBASC review of the initial study of the BBEST were transmitted to TCEQ in two recommendations in May 2010. TCEQ used these reports when developing the final, adopted standards for instream flows and bay and estuary inflows for the Trinity and San Jacinto Rivers and Galveston Bay. These standards are illustrated in *Table 6-2* below.

Table 6-2 – Bay and Estuary Freshwater Inflow Standards for Galveston Bay

<table>
<tr><th colspan="2"></th><th colspan="2">Trinity</th><th colspan="2">San Jacinto</th></tr>
<tr><td rowspan="12">Annual Inflow (Ac-Ft)
[Target Frequency]</td><td rowspan="3">Winter Inflow (Ac-Ft)
[Target Frequency]</td><td rowspan="4">2,816,532
[50%]</td><td>500,000
[40%]</td><td rowspan="4">1,460,424
[50%]</td><td>450,000
[40%]</td></tr>
<tr><td>250,000
[50%]</td><td>278,000
[50%]</td></tr>
<tr><td>160,000
[60%]</td><td>123,000
[60%]</td></tr>
<tr><td rowspan="3">Spring Inflow (Ac-Ft)
[Target Frequency]</td><td>1,300,000
[40%]</td><td>500,000
[40%]</td></tr>
<tr><td rowspan="4">2,245,644
[60%]</td><td>750,000
[50%]</td><td rowspan="4">1,164,408
[60%]</td><td>290,000
[50%]</td></tr>
<tr><td>500,000
[60%]</td><td>155,000
[60%]</td></tr>
<tr><td rowspan="3">Summer Inflow (Ac-Ft)
[Target Frequency]</td><td>245,000
[40%]</td><td>220,000
[40%]</td></tr>
<tr><td>180,000
[50%]</td><td>100,000
[50%]</td></tr>
<tr><td rowspan="4">1,357,133
[75%]</td><td>75,000
[60%]</td><td rowspan="4">703,699
[75%]</td><td>75,000
[60%]</td></tr>
<tr><td rowspan="3">Fall Inflow (Ac-Ft)
[Target Frequency]</td><td>N/A</td><td>200,000
[40%]</td></tr>
<tr><td>N/A</td><td>150,000
[50%]</td></tr>
<tr><td>N/A</td><td>90,000
[60%]</td></tr>
</table>

The standards for bay and estuary inflow demonstrated in *Table 6-2* implies the importance of not only the overall magnitude of inflows but also the basin of origin. Over time, the transfer of water from the Trinity River Basin into the San Jacinto River Basin will relocate return flows from Trinity Bay to Upper Galveston Bay. This may have some impact on the oyster beds located within Trinity Bay. The increase of flows into Upper Galveston Bay should be less of a concern because that flow will occur in the Houston Ship Channel (a dredged channel that is significantly deeper than the rest of the estuary).

6.2.3.6 Energy Reserves

Oil, gas, and other energy reserves are considered natural resources of the state. While Region H is home to a large portion of the nation's petrochemical industry, the amount of actual oil and gas mining within Region H is small compared to other portions of the state. In this plan, Region H was able to identify reliable supplies to meet most projected mining and all projected manufacturing demands throughout the planning period. No adverse effect on this resource is foreseen.

6.2.4 Navigation within Region H

Navigation within Region H is generally limited to the lower reaches of the main stems of the Brazos, San Jacinto, and Trinity Rivers including the Houston Ship Channel and Turning Basin, as well as the Gulf Intracoastal Waterway. No navigation water permits exist within Region H. It is not anticipated that the strategies recommended in the 2026 Region H RWP will impact navigation, nor the use of waters by recreational boaters and fishermen.

6.3 IMPACTS OF NOT MEETING IDENTIFIED NEEDS

6.3.1 Socioeconomic Impacts of Not Meeting Identified Needs

One alternative for addressing needs identified in the RWP is the choice to not meet the shortages. However, this alternative is associated with costs due to losses in economic revenue, population growth, and tax base. An analysis of these factors will be conducted by TWDB following the Initially Prepared Plan (IPP) and will be included in the final 2026 Region H RWP. It is currently anticipated that the TWDB analysis will examine:

- Regional Economic Impacts
    - Income Losses
    - Job Losses
- Financial Transfer Impacts
    - Tax Losses on Production and Imports
    - Water Trucking Costs
    - Utility Revenue Losses
    - Utility Tax Revenue Losses
- Social Impacts
    - Consumer Surplus Losses
    - Population Losses
    - School Enrollment Losses

6.3.2 Remaining Unmet Needs

Following the development of WMS for the 2026 RWP, certain needs identified in ***Chapter 4*** of the RWP remain unmet. That is, either no WMS was found suitable to apply to these needs, or the application of actual supplies is not allowable under the guidance for RWP development. After the application of WMS recommended by the RHWPG, the needs identified for Irrigation, Livestock, and a limited amount of Mining in a small number of counties in Region H are the only needs which remain unmet. It was recognized in the planning process that the nature of some projects, particularly related to cost, make them unlikely solutions to the needs of some WUGs. Agriculture operates on a very narrow margin in terms of cost. Rather than invest in firm water supplies, the characteristics of agricultural production require investment in lower-cost, short-term sources of water. As a result, many of these supplies may be interrupted during times of drought. Therefore, it is not reasonable to assign a WMS for agricultural use that will deviate from this existing cost model.

The RHWPG recognized irrigation conservation as an affordable strategy that could limit the needs experienced by agriculture. However, during times of exceptional drought, conservation measures alone are not enough to alleviate potential needs as no reduction in water demand is capable of providing the baseline supply of water in absence of a reliable water source from either groundwater or surface water.

In addition to conservation, the RHWPG recognizes the following potential solutions during drought that are not compatible with the guidance for inclusion in the RWP:

- Use of interruptible supplies: The predominant source of surface water for use in irrigation in Region H comes from regional providers who provide water for a number of uses in addition to agriculture. During drought when supplies are limited, firm water supplies are first set aside for municipal and industrial uses. This practice is common and provides a cost-effective interruptible supply for agriculture in most years. Similarly, water supplies for livestock are often supplied by on-site ponds that receive water from runoff and are supplemented with shallow groundwater production. During drought, these supplies may be cut off, but they remain vital supplies during most climate conditions. The guidance pertaining to RWP development prevents the application of any of these supplies to meet identified needs due to their lack of firm yield availability.
- Refraining from production during DOR: Often, when interruptible supplies are depended upon for agricultural production, it is essential to limit demands in order to eliminate water needs that cannot be met through the production cycle. The RHWPG encourages the efforts of local WWPs to work with irrigators to responsibly project the availability of water supplies during the growing season in order to provide reliable outlooks regarding the long-term availability of water for agriculture and to prevent the unnecessary investment in crops that may ultimately fail due to limited resources. This option is more difficult to implement for livestock, which requires water for maintenance of herds. In these situations, herd reduction may be the only viable option when water supplies are not available and may occur as part of seasonal agricultural operation management in response to water or hay availability.
- Conjunctive use: Finally, the RHWPG recommends that agricultural water users seek options for conjunctive use of resources to meet needs. Increasingly, users have access to both surface and groundwater supplies, and this presents an opportunity for conjunctive use. Although surface water supplies are less expensive to use, the security of groundwater availability has promoted the development of wells in many areas. Furthermore, many

groundwater-regulating entities do not limit the production of water for agricultural purposes. There is potential to produce groundwater and surface water in order to capitalize on the drought-resistant nature of groundwater while extending the sustainability of this resource through surface water use. Although the guidance for RWP development does not provide for the inclusion of this sort of conjunctive use in the RWPs, it remains a viable, real-world solution to the issue of agricultural water availability. It should be noted that the RHWPG respects the opportunity for water users to use groundwater and surface water resources in a responsible manner; it does not support the use of groundwater in a way that would exceed regulatory plans or the long-term sustainability of the aquifer.

Remaining unmet needs in the 2026 RWP following application of identified WMS and projects are shown below in *Table 6-3*.

Table 6-3 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac ft)					
			2030	2040	2050	2060	2070	2080
Irrigation	Brazoria	SJ-B	31,996	32,310	32,402	32,480	32,508	32,526
	Chambers	T	2,904	2,904	2,904	2,904	2,904	2,904
		T-SJ	1,016	1,016	1,016	1,016	1,016	1,016
	Galveston	SJ-B	5,376	5,376	5,376	5,376	5,376	5,376
	Madison	B	45	45	45	45	45	45
		T	70	70	70	70	70	70
Livestock	Brazoria	B	135	140	145	149	152	152
		B-C	21	33	47	55	63	62
		SJ-B	69	105	115	124	127	129
	Galveston	N-T	12	12	12	12	12	12
		SJ-B	184	184	184	184	184	184
	Harris	SJ	499	665	665	665	665	665
		SJ-B	51	51	51	51	51	51
		T-SJ	133	133	133	133	133	133
	Madison	B	111	111	111	111	111	111
		T	860	860	860	860	860	860
Mining	Madison	B	443	443	443	443	443	443
		T	267	267	267	267	267	267

N-T = Neches-Trinity, T = Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B-C = Brazos-Colorado

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Chapter 7 – Drought Response

7.1 INTRODUCTION

Drought is a natural and recurring meteorological phenomenon where precipitation is significantly below "normal" for a period of time. Relatively mild, short-duration droughts are common throughout Texas and typically result in limited impacts. However, extended severe drought conditions can have serious impacts on water supplies, water suppliers, and water users including:

- Reduction in available water supply leading to shortage conditions;
- Increases in water demand, particularly for seasonal demands such as landscape irrigation;
- Stress on water utility infrastructure due to elevated seasonal peak water demands relative to capacity limitations of water supply infrastructure;
- Deterioration of source water quality;
- Lifestyle and financial impacts to water users associated with restrictions on non-essential water use (e.g., loss of landscaping); and
- Financial impacts on water suppliers due to reduced revenues from water sales during periods of water demand curtailment.

Due to the potentially devastating effects of drought on both individuals and the state's economy, it is important that water suppliers and users consider the potential impacts of drought and develop robust plans to address supply or demand management under drought conditions. This chapter presents information concerning historical droughts in the region, current drought preparations and responses, recommendations for region-specific drought responses, and region-specific model drought contingency plans.

7.2 DROUGHT OF RECORD IN THE REGIONAL WATER PLANNING AREA

7.2.1 Regional Drought of Record

The Drought of Record (DOR) is typically defined as the worst drought to occur for a particular area during the available period of hydrologic record. Due to the variety of ways in which drought may be characterized (deviation from normal precipitation, temperature trends, economic losses, duration, impacts to reservoirs, etc.), defining which drought is the DOR for an area can be a complex issue. For much of the state, the DOR is generally considered to have occurred from 1950 through 1957. This drought combined severe reductions in rainfall with a multi-year duration, resulting in reduction or cessation of flows for many springs and streams, losses to livestock production and irrigated agriculture, and widespread impacts to vegetation. By the end of the drought in late 1956 or early 1957, nearly all of the counties in the state had been declared disaster areas. The 1950-1957 drought is considered to be the DOR for the 15 counties making up Region H. While subsequent major droughts have occurred in the region, none have displayed the combination of intensity and duration of the 1950s drought within the region.

7.2.2 Surface Water Drought Indication

The significance of the 1950s drought for the region can be illustrated in several ways. For reservoir supplies, which make up a large portion of surface water supply for Region H, the DOR corresponds to the period of minimum storage in the reservoir. While many of the major water supply reservoirs serving Region H were not yet constructed during the DOR, their performance under a repeat of historical hydrology including the DOR can be assessed using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM); this assessment is directly associated with the use of the various WAMs to determine firm availability of surface water for the Regional Water Plan (RWP). Modeled reservoir data was extracted from the WAM for Lakes Houston and Conroe in the San Jacinto River Basin, and Lake Livingston in the Trinity Basin, which are the major reservoirs located within Region H. Storage information was also extracted for the reservoirs owned or operated by the Brazos River Authority (BRA) in the Brazos River Basin which supply water to downstream users in Region H through a number of supply contracts. The results of this analysis are shown in *Figure 7-1*. As shown in the figure, the reservoirs and reservoir systems supplying Region H would experience their lowest storage during a repeat of the DOR, with severe and prolonged decline in stored volume. The extended hydrology available for the Brazos River Basin model shows that the lowest total volume in the reservoirs owned or operated by BRA occurs in 2014. The BRA evaluated the impact of the most recent drought (2011-2015) on the Brazos River Basin through a drought study that was completed in 2017. The results of that study indicated that the 2011-2015 drought is a new drought of record for the upper portion of the Brazos River Basin including Possum Kingdom Lake, Lake Granbury, Lake Whitney, and Lake Proctor. The study also concluded that the 1950s drought remains the drought of record for the remaining seven reservoirs that are a part of the BRA system (Lake Aquilla, Lake Belton, Lake Stillhouse Hollow, Lake Georgetown, Lake Granger, Lake Somerville, and Lake Limestone) as well as the proposed Allens Creek Reservoir.

7.2.3 Palmer Drought Severity Index

Another indicator commonly used by federal and state agencies to characterize drought severity is the Palmer Drought Severity Index (PDSI). The PDSI is an estimate of soil moisture conditions calculated based on precipitation and temperature. The PDSI classifies soil moisture on a scale ranging from approximately -6.0 to 6.0, with values of approximately -0.49 to 0.49 reflecting normal conditions and -4.0 or lower representing extreme drought. The average annual PDSI for the upper Texas Gulf Coast area, which includes the majority of the population in Region H, is shown in *Figure 7-2*. As illustrated in the figure, the 1950s drought is among the most severe in terms of PDSI and is also prolonged.

Figure 7-1 – Modeled Reservoir Storage

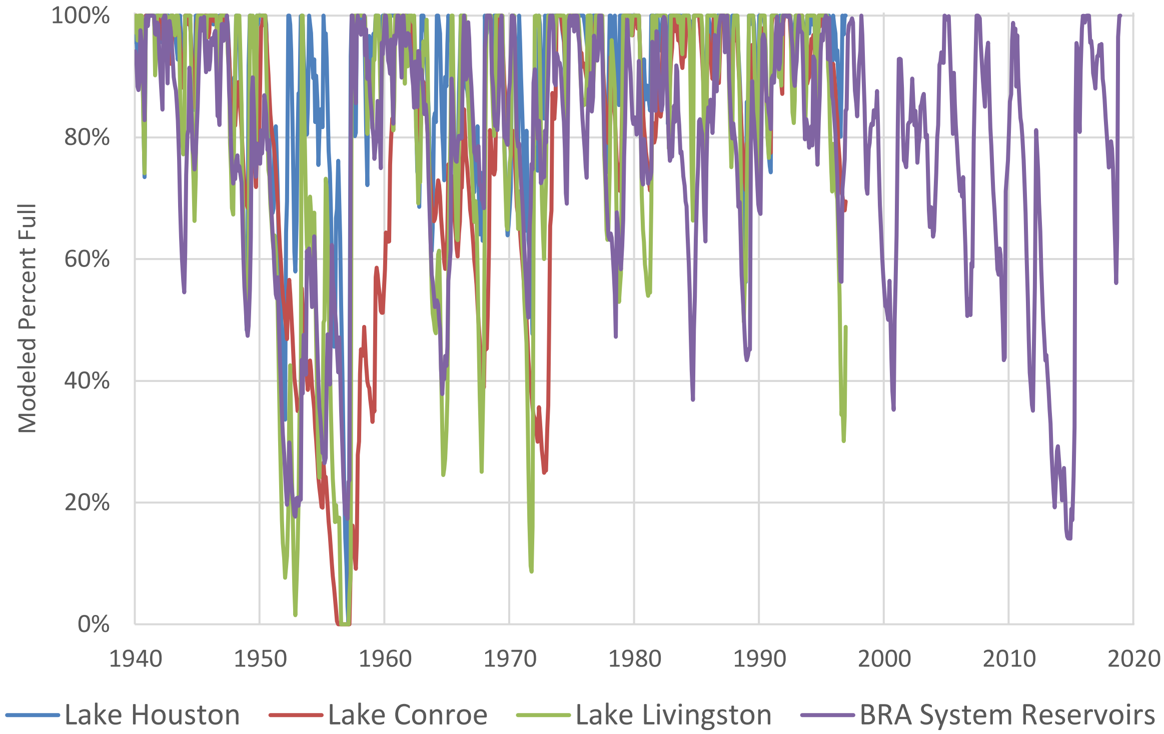
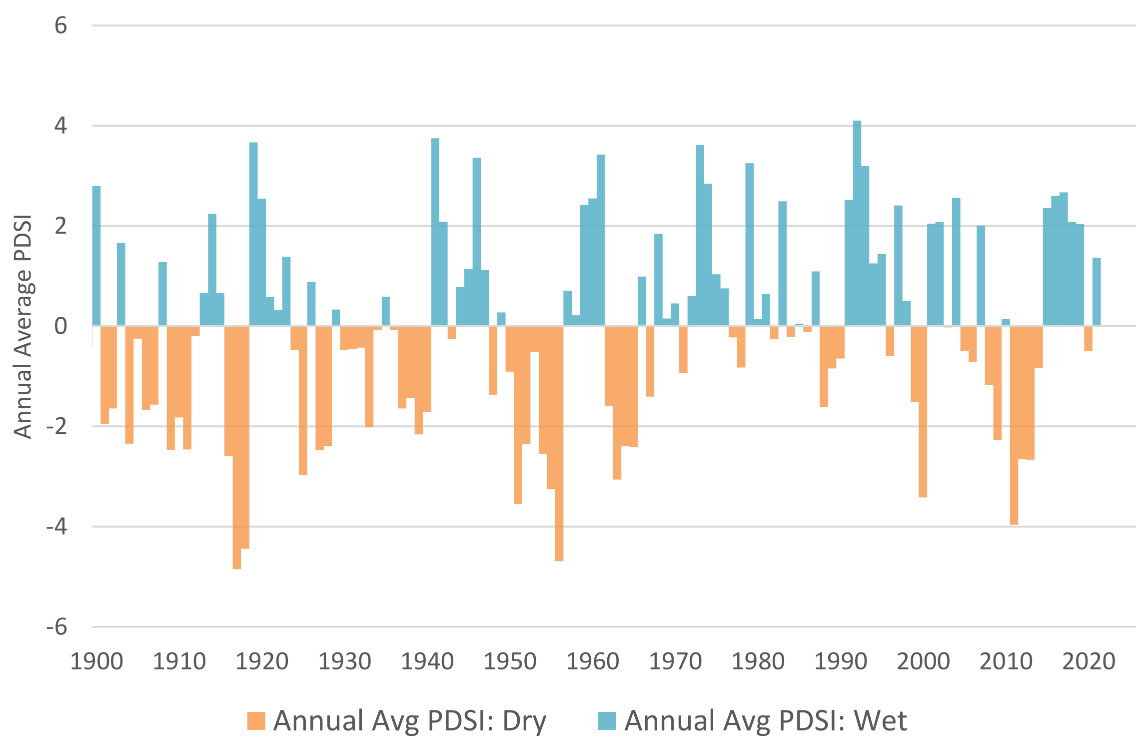


Figure 7-2 – Palmer Drought Severity Index



7.2.4 Other Regional Droughts

The Region H area, like much of Texas, has experienced a number of droughts in addition to the DOR, including several more recent dry periods. The drought period which began in approximately year 2010 or 2011 resulted in extremely high temperatures and low rainfall and soil moisture, and in some locations in the state, this period became the new drought of record. Much of the Region also experienced drought conditions in years 2022 and 2023. In Region H these droughts, while intense, were of limited duration and did not impact water supplies to the extent that would occur in a repeat of the DOR.

7.3 CURRENT PREPARATIONS FOR DROUGHT IN REGION H

7.3.1 Drought Contingency Planning Overview

The TCEQ, in accordance with the Texas Administrative Code (TAC), requires all wholesale public water suppliers, retail public water suppliers, and irrigation districts to prepare and submit drought contingency plans (DCPs) meeting the requirements of 30 TAC §288(b) and to update these plans at least every five years. TCEQ administrative rules in 30 TAC §288.1 define a drought contingency plan as "a strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies". TCEQ rules and associated guidance documents for drought contingency planning embody several key principles including:

- Drought and its potential impacts on both water supply and demand, as well as water supply infrastructure, can be anticipated;
- Drought response measures and implementation procedures can be defined in advance of drought;
- Through timely implementation of drought response measures, it is possible to avoid, minimize, or mitigate the risks and impacts of water shortages and other drought-related water supply emergencies;
- All water demands are not of equal value or importance. Some can be considered essential to public health and safety or to the economy while others can be considered non-essential or discretionary; and
- Drought contingency plans should be tailored to the unique circumstances of each water supplier (e.g., vulnerability of water supply and/or infrastructure to drought, end-users and demand characteristics, objectives, etc.).

Notwithstanding the aforementioned principle that drought contingency plans should be tailored to each water supplier's unique circumstances, there are a few elements that are found in most drought contingency plans. These include:

- Criteria and procedures for determining when to initiate and when to terminate drought response measures. These are typically referred to as drought triggers. Common examples of drought triggers include indicators of supply availability (e.g., quantity of water supply remaining in a source) and demand indicators (e.g., daily demand relative to infrastructure capacity).
- Successive stages of drought response that require the implementation of increasingly stringent measures in response to increasingly severe drought conditions. A typical drought

contingency plan will have an initial stage of voluntary measures followed by two or three successive stages of increasing stringent mandatory measures.

- Demand reduction goals or targets for each stage.
- Predetermined drought response measures for each stage that may include supply management, such as the temporary use of an alternative water source, and/or demand management, such as restrictions on non-essential water uses.
- Procedures for plan implementation and enforcement.
- Public information, notification, and education.

Most drought contingency plans place a heavy emphasis on demand management measures that are designed to reduce water demands by means of curtailment of certain uses. It is important to note that demand management in this context is distinctly different from water conservation, although the terms are often used interchangeably. The objective of water conservation is to achieve lasting, long-term reductions in water use through improved water use efficiency, reduced waste, and through reuse and recycling. By contrast, demand curtailment is focused on temporary reductions in water use in response to temporary water supply shortages or other water supply emergencies, such as equipment failures caused by excessively high peak water demands. Common approaches to water demand curtailment, applied individually or in combination, include:

- Proscriptive restrictions or bans on non-essential water uses and waste. In a municipal setting, such restrictions commonly target landscape irrigation, car washing, ornamental fountains, and other similar uses.
- Use of water pricing strategies, such as excess use surcharges, to encourage compliance with water use restrictions or to penalize excessive water use.
- Water rationing, where water is allocated to users on some proportionate or pro rata basis.

While limited-term demand curtailment under drought conditions is distinct from more lasting water conservation measures, it is noted that demand curtailment can result in a greater awareness of the value of longer-term conservation to end users, and can familiarize them with measures such as limited watering schedules that offer significant benefit when applied on a more permanent basis. Some systems which have adopted aggressive municipal conservation programs have seen substantial benefit from measures first experienced by the systems as part of shorter-term demand management during drought.

7.3.2 Current Drought Preparation

All wholesale public water providers and most municipalities in Region H have made preparations for responding to drought conditions, including the development of individual DCPs to be implemented when necessary. These plans typically identify multiple stages of drought response, each with specific triggers for initiation and termination, responses to be implemented, and quantified targets for water use reduction or other impacts for each stage. The plans also include notification procedures, means for enforcement, and in many cases a mechanism for granting variances.

7.3.3 Summary of Existing Triggers and Responses

As part of the effort associated with Task 7 of the RWP, the Region H Water Planning Group (RHWPG) performed an assessment of existing drought triggers and planned responses in the region based on DCPs submitted by water utilities to the RHWPG. TCEQ rules and 30 TAC §288(b) require that DCPs include documentation of coordination with the regional water planning groups (RWPGs) to ensure consistency with the regional plans. The RHWPG obtained DCPs for 250 entities in the region since 2019, including Wholesale Water Providers (WWPs), named Water User Groups (WUGs), and retail suppliers within the County-Other WUGs and Regional Water Authorities.

The RHWPG maintains a database of DCPs for entities in Region H, which stores data including sponsor information, number of stages, and the trigger and response types associated with each stage. Within the database, each drought stage in each DCP is characterized by the reduction type targeted in that stage (percent demand, seasonal percent demand, unit reduction, etc.), and associated reduction target value (percentage, MGD, or other). This database was updated with new DCPs submitted to the RHWPG subsequent to the 2021 RWP, and the characteristics of the most recently available DCP (some of which are from 2019 or earlier) for each entity have been summarized in *Table 7-1*. More detailed data by entity is included in ***Appendix 7-A***.

Table 7-1 – Summary of Existing DCPs in Region H

Stage	Total Entities	Trigger Type												Response Type																Reduction Type					
		Contamination	Demand/Capacity Based	Emergency Condition	Failures and Damages	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Well Run Time	Wholesale Provider	Other	Assessment and Identification	Continue Previous Stage Response(s)	Emergency Rate	Invoke All/Any Response Measures	Outdoor Watering Schedule	Leak Detection and Repair	Mandatory Reduction	Stakeholder Notification	Prohibited Use	Public Information	System Control	Terminate Contracts	Terminate Outdoor Watering	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand Remaining	Percent Limit	Unit Reduction	Other	N/A
1	324	8	208	1	31	3	9	2	26	0	58	51	72	6	0	2	0	192	57	37	314	5	10	34	0	0	285	15	7	281	0	1	8	6	11
2	324	8	235	1	31	3	10	2	38	4	58	50	62	14	187	10	3	147	48	237	313	57	7	36	1	0	39	15	12	300	1	1	8	1	6
3	324	12	234	3	35	2	10	0	35	8	58	47	62	3	230	161	0	63	5	95	313	237	6	42	20	174	4	187	13	301	1	1	7	2	6
4	159	21	94	4	46	1	9	0	14	6	22	38	45	7	86	42	9	28	6	39	143	90	6	21	30	38	1	90	8	136	1	0	1	11	1
5	54	31	5	19	34	0	1	0	3	1	0	10	20	5	33	3	10	0	1	6	42	36	1	6	1	31	0	9	5	30	0	0	1	13	0
6	11	0	4	0	1	0	0	0	0	0	0	2	5	0	1	1	0	0	0	0	9	0	0	0	0	0	0	7	0	0	0	0	0	6	0
Emergency	270	30	0	235	34	0	0	0	1	0	0	31	57	6	3	0	248	0	1	5	10	1	1	3	2	2	1	10	8	0	0	0	1	209	0
1	100%	2%	64%	0%	10%	1%	3%	1%	8%	0%	18%	16%	22%	2%	0%	1%	0%	59%	18%	11%	97%	2%	3%	10%	0%	0%	88%	5%	2%	87%	0%	0%	2%	2%	3%
2	100%	2%	73%	0%	10%	1%	3%	1%	12%	1%	18%	15%	19%	4%	58%	3%	1%	45%	15%	73%	97%	18%	2%	11%	0%	0%	12%	5%	4%	93%	0%	0%	2%	0%	2%
3	100%	4%	72%	1%	11%	1%	3%	0%	11%	2%	18%	15%	19%	1%	71%	50%	0%	19%	2%	29%	97%	73%	2%	13%	6%	54%	1%	58%	4%	93%	0%	0%	2%	1%	2%
4	49%	13%	59%	3%	29%	1%	6%	0%	9%	4%	14%	24%	28%	4%	54%	26%	6%	18%	4%	25%	90%	57%	4%	13%	19%	24%	1%	57%	5%	86%	1%	0%	1%	7%	1%
5	17%	57%	9%	35%	63%	0%	2%	0%	6%	2%	0%	19%	37%	9%	61%	6%	19%	0%	2%	11%	78%	67%	2%	11%	2%	57%	0%	17%	9%	56%	0%	0%	2%	24%	0%
6	3%	0%	36%	0%	9%	0%	0%	0%	0%	0%	0%	18%	45%	0%	9%	9%	0%	0%	0%	0%	82%	0%	0%	0%	0%	0%	0%	64%	0%	0%	0%	0%	0%	55%	0%
Emergency	83%	11%	0%	87%	13%	0%	0%	0%	0%	0%	0%	11%	21%	2%	1%	0%	92%	0%	0%	2%	4%	0%	0%	1%	1%	1%	0%	4%	3%	0%	0%	0%	0%	77%	0%

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As shown in *Table 7-1*, all of the DCPs analyzed include at least three drought stages, while 49 percent have four stages, 17 percent have five stages, and less than 5 percent have six stages. Approximately 83 percent of DCPs include a distinct emergency response or contingency stage, while a number of DCPs include some level of emergency response planning within the triggers and responses of numbered stages rather than in a separate emergency stage. For instance, DCPs with six stages typically define Stage 6 as a "Water Allocation" stage, during which a designated official has the authority to allocate water at their discretion.

A broad range of drought stage trigger types were identified across the region. *Figure 7-3* illustrates common trigger types and the frequency with which each type is included in Region H DCPs. The majority of emergency response or contingency stages are triggered by emergency conditions that prevent a utility from providing potable water to customers, such as a natural disaster or infrastructure component failure. Aside from emergency conditions, triggering based on demand or system capacity is by far the most common trigger type in Region H, being applied in over 70 percent of the DCPs analyzed within the first three stages. Some DCPs, particularly those with more than three stages, include a broad variety of other conditions for drought stage initiation, often entity-specific, which do not fit standard trigger categories (classified as "Other" in *Figure 7-3*). A list and descriptions of the trigger types identified in DCPs within Region H can be found in *Table 7-2*.

Figure 7-3 – Frequency of Trigger Types

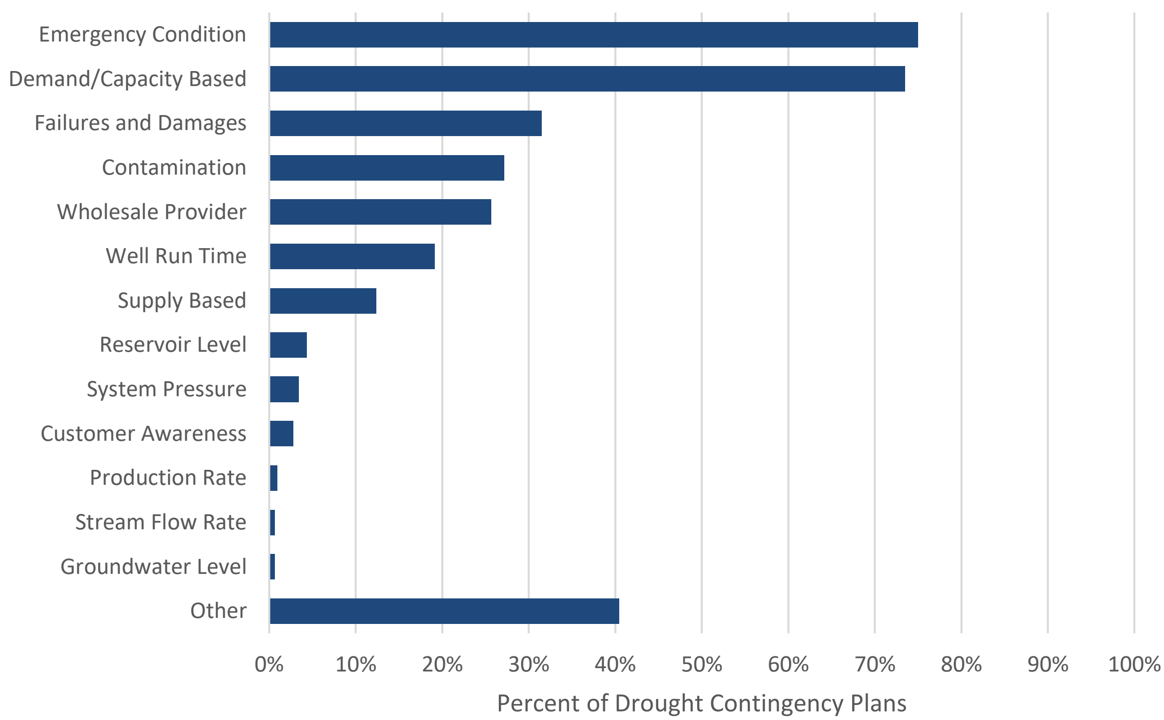
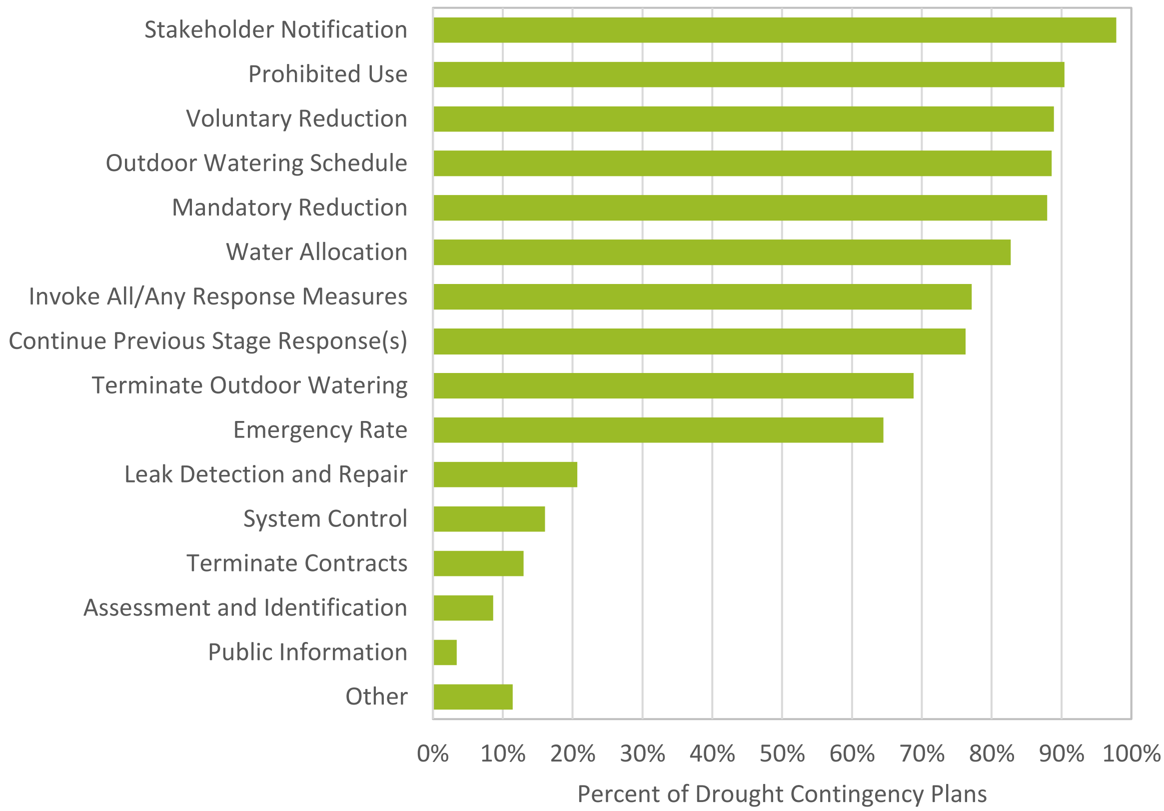


Table 7-2 – Drought Stage Trigger Types

Trigger Type	Description
Contamination	Natural or man-made contamination of water supply source(s).
Customer Awareness	Water customers are notified of drought proclamations by the utility or WWP.
Demand/Capacity Based	Demand on the water supply system reaches or exceeds a certain capacity for a defined time period.
Emergency Condition	Unforeseen emergency conditions in the event of a fire, flood, hurricane, civil disturbance, or other disaster.
Failures and Damages	Failure or damage to the water delivery system and its components, e.g., a well motor, major water line, pump system, etc.
Groundwater Level	Static water level of water wells falls below normal operating level or continues to decline.
Production Rate	Pumping production exceeds a certain rate for a defined time period.
Reservoir Level	Reservoir volume or elevation falls below a certain level.
Stream Flow Rate	River flow falls below a certain rate.
Supply Based	Supplies become limited or are reduced to a certain volume by the WWP for a defined time period.
System Pressure	The average water system pressure falls below a certain threshold.
Well Run Time	The average well run time exceeds a certain extent of time for a defined time period.
Wholesale Provider	The Wholesale Water Provider (WWP) declares drought conditions and/or water shortages that are implemented by the utility, pursuant to their contract requirements.
Other	Other miscellaneous drought triggers mentioned in Drought Contingency Plans.

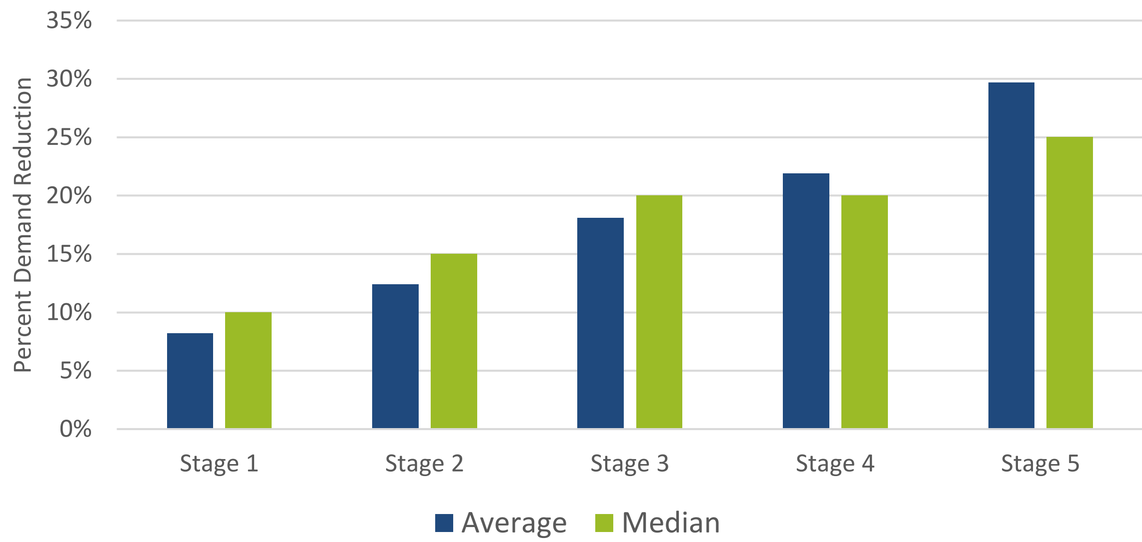
Individual DCPs often include multiple responses for each drought stage. Consequently, a variety of response types were identified. *Figure 7-4* illustrates the most common response types and how frequently they are used in DCPs. Detailed information on the prevalence of response types by individual stage is included in *Table 7-1*. Notification of relevant stakeholders such as customers, WWPs, and the general public is the most common response across all stages. Voluntary water use reductions are commonly specified for the first drought stage but are uncommon at other stages. After the first stage, other frequently specified measures include mandatory water use reductions, application of outdoor watering schedules, prohibitions on certain water uses, and entity-specific water allocation measures. Many drought stage responses include continuing the implementation of response measures from the previous stage in addition to an increase in number and/or restrictiveness of measures as more severe drought stages are triggered. Some systems may continue implementation of earlier stage responses even when not explicitly indicated in the response for subsequent stages. Emergency response measures typically involve invoking any or all necessary drought response measures set forth in their respective DCPs in order to mitigate emergency conditions.

Figure 7-4 – Frequency of Response Types



Reductions are predominantly defined in the DCPs in terms of percent demand, with a limited number of entities setting quantified goals on entity-specific unit reductions or other factors. *Figure 7-5* illustrates the average and median reduction targets for Stages 1 through 5 for entities which defined reduction goals in terms of percent of demand. Generally, target demand reductions increase as drought conditions become more severe. Entities typically did not set numerical reduction targets for emergency drought stages, nor for Stage 6 (water allocation stage) conditions. Instead, emergency drought and water allocation stages involve taking actions that mitigate and reduce emergency drought conditions as soon as possible.

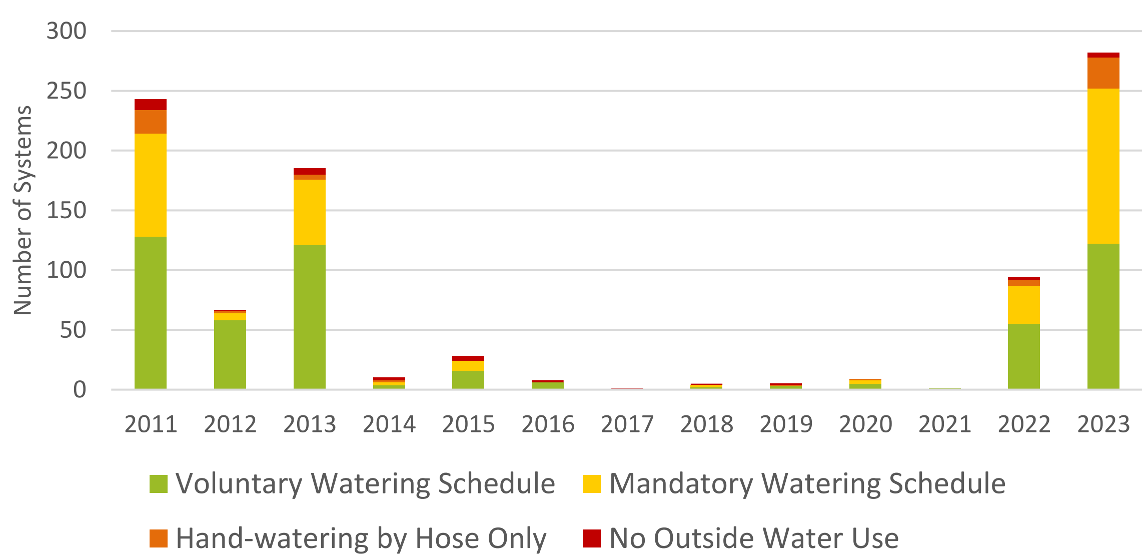
Figure 7-5 – Average and Median Target Demand Reduction



7.3.4 Recent Implementation of Drought Contingency Measures in Region H

In addition to the assessment of DCPs submitted by entities across Region H, the RHWPG also reviewed recent occurrences of entities implementing measures from their DCPs. Since 2011, TCEQ has required any wholesale or retail water supplier to report any restrictions on outdoor water use implemented due to drought or emergency conditions. The RHWPG performed an analysis of the TCEQ records of entities implementing mandatory landscape watering restrictions between May 2011 and December 2023, including WWPs, named WUGs, and retail suppliers within the County-Other WUGs and Regional Water Authorities. The drought of 2011 and dry conditions in 2013, 2022, and 2023 are apparent in the results of this analysis, shown in *Figure 7-6*.

Figure 7-6 – Number of Water Systems Restricting Outdoor Watering Due to Drought



7.3.5 Variations in Drought Response Measures

As part of the effort associated with Task 7 of the RWP, the RHWPG performed an assessment to identify potential unnecessary or counterproductive variations in drought response measures which could impede effective drought response or cause confusion to the public regarding required drought contingency activities. Evaluation of potential conflicts in drought response, both in the context of specific measures and overall demand reduction, presents a number of challenges. Various entities, including those that have a water supply relationship, may have different usage patterns, demand types, source blends, and infrastructure configurations that necessitate differing but compatible approaches to structuring stages and responses. Likewise, a specific measure type such as an outdoor watering restriction may be implemented in different manners or at different stages by various water systems; this is not indicative of a counterproductive approach, as each system has unique characteristics which should be considered in development of its DCP to achieve demand reduction. Further, it should be noted that in addition to the specific system characteristics, the efficacy of drought response measures also depends on the intensity and duration of a particular drought and, for retail municipal providers, with the public's willingness to quickly and thoroughly comply with drought restrictions.

While these differences preclude a detailed numerical evaluation of incompatible demand reductions or drought response efficacy among systems, Region H did perform a general assessment of demand reduction goals for retail systems relative to their primary wholesale water provider. Target demand reductions were compared between a WUG's own DCP and the wholesale provider's DCP for each stage between 1 and 5. As noted above, the drivers for stages and responses may differ among entities and thus this was intended solely as a simplifying assumption to allow general assessment. This analysis was limited to DCPs adopted between 2015 and 2024 (inclusive) for WUGs with at least one external supplier which have drought response goals expressed as a targeted percentage reduction of demand. Of the 63 WUG DCPs meeting these parameters, 76 percent include target reduction percentages equal to or exceeding those of their wholesale provider for at least the first three stages of a DCP, and 46 percent have reduction targets equal to or exceeding the wholesale provider's targets in all stages. Some WUGs have fewer drought stages defined than a wholesale provider's DCP; in these cases, the wholesale provider may have its own retail customers or other response options to further reduce demand beyond reductions by its wholesale customers. Targeted demand reductions in 21 percent of the analyzed DCPs were lower than the targets of the associated wholesale providers in some stages; however, these WUGs, along with many of the other entities examined, are contract wholesale customers and in some cases are not directly subject to the response measures that their providers apply to their own retail service area. The overall demands for the WUGs examined were also small relative to their provider's total demands. Based on these observations and the necessarily system-specific nature of drought planning, clear indication of counterproductive drought planning was not observed.

Additional factors further reduce the likelihood of counterproductive or confusing drought planning within Region H. Water systems often communicate closely with each other, and in particular with their wholesale providers, during planning efforts including drought contingency planning. During periods of limited source availability, these channels of communication are also important in implementing responses to drought conditions. Region H encourages all water systems to coordinate closely with their providers during DCP development and implementation.

The effective implementation of drought response measures requires not just an established plan but also awareness and compliance on the part of end users. DCPs typically include description of the method or methods of communication which will be used to notify water users of drought conditions and required responses in order to promote effective DCP implementation. Most often, end-users of municipal water receive notification regarding drought stages and responses directly from their retail provider, preventing confusion from multiple messaging. Region H strongly encourages water systems to include a robust plan for customer notification in their DCPs.

7.3.6 Effectiveness of Drought Response Measures and Challenges in Quantification

The information available to the RHWPG through submitted DCP documents and TCEQ records of implemented watering restrictions does not quantify the potential or historical reductions in water use associated with implementation of drought response measures. However, a 2023 survey of water supply utilities on drought planning conducted by the Texas American Water Works Association found that surveyed utilities consider designated watering schedules, metering of all connections, and conservation pricing in rates to be the most effective DCP provisions for achievement of water savings. Enforcement of drought rules, particularly through financial mechanisms such as citations or fees, is also considered to be important for reducing water use. The survey report also noted that voluntary reduction measures are considered to be ineffective for achieving water conservation goals, but voluntary drought stages can serve as a buffer period for increased communication before implementing mandatory restrictions. Challenges identified in the survey responses include staff availability for DCP enforcement, jurisdictional differences that preclude wholesale suppliers from enforcing drought response measures by customers, and a disconnect between many developers and water supply resource managers. The results of this survey underscore the importance of a continued commitment to drought preparations and the value of cooperation amongst water supply utilities, regulating entities, and stakeholders.

7.4 EXISTING AND POTENTIAL EMERGENCY INTERCONNECTS

Connections between water systems are common throughout Region H. Many permanent interconnects are part of regional water systems in densely developed areas, and emergency interconnects are an effective option for providing resiliency to systems during drought or other conditions that may limit supply. In accordance with the requirements of the Texas Water Development Board (TWDB) and the TAC, the RHWPG performed an analysis of existing water infrastructure that may be used for emergency interconnects. As part of the Region H survey for the 2026 RWP, WUGs and WWPs were asked about the availability of emergency interconnections to their system, which could be used either to provide emergency supply to their own system or serve as an emergency source to provide supply to connected systems. While some basic information on interconnect relationships was collected, the quantity of data was limited by the low response rate to the survey. Data on interconnects was also compiled from the Texas Drinking Water Watch online database, which is maintained by TCEQ. This data was analyzed to identify which entities have interconnects for emergency use and with what partnering supplier or recipient these interconnects exist. Information on existing and potential interconnect supply capacity was not available. Altogether, the RHWPG identified 459 permanent supply interconnects and 646 emergency supply interconnects between public water systems within the region which could be utilized for emergency supply. Additionally, several entities in Region H include establishment or activation of interconnects as a potential drought response in their DCPs. TWDB guidance for regional planning requires the RWP to include non-confidential information on currently existing interconnections such as who is connected to whom. A list of public water systems with interconnects and which systems they are connected to is provided in ***Appendix 7-B***. In accordance with TWDB guidance, information regarding the location and description of interconnect facilities is not included in the RWP.

7.5 UNCERTAINTY AND DROUGHT(S) WORSE THAN DROUGHT OF RECORD

Although Region H has benefited from its decades of preparation in managing toward drought of record conditions, water suppliers within the region and the RHWPG have continued to look toward future challenges and address uncertainty through proactive planning and project development. Several of these elements are evident in the 2026 RWP and are described below.

The 2026 RWP for Region H has been developed with a minimum management supply factor (MSF) of 1.0 for critical demands that affect public health and safety or non-agricultural industry. However, this is not considered a ceiling for planning and many project sponsors have elected to include projects that result in an MSF greater than this level. Furthermore, the Region H RWP recommends aggressive conservation strategies for all municipal WUGs, regardless of projected water needs. These considerations provide for uncertainty both in cases of hydrologic drought resulting from unforeseen climate conditions and cases of drought brought about by excess growth in demand.

The strategies in the RWP themselves are built around robust projects that promote diversification of supply and regionalization. The region has experienced significant changes over the past half-century that have demonstrated the value in cooperation in achieving regional goals while also providing water from numerous supplies that provide redundance in instances of drought. Although surface water has been a significant source of water for Region H over this time, the 2026 RWP points toward regional cooperation in strategies such as seawater desalination and the use of historically undervalued brackish groundwater resources.

Finally, although drought contingency has been included as a strategy in some regions across Texas, the RHWPG has continued to hold these strategies as reserve measures for droughts worse than the DOR. A water management strategy (WMS) for municipal drought management was considered in this planning cycle and demonstrated marginal potential savings annually. However, the RHWPG recognizes that (1) these strategies are an essential buffer during periods of extreme drought, (2) these measures often result in the same economic hardships that water supply planning is intended to address, and (3) the efficacy of drought response measures varies across utilities and even from drought to drought. Based on these considerations, this strategy was not recommended as a formal WMS for the 2026 RWP. Further study of the efficacy of drought measures may demonstrate greater certainty and benefit of these measures and warrant inclusion in the future.

In addition to drought contingency planning as a means of weathering extreme drought conditions, the historical development of water resources in the most developed portions of the region also provides other measures that may be utilized during droughts worse than the DOR. Groundwater is still a significant water supply, even within areas where the resource is managed for either subsidence or long-term viability. In this way, groundwater and surface water supplies can be balanced to respond to short-term infrastructure- or drought-related shortages while still adhering to long-term targets for sustainable use. Finally, the large regional supply systems developed by regional wholesale providers across Region H in the past few decades have made for a more resilient water supply for the entire population.

A high-level analysis of options was performed to assess potential responses to a drought worse than DOR for municipal WUGs in Region H, along with potential emergency water supply options, as described further in *Section 7.6*. Results of this analysis are summarized in *Table 7-3*, and a detailed summary of potential responses for each entity is included in ***Appendix 7-C***.

Table 7-3 –Potential Measures and Responses to a Near-Term Drought Without Drought of Record or Other Emergency Conditions

Primary source of supply	Count of WUGs	Measures included in RWP through assumptions or recommendations				Measures that may be available beyond the recommended strategies in the RWP								
						Measures to manage demand	Potential emergency water supply source(s)							
		No return flows	Maximum permitted amounts	Utilizing MAG peak factor	Management supply factors greater than 1.0	DCP measures	Early implementation of groundwater WMS	Release from upstream reservoir	Curtailment of junior water rights	Local groundwater well	Brackish groundwater development	Existing interconnect	New interconnect	Trucked in water
Surface Water	12	3	12	0	12	3	0	11	12	12	0	10	1	12
Groundwater	226	0	0	19	108	69	6	0	0	226	11	107	107	226
Blend / Multiple[1]	145	22	128	11	120	86	5	121	128	145	3	93	50	145

[1] Includes individual WUGs using a blend of multiple source types as well as County-Other WUGs which include individual utilities using multiple source types.

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7.5.1 Drought Management WMS

The RHWPG considered drought management as a potential WMS and evaluated the potential impacts of implementing mandatory drought response measures outlined in DCPs in Region H. Rather than estimating the efficacy of individual measures prescribed in the DCPs, this evaluation applied the demand reduction targets that entities set in their DCPs to post-conservation demands. The application of demand reduction percentages was subject to the following assumptions:

- Reductions in demand can only reliably be expected during implementation of mandatory use restrictions.
- Entities would likely not be implementing mandatory restrictions for an entire year. Rather, reductions were applied based on the amount of time during 2023 that entities had implemented drought response measures.
- Water savings attributable to twice-per-week watering restrictions in the Advanced Municipal Conservation WMS were excluded from the potential savings provided by drought management measures.
- Potential demand reduction volumes were capped at each entity’s needs remaining after application of conservation and loss reduction strategies, as drought management measures by nature cannot provide surplus supply.

The methodology and results of this evaluation, including a simplified analysis of economic impacts, are described in more detail in ***Appendix 5-B***.

After consideration, the RHWPG does not support the recommendation of drought management measures as a WMS in the Region H 2026 RWP. Such measures are not designed to address long-term growth in demands, but rather are inherently temporary strategies intended to conserve water supplies or reduce adverse impacts during times of drought or emergency and are not active under more hydrologically favorable conditions. Because drought management is only active and beneficial under certain periods of time, its reliable yield is essentially zero when considered in an analogous manner to surface water, groundwater, reuse, or conservation. Also, as discussed previously, the efficacy of individual drought response measures is difficult to quantify and can vary considerably from one entity to another and one drought to another due to hydrologic and human factors. This creates additional uncertainty in the use of drought response as a reliable measure for addressing water needs.

A further challenge in reflecting drought management as a WMS, associated with both of these factors, is the potential for such a WMS to reflect demand reductions already inherent within the per-capita water demand projections utilized by the Plan. Demand projections for the regional plans are typically based on observed WUG per-capita usage for the driest year or years within a timeframe established by TWDB recently preceding projection development. Therefore, demand projections are based on the conditions during which DCP measures would be most likely to be actively implemented. For this reason, the incorporation of drought management as a WMS could effectively double-count potential savings. Finally, the RHWPG recognizes that implementation of DCPs is a curtailment of demands rather than a strategy to meet demands, and therefore, the costs associated with short-term drought management represent economic impacts of not meeting demands.

While drought management measures are not included as WMS in the Region H RWP, drought management remains a critical component of water supply management. The RHWPG strongly supports the development of robust DCPs and implementation of DCPs under appropriate conditions by water providers in order to prolong supply availability and reduce impacts to water users and local economies. This is essential in light of potential shifts in climate and the opportunity for drought conditions that are more severe than the drought of record.

7.6 EMERGENCY RESPONSES TO LOCAL DROUGHT CONDITIONS OR LOSS OF MUNICIPAL SUPPLY

In addition to regional or statewide droughts, entities may be subject to localized drought conditions or loss of existing water supplies due to infrastructure failure, temporary water quality impairment, or other unforeseen conditions. Loss of existing supplies, while relatively uncommon, is particularly challenging to address as the causes are often difficult to anticipate. Numerous entities within Region H have DCPs which include an emergency response stage and corresponding measures for droughts exceeding the DOR or for other emergency water supply conditions. Some entities, including a number of WWPs, also have emergency action plans which establish procedures for responding rapidly and effectively to emergency conditions.

Because it is not possible for water providers to predict all emergency conditions and because responses or repairs may require an extended period of time, it is important to consider a range of options for emergency water supply sources available under emergency conditions. In accordance with TWDB guidance, it is assumed that emergency conditions include, but are not limited to, entities having approximately 180 days or less of remaining supply. A high-level analysis of options was performed to assess potential emergency water supply options for municipal WUGs in Region H. In addition to emergency conditions, this analysis also includes potential measures to respond to a drought worse than the drought of record. WUGs were characterized by projected population, existing supply source type (surface water, groundwater, or blend), proximity to other water systems, and other WUG-specific information. These characteristics were then used to identify potentially feasible emergency supply options and associated infrastructure requirements. Results of this analysis are summarized in *Table 7-3*, and more detailed data for each entity is included in ***Appendix 7-C***.

These response measures are applicable for all municipal WUGs, but a subset of WUGs meeting certain criteria may be particularly vulnerable to emergency supply conditions: those with projected Year 2030 population of 7,500 or less, WUGs reliant on a sole source for water supply, and WUGs which have reported having less than 180 days of available supply at any time in the last 10 years (see *Figure 7-7*), as well as all small systems which are included in County-Other WUGs. *Table 7-4* summarizes emergency supply options identified in the emergency response screening analysis specifically for WUGs meeting this selection criteria. Consideration of emergency supply options for these entities is particularly important as many smaller WUGs may not have existing access to backup supplies through interconnect facilities with adjacent systems.

Figure 7-7 – Named WUGs Meeting Emergency Response Screening Criteria

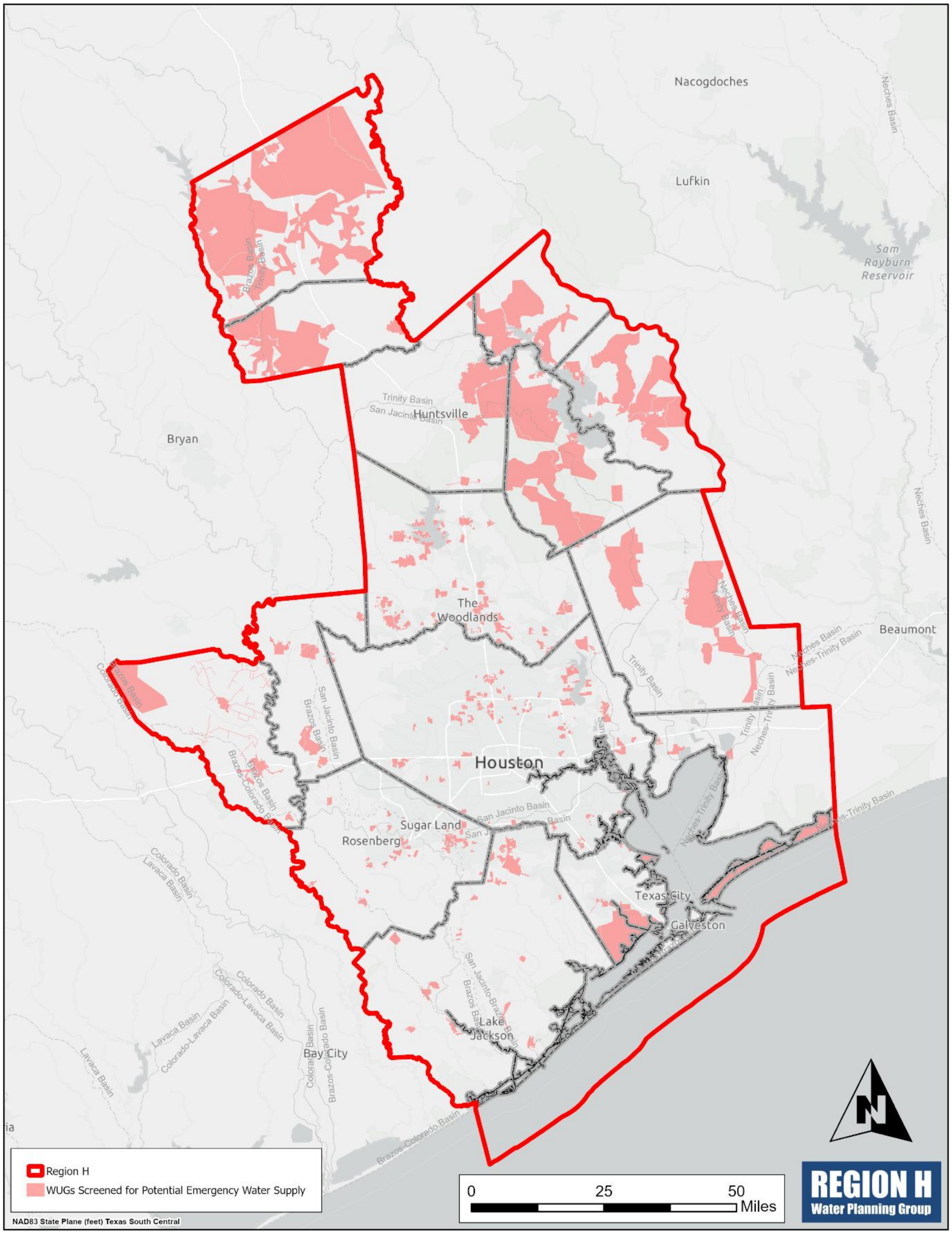

Table 7-4 – Potential Emergency Supply Options for WUGs Meeting Emergency Response Screening Criteria

Primary Source of Supply	Count	Potential Emergency Water Supply Source(s)						
		Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local GW Well	Brackish GW	Existing Interconnect	New Interconnect	Trucked In Water
Surface Water	11	10	11	11	0	10	0	11
Groundwater	225	0	0	225	11	106	107	225
Blend/Multiple[1]	81	66	68	81	2	50	29	81

[1] Includes individual WUGs using a blend of multiple source types as well as County-Other WUGs which include individual utilities using multiple source types.

7.7 REGION-SPECIFIC DROUGHT RESPONSE RECOMMENDATIONS

7.7.1 Drought Response Recommendation for Surface Water

The RHWPG acknowledges that the DCPs for surface water suppliers are the best drought management tool for surface supplies and recommends that the DCP triggers developed by the operators of these supplies serve as the RHWPG triggers for surface water. The RHWPG also recognizes that these triggers are subject to change as providers periodically reassess their needs, and the RHWPG encourages both wholesale providers and other entities using surface water to reexamine their DCPs regularly. In particular, reservoirs are a major source of surface water in Region H, and drought triggers for direct providers and users of surface water in Region H are typically tied to reservoir levels or storage volume. The three major reservoir supplies located within Region H are Lakes Conroe, Houston, and Livingston. Major triggers and responses for these reservoirs as of April 2024 are summarized in the following text.

The San Jacinto River Authority (SJRA) adopted revised DCPs on April 25, 2024, for each of its four water supply divisions including the Lake Conroe Division. Drought triggers were developed through a detailed study of hydrologic conditions in the San Jacinto River Basin as well as projected demands of SJRA customers on Lake Conroe. The DCP includes four primary stages as well as an emergency stage that may be utilized in the case of infrastructure failure, water supply contamination, the occurrence or anticipation of a drought more severe than the drought of record, or other factors as recognized by the SJRA General Manager. The response actions specified for the emergency stage include responses from Stage 1 through 4 and any actions deemed necessary to resolve the emergency condition. SJRA's triggers and responses for Lake Conroe are summarized in *Table 7-5*. The City of Houston (COH) also owns water rights in Lake Conroe. However, the COH DCP is based on the total storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-5 – Summary of Lake Conroe Drought Triggers and Responses

Drought Stage	Trigger	Action
1 (Voluntary)	Lake Conroe below 198'	Voluntary 5% reduction.
2 (Moderate)	Lake Conroe below 196'	Mandatory 5/10% (Winter/Summer) reduction in non-industrial use.
3 (Advanced)	Lake Conroe below 193'	Mandatory 10/20% (Winter/Summer) reduction in non-industrial use. Mandatory 1% reduction in industrial use.
4 (Severe)	Lake Conroe below 190'	Mandatory 15/30% (Winter/Summer) reduction in non-industrial use. Mandatory 5% reduction in industrial use.

As stated above, the SJRA adopted a revised DCP on April 25, 2024, related to its four operating divisions, including the Highlands Division, which diverts water from Lake Houston. As Lake Houston receives some diversions from the Trinity River, drought triggers were developed through detailed study of hydrologic conditions in the San Jacinto River Basin and the Trinity River Basin as well as projected demands of SJRA customers on supplies taken at Lake Houston. The Highlands Division DCP includes four primary stages as well as an emergency stage that may be utilized in the case of infrastructure failure, water supply contamination, the occurrence or anticipation of a drought more severe than the drought of record, or other factors as recognized by the SJRA General Manager. SJRA's triggers and responses for Lake Houston are summarized in *Table 7-6*. The COH also owns water rights in Lake Houston. However, the COH DCP is based on the total storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-6 – Summary of Lake Houston Drought Triggers and Responses

Drought Stage	Trigger	Action
1 (Voluntary)	Lake Houston below 40.2' and Trinity River flows at Romayor, TX below 4,000 cfs	Voluntary 5% reduction.
2 (Moderate)	Lake Houston below 39.2' and Trinity River flows at Romayor, TX below 4,000 cfs	Mandatory 5/10% (Winter/Summer) reduction in non-industrial use.
3 (Advanced)	Lake Houston below 37.2'	Mandatory 10/20% (Winter/Summer) reduction in non-industrial use. Mandatory 1% reduction in industrial use.
4 (Severe)	Lake Houston below 35.2'	Mandatory 15/30% (Winter/Summer) reduction in non-industrial use. Mandatory 5% reduction in industrial use.

cfs= cubic feet per second

The Trinity River Authority (TRA) DCP for Lake Livingston, adopted on April 24, 2024, includes three primary stages as well as an emergency stage that may be utilized in the case of infrastructure failure, water supply contamination, emergency drawdown for structural integrity purposes, or any emergency preventing customers from withdrawing water. Triggers and responses for these stages are summarized in *Table 7-7*. The COH also owns water rights in Lake Livingston. However, the COH DCP is based on the total storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-7 – Summary of Lake Livingston Drought Triggers and Responses

Drought Stage	Trigger	Action
1 (Mild)	Lake Livingston below 126.50'	Voluntary 5% reduction.
2 (Moderate)	Lake Livingston below 124.00'	Mandatory 10% reduction.
3 (Severe)	Lake Livingston below 121.40'	Mandatory 25% reduction.

7.7.2 Drought Response Recommendation for Groundwater and Other Sources

Much of Region H has historically been heavily dependent on groundwater and, although increased demands from a growing population and the risk of subsidence in some areas has necessitated increased regulation of groundwater use, the Gulf Coast Aquifer and several other formations remain important sources of water for many users in the region. Groundwater production is generally local to points of use and aquifer properties vary spatially. Likewise, the characteristics of other sources such as reuse are specific to the associated supplier. As such, many providers using these sources have developed their DCPs in the context of their individual supply portfolios. The RHWPG acknowledges that the DCPs for groundwater suppliers are the best drought management tool for groundwater supplies and recommends that the DCPs developed by the operators of these supplies serve as the RHWPG triggers for groundwater. The RHWPG also recognizes that the number and specific components of these triggers are subject to change as providers periodically reassess their needs and encourages both wholesale providers and other entities to examine their DCPs regularly.

The RHWPG recommends that water providers regularly review the U.S. Drought Monitor as a tool for tracking drought conditions and in drought planning efforts leading up to drought measure implementation. The drought monitor is easily accessible, regularly updated, and does not require entities to directly monitor specific sources to benefit from its information. Its simplicity also facilitates its use in communicating drought conditions to customers and other water users. *Table 7-8* (reproduced from the U.S. Environmental Protection Agency website) shows the categories of the U.S. Drought Monitor and impacts on water supplies and agriculture that may be associated with each category. More information on how the drought categories are assigned can be found at the University of Nebraska’s National Drought Mitigation Center website.

Table 7-8 – Categories of Drought Severity

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought (Emergency)	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

The RHWPG recommends the following actions based on each of the drought classifications listed:

- Abnormally Dry – Entities should begin to review their DCP, status of current supplies, and current demands to determine if implementation of a DCP stage is necessary.
- Moderate Drought – Entities should review their DCP, status of current supplies, and current demands to determine if implementation of a DCP stage is necessary.
- Severe Drought – Entities should review their DCP, status of current supplies, and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point, if the review indicates current supplies may not be sufficient to meet reduced demands, the entity should begin considering alternative supplies.
- Extreme Drought – Entities should review their DCP, status of current supplies, and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point, if the review indicates current supplies may not be sufficient to meet reduced demands, the entity should consider alternative supplies.
- Exceptional Drought – Entities should review their DCP, status of current supplies, and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point, if the review indicates current supplies are not sufficient to meet reduced demands, the entity should implement alternative supplies.

7.7.3 Recommendations for Entities Not Required to Submit a DCP

While wholesale and retail public water suppliers and irrigation districts are required to have a DCP, there are a number of users such as industrial operations and individual irrigators which are not. While some of these users receive water from providers with established drought management procedures, all water users are subject to the impacts of drought. For entities not required to have a DCP, the RHWPG recommends regular monitoring of drought conditions in order to facilitate decision making processes. Several resources are available to water users for monitoring drought. For users that receive water from an outside supplier, communication with their supplier and notifications of anticipated or implemented drought stages is a key resource. The following references are also recommended for consideration when planning for or experiencing drought:

- Weekly Maps of Palmer Drought Severity Index: *https://www.ncei.noaa.gov/access/monitoring/weekly-palmers/*
- U.S. Drought Monitor (Texas detail): *https://www.drought.gov/drought/states/texas*
- TCEQ drought information: *https://www.tceq.texas.gov/response/drought*
- TWDB drought information: *http://waterdatafortexas.org/drought/*
- Texas State Climatologist: *https://climatexas.tamu.edu/drought/index.html*
- National Integrated Drought Information System: *https://www.drought.gov/*
- TWDB and University of Texas at Austin study: *Early Warning of Summer Drought over Texas and the South Central United States: Spring Conditions as a Harbinger of Summer Drought*

The RHWPG further recommends that water providers, including those not required to submit a DCP, regularly monitor the activities and findings of the Texas Drought Preparedness Council. Additional information on the Texas Drought Preparedness Council Situation Reports and other useful references are discussed in greater detail in *Section 7.8.1*.

7.7.4 Recommendations and Model Plans for the Development of DCPs

Model drought contingency plans addressing the requirements of 30 TAC §288(b) were developed for Region H and are available in ***Appendix 7-D***. Model plans were developed for wholesale water providers, irrigation districts, retail public water suppliers, and industrial users. It should be noted that 30 TAC §288(b) does not require the development of drought contingency plans for industrial water users; however, a template has been provided for consideration based on the significant portion of demands in Region H from the industrial sector. These model plans were largely based on templates provided by the TCEQ, with several modifications made to elaborate on notification procedures, DCP revision, and other components.

7.8 OTHER RECOMMENDATIONS

7.8.1 Texas Drought Preparedness Council

The Texas Drought Preparedness Council is composed of representatives from multiple state agencies and plays an important role in monitoring drought conditions, advising the governor and other groups on significant drought conditions, and facilitating coordination among local, state, and federal agencies in drought response planning. The Council meets regularly to discuss drought indicators and conditions across the state and releases situation reports summarizing their findings.

The RHWPG supports the ongoing efforts of the Texas Drought Preparedness Council. As part of the sixth cycle of regional water planning in Texas, the Council provided three recommendations to all RWPGs in 2024:

- The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. The DPC encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures.
- The Drought Preparedness Council encourages regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability.

- The Drought Preparedness Council encourages regional water planning groups to identify in their plans utilities within their boundaries that reported having less than 180 days of available water supply to the Texas Commission on Environmental Quality during the current or preceding planning cycle. For systems that appeared on the 180-day list, RWPGs should perform the evaluation required by 31 TAC §357.42(g) if it has not already been completed for that system.

In accordance with the Council's recommendation and standard regional planning requirements, the 2026 Region H RWP evaluates needs and strategies based on dry-year water demand projections and water supply availability evaluated for drought of record conditions. Furthermore, the RWP incorporates numerous considerations for droughts that may be worse than a drought of record, as described in *Section 7.5*. These considerations are relevant regardless of potential causes of severe droughts. Hydrologic droughts, which may occur due to climate conditions such as increased temperatures and evaporation and/or reduced rainfall, can affect supply availability, but rapid growth in demands beyond projections can also induce stress on water supplies. Regionalization, diversification of supply, management supply factors above 1.0, and drought contingency measures are all part of the region's efforts to plan for droughts worse than the drought of record.

Four systems in Region H have reported conditions of less than 180 days of supply availability during the last two planning cycles. These systems have been included in the emergency response screening analysis described in *Section 7.6*.

The RHWPG supports the efforts of the Texas Drought Preparedness Council and recommends that water providers and other interested parties regularly review the Council's reports as part of their drought monitoring procedures. More information can be found at the following references:

- Texas Drought Preparedness Council and 2021-2022 Drought Preparedness Council Biennial Report: *https://tdem.texas.gov/about/temac*
- Drought Annex to the State of Texas Emergency Management Plan: *https://waterdatafortexas.org/drought/twdb-reports/state_of_texas_drought_annex_2016.pdf*
- Emergency Drinking Water Supplement to the State of Texas Drought Preparedness Plan: *https://www.tceq.texas.gov/assets/public/agency/annex-a.pdf*

7.8.2 Development, Content, and Implementation of DCPs

The RHWPG recognizes that the DCPs developed by water providers in the region are the best available tool for drought management, and makes the following recommendations to providers regarding development, content, and implementation of DCPs:

- In addition to any monitoring procedures included in the DCP, regular monitoring of resources and information from TCEQ, TWDB, the Texas Drought Preparedness Council, and the U.S. Drought Monitor.
- Coordination with wholesale providers regarding drought conditions and potential implementation of drought stages, particularly during times of limited precipitation.
- Review of the DCP by appropriate water provider representatives, particularly during times of limited precipitation.

- Regular consideration of updates to the DCP document to accommodate changes in supply source, infrastructure, water demands, or service area.
- Communication with customers during times of decreased supply or precipitation in order to facilitate potential implementation of drought response measures and reinforce the importance of compliance with any voluntary measures.
- Designation of appropriate resources to allow for consistent application of enforcement procedures as established in the DCP.

Retail and wholesale public water suppliers are required under 30 TAC §288.20 to notify TCEQ within five business days when implementing any mandatory provisions of a DCP. Similarly, 30 TAC §291.200 requires suppliers to notify TCEQ when the water system has access to less than 180 days of supply. Notice can be provided to TCEQ through an online form at *https://www.tceq.texas.gov/drinkingwater/homeland_security/security_pws.*

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Chapter 8 – Unique Stream Segments, Reservoir Sites, and Other Recommendations

8.1 INTRODUCTION

Title 31, §357.43 of the Texas Administrative Code (TAC) specifies that the Regional Water Plan (RWP) shall include recommendations on regulatory, administrative, or legislative issues. The Regional Water Planning Group (RWPG) establishes these recommendations in order to facilitate the orderly development, management, and conservation of water resources. In addition, the group forms recommendations to prepare for and respond to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health and welfare, provide further economic development, and protect the agricultural and natural resources of the state and the regional water planning area. Furthermore, 31 TAC §357.43 specifies that each RWPG throughout Texas shall make recommendations to identify which stream segments, if any, can be classified as ecologically unique within the region along with determining unique sites for reservoir construction. This chapter presents the recommendations made by the Region H Water Planning Group (RHWPG), referencing these chapters from the TAC and the Texas Water Code (TWC).

The RHWPG believes that stewardship of the environment can be coupled with water supply development. Successful planning and implementation of these recommendations will serve to enhance the quality of life and sustain the local economy throughout the water planning area.

8.2 UNIQUE STREAM SEGMENTS

The TAC offers the opportunity for RWPGs to identify river and stream segments of unique ecological value within a planning area. Per the language of §357.43:

> *(b) Ecologically Unique River and Stream Segments. RWPGs may include in adopted RWPs recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in this subsection. The RWPG shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted RWP shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.*

Furthermore, 31 TAC §357.43(b) provides the opportunity for the RWPG to recommend such segments to be designated as unique and subsequently requires that the RWPG assess impacts of the RWP on such segments:

(1) *A RWPG may recommend a river or stream segment as being of unique ecological value based upon the criteria set forth in §358.2 of this title (relating to Definitions).*

(2) *For every river and stream segment that has been designated as a unique river or stream segment by the legislature, during a session that ends not less than one year before the required date of submittal of an adopted RWP to the Board, or recommended as a unique river or stream segment in the RWP, the RWPG shall assess the impact of the RWP on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended WMSs. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment.*

Furthermore, 31 TAC §358.2 defines the criteria by which a stream segment may be identified as unique:

(A) ***Biological function:*** *stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;*

(B) ***Hydrologic function:*** *stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;*

(C) ***Riparian conservation areas:*** *stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;*

(D) ***High water quality/exceptional aquatic life/high aesthetic value:*** *stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or*

(E) ***Threatened or endangered species/unique communities:*** *sites along stream where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species; and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.*

The significance of streams of unique ecological value is defined in TWC 16.051:

> *The legislature may designate a river or stream segment of unique ecological value. This designation solely means 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 Parks and Wildlife Department (TPWD) provided the RHWPG with the document *Ecologically Significant River and Stream Segments of Region H Regional Water Planning Area* (Norris and Linam, October 1999) that detailed information on the impact to water resources in the region due to rapid population growth. As the region's population continues to grow, water resources will become limited; therefore, identifying ecologically unique streams is imperative. Several sources were used to identify the 259 river and stream segments that exist within Region H boundaries. The methodology stated above was used to determine which of these water bodies should be classified as ecologically unique. TPWD selected 29 for inclusion as “ecologically significant” streams. This analysis served as the basis for further consideration of which streams might be of “unique ecological value”. In 2003, TPWD updated their recommendations list, adding two streams. Members of the RHWPG nominated two tributaries of Galveston Bay as unique due to high aesthetic value. In 2005, the Houston Sierra Club submitted nominations for 18 stream segments within the region, nine of which coincided with previously mentioned nominations. Finally, in 2009, the Houston Sierra Club nominated four segments which had previously been nominated.

The RHWPG considered all 40 nominated stream segments, using the following described methodology to make a final selection.

(1) Screened 40 nominated streams based on data provided by TPWD and other sources (see *Table 8-1*) using a decision rule of selecting those streams with five or more criteria factors cited by the TPWD.
(2) Compared screened streams with previously studied reservoir sites and published or potential water conveyance plans and eliminated streams that might conflict with potential water development projects.
(3) Compared screened streams with the Texas Commission on Environmental Quality (TCEQ) water rights and wastewater discharge information and identified streams that might raise water quality permitting issues.
(4) Compared screened streams with Bayou Preservation Association and Houston Canoe Club ranking of streams in the region and other recreational use information.
(5) Compared screened streams with riparian conservation areas and public lands, adding segments entirely within conservation areas and narrowing the recommendations to only those segments bordered by public lands.

Table 8-1 – Streams Considered for Recommendation as Unique Stream Segments

River or Stream Segment	County	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality/ Aesthetic Value	Endangered/ Threatened Species	Conveyance Project/ Proposed Reservoir Site	Water Rights	Wastewater Outfall
Considered in 2001 Regional Plan:									
Armand Bayou	Harris	●	●●	●●	●			●	●●
Austin Bayou	Brazoria	●	●	●●		●●●		●●	
Bastrop Bayou	Brazoria	●	●	●●		●●●		●	
Big Creek	Fort Bend	●	●	●●	●●			●	●
Big Creek	San Jacinto	●		●●●	●	●		R	●
Brazos River	Austin/Waller/Braz./Ft. Bend	●	●●●	●●●		●●	●	●●	●●
Caney Creek[1]	Walker/Harris	●	●●	●●					●
Carpenters Bayou	Harris	●	●●	●				●	●●
Cedar Lake Creek	Brazoria	●	●●	●●		●●●●		●	
Clear Creek	Waller	●	●●		●			R	
East Fork San Jacinto River	Walker/Harr./San J./Lib./Mont.	●	●●	●●	●●●				●
East Sandy Creek	Walker	●	●	●					
Halls Bayou	Brazoria	●	●			●			
Harmon Creek	Walker	●	●●	●	●			●●	●
Jones Creek	Brazoria	●	●	●●				●●	
Lake Creek	Montgomery	●	●●		●●●	●		R	●
Luce Bayou	Harris/Liberty	●	●●				●	●	
Menard Creek	Polk	●	●●	●		●		R	
Mill Creek	Austin	●	●●		●●	●			●●
Nelson Creek	Walker	●	●		●●				●
Old River	Liberty	●	●●	●	●				
Oyster Bayou	Chambers	●	●	●●				●●	
Redfish Bayou	Brazoria		●	●●				●	●
San Bernard River	Brazoria/Fort Bend/Austin	●	●●			●●		●●	●
Upper Trinity River	Walker/Leon/Houston		●			●		●●	
Lower Trinity River	Chambers/Liberty	●	●●●	●●●		●●	E	●●	●
Upper Keechi Creek	Leon	●	●	●				●	
Wheelock Creek	Leon		●		●				
Winters Bayou[1]	San Jacinto/Walker	●	●●	●	●				
Recommended by Houston Sierra Club (2005):									
Boswell Creek	Walker/San Jacinto	●	●	●	●	●●			
Briar Creek	Walker		●	●					
East Bay Bayou	Chambers		●	●				●●	
Henry Lake Branch	San Jacinto		●	●					●
Little Lake Creek[1]	Montgomery/Walker		●	●					
Lost River	Chambers/Liberty	●	●	●					
Onion Bayou West Fork San Jacinto	Chambers	●	●	●				●●	
West Fork San Jacinto[1]	Walker		●	●			●		
West Sandy Creek	Walker		●	●					
Recommended by RHWPG Members (2005):									
Lone Oak Bayou	Chambers	●	●		●				
Whites Bayou, below IH-10	Chambers/Liberty		●	●	●				

Note: More than one "●" in a criteria column indicates that the river or stream segment satisfies that particular criterion in more than one way. For example, Armand Bayou is a State Coastal Preserve and is also a part of the Great Texas Coastal Birding Trail.

More than one "●" on the Water Rights or Wastewater Outfall column indicates more than one right or outfall located on that stream.

1 - Also proposed by Houston Sierra Club in 2009.

R - Recreational permit without diversion

E - Existing reservoir or impoundment

Based on the information provided in past RWPs, the RHWPG recommended retention of the unique designations for the eight segments designated by the Texas Legislature based on prior consideration and review. These segments are listed in *Table 8-2* and shown in *Figure 8-1*. The following text describes each of the unique stream segments designated by the Texas Legislature and reaffirmed in the 2026 Region H RWP.

Table 8-2 – Recommended Unique Stream Segments

Stream Segment	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Lake Creek	Brazoria
Menard Creek	Liberty and Polk
Oyster Bayou	Chambers

8.2.1 Armand Bayou

Armand Bayou is a coastal tributary of Clear Lake, a secondary bay in the Galveston Bay System, in southern Harris County. The bayou is often shallow and has a mean width of 40 feet that supports varying flow over a muddy substrate. This scenic natural bayou and associated riparian forest offer habitat for wildlife such as alligators, waterfowl, raccoons, bobcats, and river otters. Noteworthy bird species known to inhabit the area include pileated woodpeckers, red-shouldered hawks, barred owls, ospreys, and migratory songbirds. Several hundred acres of restored coastal prairie offer habitat for grassland species such as the sedge wren and Le Conte's sparrow. The associated marshes that border the riparian forest provide valuable habitat for commercially and recreationally important species such as white shrimp, blue crabs, and red drum. In addition, the bayou also provides valuable recreational opportunities to local residents within an urban context. The ecologically significant segment is from the confluence with Clear Lake in Harris County upstream to Genoa-Red Bluff Road in Harris County.

(1) **Biological Function:** significant riparian zone and associated marshes display significant overall habitat value.
(2) **Hydrologic Function:** performs valuable hydrologic function relating to flood attenuation for the Pasadena and Clear Lake areas.
(3) **Riparian Conservation Area:** fringed by the Armand Bayou Coastal Preserve and is a part of the Great Texas Coastal Birding Trail.
(4) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** high aesthetic value for outdoor recreation within an urban context.

8.2.2 Austin Bayou

Austin Bayou is a scenic coastal plain bayou fringed by native prairie, agricultural land, and woodlands. It begins near Rosharon in north central Brazoria County and flows southeasterly 26 miles into Bastrop Bay. The bayou is narrow (about 25 feet wide) with a limited flow of water. It provides valuable habitat for wildlife and is a recreational resource to local residents. The bayou and associated coastal marsh offer significant habitat for wading birds such as the wood stork, reddish egret, and white-faced ibis. Other known inhabitants include white-tailed kites, white-tailed hawks, waterfowl (geese and sandhill cranes), and grassland species (sedge wren, Le Conte's sparrow, and grasshopper sparrow). The ecologically unique segment is that portion of the stream within the Brazoria National Wildlife Refuge (from the confluence with Bastrop Bayou to FM 2004).

(1) **Biological Function:** coastal stream fringed with native prairie and woodlands that display significant overall habitat value.
(2) **Riparian Conservation Area:** fringed by the Brazoria National Wildlife Refuge and part of the Great Texas Coastal Birding Trail.
(3) **Threatened or Endangered Species/Unique Communities:** designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, providing habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.3 Bastrop Bayou

Bastrop Bayou is a scenic coastal waterway fringed by extensive freshwater wetland habitat. The bayou rises in the central part of Brazoria County and flows deeply in a southeasterly direction for 13 miles where it empties into Austin Bayou and ultimately Bastrop Bay. Like Austin Bayou, Bastrop Bayou provides valuable habitat for endangered or threatened shorebirds as well as waterfowl, grassland species, and birds of prey. These include geese, sandhill cranes, sedge wrens, grasshopper sparrows, white-tailed kites, and white-tailed hawks. In addition to numerous birdwatching opportunities, the bayou also provides outdoor opportunities in the form of water related activities to local residents. The ecologically significant segment is that portion within the Brazoria National Wildlife Refuge. This segment is within TCEQ stream segment 1105.

(1) **Biological Function:** extensive freshwater wetland habitat that displays significant overall habitat value.
(2) **Hydrologic Function:** extensive freshwater wetlands that perform valuable hydrologic function relating to water quality.
(3) **Riparian Conservation Area:** fringed by the Brazoria National Wildlife Refuge and part of the Great Texas Coastal Birding Trail.
(4) **Threatened or Endangered Species/Unique Communities:** designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, providing habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.4 Big Creek (Fort Bend County)

Big Creek begins south of Rosenberg and flows southeasterly 25 miles into the Brazos River in Fort Bend County. The creek is an old Brazos River channel with associated sloughs, bayous, oxbow lakes, and coastal prairies that are bordered by bottomland hardwood forest. This habitat provides an excellent opportunity for birdwatching, as over 270 species of birds have been sighted in this area. Birds commonly seen here include purple gallinules, least bitterns, prothonotary warblers, barred owls, white-ibis, herons, and egrets, among others. Other wildlife that inhabits the area includes alligators, bobcats, raccoons, feral hogs, and gray foxes. The ecologically significant segment is that portion of the stream within the Brazos Bend State Park.

(1) **Hydrologic Function:** bottomland hardwood forest and associated wetlands that perform valuable hydrologic function relating to water quality.

(2) **Riparian Conservation Area:** fringed by Brazos Bend State Park and part of the Great Texas Coastal Birding Trail.
(3) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** designated as an Ecoregion Reference Stream by the TPWD River Studies Program for high dissolved oxygen and diversity of benthic macroinvertebrates.

8.2.5 Big Creek (San Jacinto County)

Big Creek rises near Coldspring in central San Jacinto County and flows southeasterly into northern Liberty County where it joins the Trinity River. The creek is narrow with a sandy bottom, follows a run, riffle, pool sequence, and contains abundant woody debris. This provides habitat for a diverse community of fish and macroinvertebrates including the southern brook lamprey, blacktail shiner, blacktail redhorse, blackstripe topminnow, numerous perch species, and several species of sunfish. The creek meanders through pristine forestland in the Sam Houston National Forest and provides significant opportunities for birdwatching and outdoor recreation. Bird species often found include Louisiana waterthrushes and worm-eating warblers, as well as the endangered red-cockaded woodpecker around which the National Forest Service developed an interpretive site. An interpretive trail through the Big Creek Scenic Area and the Lone Star Hiking Trail provide access to the creek and provide an opportunity to see mammals such as bobcats, squirrels, and beavers. The ecologically significant segment is that portion of the stream that exists within the Sam Houston National Forest within San Jacinto County.

(1) **Biological Function:** displays significant overall habitat value considering the high degree of biodiversity.
(2) **Riparian Conservation Area:** fringed by the Sam Houston National Forest and the Big Creek Scenic Area and is part of the Great Texas Coastal Birding Trail.
(3) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** exceptional aesthetic value.
(4) **Threatened or Endangered Species/Unique Communities:** red-cockaded woodpecker group nearby.

8.2.6 Cedar Lake Creek

Cedar Lake Creek begins in northwest Brazoria County and flows southeasterly 28 miles into Cedar Lake and ultimately to the Gulf of Mexico. The creek is bordered by bottomland hardwood forest in the northern portion and by interspersed native prairies, farmland, and coastal marshes in the south. It is one of the few remaining unchannelized bayous in the region. The creek itself and the adjacent San Bernard National Wildlife Refuge provide habitat to numerous bird species including the scissortailed flycatcher and numerous shorebirds. The ecologically significant segments are those portions of the stream adjacent to the San Bernard Wildlife Refuge within Brazoria County.

(1) **Biological Function:** undredged bayou with extensive forest and wetlands that display significant overall habitat value.
(2) **Hydrologic Function:** bottomland forest and wetlands that perform valuable hydrologic functions relating to flood attenuation and water quality.
(3) **Riparian Conservation Area:** fringed by San Bernard National Wildlife Refuge and part of the Great Texas Coastal Birding Trail.

(4) **Threatened or Endangered Species/Unique Communities:** significant due to presence of reddish egret, wood stork, and white-faced ibis.

8.2.7 Menard Creek

Menard Creek begins east of Livingston in central Polk County and flows southeasterly to the Polk County line where it turns northwesterly and flows through Liberty County into the Trinity River. The creek channel is narrow and shallow with a sandy bottom and follows a sinuous path through banks lined with pine and hardwood forest. The ecologically significant segment is from the confluence with the Trinity River near the Polk and Liberty County line upstream to its headwaters located east of Livingston in the central part of Polk County. The portion that runs through Hardin County is not included in the segment as it is outside Region H.

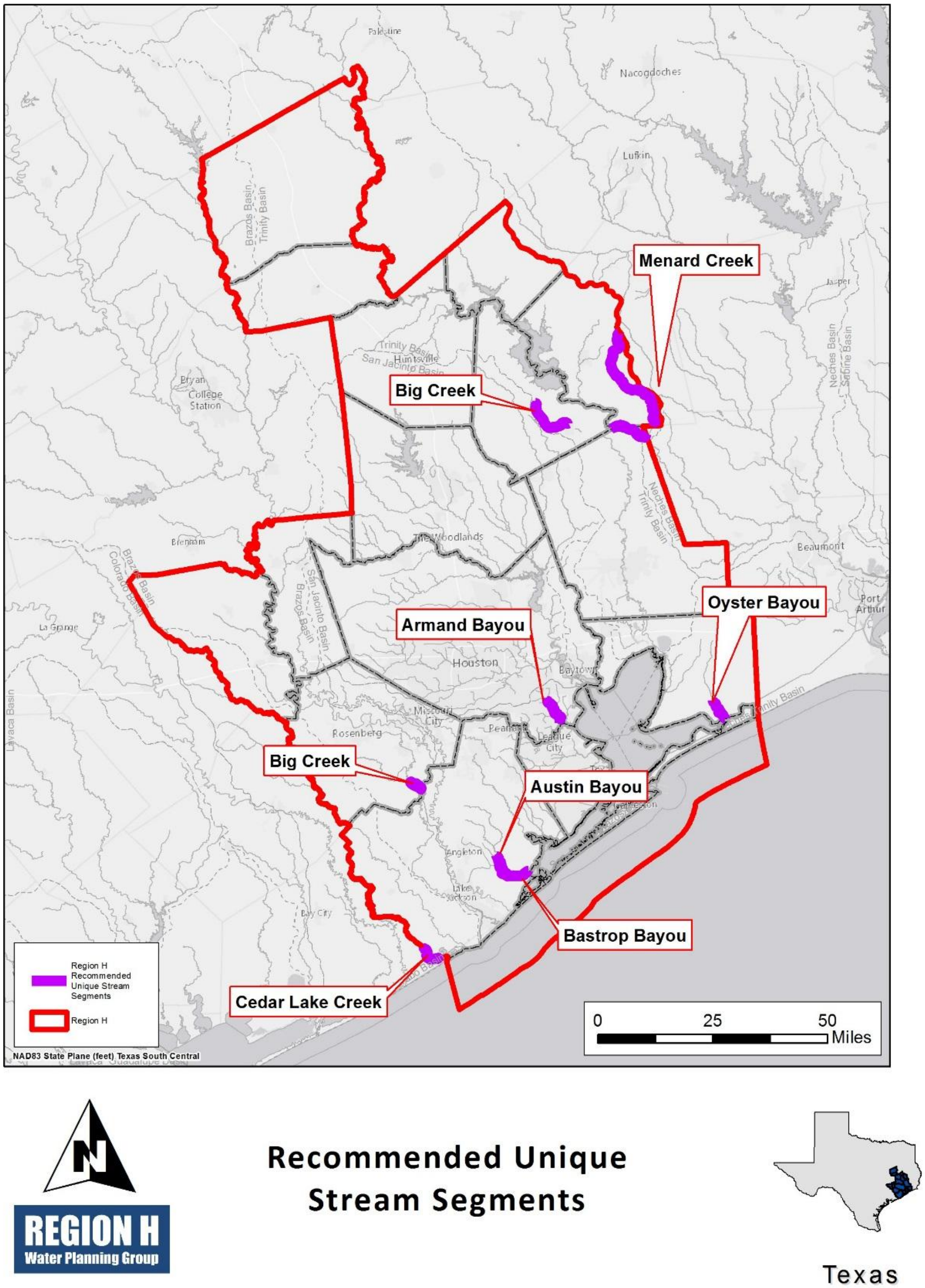
(1) **Biological Function:** bottomland hardwood forest that displays significant overall habitat value.
(2) **Hydrologic Function:** performs valuable hydrologic functions relating to water quality and groundwater recharge of the Chicot Aquifer.
(3) **Riparian Conservation Area:** fringed by the Big Thicket National Preserve.
(4) **Threatened or Endangered Species/Unique Communities:** high diversity of freshwater mussels, many of which are rare.

8.2.8 Oyster Bayou

The segment of Oyster Bayou in Chambers County within the Anahuac National Wildlife Refuge (NWR) provides freshwater inflow to the coastal marsh. Wetland habitats provide important wintering and migration stopover habitat for migratory birds including Central Flyway waterfowl, shorebirds, wading birds, and marsh and waterbirds. Upland habitats including prairie and woodlands are important to many neotropical or nearctic and temperate landbirds, including several sensitive or declining species. The mottled duck is an important resident waterfowl species for which the refuge provides year-round habitat for nesting, brood-rearing, molting, and wintering. Coastal marshes serve as nursery areas for many important commercial and recreational fish and shellfish species including white and brown shrimp, blue crab, red drum, flounder, and speckled sea trout. The ecologically significant segment is that portion of the stream within the Anahuac National Wildlife Refuge.

(1) **Biological Function:** provides nursery for commercial and recreational fisheries.
(2) **Hydrologic Function:** provides sediment removal above East Bay.
(3) **Riparian Conservation Area:** part of the Anahuac National Wildlife Refuge.
(4) **Threatened or Endangered Species/Unique Communities:** piping plover habitat within the Anahuac NWR.

Figure 8-1 – Recommended Unique Stream Segments



8.2.9 RWP Impacts to Unique Stream Segments

The RHWPG conducted an assessment of potential impacts of projected water demands and the Water Management Strategies (WMS) and infrastructure projects recommended in the RWP on the eight recommended unique stream segments. As noted in *Section 8.2*, the criteria associated with a unique stream segment may include biological function, hydrologic function, riparian conservation, high water quality, and/or habitats for threatened, endangered, or unique species. The recommended WMS and projects in the 2026 RWP are not expected to cause negative impacts to these important functions. Minimal changes to water quality may occur as a result of increasing return flows from wastewater treatment plants (WWTPs) with outfalls located on the unique stream segments or tributaries thereof; it is assumed that these return flows would be treated to standards meeting or exceeding those for current levels of discharge.

8.2.9.1 Impacts of Projected Water Demands

Potential impacts of changing water demand over time on instream flows of the recommended unique stream segments were assessed through a comparison of modeled dry condition streamflow to projected change in return flows from years 2030 through 2080. Minimum annual inflows to these segments were assessed using the TCEQ Run 3 Water Availability Models (WAMs) for seven of the segments, with Armand Bayou excluded due to the lack of a corresponding model point in the WAM. These flows were compared to the potential increases or decreases in return flows from contributing WWTPs within the drainage area of each unique stream segment to determine the potential impact of changing demands on these streams. Changes in return flows were estimated based on RWP demand projections for the Water User Groups (WUGs) associated with each WWTP at a return flow factor of 40 percent. This estimate of change in flow was utilized to evaluate and assign an impact score for each unique stream segment, based on the quantitative thresholds shown in *Table 8-3.*

Table 8-3 – Water Demand Impact Scoring Matrix

Estimated Change in Minimum Annual Flow	Impact Description	Demand Impact Score
Flow reduced more than 20 percent	High Impact	1
Flow reduced 10.01 to 20 percent	Medium High	2
Flow reduced 5.01 to 10 percent	Medium	3
Flow reduced 1.01 to 5 percent	Medium Low	4
Flow reduced 0 to 1 percent	None or Low	5
Flow increased	Positive	5

The results of this assessment, as well as information on WWTPs and the WUGs contributing return flows, are summarized in *Table 8-4*. It should be noted that the potential impacts summarized in *Table 8-4* are related to changes in projected water demands rather than the development of any particular WMS or project. In some cases, growth in water demand may be addressed through increased contracts with wholesale water providers or increased utilization of existing infrastructure such as groundwater wells.

Table 8-4 – Impacts of Projected Water Demand on Unique Stream Segments

Unique Stream Segment	WWTPs in Drainage Area[1]	Associated WUGs[2,3,4]	Modeled Minimum Annual Flow (ac ft/yr)	Change in Return Flows (ac ft/yr)	Percent Change in Minimum Flow	Impact Description	Impact Score
Armand Bayou	4	Houston, Pasadena, Deer Park	n/a	176	n/a	Positive	5
Austin Bayou	1	Danbury	3,020	-4	-0.12%	Low	4
Bastrop Bayou	2	Danbury, Angleton	9,355	-76	-0.81%	Low	4
Big Creek (Fort Bend)	6	Rosenberg, Richmond, Houston, Orchard	23,042	2,178	9.45%	Positive	5
Big Creek (San Jacinto)	1	Coldspring	77	-10	-12.46%	Medium-High	2
Cedar Lake Creek	0	n/a	121	0	0.00%	None	5
Menard Creek	0	n/a	3,219	0	0.00%	None	5
Oyster Bayou	0	n/a	33,623	0	0.00%	None	5

1. Excludes WWTPs with permit marked as "terminated" in EPA FRS data.

2. Due to the large number of WWTP facilities in the City of Houston system, the analysis of return flow excludes increased flow from the City of Houston. Return flows from the City of Houston could provide additional positive impacts during low-flow conditions.

3. The City of Orchard is included in the RWP as part of the projected demand for the County-Other WUG in Fort Bend County. The analysis of return flow excludes increased flow volumes from the City of Orchard, which would be anticipated to provide additional positive impacts during low-flow conditions.

4. Coldspring is included in the RWP as part of the San Jacinto SUD WUG. The analysis shown the table reflects the population change over time for the full San Jacinto SUD, which may result in overestimation of impacts.

8.2.9.2 Impacts of Recommended Projects

The potential impacts of recommended WMS projects on instream flows of the recommended unique stream segments were assessed through a spatial analysis of recommended WMS projects, comparing project locations to the drainage area of each unique stream segment. For projects identified within the contributing drainage area of the unique stream segments, the evaluation of potential impact also considered the project type. For example, conveyance or treatment infrastructure may be located within the drainage area of a stream segment but supplied from and serving areas not connected with the flow of the segment. An impact score was then assigned to each applicable project, based on the potential impacts shown in *Table 8-5.* The results of this assessment, as well as information on WWTPs and the WUGs contributing return flows, are summarized in *Table 8-6*.

The following observations and assumptions were made for this analysis:

- No recommended projects are anticipated to divert surface water from the recommended unique stream segments or their tributaries.
- Municipal conservation projects were not included in the analysis, as the Region H methodology for estimating municipal conservation savings from these projects focused on outdoor water uses that are unlikely to contribute to return flows.
- Water loss reduction projects were not included in the analysis, as they do not contribute directly to return flows.

Table 8-5 – Project Impact Scoring Matrix

Estimated Project Impact	Impact Description	Environmental Needs Score
Significantly reduces flows	Significant Decrease	1
Reduces flows	Moderate Decrease	2
No change or slight increase	None or Limited	3
Increases flows	Moderate Increase	4
Significantly increases flows	Significant Increase	5

Table 8-6 – Impacts of WMS Projects on Unique Stream Segments

Unique Stream Segment	WMS Projects in Drainage Area	Impact Description	Impact Score
Armand Bayou	League City Effluent	Limited	3
	Pearland Reuse Infrastructure	Limited	3
	Pearland Surface Water Treatment Plant Development	None	3
	SEWPP Expansion	None	3
	Southeast Transmission Line Improvements	Limited	3
	WUG Infrastructure Expansions (3 projects)[1]	None or Limited	3
Austin Bayou	WUG Infrastructure Expansions (2 projects)[1]	None or Limited	3
Bastrop Bayou	Municipal Irrigation Reuse Development, Brazoria County[2]	None	3
	WUG Infrastructure Expansions (3 projects)[1]	None or Limited	3
Big Creek (Fort Bend)	Municipal Irrigation Reuse Development, Fort Bend County[2]	None	3
	Rosenberg GRP Infrastructure	Limited	3
	Richmond Reuse Infrastructure	None	3
	Richmond GRP Infrastructure[3]	Limited	3
	WUG Infrastructure Expansions (11 projects)[1]	None or Limited	3
Big Creek (San Jacinto)	No projects within drainage area	None	3
Cedar Lake Creek	No projects within drainage area	None	3
Menard Creek	No projects within drainage area	None	3
Oyster Bayou	No projects within drainage area	None	3

1. WUG Infrastructure Expansion projects may contribute to slight increases in streamflow through future return flows. It should be noted that not all WUG Infrastructure Expansion projects are associated with WWTPs discharging within the contributing drainage area.
2. Recommended Municipal Irrigation Reuse Development projects in the RWP are associated with reuse of treated effluent from future master planned communities and do not impact current levels of return flow.
3. The project is associated with reuse of future WMS supplies received from contractual sources and is not anticipated to impact existing return flows.

8.3 UNIQUE RESERVOIR SITES

According to the 2022 State Water Plan (SWP), Texas has 187 major water supply reservoirs which provide a large portion of the state's water supply. The SWP also recommended the construction of 23 reservoirs for future supplies, meaning that reservoirs will continue to be a vital asset in future water management and should be protected.

The TAC offers an opportunity to designate sites of unique value for use as surface water supply reservoirs within a planning region. The following criteria are outlined in order to provide for this protection. Per the language of §357.43:

> *(c) Unique Sites for Reservoir Construction. An RWPG may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The criteria at §358.2 of this title shall be used to determine if a site is unique for reservoir construction.*

Per the language of §358.2(7), these criteria include:

(A) Site-specific reservoir development is recommended as a specific water management strategy or as a unique reservoir site in an adopted regional water plan; or

(B) The location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics, or other pertinent factors make the site uniquely suited for reservoir development to provide water supply for:

- *(i) The current planning period; or*
- (ii) *Where it might reasonably be needed to meet needs beyond the 50-year planning period.*

The significance of sites of unique value for reservoir construction is defined in TWC 16.051:

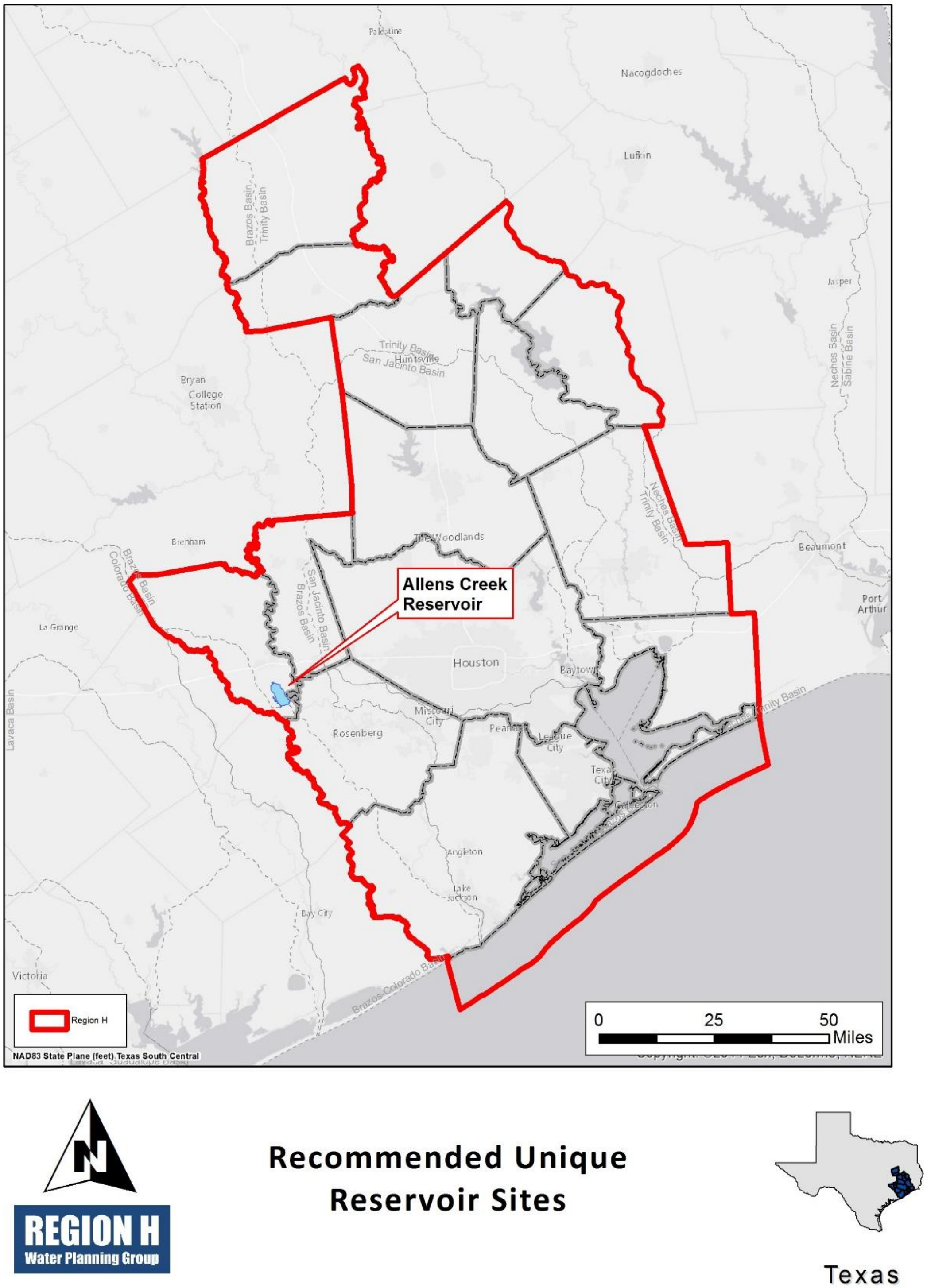
> *The legislature may designate a site of unique value for the construction of a reservoir. A state agency or political subdivision of the state may not obtain a fee title or an easement that would significantly prevent the construction of a reservoir on a site designated by the legislature under this subsection.*

The TWC continues to declare that the reservoir sites designated as having a unique value in the 2007 SWP were designated under this section until September 1, 2015. In July 2008, the Texas Water Development Board (TWDB) provided the *Reservoir Site Protection Study* that recommended proposed reservoir project sites to be designated as unique reservoir sites by the legislature. The board identified 220 major reservoir sites in Texas that were included in previous studies to be screened. The TWDB used the screening process stated above in the TWC for all the reservoirs. After technical evaluations, the 16 top ranked reservoirs (14 major and 2 minor reservoirs) were selected to be recommended as unique reservoir sites. Of the four unique reservoir sites identified in the TWDB study, Region H has continued to include one of them as an active strategy in the 2011, 2016, 2021, and 2026 RWPs. In each plan, Allens Creek Reservoir has been selected as a water management strategy. Details on this project are described below, and the site is illustrated in *Figure 8-2*.

8.3.1 Allens Creek Reservoir

This site is located in Austin County, one mile north of the City of Wallis, on the Allens Creek tributary to the Brazos River. Approximately 7,000 acres would be inundated. This project is configured as a scalping reservoir that would divert stormwater flows from the Brazos River and impound these flows in the reservoir to create storage yield. During periods of median to low flows, diversions are limited by instream flow thresholds established to protect the environment and downstream water rights. The maximum dam height is 53 feet. The conservation storage quantity is approximately 145,500 acre-feet at an elevation of 121 feet above mean sea level (MSL). The projected firm yield of this project is 99,650 acre-feet per year (ac-ft/yr). The total project capital cost is estimated at $493,919,561. Supplies from the reservoir could be used to meet needs in the lower Brazos and San Jacinto River Basins as well as the adjoining San Jacinto-Brazos coastal basin.

Figure 8-2 – Recommended Unique Reservoir Sites



8.4 OTHER REGULATORY, ADMINISTRATIVE, AND LEGISLATIVE RECOMMENDATIONS

RWPGs may develop and include in the RWP regulatory, administrative, or legislative recommendations that will facilitate the orderly development, management, and conservation of water resources in Texas and will facilitate more voluntary water transfers and help the state prepare for and respond to droughts. In addition, they may develop information regarding the potential impacts of recommendations enacted into law once proposed changes are in effect.

These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed toward the TCEQ, that administrative recommendations are directed toward the TWDB, and that legislative recommendations are directed toward the State of Texas Legislature.

The RHWPG has adopted the following regulatory, administrative, and legislative recommendations, which are discussed in detail in ***Appendix 8-A***.

8.4.1 Regulatory and Administrative Recommendations

The RHWPG recommends that the TWDB determines, in conjunction with the TCEQ and TPWD, which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, the guidance should be added to the Planning Guidelines, so that Regional Water Planning Groups can reflect the cost of those requirements in their budgets and scopes of work. Adding environmental guidelines will also make water plans consistent across the state.

The RHWPG recommends that TCEQ continue routine updates to Water Availability Models across the state based on a prioritized methodology based on observed climate conditions and the overall limitation on water resources in each basin.

Work with water utilities and planners to identify the limitations of current planning approaches regarding OneWater management and how these programs may best be reflected in regional plans. This will have the added benefit of promoting these options for comprehensive water management.

The RHWPG recommends adjusting guidance and implementation procedures for the analysis of potentially infeasible WMS required as part of the RWP cycle, including additional narrowing of scope, adjusted terminology, and adjusted process timing.

8.4.2 Legislative Recommendations

The RHWPG supports continued usage of the Rule of Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts, and supports creation of groundwater conservation districts, as necessary, by local subarea water interests. These districts provide a unique opportunity for balancing local management with regional planning through the joint planning exercises of Groundwater Management Areas.

The RHWPG supports funding for research and long-term monitoring infrastructure to advance the state of the science on the Brazos River Alluvium and on groundwater-surface water interaction.

The RHWPG supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.

The RHWPG supports water conservation and recommends that the Legislature continue to address and improve water conservation activities in the state, including continued funding of research into advanced conservation technologies.

The RHWPG recommends that RWP requirements related to the "highest practicable level of water conservation and efficiency achievable" be removed, and where necessary instead reference "considerations necessary for permit requirements" in relation to conservation.

The RHWPG wishes to recognize the Legislature's efforts in emphasizing the importance of loss reduction in the RWP process and also recommends expanded funding support for water loss mitigation programs.

The RHWPG recommends additional funding be provided to TWDB for the 2031 RWP cycle, which occurs between Census cycles, to support the process of reevaluating and redistributing population projections.

The RHWPG recommends that the Legislature remove the unnecessary and counterproductive barriers to interbasin transfers that exist in current law.

The RHWPG recommends that the State consider legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.

The RHWPG recommends establishment of additional and dedicated funding to pursue necessary future efforts of the State's bay and estuary programs.

8.4.3 Infrastructure Finance Recommendations

The RHWPG recommends increasing the funding of the State Revolving Funds Program in future decades and expanding the program to include coverage for system capacity increases to meet projected growth for communities.

Provide a mechanism to leverage federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and landowners to facilitate the use of funding programs for property under long-term lease agreements.

The RHWPG recommends continued state and federal support of the Texas Community Development Program and increasing the allocation of funds for the Small Town Environment Program.

The RHWPG recommends continued support and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the federal level.

Provide technical assistance grants for the advancement of desalination water supplies and implementation of new desalination technologies available to wholesale and retail water suppliers. Provide resources for identification and feasibility assessment of opportunities for aquifer storage and recovery projects. Continue to fund appropriate demonstration facilities to develop a customer base and pursue federal funding for desalination programs.

Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, funding opportunities should be made available to these public/private partnerships and to private nonprofit water supply corporations.

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Chapter 9 – Implementation and Comparison to Previous Regional Water Plan

9.1 INTRODUCTION

The development of Regional Water Plans (RWPs) is a cyclical process that provides continual input to the State Water Plan (SWP). By design, the plans are updated regularly on a five-year cycle which allows for refinement of water demands, supplies, and recommended strategies. Texas Water Development Board (TWDB) guidance for 2026 RWP development provides for the inclusion of a chapter dedicated to the discussion of implementation of the previous RWP as well as identified differences between the two cycles of planning which point to revised perspectives on demands, supplies, and application of water management strategies (WMS). This chapter identifies the level of project implementation for projects identified in the 2021 RWP and speaks to the differences between the previous plan and the updated 2026 RWP. Additionally, this chapter addresses the progress of the Region H Water Planning Group (RHWPG) in encouraging cooperation between water users for the purpose of achieving economies of scale and otherwise incentivizing strategies that benefit the entire region.

9.2 IMPLEMENTATION OF PREVIOUSLY RECOMMENDED WATER MANAGEMENT STRATEGIES

In order to evaluate the status of various projects in Region H, a variety of information was collected from a number of sources. These include:

- Survey responses collected during the Region H Water User Group (WUG) survey conducted in 2023,
- Follow-up coordination with project sponsors,
- Information from TWDB on funded projects, and
- Local knowledge of members of and consultants to the RHWPG.

The following sections discuss those projects and WMS that were recommended in the 2021 RWP and have been partially or completely implemented since that plan was published. These WMS or portions thereof which have been implemented are not included in the current RWP. More detailed information on the implementation of specific strategy and project types, including reservoir projects, large-scale brackish groundwater development, and seawater desalination, can be found in ***Chapter 5.***

An implementation reporting workbook was developed by TWDB to compile consistent and detailed information on the implementation of 2021 RWP projects. This implementation report was completed by the RHWPG based on data from the sources listed above. Results can be found in ***Appendix 9-A***

9.2.1 Conservation

- **Irrigation Conservation:** It is assumed that irrigation conservation practices have been implemented in Region H since the development of the 2021 RWP. These projects have been carried out by individual irrigators as the economics make conservation projects viable. These projects continue to be recommended in the 2026 RWP.
- **Advanced Municipal Conservation and Water Loss Reduction:** It is assumed that municipal conservation and loss reduction practices have been implemented in Region H since the development of the 2021 RWP. Noteworthy conservation programs within Region H include implementation of automated metering infrastructure (AMI) by the City of Sugar Land and extensive conservation education efforts undertaken by multiple Regional Water Authorities. Additionally, retail water suppliers with more than 3,300 connections have developed updated Water Conservation Plans (WCPs), as described in ***Subchapter 5B***. ***Subchapter 5B*** provides an analysis of current conservation efforts in Region H, including common conservation measures, their prevalence in the WCPs, and an assessment of WCP conservation savings goals. Conservation projects continue to be recommended in the 2026 RWP.

9.2.2 Conveyance

- **BWA Transmission Expansion:** The Brazosport Water Authority (BWA) has implemented extensive transmission infrastructure serving portions of Brazoria and Fort Bend Counties. Future expansions of BWA's transmission system are planned in order to increase conveyance capacity to the Angleton area and beyond. Future phases of this project are recommended in the 2026 RWP.
- **CHCRWA Transmission and Internal Distribution:** The Central Harris County Regional Water Authority (CHCRWA) has participated with the North Harris County Regional Water Authority (NHCRWA) in developing transmission infrastructure to receive water from the Northeast Water Purification Plant (NEWPP) and has implemented a significant portion of these efforts. CHCRWA is also developing internal distribution infrastructure to serve individual member districts. This project utilized funding from TWDB to facilitate project implementation. This project also received funding in 2016 under the State Water Implementation Fund for Texas (SWIFT) program. Future phases of this project are recommended in the 2026 RWP.
- **City of Houston GRP Transmission:** The City of Houston (COH) continues to utilize its surface water capacity for its own groundwater reduction requirement as well as that of its contract Groundwater Reduction Plan (GRP) participants and has implemented multiple phases of transmission infrastructure in support of this process. Future phases of this project are recommended in the 2026 RWP.
- **COH, NHCRWA, and CHCRWA Shared Transmission:** The shared transmission line has been completed and is in service.
- **GCWA Industrial Raw Water Line:** The line delivering additional raw water supply from the Gulf Coast Water Authority (GCWA) to industrial customers in Galveston County is complete.
- **NFBWA Phase 2 Distribution Segments:** Phase 2 Distribution Segments for the North Fort Bend Water Authority (NFBWA) are in development and the project is anticipated to be completed in the near future. This infrastructure development continues to be a recommended project in the 2026 RWP.
- **NHCRWA Distribution Expansion:** NHCRWA has worked to implement internal distribution for surface water as part of its GRP. This project has received funding in multiple years since

2015 under the SWIFT program. Future phases of this project are recommended in the 2026 RWP.

- **NHCRWA Transmission Lines:** NHCRWA has participated with CHCRWA in developing transmission infrastructure to receive water from the NEWPP and has implemented a portion of this infrastructure. This project received funding under the SWIFT program. Future phases of this project are recommended in the 2026 RWP.
- **Southeast Transmission Line Improvements:** Development of shared transmission infrastructure is in the design phase, with construction anticipated before 2030. This infrastructure development continues to be a recommended project in the 2026 RWP.
- **Surfside Beach Supply Infrastructure:** The infrastructure to convey treated surface water supply from the City of Freeport to the Village of Surfside Beach is completed and in service.
- **WHCRWA Distribution Expansion:** The West Harris County Regional Water Authority (WHCRWA) has worked to implement internal distribution for surface water as part of its GRP. Partial funding for the 2025 phase was received through the SWIFT program. Future phases of this project are recommended in the 2026 RWP.
- **WHCRWA/NFBWA Transmission Line:** WHCRWA is participating with NFBWA in developing transmission infrastructure to receive water from the NEWPP. Funding is being provided for this project through the Water Infrastructure Fund (WIF) program. This project also received funding under the SWIFT program. Multiple segments of the project have been constructed or are under construction, with completion estimated for the near future. Future phases of this project are recommended in the 2026 RWP.

9.2.3 Groundwater Development

- **Brackish Groundwater Supplies:** Municipal WUGs in Montgomery County have developed groundwater wells in the fresh to brackish Catahoula Aquifer. Some WUGs utilize this supply through blending with other sources before treatment. Additional brackish supply is recommended in the 2026 RWP.
- **BWA Brackish Groundwater Development:** BWA has completed initial well development for the project, with treatment infrastructure in the design phase. The first phases of the treatment facility are anticipated to enter construction in 2025. This project continues to be recommended in the 2026 RWP. This project received funding under the SWIFT program.
- **Expanded Use of Groundwater:** It is assumed that groundwater supply development has occurred where necessary and, in accordance with local regulation, to increase supplies to current water users. These projects continue to be recommended in the 2026 RWP.
- **Groveton Groundwater Expansion:** Development of a new groundwater well and associated transmission infrastructure by the City of Groveton is complete.

9.2.4 Groundwater Reduction Plans

- **CHCRWA GRP:** CHCRWA continues to implement projects to convert from groundwater to alternative sources on the schedule set forth by the Harris-Galveston Subsidence District (HGSD). This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **City of Houston GRP:** The COH continues to utilize its surface water capacity for its own groundwater reduction requirement as well as that of its contract GRP participants. This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of

this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.

- **City of Missouri City GRP:** The City of Missouri City successfully implemented the first phase of its GRP prior to the 2016 RWP, including the construction of a surface water treatment plant. The City has also applied for funding through the Clean Water State Revolving Fund (CWSRF) to develop direct reuse supplies. Design and development of infrastructure for the 2027 GRP conversion phase is ongoing. Future phases of this project are recommended in the 2026 RWP.
- **City of Richmond GRP:** The initial surface water treatment facility and associated transmission infrastructure identified in the GRP have been constructed and are operational. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **City of Rosenberg GRP:** Rosenberg has entered into a contractual agreement to receive treated water from BWA. The pipeline conveying this contract water has been constructed, and this supply is reflected as existing in the 2026 RWP. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **City of Sugar Land IWRP:** Sugar Land constructed a surface water treatment plant to provide for its first phase of conversion prior to the 2016 RWP. In 2019, Sugar Land completed an Integrated Water Resource Plan (IWRP) to better define future projects for meeting conversion requirements and growing demands. Sugar Land has also secured a contract with the Brazos River Authority (BRA) for use of water made available through its system operations permit. Sugar Land has continued expansion of its water distribution system. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP through the Sugar Land IWRP WMS.
- **Fort Bend MUD 25 GRP:** Fort Bend County MUD 25 successfully implemented the first phase of its GRP prior to the 2016 RWP, including the development of a reuse system for adjoining water users. Future phases of this project are recommended in the 2026 RWP.
- **Fort Bend WCID 2 GRP:** Fort Bend WCID 2 successfully implemented the first phase of its GRP prior to the 2016 RWP, including the construction of a surface water treatment plant. Future phases of this project are recommended in the 2026 RWP.
- **NFBWA GRP:** NFBWA continues to implement projects to convert from groundwater to alternative sources on the schedule set forth by the Fort Bend Subsidence District (FBSD). This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **NHCRWA GRP:** NHCRWA continues to implement projects to convert from groundwater to alternative sources on the schedule set forth by HGSD. This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **WHCRWA GRP:** WHCRWA continues to implement projects to convert from groundwater to alternative sources on the schedule set forth by HGSD. This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.

9.2.5 Reuse

- **City of Houston Reuse:** Houston currently uses a portion of its Water Right 5827 at Lake Houston for diversions to the NEWPP and the West Canal. Region H explored alternatives for use of these water supplies in the 2021 RWP and this project is recommended in the 2026 RWP.
- **NFBWA Member District Reuse:** A number of member districts of NFBWA have implemented local scale non-potable direct reuse projects. Future expansions of this reuse infrastructure development continue to be recommended in the 2026 RWP.
- **NHCRWA Member District Reuse:** A number of member districts of NHCRWA have implemented local scale non-potable direct reuse projects. Future expansions of this reuse infrastructure development continue to be recommended in the 2026 RWP.
- **San Jacinto Basin Regional Return Flows:** Several Major Water Providers (MWPs) within the Region have submitted applications to the Texas Commission on Environmental Quality (TCEQ) to utilize a portion of the available return flows in the San Jacinto River Basin. This strategy utilizes other infrastructure projects to allow for use of return flows. This strategy continues to be recommended in the 2026 RWP.
- **Wastewater Reclamation for Municipal Irrigation:** Some projects to develop reclaimed wastewater as a supply for municipal irrigation use have been implemented in Region H since the development of the 2021 RWP. Future phases of this WMS and associated infrastructure projects continue to be recommended in the 2026 RWP.
- **Westwood Shores MUD Reuse:** Development of non-potable direct reuse infrastructure for Westwood Shores MUD is in the planning phase. This strategy continues to be recommended in the 2026 RWP.

9.2.6 Surface Water Development

- **Allens Creek Reservoir:** BRA is pursuing investigations, design, and permitting related to the development of Allens Creek Reservoir. This project is recommended in the 2026 RWP.
- **Dow Reservoir and Pump Station Expansion:** The Brazosport Water Supply Corporation (BWSC) is engaged in detailed design of the pump station and impoundment for expanding the capacity and supply for the Harris Reservoir. This project is recommended in the 2026 RWP as the BWSC Reservoir and Pump Station Expansion.

9.2.7 Treatment

- **BWA Conventional Treatment Expansion:** BWA has engaged in the implementation of improvements to its conventional water treatment facilities to increase the capacity of the facility. Some of these efforts are being funded through the Drinking Water State Revolving Fund (DWSRF). Additional expansion of the treatment capacity for BWA facilities is planned. Future phases of this project are recommended in the 2026 RWP.
- **COH Northeast Water Purification Plant Expansion:** The first phase of the NEWPP expansion project has been constructed. Project sponsors received funding for the treatment plant expansion through the SWIFT program. Future phases of this project are recommended in the 2026 RWP.
- **Pearland Surface Water Treatment Plant Development:** The first 10 million gallons per day (MGD) phase of the Pearland surface water treatment plant has been constructed and is

beginning initial service, and a second 10 MGD phase is still planned by the project sponsor for completion by 2030. Future phases of this project are recommended in the 2026 RWP.

- **SEWPP Expansion:** The expansion of the SEWPP is in the planning phase, with the planned capacity of the project increased from the 2021 RWP. This project is recommended in the 2026 RWP.

9.2.8 Other

- **Brazos Saltwater Barrier:** The Brazos saltwater barrier is a potential option for enhancing the useful yield of surface water supplies in the lower end of the Brazos River. Dow Inc. currently holds a permit for construction of a temporary saltwater barrier in the circumstance of extreme drought and has resources to implement a temporary barrier as the need arises. This project is recommended in the 2026 RWP.
- **GCWA Shannon Pump Station Expansion**: The GCWA Shannon Pump Station Expansion is in the design phase and continues to be recommended in the 2026 RWP.
- **New and Expanded Contracts:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. Contractual transfers continue to be recommended in the 2026 RWP.

9.3 COMPARISON TO PREVIOUS REGIONAL WATER PLAN

Each round of regional water planning produces a number of changes through the way in which demands, supplies, and strategies are represented. Some of these adjustments are brought about by updated information where others may be driven by shifts in water availability, regulation, or approach by water providers.

9.3.1 Water Demand Projections

Water demand projections were developed by TWDB during the development of the 2026 RWP. The Region H Population Demands Committee and Non-Population Demands Committee reviewed the preliminary projections provided by TWDB and provided feedback, which was incorporated into the final water demand projections used in the 2026 RWP.

TWDB employed new methodologies to estimate water demands for irrigation, livestock, manufacturing, mining, and steam electric power generation during the 2026 regional planning cycle. Non-population demands in Region H were extensively examined by the Non-Population Demands Committee, with particular attention paid to projections associated with new methodologies. The RHWPG requested a limited number of adjustments to projections for all non-municipal water demand categories, with these adjustments subsequently approved by TWDB. All non-municipal demand categories except for Manufacturing display a limited magnitude of change in projected water demand from the 2021 RWP to the 2026 RWP. The TWDB methodology for projection of Manufacturing water demand was adjusted subsequent to the 2021 RWP to incorporate more recent data and address Regional Water Planning Group (RWPG) feedback from the 2021 RWP, resulting in higher demands for the 2026 RWP.

It was noted by the Planning Group that the potential future expansion of hydrogen production or other emerging technologies could potentially have significant impacts on future industrial water demand for the Region. While uncertainty regarding the future of this production sector precludes incorporation of corresponding projection adjustments for the 2026 RWP, the RHWPG has engaged in preliminary studies of topics surrounding water demand for emerging technologies and will continue to monitor the issue for future planning cycles.

Figures comparing 2021 RWP and 2026 RWP projected demands for Irrigation, Livestock, Manufacturing, Mining, and Steam Electric Power are shown in *Figure 9-1* through *Figure 9-5*.

Figure 9-1 – Comparison of Irrigation Demand Projections

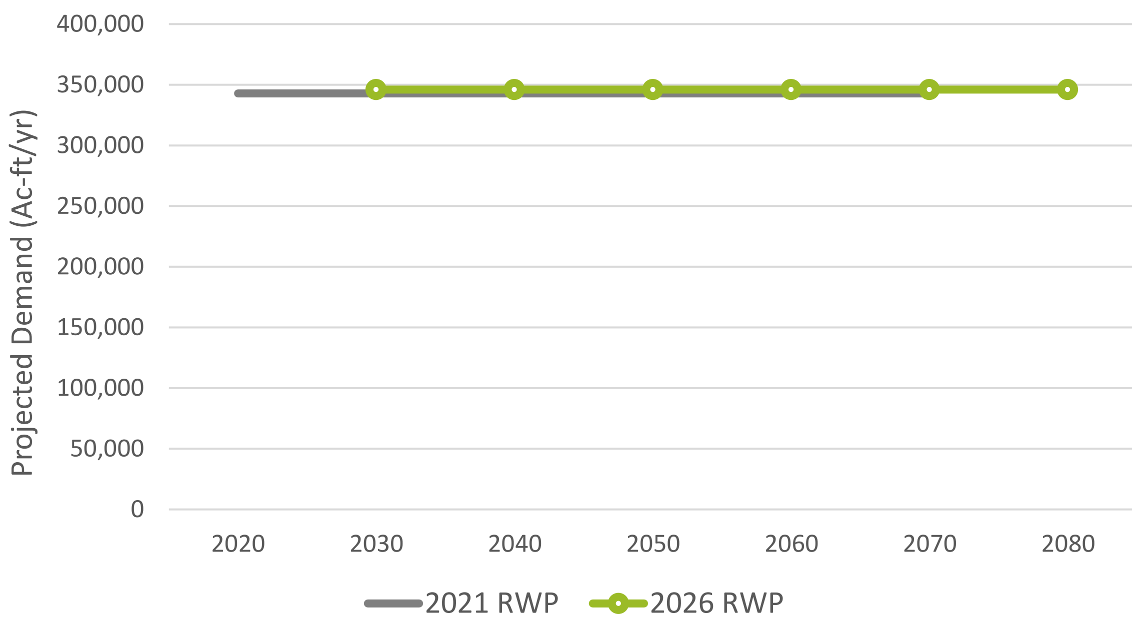


Figure 9-2 – Comparison of Livestock Demand Projections

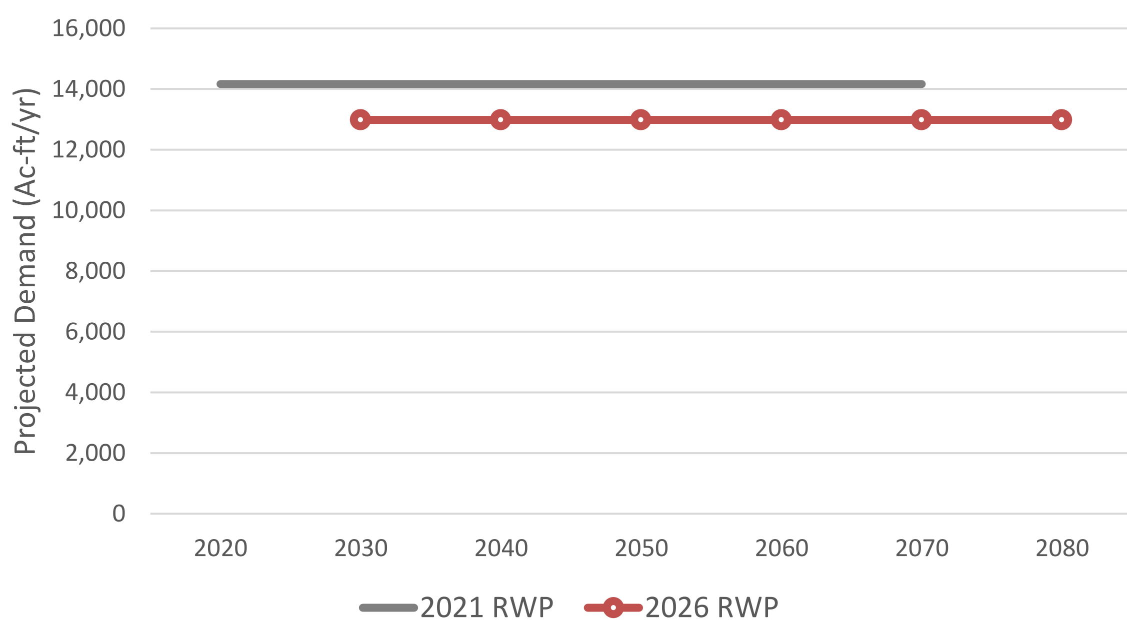


Figure 9-3 – Comparison of Manufacturing Demand Projections

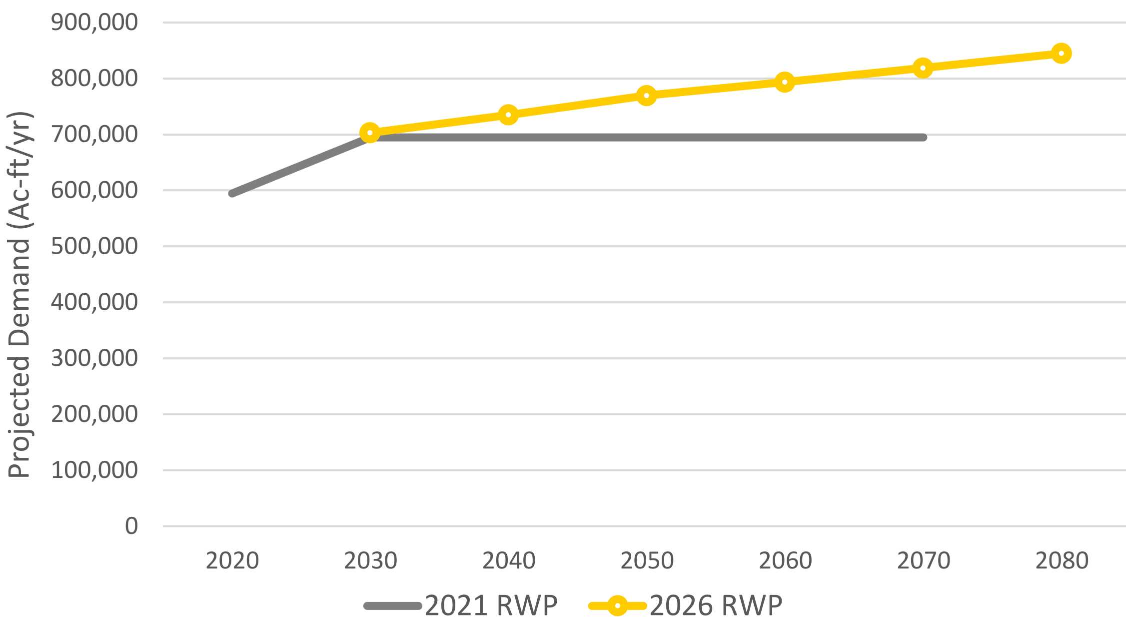


Figure 9-4 – Comparison of Mining Demand Projections

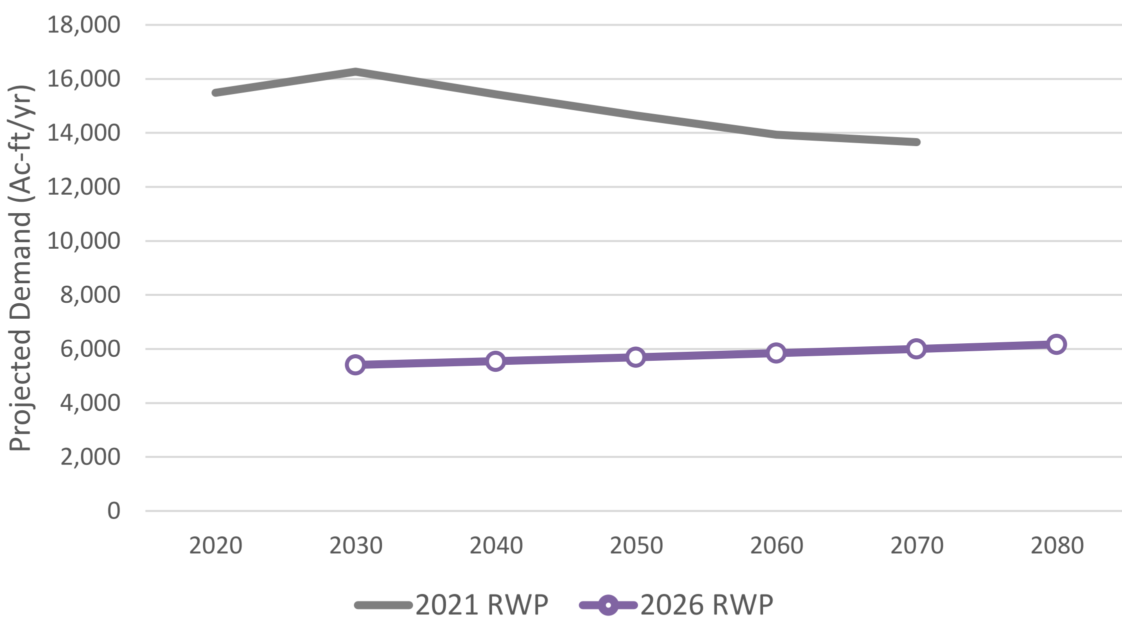
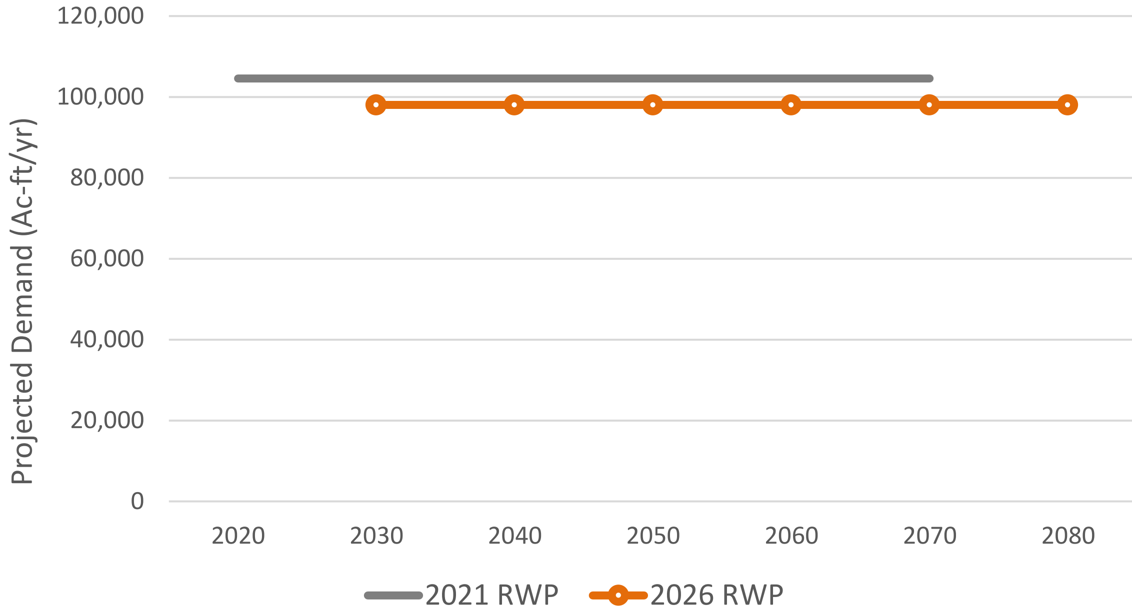


Figure 9-5 – Comparison of Steam Electric Power Demand Projections

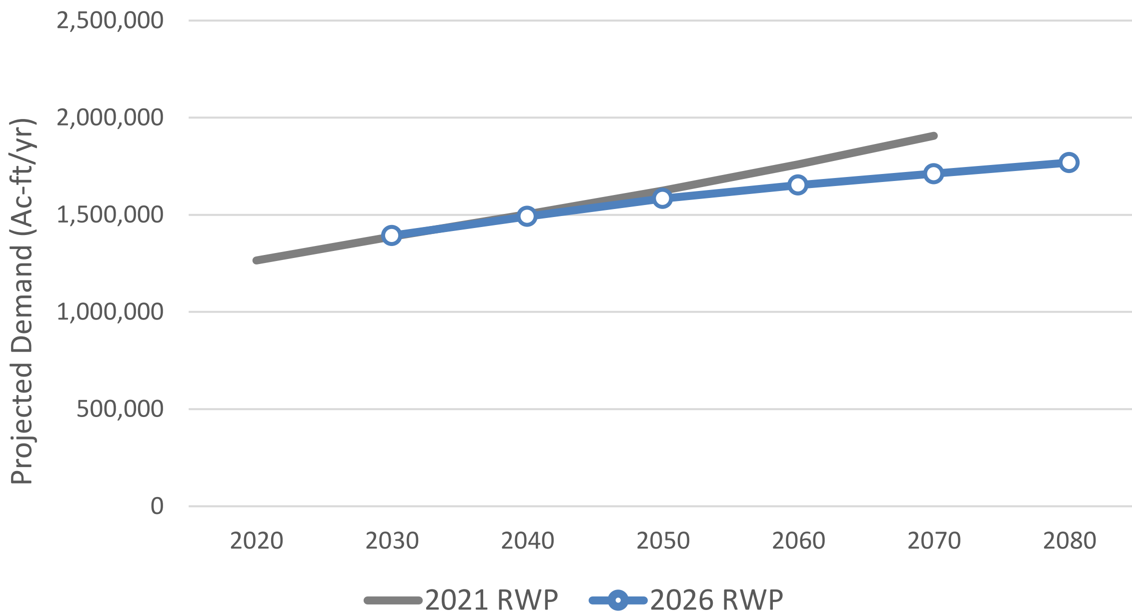


The population and municipal water demand projections in the 2021 RWP were closely based on those of the 2016 RWP, which were in turn based on population projections from a study conducted by HGSD, FBSD, and the Lone Star Groundwater Conservation District to evaluate regional groundwater availability and management. These population projections were applied in combination with TWDB-prepared estimates of per-capita demand and passive conservation savings to generate municipal demand projections.

For the 2026 RWP, TWDB generated WUG-level projections for all RWPGs. The RHWPG opted to request an exception from these state-generated projections for a portion of the Region and, instead, utilize information developed for a parallel project to evaluate groundwater use within the region for HGSD and FBSD. This request builds upon similar efforts undertaken by the Region for prior RWP cycles and involved close coordination among the RHWPG, the Subsidence Districts, and TWDB staff. This study was designed to fit with the regional planning process, and coordination with TWDB was performed in order to ensure uniformity between the groundwater study and the projection development conducted by TWDB. This request was evaluated and subsequently approved by TWDB. These population projections were applied in combination with TWDB-prepared estimates of per-capita demand and passive conservation savings to generate municipal demand projections.

Municipal demand projections in the 2021 and 2026 RWPs are compared in *Figure 9-6*, and a comparison of projected demands in the 2021 and 2026 RWPs by county and water use type can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 9-6 – Comparison of Municipal Demand Projections



Municipal demand projections in the 2026 RWP were similar to those in the 2021 RWP through approximately 2050, with projections after this date slightly lower for the 2026 RWP. This is primarily attributable to the updated population projections for the 2026 RWP, which anticipate attenuation of growth for portions of the urban core and surrounding suburbanized areas after 2050.

9.3.2 Drought of Record, Modeling Assumptions, and Existing Source Supplies

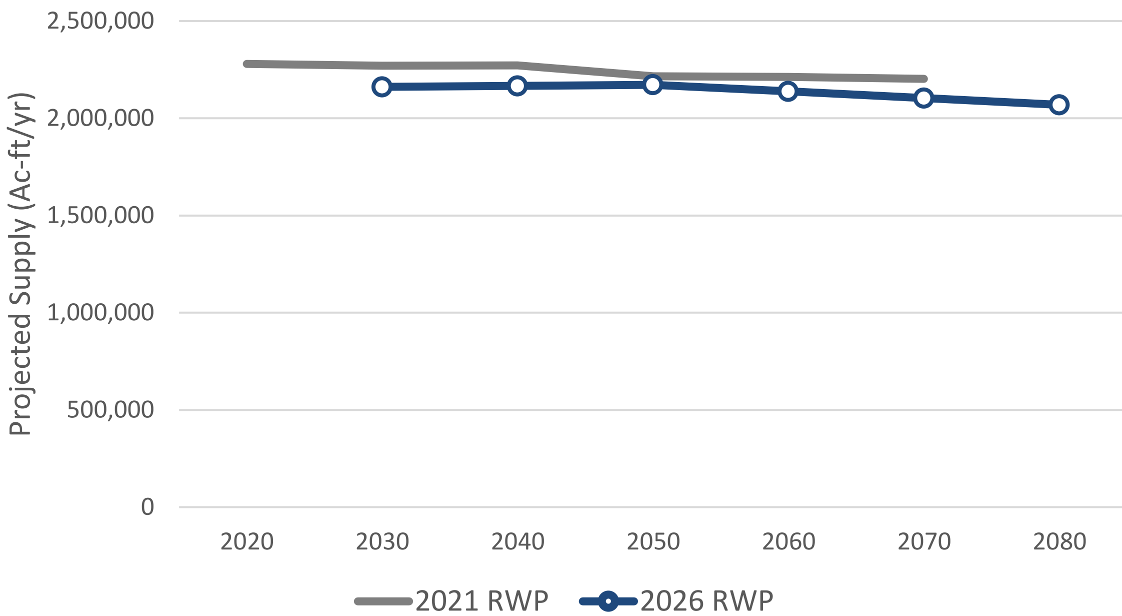
Both groundwater and surface water supplies in Region H are developed using guidelines that are either dictated by regional water planning guidance or applied at the discretion of the RHWPG. These assumptions and approaches vary between the 2021 and 2026 RWPs in a number of ways. However, there are also several similarities in the yield evaluation process that provide continuity between the two plans.

Surface water supplies in Region H are developed based on output from the TCEQ Water Availability Models (WAMs) for each basin. In addition, the following assumptions were applied in the 2021 and 2026 RWPs.

- In both the 2021 and 2026 RWPs, Region H has used the TCEQ WAM Run 3 as the base model for evaluation of existing water supplies.
- In both the 2021 RWP and 2026 RWPs, Region H has elected to seek TWDB approval to modify the base Run 3 WAMs to include limited return flows. In the Trinity River Basin, this includes wastewater flows from the upper basin after the application of reuse WMS. Region H also uses a modified WAM developed by the Brazos G RWPG that includes some limited return flows.
- The RHWPG has historically used the drought of the 1950s as a representation of drought of record conditions for all basins in the region. This assumption continues in the 2026 RWP.

Identified surface water supplies in the 2021 and 2026 RWPs are compared in *Figure 9-7*, and a comparison of total water supplies within each county can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

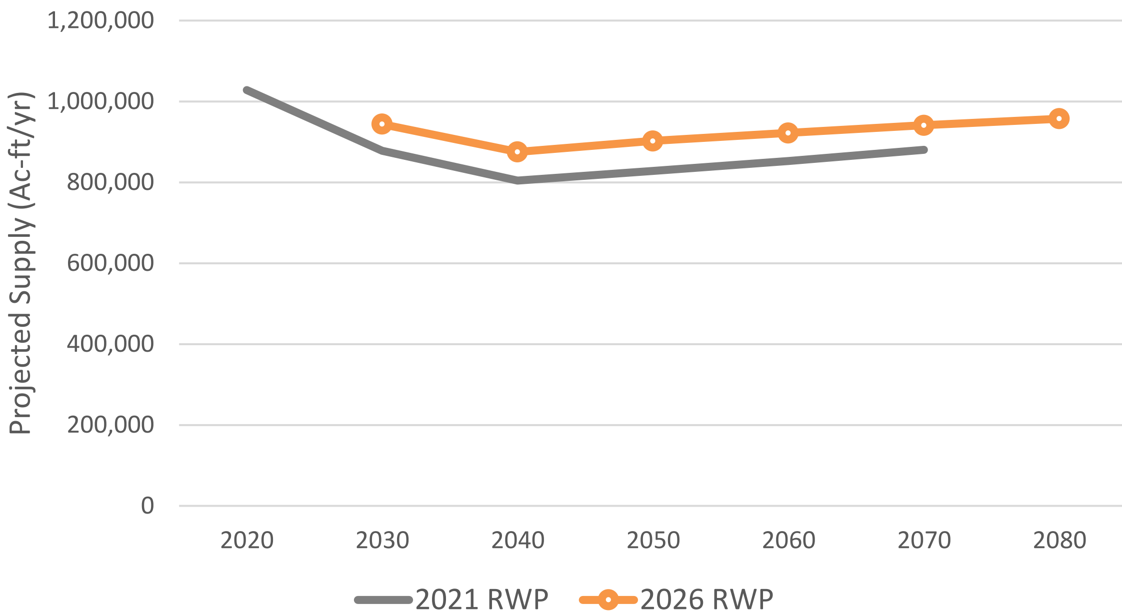
Figure 9-7 – Comparison of Surface Water Supply Projections



Groundwater supplies in both the 2021 RWP and 2026 RWP were based primarily upon the Modeled Available Groundwater (MAG) for each formation included in the Groundwater Management Area (GMA) process. For both cycles, TWDB allowed the designation MAG peak factors, which allow the regional plans to reflect a higher short-term supply availability during drought of record conditions that are still consistent with long-term achievement of desired future conditions. Additionally, TWDB determined that the use of MAG values was not suitable within the jurisdiction of subsidence districts and supply availability in those districts has been revised to align with the district regulatory plans. The process of determining and applying MAG peak factors is discussed in detail in ***Chapter 3***.

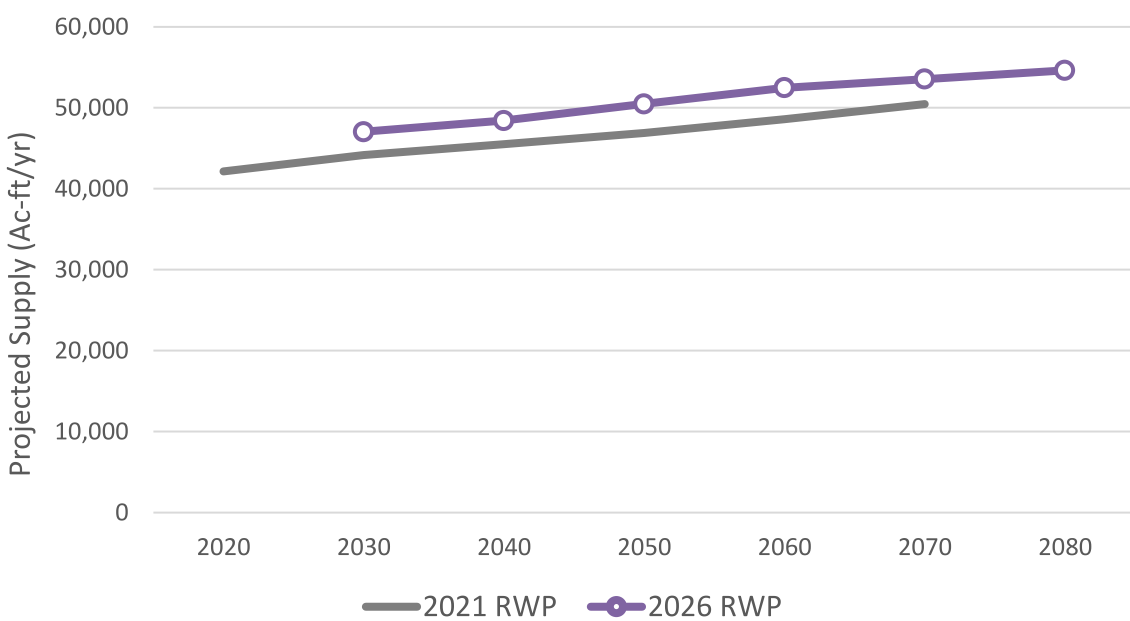
Identified groundwater supplies in the 2021 and 2026 RWPs are compared in *Figure 9-8*, and a comparison of total water supplies within each county can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 9-8 – Comparison of Groundwater Supply Projections



Reuse supplies in both the 2021 and 2026 RWPs were developed based on knowledge of existing projects and permits, including the use of supplemental information provided by TWDB. Identified reuse supplies in the 2021 and 2026 RWPs are compared in *Figure 9-9*, and a comparison of total water supplies within each county can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 9-9 – Comparison of Reuse Supply Projections



9.3.3 WUG Supplies and Needs

In both the 2021 and 2026 RWPs, care was taken in assigning existing, available supplies based on stakeholder input and knowledge of the regional water supply. It should be noted that needs are not the mere difference between regional demand and regional supply, as water supplies are not uniformly distributed throughout the region and infrastructure is needed in the form of projects in order to make existing, developed sources of water available for end use. Effort was taken in order to realistically curtail supplies available to individual WUGs in order to properly demonstrate local needs and, eventually, the recommended management strategies to address the identified shortfall.

The supplies allocated to WUGs in both the 2021 and 2026 RWPs are shown in *Figure 9-10*. Identified WUG needs in the 2021 and 2026 RWPs are shown in *Figure 9-11*. A comparison of allocated existing supplies and identified needs in the 2021 and 2026 RWPs by county and water use type can be found within the DB27 reports (see ***Section ES.11*** of the Executive Summary).

Figure 9-10 – Comparison of WUG Allocations

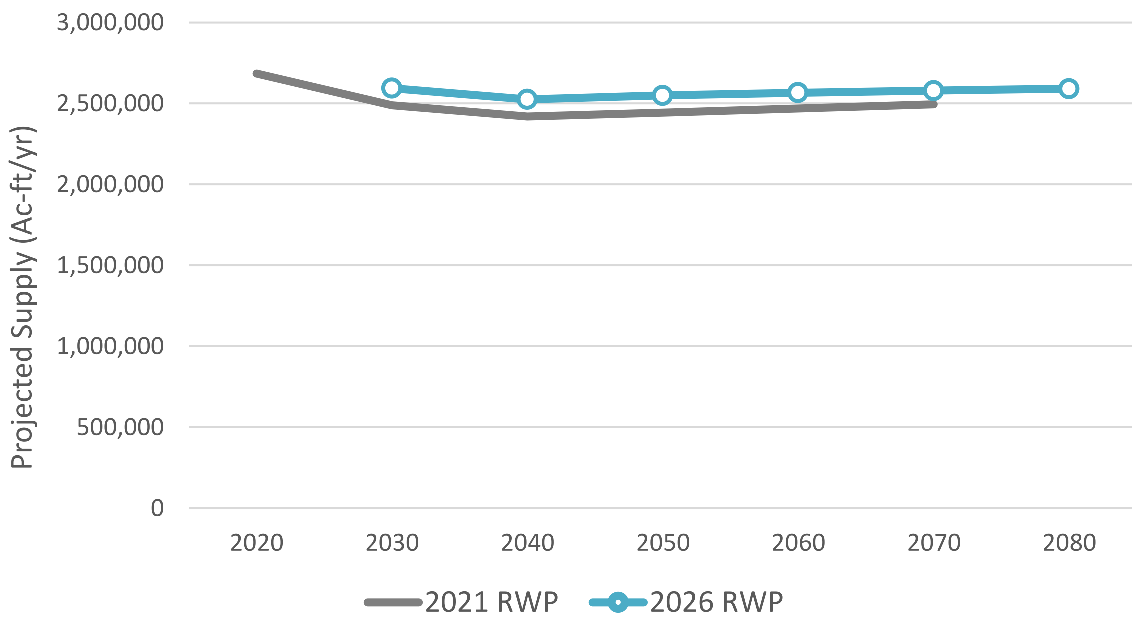
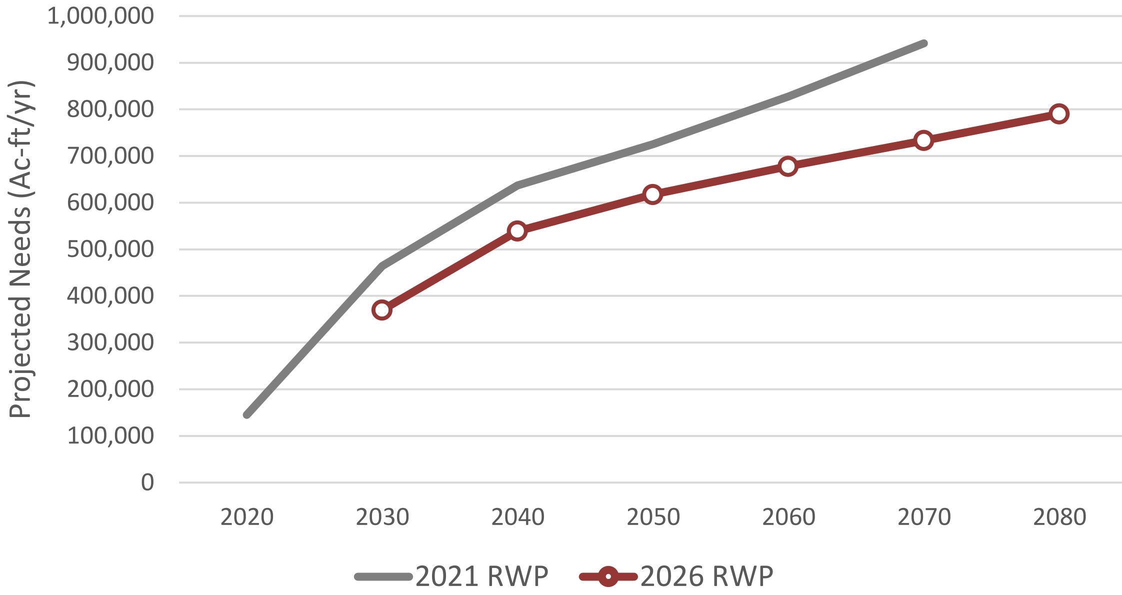


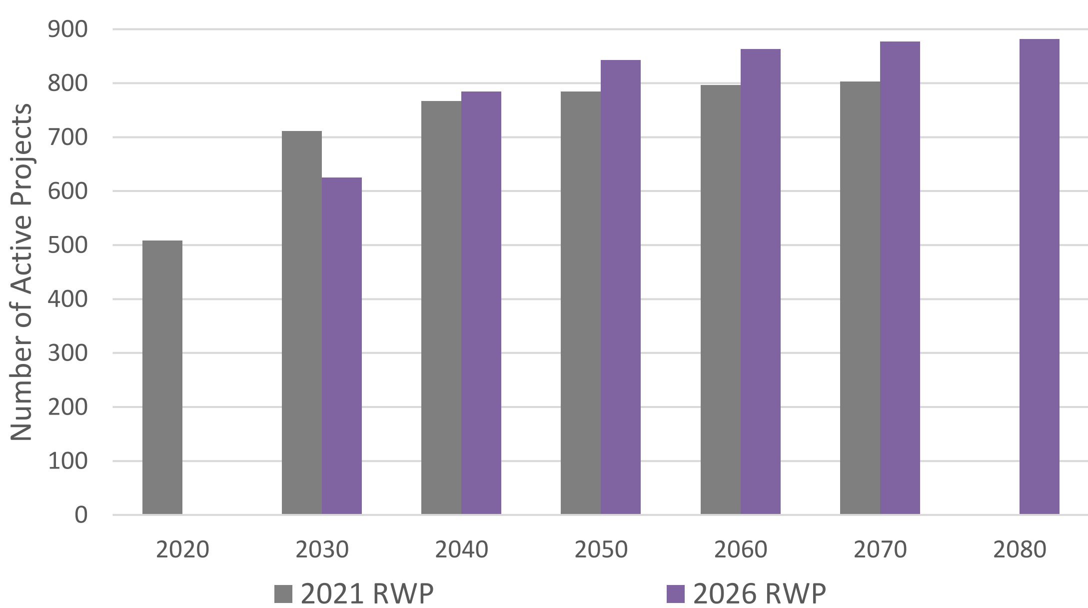
Figure 9-11 – Comparison of Identified WUG Needs



9.3.4 Recommended and Alternative Water Management Strategies

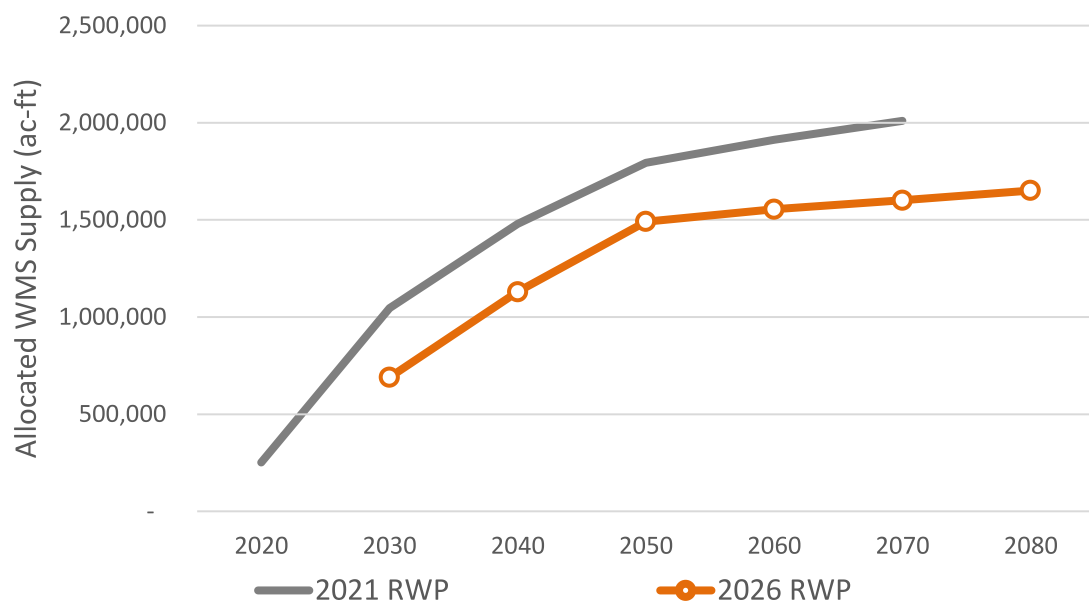
In total, the RHWPG has recommended 60 WMS and 885 capital projects for the 2026 RWP, compared to 63 WMS and 821 capital projects identified in the 2021 RWP. For purposes of this comparison, all components of a grouped WMS within TWDB's DB27 database are considered a single WMS. The number of capital projects identified in each RWP and actively associated with supply volumes in each decade are shown below in *Figure 9-12*.

Figure 9-12 – Comparison of Number of Active Projects



Allocations of WMS supplies in the 2026 RWP differ from those in the 2021 RWP for a number of reasons, including differences in projected WUG demands, establishment of new existing contracts between water providers and WUG customers, implementation of 2021 WMSs as existing supplies, changes in recommended WMS, and changes to associated project schedules. The WMS supply volumes allocated in each RWP are shown below in *Figure 9-13*.

Figure 9-13 – Comparison of Allocated WMS Supply Volumes



9.4 REGIONALIZATION OF WATER MANAGEMENT STRATEGIES IN REGION H

RWPGs are required by statute to prepare long-term regional water supply plans which consider ongoing local and regional planning efforts and which are consistent with plans developed by other regions throughout the state. Furthermore, regional water plans are required to meet projected water needs with strategies that, among other requirements, are cost-effective. Strategies which meet needs of multiple WUGs are typically more cost-effective than localized strategies due to economy of scale and the reduced unit cost of planning, designing, and constructing one larger facility rather than multiple smaller projects.

Regional strategies that meet the needs of multiple WUGs and achieve economies of scale are common in Region H. Several of the major water providers in Region H are Regional Water Authorities, which were created by the Texas Legislature to lead water planning and groundwater conversion efforts. Additionally, COH has developed important relationships with the regional water authorities and river authorities to coordinate interbasin transfers from the Trinity River Basin to the largest demand centers in Region H. GCWA also provides water to numerous municipal, agricultural, and industrial users in the southwestern part of Region H through the use of an extensive canal network, numerous supply sources, and planned projects for large-scale infrastructure. Many of these large-scale, cooperative strategies and projects have been prompted by the requirements of the FBSD and HGSD to significantly reduce groundwater use.

The 2026 Region H RWP includes numerous strategies sponsored by these major water providers and other entities to develop long-term water supplies on a large geographic scale, sometimes including projects that span multiple counties and basins. Furthermore, when evaluating strategies to meet needs, especially when local groundwater development is not a viable option due to availability or groundwater reduction regulations, the RHWPG frequently recommends strategies for new and expanded contracts with regional providers as the first option to meet needs. The RHWPG is supportive of the efforts of water providers in the region to provide large-scale, long-term water supplies through cooperative projects that increase reliability of supply in the region.

Of the projects and strategies recommended in the 2026 RWP, eight projects and 20 WMS involve multiple sponsors and / or wholesale water providers, and 29 recommended strategies would meet needs of multiple WUGs. These and other metrics of cooperative strategies in the 2026 RWP are compared to the 2021 RWP in *Table 9-1*. Overall, the number of strategies and projects which are sponsored by multiple entities, use more than one water supply source, or serve supply to multiple WUGs have remained similar to or increased relative to the 2021 RWP. While the number of WMS involving transfers has decreased since the 2021 RWP, the number of providers serving multiple customers has increased; this reflects in part the implementation of previously recommended strategies from earlier planning cycles and the ongoing increase in regionalization of supplies within the Region H areas. These results highlight the continued importance of regional approaches in Region H.

Table 9-1 – Assessment of Progress in Developing Regional Water Supplies and Strategies

Summary of Recommended WMS, Projects, and Providers in Region H	2021 RWP	2026 RWP
WMS[1] supplying multiple WUGs	30	29
WMS[1] with multiple sponsors / sellers	12	20
WMS[1] using multiple water sources	20	20
WMS[1] involving at least one transfer	44	31
Projects with multiple sponsors	7	8
Region H wholesale water providers[2] serving multiple WUGs	51	64

[1] Excludes Municipal Conservation, Water Loss Reduction, and Expanded Use of Groundwater, which are employed on a localized, single-WUG basis.

[2] Wholesale water providers here refer to any entity, which may or may not also qualify as a WUG, which sells water on a wholesale basis, including sales to non-municipal WUGs.

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Chapter 10 – Adoption of Plan and Public Participation

10.1 INTRODUCTION

The Region H Water Planning Group (RHWPG) has sought to encourage public involvement and the participation of interested parties during the process of plan development so that any concerns could be addressed before the draft plan was completed. From its initial deliberations in preparing the 2001 Regional Water Plan (RWP), the RHWPG has made a commitment to an open planning process and has actively solicited public input and involvement in developing the elements of the 2026 RWP. Securing a high level of public participation continues to be a challenge for long-term planning, even for a topic as vital to public well-being as the water supply, particularly if there is no drought. Nevertheless, the RHWPG has reached out to communicate with the general public by pursuing several avenues to gain public involvement.

10.1.1 Regional Water Planning Group as Stakeholder Representatives

The first line of public involvement occurs through the membership of the RHWPG. Each of the members of the RHWPG represent an interest category, such as river authorities, agriculture, small businesses, the general public, etc. They also represent the different geographic areas within this expansive region. Most of these members have connections to the community through various organizations. These linkages, such as professional organizations or citizen groups, are the first avenue for taking information to the public and for receiving input to the RHWPG.

During development of the 2026 RWP, the RHWPG has met at least four times per year, typically on the first Wednesday of the month, so that interested parties can plan to attend and follow the proceedings. Notices of these meetings are posted on the Texas Secretary of State website and the Region H website and are e-mailed to a list of "interested persons" who have requested to be informed. The RHWPG maintains minutes of its meetings and places them on the Region H Water website for review, along with other meeting resources.

10.1.2 Public Outreach

In addition to regular meetings related to the routine business of plan development, the RHWPG and its representatives participated in numerous opportunities to address organizations associated with water supply and natural resources as well as the general public. A partial list of these organizations includes the following:

- Association of Water Board Directors - Texas
- Bayou Preservation Association
- Brazoria County Groundwater Conservation District
- Gulf Coast Water Conservation Symposium
- Harris-Galveston Subsidence District
- Houston-Galveston Area Council
- North Houston Association

- Texas Industrial Energy Efficiency Program
- Texas Municipal League
- West Houston Association

10.1.3 Rural Outreach

In addition to representation through RHWPG members and public outreach to organizations, the RHWPG conducted targeted outreach to rural entities in the region. Region H is highly diversified in development, and in addition to large urban centers also encompasses large areas of lower density rural development served by small water systems. These systems face many of the same challenges during dry conditions as more urbanized areas, and many rural areas within the Region are also experiencing, or are projected to experience, substantial population growth. These challenges can be compounded by the scale of these systems, their distance from other entities, and the options readily available to them to address limitations on existing supplies. Outreach to rural systems is thus an important measure in properly planning for these areas in the RWP.

To support RHWPG efforts in rural outreach, the Texas Water Development Board (TWDB) provided a list of 206 public water systems in the Region H Water Planning Area that qualify as rural subdivisions, including some which are included in aggregate County-Other Water User Groups (WUGs). Of the rural systems identified by TWDB, 164 systems, or nearly 80 percent, are included within named WUGS within the RWP. The RHWPG conducted a WUG survey in May 2023, with these rural entities contacted as part of that outreach effort. A separate email and telephone survey was sent in August 2024 to another 42 rural entities shown within County-Other WUGS for which contact information was available. Overall, 31 rural entities responded to the RHWPG outreach efforts, providing information regarding population and demand projections, supply sources, water sales and purchases, interconnections, water management strategies, conservation, and drought management. Survey response information was considered in the development of the 2026 Region H RWP.

10.1.4 Interregional Coordination

Interregional coordination has been a key component of planning in Region H since the inception of the Regional Planning process, as the region utilizes existing supplies from other regions and past Region H RWPs have recommended multiple Water Management Strategies (WMS) that involve sources or sponsors in other regions. As growth within Texas continues, close coordination and effective communication between Regional Water Planning Groups (RWPGs) has become increasingly important to effective planning. In recognition of the importance of sharing of information across regional boundaries, in 2019 the Texas Legislature created the Interregional Planning Council (IPC) to improve coordination between RWPGs, facilitate dialogue regarding WMS that could impact multiple regions, and share best practices for the RWP process. In 2020, the IPC developed recommendations related to enhancing interregional coordination, including discussing an interregional coordination process at the beginning of the planning cycle, identifying potential interregional issues and opportunities early in the planning cycle, and documenting coordination. A subsequent IPC report issued in 2024 examined the status of these suggested practices and made additional recommendations. In addition to IPC guidance, TWDB recommended identifying WMS that develop or use water resources in another region, or which may otherwise generate opportunities for interregional coordination.

Based on the recommendations from the IPC and TWDB, the RHWPG discussed potential processes for interregional coordination at a regular meeting of the RHWPG in the first year of the current planning cycle, on November 3, 2021. At this meeting, the RHWPG considered interregional coordination actions and discussed existing sources and potentially feasible strategies that involve other planning regions. The RHWPG identified a number of interregional coordination approaches to be utilized during the development of the 2026 RWP, including the following.

- Utilization of liaisons to RWPGs and other planning entities: Region H has benefited from use of liaisons to other Regions in prior cycles and has continued this measure for the 2026 RWP. These liaisons, which may be members of multiple RWPGs, non-voting members of Region H, or other regular attendees with cross-regional experience, provide regular reports at planning group meetings of relevant planning activities in other regions. The RHWPG has designated planning group members to serve as liaisons to Regions C and G, as well as to Region 6 and Region 8 Flood Planning Groups, Groundwater Management Areas 12 and 14, and the Interregional Planning Council. While formal liaison positions to Regions I and K are currently vacant, the RHWPG coordinates with representatives of both regions to share information.
- Authorizing RWPG administrators or consultants to coordinate with neighboring RWPGs: In addition to regularly scheduled updates and formal correspondence, the day-to-day activities involved in RWP administration and technical development often require coordination between the designated political subdivisions administering the RWPs and by the technical consultant teams for adjacent regions. This longstanding practice of sharing information, in conjunction with the use of a common TWDB planning database, helps to promote compatible planning approaches and reduce the risk of conflicting strategies.
- Coordination through RWPG Chair conference calls: TWDB periodically hosts conference calls of the RWPG Chairs and support teams in order to promote timely discussion of RWP process issues and best practices. The Region H Chair and other representatives regularly participate in these calls and provide applicable guidance to the RWPG.
- Coordination through stakeholder entities: Stakeholders in Region H are involved in coordinated studies with others across planning region boundaries. The RHWPG coordinates with local stakeholders regarding these and other efforts through surveys as well as targeted outreach to wholesale water providers.

Region H shares multiple existing sources with other regions, either through interconnections to or from Region H or based on geography and geology. Additionally, multiple surface water sources in Region H are downstream in river basins shared with upstream RWPGs. Coordination between the consultant teams of Regions H, I, G, C, and K was critical in determining availability of these sources. Among these is the Brazos River Alluvium Aquifer, which is a groundwater source in Regions G and H. In 2023, the RHWPG formed a committee to discuss availability and planned use of this source. The Region H Brazos Alluvium Committee supported a presentation to the Region G planning group on this source. Additionally, multiple strategies recommended in the 2026 Region H RWP use supplies from other regions, and some WUGs benefit from strategies recommended in other RWPs. These strategies include:

- Multiple WMS and projects to expand use of supply from Brazos River Authority water rights, which originate in portions of Regions G and H, and which are provided to Region H customers by contract;
- the East Texas Transfer, which conveys water from Region I to Region H; and
- the LNVA Neches-Trinity Basin Interconnect, which conveys water from Region I to Region H.

Upon adoption of the 2026 Region H Initially Prepared Plan (IPP), the RHWPG will submit letters to Region G and Region I documenting the recommendation of these strategies and providing a link to the Region H IPP for review.

10.1.5 Public Notes and Press Releases

RHWPG meetings and meetings of RHWPG technical committees were held as public meetings, with notice posted in accordance with 31 Texas Administrative Code (TAC) §357.21. The RHWPG met all requirements under 31 TAC §357.12 and 357.21, as well as the Public Information Act and Open Meetings Act. It should be noted that the coronavirus disease 2019 (COVID-19) pandemic precluded physically convening the RHWPG during a portion of 2021. By virtue of the Governor's Disaster Proclamation and subsequent temporary suspension of certain provisions of the Texas Open Meetings Act, the RHWPG held three meetings during 2021 as publicly accessible webinars with provision for full public participation and comment. Notice for public meeting webinars, including information on multiple options to access each meeting, was posted in the same manner as regular physical meetings of the RHWPG.

10.1.6 Region H Water Website

A website was developed at the onset of the first biennium of the 2011 RWP in order to maintain contact with the public and to provide members of the RHWPG with resources for plan development. The site, Region H Water (*http://www.regionhwater.org*), provides visitors with an overview of the regional planning process in Texas and specific information on the Region H Water Planning Area and Water Planning Group. The site also provides information and announcements for meetings of the RHWPG and downloads of past RWPs.

10.1.7 Texas Water Development Board Website

The TWDB provides extensive information on the regional water planning process, including background information, current planning documents, and relevant rules and statutes, on its regional planning webpage (*www.twdb.texas.gov/waterplanning/rwp*). Upcoming meetings, contact information, and downloadable copies of previously adopted RWPs are available as well.

10.2 PLANNING GROUP ACTIVITIES

10.2.1 Regional Planning Group Meetings

The public meetings held as part of the planning process for Region H during the 2026 regional water planning cycle are summarized below. Additional information and supporting materials, including detailed meeting minutes, are available on the Region H website (*http://www.regionhwater.org*).

10.2.1.1 Public Meeting, February 3, 2021

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on February 3, 2021, at 10:00 a.m. as part of the regular meeting of the RHWPG. Due to concerns with the COVID-19 pandemic, the meeting was held as a publicly accessible webinar with provision for full public participation and comment, as permitted by the Governor's Disaster Proclamation and subsequent temporary suspension of certain provisions of the Texas Open Meetings Act. No public comments were provided.

Mr. Taucer provided an overview of the RHWPG membership, citing that the group is made up of 26 members and 12 interest groups of broad distribution and diverse backgrounds. He noted the current voting members and current non-voting members. Following a brief explanation by Mr. Houston regarding the current terms of voting members, Mr. Marcell made a motion to extend the term of existing Region H voting members for an additional five-year term. The motion was seconded by Mr. Fisseler and was carried unanimously.

Mr. Houston made a motion to accept the resignation of Jimmie Schindewolf as a voting member of the RHWPG, declare the position vacant, and to appoint Jun Chang as the new voting member representing Water Districts. The motion was seconded by Mr. Masterson and carried unanimously.

Mr. Evans stated the current members of the Executive Committee are up for election for a one-year term, and announced the current slate of officers: Mark Evans, Chair; Marvin Marcell, Vice-Chair; Jace Houston, Secretary; and John Bartos and Pudge Willcox, Members. Each of the members expressed their willingness to continue serving in their respective capacity, with the exception of Mr. Willcox, who resigned as a Member of the Executive Committee. Mr. Masterson made a motion to re-elect the current slate of officers along with Member John Bartos for a one-year term and declared Mr. Willcox's position vacant until the item can be addressed at the next meeting. The motion was seconded by Mr. Ward and carried unanimously.

Mr. Taucer explained the various committees that meet during the course of the planning cycle along with their respective responsibilities. Mr. Evans stated as the Executive Committee Chair, he will review each committee and current members for the upcoming cycle.

Mr. Evans explained that the Region 6 San Jacinto Regional Flood Planning Group requested the RHWPG to appoint a non-voting member to their group. Mr. Turco stated that he will be attending the upcoming meetings as a representative of the Harris-Galveston Subsidence District and will provide an update related to the responsibilities of the non-voting member at the next RHWPG meeting. Mr. Evans requested this item be tabled until the April 7, 2021, RHWPG meeting.

Mr. Houston provided a brief overview of the Region H Local Contribution account history and balance. Mr. Ward made a motion to authorize the San Jacinto River Authority to use funds from the Region H Local Contribution account to pay for the renewal of director and officer liability insurance for RHWPG members. The motion was seconded by Mr. Masterson and carried unanimously.

Mr. Taucer explained the working timeline for the initial contracts and Request for Application related to the Sixth Cycle of Regional Water Planning provided by the TWDB.

Mr. Bookout provided information related to the anticipated timeline for initial Request for Applications (RFA) for the Sixth Cycle of Regional Water Planning. He provided an overview related to contracting and initial scope of work.

Mr. Taucer provided information related to the Sixth Cycle of Regional Water Planning. He stated that the Water Planning Group previously authorized the San Jacinto River Authority to prepare and submit the grant application; post public notice; and negotiate and execute a contract with TWDB. Mr. Taucer then reviewed the various aspects of the application process.

Mr. Taucer explained the various elements related to public input relative to the development of the 2026 RWP and the 2027 State Water Plan. He stated that the meeting is likely to occur in the later part of the year, prior to the technical analysis and is one of largest notification cycles in the planning period. Mr. Bartos made a motion to authorize the San Jacinto River Authority to provide public notice and hold a pre-planning public meeting to obtain public input on the development of the 2026 RWP and the 2027 State Water Plan. The motion was seconded by Mr. Masterson and carried unanimously.

Ms. Temple McKinnon provided an overview of the activities and select recommendations of the Interregional Planning Council to TWDB such as Regional Water Planning process revisions; TWDB Communications and information sharing; and revisions to planning requirements for enhanced interregional coordination. She then provided a summary of the TWDB actions.

Lann Bookout provided information related to TWDB's mining water use study; the 5-year boundary review process; and the flood planning website.

10.2.1.2 Public Meeting, April 7, 2021

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on April 7, 2021, at 10:00 a.m. as part of the regular meeting of the RHWPG. Due to concerns with the COVID-19 pandemic, the meeting was held as a publicly accessible webinar with provision for full public participation and comment, as permitted by the Governor's Disaster Proclamation and subsequent temporary suspension of certain provisions of the Texas Open Meetings Act. No public comments were provided.

Mr. Evans announced the resignation of Mr. Willcox and an additional vacancy due to the passing of Mr. Robert Bruner. Mr. Willcox recommended he be replaced by Mr. Caleb Cooper. Mr. Turco made a motion to accept the resignation of Mr. Willcox, declare both positions vacant, and to appoint Mr. Cooper as a new voting member of the RHWPG representing Agriculture. The motion was seconded by Mr. Lord and carried unanimously.

Mr. Langford made a motion to appoint Mr. Brandon Wade to the Region 6 San Jacinto Regional Flood Planning Group and Mr. Glenn Lord to the Region 8 Lower Brazos Regional Flood Planning Group. The motion was seconded by Mr. Turco and carried unanimously.

Mr. Ward made a motion to appoint Mr. Mark Evans as a member of the Interregional Planning Council and Mr. Jace Houston as alternate to the same. The motion was seconded by Mr. Brunett and carried with all present voting aye.

Mr. Taucer provided an update and noted new non-voting members to the RHWPG.

Ms. Sarah Robinson of the City of Houston and Mr. Stephen Cortes of Goldwater provided information related to the various programs and incentives to encourage a reduction in water demand over the next five years in the City of Houston.

Mr. Taucer and Mr. Marcell provided a brief update and highlighted several bills that were passed during the 87th Legislative Session that directly impact water planning, funding, etc.

Mr. Taucer provided information related to the 2026 RWP schedule and Sixth Cycle of Regional Water Planning provided by the TWDB. Mr. Taucer announced that grant applications are due April 12, 2021.

Mr. Taucer stated that the Request for Qualifications (RFQ) was released on March 12, 2021 and has been submitted by the San Jacinto River Authority. He provided an overview relative to the additions of various tasks to the scope as well as proposed budget of same.

Mr. Taucer and Ms. Amber Batson explained the procurement process. Mr. Ward made a motion to authorize the San Jacinto River Authority to request statements of qualifications to prepare the 2026 Region H RWP on behalf of the RHWPG in accordance with 31 TAC 355.92(c). The motion was seconded by Mr. Bartos and carried unanimously.

The RHWPG discussed the various advantages and disadvantages of virtual versus in-person meetings. It was agreed that the next meeting in July will take place via GoToWebinar and in-person meetings will resume thereafter.

Mr. James Golab of TWDB presented information related to the Statewide ASR-AR Suitability Survey.

Mr. Bookout provided an overview of the various information related to TWDB.

10.2.1.3 Public Meeting, July 7, 2021

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on July 7, 2021, at 10:00 a.m. as part of the regular meeting of the RHWPG. Due to concerns with the COVID-19 pandemic, the meeting was held as a publicly accessible webinar with provision for full public participation and comment, as permitted by the Governor's Disaster Proclamation and subsequent temporary suspension of certain provisions of the Texas Open Meetings Act. There were no public comments.

Mr. Evans announced the vacant position representing Agriculture and the vacant position representing Counties. He explained that Judge Henson resigned his position representing Counties and recommended Judge Byron Ryder be appointed. Mr. Bailey made a motion to appoint Judge Byron Ryder as a voting member of the RHWPG representing Counties. The motion was seconded by Mr. Masterson and carried unanimously.

Mr. Taucer provided an overview of the various bills of the 87th Legislative Session impacting Water Planning Groups, including HB 1905, SB 905, SB 600, and SB 669.

Mr. Taucer provided a review of the various recommendations from the 2021 RWP regarding unique stream segments, unique reservoir sites, and other regulatory, administrative, and legislative recommendations.

Ms. Amber Batson stated that the San Jacinto River Authority issued a Request for Qualifications to solicit information that will enable the RHWPG to select one or more consultants to provide professional services to prepare the 2026 Region H RWP. She explained Freese and Nichols, Inc., was the only respondent out of approximately four hundred bid invitations sent out. Mr. Lord made a motion to select Freese and Nichols, Inc., as the qualified consultant to provide professional services to prepare the Region H RWP for the RHWPG. The motion was seconded by Mr. Turco and carried unanimously.

Mr. Taucer provided an overview of the 2026 Region H RWP stating they are currently in the administrative mode of the cycle. He stated the team will be transitioning to a technical mode in the next six months.

Mr. Taucer provided an update related to the TWDB's procedural changes mostly aimed at streamlining processes. He reviewed the changes related to the grant application process, funding, general public outreach, regular meeting notices, and plan adoption process. He explained that there were no changes to the major notice events.

It was stated that the Governor announced all pre-pandemic requirements related to the Open Meetings Act will resume September 1, 2021.

Mr. Taucer stated the consultant team would visit the West Houston Association in mid-September.

Mr. Bookout provided information related to the Mining Water Use Study website, TWDB Member Survey, rulemaking changes due to stakeholder input or legislative changes, the approval of the 2022 State Water Plan by TWDB, due dates for contract execution, and guidance principles and Water Supply Planning Rules review. He provided a brief overview of various legislative bills, the Sixth Cycle of the RWP, and related pre-planning meetings.

10.2.1.4 Public Meeting, November 3, 2021

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on November 3, 2021, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe.

One member of the public provided comment. Mr. John Graziano commented on property rights and environmental issues.

Mr. Philip Taucer provided an overview of the existing terms for the voting members. Mr. Wade made a motion to extend the term of existing Region H Voting Members for an additional five-year term. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer provided an overview of the various vacant positions, in particular the member representing agriculture. Mr. Evans asked that a meeting of the Nominating Committee take place prior to the next RHWPG meeting and the Committee recommend members to be appointed to the various vacant positions within the Water Planning Group.

Mr. Taucer provided information related to the milestones for the development of the 2026 Region H RWP.

Mr. Taucer stated that one written comment had been provided by Mr. Hollingsworth of Gulf Coast Water Authority related to the restriction of non-agricultural Brazos River Alluvium well usage until such time that it is determined that pumping from the alluvium does not impact the availability of water of the Brazos River downstream users. He also suggested the plan address the opportunity for collaboration among Brazos G, Region H, the Brazos River Authority, and coastal wholesale providers to develop seawater desalination as a water portfolio option for the State of Texas. The public was invited to comment on the 2026 RWP and the 2027 State Water Plan. There were no further comments.

Mr. Taucer provided an overview of the recommendations provided by the Interregional Planning Council related to improving the interregional coordination process for regional planning. He reviewed the current ongoing interregional coordination process and the recommendations of the Interregional Planning Council for same. He stated that the TWDB recommended that the Planning Groups identify management strategies that develop or use a water resource in another region and to determine which strategies may create interregional coordination opportunities. Mr. Taucer provided an overview of the existing connections to other regions as well as the various water management strategies and corresponding infrastructure projects. He explained some potential actions for interregional coordination: utilize liaisons and sponsors to gather WMS data, meet with liaisons from potentially affected regions, and report to planning groups; form committee to meet with neighboring RWPGs or representatives; and authorize RWPG administrators or consultants to meet with neighboring regions or representatives. Discussion ensued related to the Brazos River Alluvium, seawater desalination, and the Lake Whitney reallocation projects as potential water management strategies.

Various Water Management Strategies were discussed in agenda item 9.

Mr. Taucer provided an update of recently attended meetings: West Houston Association Water Resources Committee and the Gulf Coast Water Conservation Symposium.

Mr. Lann Bookout provided various updates related to the TWDB.

10.2.1.5 Public Meeting, January 18, 2022

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on January 18, 2022, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. There were no public comments.

The Committee reviewed the current officers and Executive Committee membership, noted the vacancy on the Executive Committee created when Pudge Willcox stepped down from the Planning Group, and discussed requirements in the Region H bylaws regarding these roles.

Mr. Chang noted that Region H Municipal representative Yvonne Forrest had expressed a willingness to serve in the vacant position. Mr. Bailey made a motion to recommend to the WPG that Ms. Forest fill the vacant Executive Committee Position. The motion was seconded by Mr. Ashmore and carried unanimously.

Mr. Ashmore made a motion to recommend to the WPG that current officers and members of the Executive Committee be reappointed for 2022, with the addition of Ms. Forrest in the vacant Executive Committee position. The motion was seconded by Mr. Bailey and carried unanimously.

Mr. Chang discussed the vacancy for a voting member of the WPG representing Counties created when John Blount stepped down from the WPG. He noted that Mr. Blount had recommended Loyd Smith, previous alternate for the position and current Interim County Engineer for Harris County. The Committee also discussed a Harris County Commissioners Court order nominating Mr. Smith for the position. Mr. Bailey made a motion to recommend to the WPG that Mr. Smith fill the vacant Counties position. The motion was seconded by Mr. Ashmore and carried unanimously.

Mr. Chang discussed the vacancy for a voting member of the WPG representing Public created when Carl Masterson stepped down from the WPG. He noted that Mr. Masterson had recommended Ken Kramer, previous alternate for the position and former director of the Lone Star Chapter of the Sierra Club. Mr. Kramer had also submitted a letter expressing interest in serving in the position. The Committee noted that Mr. Kramer had a long association with the WPG and valuable perspectives on water and planning in Texas. Mr. Ashmore made a motion to recommend to the WPG that Mr. Kramer fill the vacant Public position. The motion was seconded by Mr. Bailey and carried unanimously.

Mr. Chang discussed the vacancy for a voting member of the WPG representing Agriculture created by the passing of long-time WPG member Robert Bruner. Mr. Evans noted that he had spoken with Mr. Bruner's wife, Toni, who has been a frequent attendee of the WPG's meetings since the early years of the Regional Planning process. Mrs. Bruner recommended Judge Danny Pierce, previous alternate for the position and current Walker County Judge, and indicated that she anticipates reaching out to him regarding his interest in filling the vacancy; Mrs. Bruner also expressed a willingness to serve in the position if Mr. Pierce is unable to do so. Mr. Bailey made a motion to recommend to the WPG that Mr. Pierce fill the vacant Agriculture position, with Mrs. Bruner to be recommended if Mr. Pierce indicates that he is not able to serve in the role. The motion was seconded by Mr. Ashmore and carried unanimously.

10.2.1.6 Public Meeting, February 2, 2022

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on February 2, 2022, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Chang, Chair of Nominating Committee (Gary Ashmore, David Bailey, Mark Evans, Glenn Lord, and Michael Turco) explained that the committee met on January 18, 2022, to recommend individuals to fill the various vacancies within the Planning Group. Following are the nominations:

Danny Pierce representing Agriculture (Alternate-Toni Bruner); Loyd Smith representing Counties; and Ken Kramer representing General Public.

The Committee also nominated Yvonne Forrest to serve on the Executive Committee as a member representing Municipalities. Mr. Ward made a motion to approve the slate of individuals as presented. The motion was seconded by Mr. Wade and carried unanimously.

Mr. Evans explained that currently, there is a vacancy on the Executive Committee due to Mr. Pudge Willcox's resignation. Mr. Evans named the members of the Executive Committee: Mark Evans (Chair), John Bartos, Jace Houston, and Marvin Marcell. Mr. Chang made a motion to elect Mark Evans as Chair, Marvin Marcell as Vice President, Jace Houston as Secretary, John Bartos, and Yvonne Forrest as committee members. The motion was seconded by Mr. Turco and carried unanimously.

Mr. Taucer explained that the beginning of a new cycle is a good time to review the RHWPG's Bylaws. He stated that various state laws have changed. Mr. Houston and Mr. Bartos volunteered to review the various changes and present and discuss any necessary revisions to the Bylaws.

Mr. Taucer explained that during the COVID-19 pandemic, the Governor's proclamations created an avenue for agencies to meet remotely while maintaining transparency, allowing for public input, and continued outreach. He stated that the RHWPG went above and beyond to ensure public transparency and participation. Further, Mr. Taucer stated that many agencies have ratified all formal actions taken during the pandemic as a precaution to avoid risk from challenges, validity, etc. Mr. Wade moved for approval to ratify all formal actions taken by the RHWPG during meetings held remotely due to the COVID-19 pandemic. The motion was seconded by Mr. Turco and carried with all present voting aye.

Mr. Taucer provided an update of the various revisions to the State Water Planning Guidance Principles and Regional Water Planning rules which can be found on the TWDB's website.

Mr. Taucer explained that certain designated political subdivision expenses are now eligible for funding such as administrative expenses. Discussion ensued related to the continued use of the local contribution fund for various administrative expenses. It was suggested no action be taken at this time, however, it could be considered at a later date, if necessary.

Mr. Taucer explained that the TWDB had recently released the draft projection along with methodology information relative to livestock, manufacturing, and steam electric power. He provided a high-level overview comparing methodologies used in the last cycle and this cycle. Mr. Taucer stated that the TWDB allows the planning groups, throughout the cycle, the flexibility to adjust the projections through data-based information.

Mr. Taucer stated that the information is not currently available, however he explained that the TWDB will provide a draft list of the WUGs along with data on historical water use, connection counts, and recent population per capita. Further, Mr. Taucer stated that the planning groups would have the opportunity to request changes to the list. He stated that once the list is available, the Population Demands Committee will meet to review and discuss.

Mr. Taucer explained the TWDB and the Interregional Planning Council's recommendations related to the Interregional Coordination process. Discuss and document the process, identify cross-regional sources, determine which strategies may create coordination opportunities, standing agenda item for liaisons, coordination memoranda by consultant team, and formal meeting(s) of interregional representatives were a few that Mr. Taucer mentioned. Discussion ensued. Mr. Houston made a motion to receive updates from interregional planning council liaison on an as-needed basis. The motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided an overview related to the schedule and milestones for the development of the 2026 Region H RWP by providing dates of scheduled events/tasks.

Mr. Taucer expressed that the consultant team is willing to provide presentations to interests groups, etc.

Mr. Bookout suggested that an agenda item be considered at the next Region H meeting to authorize the San Jacinto River Authority to amend the contract by including additional scope and fees, a requirement of the TWDB.

10.2.1.7 Public Meeting, May 4, 2022

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on May 4, 2022, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Evans presented the slate of individuals assigned to serve on various Region H committees for development of the 2026 RWP and asked that members wishing to serve on a committee contact him for consideration. He stated that a chair will be named to the Water Management Strategies and Non-Population Demand Committees in the near future and reminded the group that committee meetings are open to the public and required to be posted. The committee assignments were presented as follows:

- Executive Committee: John Bartos, Mark Evans (Chair), Yvonne Forrest, Jace Houston, and Marvin Marcell.
- Nominating Committee: Gary Ashmore, David Bailey, Jun Chang (Chair), Glenn Lord, and Mike Turco.
- Non-Population Demand Committee: W.R. Baker, Carl Burch, James Comin, Robert Istre, and Glenn Lord.
- Population Demand Committee: Robert Istre, Ivan Langford, Marvin Marcell (Chair), Byron Ryder, and Mike Turco.
- Groundwater Supply Committee: Gary Ashmore, David Bailey, Yvonne Forrest, Ivan Langford, and Mike Turco (Chair).
- Surface Water Supply Committee: Brad Brunett, Jun Chang, Yvonne Forrest, Jace Houston (Chair), Brandon Wade, and Kevin Ward.
- Water Management Strategies Committee: John Bartos, Brad Brunett, Jun Chang, Yvonne Forrest, Bob Hebert, Jace Houston, Ken Kramer, Ivan Langford, Glenn Lord, Mike Turco, Brandon Wade, and Kevin Ward.

Mr. Taucer provided a high-level overview of the amendment process for an adopted RWP. He explained that the City of Baytown requested a proposed amendment to the 2021 Region H RWP to better capture their current infrastructure capacity and to facilitate inclusion of anticipated infrastructure expansion for consistency with upcoming State funding considerations. Following discussion, Mr. Langford made a motion to approve the submittal of the application package to TWDB for the determination of minor amendment status to the State water plan. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer provided an overview of proposed amendments to the Region H Bylaws to include minor revisions to statute references, the length of time in which meeting notifications must be given to the public, changes to the posting requirements for the Raw Water Plan, as well as changes to the language pertaining to members serving in alternate positions. A brief discussion ensued after which Mr. Houston suggested the document be reviewed for grammatical errors prior to being brought back before the group for consideration. Mr. Evans then stated the item would be tabled until the August 3, 2022, RHWPG meeting.

Mr. Taucer stated the initial phase of planning funding for the 2026 RWP has already been executed and that TWDB is currently working on contract amendments for the remainder of the planning cycle. He went on to explain that action needs to be taken to authorize SJRA as the local political subdivision to enter into and execute the contract and amendments on behalf of the planning group. Following discussion, Mr. Marcell motioned to authorize the San Jacinto River Authority to negotiate and execute an amendment to the TWDB contract to incorporate the full scope of work and total project cost for the 2026 RWP. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer explained that a new study examining water usage by the mining industry is under development by the Bureau of Economic Geology (BEG) for the TWDB. The study takes a fresh look at mining demands and is currently available in draft format, with the final report anticipated for release in June. Mr. Taucer provided a link for those interested in taking a more detailed look at the study. He provided a high-level overview comparing methodologies used in the last cycle and this cycle, to include historical use by mining type, demand locations and water sources, industry and agency data and projections by mining type. Mr. Taucer stated the projections from the BEG Study are much lower than the projections from the 2016-2021 Plan and continued by explaining the new projections are much more in line with the recent historical TWDB numbers for Region H counties and the change in conditions over the last ten years. He reminded the group that these are draft numbers and that there may be some refinement moving forward.

Mr. Taucer announced that the TWDB recently released its draft list of the WUGs along with the supporting data on historical water use, connection counts, and recent population per capita. He stated the TWDB has asked the planning groups to follow up with any comments or revisions by June. Mr. Taucer provided a high-level overview of Municipal WUGs. Following discussion, Mr. Taucer stated that after preliminary review by the RWPG consultant team and members, preliminary recommendations include rolling non-member districts out of regional water authorities, rolling member districts into regional water authorities, and additional name updates.

Mr. Houston made a motion to authorize the Consultant Team and Population Demands Committee to develop and transmit recommendations to TWDB regarding WUG identification and data. Following a brief discussion, the motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided an overview related to the schedule and milestones for the development of the 2026 Region H RWP by providing dates of scheduled events/tasks.

Mr. Taucer reported on a recent meeting with the Harris-Galveston Subsidence District to discuss the overall planning process, Region H's background, local efforts, and a recap of the plan. He continued by stating the consultant team is willing to provide presentations to interests groups, etc., and reminded the group that the technical outreach portion of the plan will be starting soon.

Mr. Bookout provided an update related to upcoming deadlines, future meetings, and other pertinent topics related to the TWDB. Mr. Evans announced that Bob Hebert resigned his position effective immediately. Mr. Evans stated that Mike O'Connell has been recommended to fill the position representing Small Business and that the vacant position needed to be posted on the website. He continued by stating discussion related to filling the vacancy would be discussed and possibly considered at the August meeting. Mr. Houston announced the passing of former Harris-Galveston Subsidence District General Manager and Region H WPG member Ron Neighbors. Mr. Houston stated that a celebration of life is scheduled for May 21, 2022, in La Grange, Texas.

Mr. Evans requested that Item 7a, tabled previously in the meeting, be revisited for additional consideration. A brief discussion ensued after which Mr. Holland motioned to approve the proposed redline amendments to the Region H bylaws. The motion was seconded by Ms. Forrest and carried unanimously.

10.2.1.8 Public Meeting, August 3, 2022

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on August 3, 2022, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Evans stated that the Nominating Committee met at 9:30 a.m., on August 3, 2022, and recommended Mike O'Connell to fill the vacancy for Small Business and Arthur Bredehoft to fill the vacancy for Water Utility. Mr. Chang made a motion to accept the resignation of Judge Bob Hebert, to declare the vacancies of Small Business and Water Utility positions, and to approve Mike O'Connell and Arthur Bredehoft to fill the positions of Small Business and Water Utility, respectively. The motion was seconded by Mr. Marcell and carried unanimously.

Ms. Paula Paciorek, Division Manager for Houston Public Works, presented information relative to the evolution of the City of Houston's water conservation initiatives through education, incentive programs, rebate programs, etc. She explained the various upcoming campaigns that will continue to educate the public about water conservation and drought response.

Mr. John Nyland of Invenergy spoke about a request to amend both the 2021 Region H RWP and the 2022 State Water Plan to reflect the most updated project information and details to the Freeport Seawater Desalination Project that were previously listed in both documents. He explained that the project was listed as a dormant project, however Brazosport Water Authority ("BWA") and its partners have been actively advancing it and are now seeking to sponsor the project. Mr. Nyland stated that BWA partnered with Invenergy Clean Water ("Invenergy") and IDE Technologies to develop the desalination plant in Freeport's industrial park. He explained that the desalination capacity of the project is listed in the 2021 Region H RWP and the 2022 State Water Plan as 11,200 acre-feet per year (ac-ft/yr) or 10 million gallons a day (MGD), with the potential to scale to 100 MGD. He stated that BWA is requesting to change to 28,000-56,000 ac-ft/yr or 25-50 MGD as a result of the new information indicating considerably larger and more diverse water needs than previously expected due to growth in the region and expansion into other areas. Furthermore, Mr. Nyland stated that BWA is interested in the benefits of additional resilient capacity that can replace ground and surface water withdrawals and mitigate the drought and subsidence conditions of the State. Discussion ensued. Mr. Houston made a motion to approve the submittal of the application package to TWDB to determine if the request is considered a minor amendment or a major amendment. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer explained the process of amending the contract with the subconsultants and outlined the various tasks that would be affected. Mr. Chang moved approval to authorize the San Jacinto River Authority to execute the amended contracts with subconsultants. The motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided an update to the data and projections related to the non-municipal water demand. He stated that committee activities would include detailed review of the historical data and demand basis and recommendation of proposed changes to the projections as appropriate. Further, Mr. Taucer explained efforts related to the 2026 RWP WUG survey and the Major Water Provider list evaluation.

Mr. Taucer provided an update related to the Population Demands Committee's review of the WUG list, stating only minor changes were determined. He stated that the committee was engaged in coordination with Subsidence Districts, TWDB, and RWPGs to review historical data and demand basis, and to provide recommendations of proposed changes to projections.

Mr. Taucer provided information related to sub-WUG planning options that were requested by several RWPGs. He stated that they are primarily for rural areas or small entities that are buried in “County-other”. He stated that the regions will develop and track the data with information support from TWDB. Mr. Taucer provided an outline of the benefits and potential applications. Mr. Kramer made a motion to authorize the Population Demands Committee to evaluate potential sub-WUGs and submit requests for sub-WUGs to TWDB. The motion was seconded by Mr. Turco and carried unanimously.

Mr. Taucer provided an overview related to the schedule and milestones for the development of the 2026 Region H RWP by providing dates of scheduled events / tasks.

It was reported that TWDB met in July and accepted Mark Evans and Jace Houston as representative and alternate on the Interregional Planning Council.

Mr. Bookout provided an overview of the 2026 Regional Water Plans Projections Methodology.

10.2.1.9 Public Meeting, November 2, 2022

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on November 2, 2022, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Taucer explained the proposed amendment by the Lower Neches Valley Authority (LNVA) would expand pumping capacity in the LNVA Devers system and support current and future water needs of customers. Mr. Taucer then explained that the proposed amendment is anticipated to be a minor amendment, but it would have to be submitted to TWDB for the official determination. Mr. Sims made a motion to approve the submittal of the application package to TWDB for determination of the minor amendment status. The motion was seconded by Mr. Langford and carried unanimously.

Mr. Taucer provided an overview of the data and projections for the 2026 Region H RWP. He reviewed the different methodologies for irrigation, mining, livestock, manufacturing, and steam electric. Mr. Taucer reviewed the path forward stating that the committee would take a detailed look at the background data and look for evidence of data errors, new or missed facilities, planned facilities, closures, and major differences in long-term demand. He stated that revisions are due July 14, 2023.

Mr. Taucer discussed the potential alignment with Houston Galveston Subsidence District and the Fort Bend Subsidence District Joint Regulatory Plan Review. He stated that said alignment would yield highly detailed local analyses, enhanced spatial resolution, and include nine Region H counties. Mr. Taucer stated that this is an ongoing coordination with the RHWPG and TWDB and any revision requests are due August 11, 2023.

Mr. Taucer provided an overview related to the schedule and milestones for the development of the 2026 Region H RWP by providing dates of scheduled events / tasks.

10.2.1.10 Public Meeting, February 1, 2023

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on February 1, 2023, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Chang explained that the Nominating Committee met this morning and unanimously recommended that the current slate of officers and the members of the executive committee continue fulfilling their terms. Members being Mark Evans, Chair, Marvin Marcel, Vice-Chair, Jace Houston, John Bartos, and Yvonne Forrest. Mr. Turco made a motion to elect the current members of the Executive Committee. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Brandon Wade provided information related to the Brazos River Alluvium Aquifer. He opined that it is the next big drought threat. He provided history of the Gulf Coast Water Authority and the areas it serves. Mr. Wade explained that there are approximately 2,116 wells along the Brazos River Alluvium and in a drought situation, as it was in 2009, 2011, and 2013, the alluvium wells continue to pump, while the low flow downstream affects the Gulf Coast Water Authority, NRG, and Dow. Further discussion ensued. Mr. Wade concluded by suggesting that Region H provide input into Region G's plan, monitor development of DFCs, Groundwater Districts, and well permit applications, perform an analysis of Brazos Alluvium pumping on flows in the Brazos River, and support Allen's Creek, desalination, groundwater subsidence, and reuse.

Mr. Turco and Mr. Taucer provided an overview of the Harris-Galveston Subsidence District and Fort Bend Subsidence District 2023 Joint Regulatory Plan Review.

Mr. Taucer provided information related to a request from BASF Corporation regarding the consistency of a proposed project with the RWP. He explained that BASF Corporation submitted a water right application which includes an interruptible Brazos River diversion and bed and banks transfer. He stated the Texas Commission on Environmental Quality (TCEQ) requires a letter from the Regional Water Planning Group stating that the request is not inconsistent with the RWP. After discussion, Mr. Turco made a motion to submit a letter stating the proposed project is consistent with the RWP and request that it include TCEQ's permitting process to include a public comment period. The motion was seconded by Mr. Bredehoft and carried with all ayes and one nay (Mr. Istre).

Mr. Taucer reported that the Non-Population Demand Committee is in the process of reviewing the draft projections provided by TWDB. He stated that revisions are due July 14, 2023.

Mr. Taucer explained that the TWDB recently released population demand data and projections. He stated that the planning group is considering a potential alignment of populations with the Joint Regulatory Plan Review Process because of its detail and spatial resolution. Mr. Taucer provided a review of data of several counties.

Mr. Taucer explained that the current focus is on the demand projection process. He stated that the TWDB anticipates adopting projections in October.

Mr. Evans stated that the Interregional Council adopted rules, and the next meeting is slated to take place in the spring.

Mr. Bookout provided updates relative to the legislative session and certain bills that TWDB is tracking.

10.2.1.11 Public Meeting, May 3, 2023

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on May 3, 2023, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe.

One member of the public provided comment. Mr. Sarkis provided comments related to agenda item 6a.

Mr. Chang stated that the Nominating Committee met on May 3, 2023, to discuss nominations to fill the water utilities vacancy. Mr. Chang stated that the Nominating Committee recommends Alisa Max to fill the water utilities vacancy. Mr. Wade made a motion to accept the Nominating Committee's recommendation to appoint Ms. Alisa Max to the RHWPG representing water utilities. The motion was seconded by Ken Kramer and carried with 18 ayes and 1 nay (Mike O'Connell).

Mr. Taucer provided information related to the various recommendations from the Non-Population Demands Committee regarding the draft TWDB projections for the 2026 Region H RWP. He provided the committee's recommendations related to irrigation, manufacturing, mining, and steam electric power. Mr. Taucer stated that the proposed recommendations for this cycle are similar to the last cycle's projections. Mr. Ken Kramer asked that the TWDB take into consideration agricultural use. Discussion ensued. Mr. Bredehoft made a motion to approve the submittal to TWDB along with Mr. Kramer's comments. The motion was seconded by Mr. Marcell and carried unanimously.

Mr. Taucer provided information related to the various recommendations from the Population Demands Committee regarding the draft TWDB projections for the 2026 Region H RWP. Mr. Marcell provided a brief history of the methodology used over the last several years to project population water demand. He stated that the committee recommended using the Joint Regulatory Plan Review populations where available, utilize TWDB projections in remaining counties, and for select counties, use 0.5 migration projection. Discussion ensued. Mr. Kramer made a motion to approve the Population Demands Committee's recommendations to submit said recommendations to TWDB. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Taucer explained that the WUG survey is a regular part of the planning process. He stated that the information obtained is utilized in projections, identifying existing supplies and infrastructure, interconnect facilities, future projects, and conservation and drought contingencies.

Mr. Taucer stated that TWDB incorporated the Major Water Provider concept in the previous cycle. He stated that TWDB gave each Regional Water Planning Group the latitude in determining entities of key significance in the region's supplies. He explained that last cycle, the planning group recommended designating any entity that had more than 25,000 ac-ft/yr of anticipated current or future supply to itself or others, with the Population Demands Committee recommending an additional criterion of at least 10,000 ac-ft/yr of anticipated current or future supply to recipients outside of the entity's retail service area. Mr. Taucer then provided a list of the potential MWPS meeting these criteria for Region H. Mr. Bredehoft made a motion to direct the consultant team to submit a list of recommended MWPs to the TWDB. The motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided information related to the groundwater supply analyses. He explained that modeled available groundwater (MAG) peak factors allow the RWP to better reflect situations where groundwater conservation districts allow temporary production in excess of Modeled Available Groundwater. The MAG peak factors do not change the MAG or any regulatory entity's regulatory approach and are related specifically to the RWP. He explained that MAG peak factors must be studied by any Planning Group requesting their use, approved by each of the applicable groundwater conservation districts and groundwater management areas, and by TWDB. Mr. Taucer stated that this process was utilized by the RHWPG for the 2021 RWP. Mr. Turco made a motion to authorize the consultant team and Groundwater Supply Committee to coordinate with groundwater regulatory entities to develop MAG peak factors for Region H and submit an associated request to TWDB. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer explained that surface water availability in the regional plan is required to be examined through TCEQ's Water Availability Model (WAM) Run 3 which includes a very specific set of assumptions that looks at existing permanent rights in the priority system, historical hydrology, full authorized diversions, and no/limited return flows. He stated that TWDB specified utilizing WAM Run 3 due to its cautious assumptions. Mr. Taucer stated that TWDB requires any group utilizing any other model or a modified WAM to request an exception to the surface water modeling requirements. He stated that Region H is requesting the use of Region G's modified model as well as information and model elements from Region C. Mr. Sims made a motion to authorize the consultant team and Surface Water Supply Committee to develop and submit to the TWDB a request for potential exceptions to Surface Water Modeling requirements. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Taucer stated that the next four to six months will be busy for various committees with a Technical Memorandum due to TWDB in March 2024.

Mr. Wade stated that he was invited by Region G to give a presentation on the Brazos Alluvium. Ms. Rose stated that Mr. Evans was elected as Chair of the Interregional Planning Council.

Ms. Rose provided information related to administrative logistics. Mr. Bredehoft stated that infrastructure surcharges at the retail level will be the topic of discussion in The Woodlands in the near future.

10.2.1.12 Public Meeting, August 2, 2023

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on August 2, 2023, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comment was provided.

Mr. Taucer provided information relative to the proposed amendment related to the LNVA Devers Pump Station Relocation. He explained that the TWDB determined the proposed amendment to be a minor amendment. He stated that the technical memorandum explained that this project would increase capacity by nearly 80 MGD. Discussion ensued related to environmental impacts. It was noted that additional language will be added to Section 6.1.1 to address environmental concerns. Mr. Taucer stated that no written comments had been received.

Mr. Sims made a motion to amend the 2021 Region H RWP to incorporate the proposed LNVA Devers Pump Station Relocation. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Marcell provided an update from the Population Demands Committee stating that they met in July and reviewed per capita demands, WUG survey, WUG outreach, and revision requests. Mr. Taucer then presented a more detailed look related to the draft populations per-capita water demand projections. Discussion ensued. Mr. Chang made a motion to approve revisions to draft population and per-capita water demand projections and authorize the consultant team and Population Demand Committee to coordinate with the TWDB to finalize adjustments. The motion was seconded by Mr. Turco and carried unanimously.

Mr. Evans explained that the Brazos Alluvium Committee consists of Brandon Wade, Ken Kramer, Brad Burnett, and Mike Turco. He stated that the committee's responsibility includes coordination with the Region G Planning Group related to the Brazos Alluvium and facilitate effective communication of same between the Region H and the Region G Planning Groups during the 2026 Regional Planning Cycle. The committee reported on the July 14, 2023, meeting, stating that discussions took place related to a path forward.

Mr. Taucer provided a brief overview of the MAGs since the previous cycle and reported on their overall stability.

Mr. Taucer and the Groundwater Supply Committee provided information relative to non-relevant aquifers in Austin, Waller, Fort Bend, Trinity, and Walker counties.

Mr. Taucer mentioned the upcoming meetings of the Groundwater Committee, the Brazos Alluvium Committee, the Surface Water Committee, and the Water Management Committee.

Mr. Taucer provided a recap of the schedule of events and upcoming tasks.

Mr. Evans provided an update of the Interregional Planning Council.

Mr. Taucer commented on an upcoming meeting taking place at the Bayou Preservation Association.

Ms. Rose provided an update on various resources available on TWDB's website, TWDB's sunset bill, and other various bills from the 88th Legislative Session.

10.2.1.13 Public Meeting, October 4, 2023

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on October 4, 2023, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comment was provided.

Mr. Evans explained the need to extend the term of existing Region H voting members for an additional five-year term. Mr. Langford inquired about the level of interest in the voting members retaining their current positions. Mr. Bartos stated that if there were any issues, they would be reported to the members. Additional discussion ensued. Mr. Langford made a motion to extend the term of existing Region H voting members for an additional five-year term. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Chang explained that the Nominating Committee met and considered the nomination of Cynthia Wagener to the RHWPG. He stated that Ms. Wagener expressed a desire to serve as a member representing industries. Mr. Chang stated that the Committee recommended her appointment. Mr.

Chang made a motion to accept the Nominating Committee's recommendation to appoint Ms. Cynthia Wagener to the RHWPG representing industries. The motion was seconded by Mr. Houston and carried unanimously.

Mr. Taucer provided an update on the water demand projections for the 2026 Region H RWP, stating that the projections are the foundation of the plan. He provided further details related to water demand projections and the proposed adjustments for irrigation, livestock, manufacturing, mining, steam electric power, and municipal.

Mr. Taucer provided a recap of the methodology used and a status update of the draft surface water and reuse supply availability analyses. He stated that the team is currently drafting the supply analyses and identification of exceptions. Further, Mr. Taucer provided information related to surface water evaluations of reservoirs and Run-of-River supplies.

Mr. Taucer provided a recap of the Groundwater Supply Committee's review of supply and MAG availabilities for the counties within Region H that are inside and outside of the Fort Bend and Harris-Galveston Subsidence Districts. Mr. Taucer explained the committee's recommendations: coordinate with groundwater conservation districts on interest; provide Groundwater Management Areas (GMAs) with an initial overview of the process; confirm compatibility of factors; and where applicable, proceed with formal approval process.

Mr. Taucer explained that there are smaller, less productive formations in the region that the GMAs, for purposes of establishing their MAG, deem non-relevant for that particular process, however, are still there and productive and are supply sources for more rural, agricultural users. Further, he stated that the TWDB allows the regional groups considerable latitude for setting the availability of the non-relevant formations. Mr. Taucer explained that the Groundwater Supply Committee met and reviewed the current data sources and recommended that the data be updated with more recent data of increased quality; provide additional RWP information on potential uncertainty; and summarize relative magnitude of supply for context. Mr. Bartos made a motion to approve the methodology used for the supply estimates as recommended by the Groundwater Supply Committee. The motion was seconded by Mr. Bailey. Discussion ensued. The motion carried with all present voting aye.

Mr. Taucer provided information related to new task (4B) for the 2026 RWPs referencing Senate Bill 1511 of the most recent legislative session. He explained that the Water Management Strategies Committee will meet and discuss this issue in detail. Further, Mr. Taucer stated that the legislation requires planning groups to identify any strategies that are now considered infeasible and amend the plan to either remove, adjust, or move them back to a time step that is more feasible. He explained that in the event a project is taking any affirmative step toward implementation, then it is open in terms of permitting, securing funding, etc., therefore it is considered feasible. Mr. Taucer went on to explain potentially infeasible WMS and concluded that there were some reuse projects that could be considered infeasible in Montgomery County.

Mr. Taucer provided an update on various scheduled events and tasks related to the 2026 Region H RWP.

Mr. Taucer stated that presentations were made in August at the Texas Groundwater Summit and to the Bayou Preservation Association in September. He also mentioned an upcoming presentation at the Gulf Coast Water Conservation Symposium in February 2024.

Ms. Rose provided information related to various information on their website, due dates for specific milestones, and items of interest from the legislative session.

10.2.1.14 Public Meeting, December 6, 2023

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on December 6, 2023, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comment was provided.

Mr. Tom Michel stated that he has been on the Brazos BBASC Committee for several years, however he retired from the SJRA on December 4, 2023. He explained the process for appointment to the Brazos BBASC and recommended Mr. Bret Raley, SJRA Lake Conroe Division Manager to serve on the committee. Mr. Kramer stated that in October, Mr. Aubrey Spear, City of Lubbock Water Utilities Director expressed an interest in the Brazos BBASC membership. Further, he explained that because Mr. Spear is now the newly appointed General Manager for SJRA, Mr. Kramer proposed deferring action until Mr. Spear's preference can be determined. The water planning group agreed to defer action on this item until February, therefore no action was taken.

Mr. Taucer provided a brief update related to the supply availability analyses for the 2026 RWP. He explained the various nuances related to surface water, groundwater, and reuse analyses.

Mr. Taucer provided information related to the RWP technical memorandum which will be considered for approval in February 2024. He explained that the technical memorandum includes information related to assumptions and unmodified surface water availability values, model files and documentation, methodology for groundwater, process, and list of potentially feasible projects, infeasible WMS analysis, and simplified planning intent.

Mr. Taucer explained per 31 TAC 357.12(b), the RHWPG is required to prepare a summary of its process for identifying and selecting WMS for development of the 2026 RWP. He provided an overview of each of the necessary steps. Discussion ensued. Mr. Bartos made a motion to approve the process for identifying and evaluating potentially feasible Water Management Strategies in 2026 Region H RWP. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer explained that infeasible WMS and WMS projects are defined as those that sponsors have not taken affirmative steps toward implementation. Further he explained that if any projects were identified as infeasible, steps could be taken to amend the plan to adjust online decade, amend the plan to remove it, or amend the plan to replace it. Discussion ensued.

Mr. Houston opined that based on the legislative history and intent, he believes no projects on the list should be considered infeasible. Mr. Houston made a motion to accept and consider all projects on the list as feasible. The motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided an overview of the process regarding notice to proceed (NTP) for the WMS analyses which includes a scope and fee request and TWDB approval. Mr. Taucer stated that the RHWPG will consider taking action in February to approve a NTP request and authorize the consultant team, WMS Committee, and the San Jacinto River Authority to submit the request to TWDB, coordinate with TWDB as needed on follow-up information, and execute the subsequent contract amendment.

Mr. Taucer explained that TWDB recognized the effort provided and cost to the political subdivision in administering the RWP and created some flexibility for those costs. He explained, to be eligible for the funding, the Water Planning Group must certify administrative expenses to be submitted to TWDB for reimbursement for the sixth cycle of RWP development. Mr. Chang made a motion to certify administrative expenses to submit to TWDB for reimbursement for the sixth cycle of RWP development. The motion was seconded by Ms. Max and carried unanimously.

Mr. Taucer explained that the contract amendment includes the remaining scope and funding as well as additional legislative appropriation in an approximate amount of $420,000. He stated that to meet the deadlines, the amendment was executed between SJRA and TWDB, therefore asking the Water Planning Group to ratify contract Amendment No. 2. Mr. Bredehoft made a motion to ratify SJRA executing contract Amendment No. 2 between SJRA and TWDB and authorize SJRA to execute amended contracts with subconsultants. The motion was seconded by Mr. Kramer and carried unanimously.

Mr. Taucer provided a recap of the schedule of events and upcoming tasks for the 2026 Region H RWP.

Mr. Evans reported on the Interregional Planning Council stating that the Interregional Planning Council Report is currently in draft form and will be submitted to TWDB in 2024.

Mr. Taucer provided information related to the upcoming Gulf Coast Symposium and Water Forum taking place in February 2024.

Ms. Rose reported that TWDB is working through the process of implementing funds approved by Proposition 6.

10.2.1.15 Public Meeting, February 7, 2024

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on February 7, 2024, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Evans announced the resignations of Ms. Yvonne Forrest, Mr. Glenn Lord, and Mr. Jace Houston. Mr. Evans stated that the Nominating Committee will meet prior to the next meeting to review recommendations.

Mr. Taucer announced the resignation of Mr. Tom Michel from the Brazos Basin and Bay Area Stakeholder Committee (BBASC). He stated that Mr. Michel recommended Mr. Bret Raley, Lake Conroe Division Manager, San Jacinto River Authority, due to his vast experience in water resources. Mr. Langford made a motion to nominate Bret Raley to the BBASC. The motion was seconded by Mr. Kramer and carried unanimously.

Mr. Taucer explained that the Neches, Neches-Trinity, Trinity-San Jacinto, San Jacinto, and Brazos-Colorado basins water supply analyses and projected needs were completed. He stated that changes are not anticipated and should be fairly similar to the last cycle. Mr. Taucer reviewed the completed analyses related to groundwater and the respective approach. Mr. Taucer stated further discussion will take place at the May meeting.

Mr. Taucer explained that the Technical Memorandum summarizes the initial steps in the planning process and includes critical elements as defined by 2.12.1 of the TWDB Exhibit C – *Second Amended General Guidelines for Development of the 2026 Regional Water Plans.* He went on to explain that the contents of the memorandum signify draft representations of the water demand, supplies, and needs anticipated for the sixth round of planning. Mr. Taucer provided a brief overview of the summary progress related to population and demand, source availability, existing supplies, needs, strategy identification, and administrative milestones. Discussion ensued. Mr. Brunett made a motion to authorize the preparation and submittal of the required documentation to the TWDB, with the addition/notation of hydrocarbon projects, to the memorandum. The motion was seconded by Ms. Wagener and carried unanimously.

Mr. Taucer explained that a Notice to Proceed (NTP) must be initiated for all of the smaller studies for regions of a certain size. Mr. Bartos explained that the WMS Committee reviewed the aspects of the NTP and explained the various tasks that would be included. It was requested that funds in the amount of $20,000 be allocated for hydrocarbon / emerging technologies. Mr. Turco made a motion to approve a notice-to-proceed request to include the $20,000 allocation for hydrocarbon / emerging technologies, and authorize the Consultant Team, WMS Committee, and San Jacinto River Authority to submit the request to TWDB, coordinate with TWDB as needed on follow-up information, and execute the subsequent contract amendment issued. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Taucer provided a recap of the schedule of events and upcoming tasks for the 2026 Region H RWP.

Mr. Taucer provided information related to the upcoming Gulf Coast Symposium and Water Forum taking place on February 22, 2024, as well as the Texas Industrial Energy Efficiency Program Forum taking place on March 7, 2024, in Pasadena, Texas.

Ms. Rose reported that TWDB continues to work on rule making processes related to Proposition 6.

10.2.1.16 Public Meeting, May 1, 2024

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on May 1, 2024, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Bartos made a motion to accept the resignations of Yvonne Forrest, Jace Houston, and Glenn Lord as voting members of the RHWPG and declare the positions vacant for voting members representing Municipalities, River Authorities, and Industries. The motion was seconded by Mr. Ward and carried unanimously.

Mr. Chang, Chair of the Nominating Committee, stated the vacated positions were posted according to the By Laws and nominations were received. He explained that the committee met prior to this meeting to review the nominations. He stated that the committee recommended Aubery A. Spear to fill the vacancy for River Authorities with term expiring in 2028; Greg Eyerly to fill the vacancy for Municipalities with term expiring in 2026; and Jason Garrard to fill the vacancy for Industries with term expiring in 2028.

Mr. Smith made a motion to accept and approve Mr. Aubrey Spear, Mr. Greg Eyerly, and Mr. Jason Garrard to fill the vacancies for River Authorities, Municipalities, and Industries, respectively. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Evans explained the Chair, Vice-Chair, Secretary, and two Members At-Large make up the Executive Committee. Mr. Chang stated that the Nominating Committee deliberated and recommended the following members to serve on the Executive Committee:

- Mr. Mark Evans – Chair
- Mr. Marvin Marcell – Vice-Chair
- Mr. John Bartos – Secretary
- Mr. David Bailey – At Large Member, representing GMA 12
- Mr. Arthur Bredehoft – At-Large Member, representing Water Utilities

Mr. Ward made a motion to approve the members as stated. The motion was seconded by Mr. Ryder and carried unanimously.

Mr. Taucer explained that the City of Montgomery submitted an application to amend the 2021 Region H RWP which included a new water plant with storage capacity and an expanded groundwater production capacity which would support the future needs of customers. He opined that the proposal should be a minor amendment which would impact the executive summary, the text and summary tables in Chapter 3 – Existing Supplies; text, strategy, project, cost tables, project technical memorandum, and Appendix DB in Chapter 5 – Water Management Strategies; and other various text, tables and figures from Chapters 6, 9, and 11. Mr. Bredehoft made a motion to approve the submittal of the application package to the TWDB for the determination of minor amendment status. The motion was seconded by Ms. Max and carried with all present, voting aye.

Mr. Kramer requested a presentation of the Interregional Planning Council Report to TWDB. Ms. Rose of TWDB presented various aspects of the report including three statutory charges, recommendations to the legislature, recommendations to TWDB, and recommendations to future Interregional Planning Councils.

Mr. Taucer explained the various refinements to the post technical memo, specifically related to MAG peak factors, non-MAG groundwater availability, Brazos Basin Surface water, Lake Livingston availability, new WUGs, contracts, infrastructure capacity limits, and GRP infrastructure. Mr. Wade reiterated his continued concern related to the Brazos Alluvium.

Mr. Taucer provided an update related to the water conservation and drought contingency plans, which are due May 1, 2024. He stated that Region H has received numerous submittals and explained the importance of the same.

Mr. Taucer explained the necessity for the budget amendment which increases Task 2A, Population Demand, by $15,800; Task 2B, Non-Population Demand, by $60,000; and Task 3, Supply, by $80,434. He reiterated that there is no overall increase to the budget, only the reallocation of funds to Tasks 2A, 2B, and C, as stated above. Mr. Bredehoft made a motion to amend the budget for the development of the 2026 Region H RWP, as presented. The motion was seconded by Mr. Kramer and carried unanimously.

Mr. Taucer provided an update related to the development of the 2026 Region H RWP, announcing upcoming due dates for several scheduled events and tasks, such as existing supply refinements, socioeconomic impacts analysis, WMS analyses, and conservation and drought activities summaries.

Mr. Wade resigned his position on the Region 6 Flood Planning Group and recommended the appointment of Alisa Max who is willing to serve on the same.

Mr. Taucer discussed the various meetings attended in the last few months as well as upcoming outreach efforts.

Ms. Rose provided updates from TWDB related to the Conservation Resources Guide for Development of the 2026 Regional Water Plans, Water Use Survey, Water Conservation Plans, Annual Reports, Water Loss Audits, Texas Water Service Boundary Viewer, and the Conservation Information Dashboard for Water Supply Planning.

Mr. Bartos introduced Mr. Marty Kelly and Ms. Monica Polgar of the Texas Parks and Wildlife Department. Mr. Erich Peterson, General Manager of The Woodlands Water Agency discussed the One Water Task Force. Mr. Spear discussed his representation on the Water Conservation Advisory Council.

10.2.1.17 Public Meeting, August 7, 2024

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on August 7, 2024, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Taucer presented information related to the proposed amendment by the Baytown Area Water Authority (BAWA) which requested the 2021 RWP and the 2022 State Water Plan to be amended to incorporate BAWA's planned East Surface Water Treatment Plant Expansion WMS and associated WMS Project. He explained the amendment would impact Volume 1 and Volume 2, with very few changes overall. Mr. Taucer stated that no comments from the public were received. Discussion ensued related to allocation, possible environmental impacts, capacity, and future expansion.

Mr. Langford made a motion to amend the 2021 Region H RWP to incorporate the proposed Baytown East Surface Water Treatment Plant Expansion. The motion was seconded by Mr. Spear and carried unanimously.

Mr. Taucer provided information related to the City of Houston's proposed amendment to the 2021 Region H RWP. He explained that the amendment better reflects the expanded treatment capacity of the existing facility site to support current and future needs of customers. Mr. Taucer stated that the amendment would most likely be considered a minor amendment per TWDB's definition of same. He explained that the amendment would affect the Executive Summary, Chapter 5 – Water Management Strategies, Chapter 6 – Impacts of the RWP, Chapter 9 – Financing, Chapter 11 – Implementation and Comparison, and Data Base 22 data entry. Discussion ensued. Mr. Bredehoft made a motion to approve the submittal of the application package to TWDB for the determination of minor amendment status. The motion was seconded by Mr. Chang and carried unanimously.

Mr. Taucer explained that the various changes to the planning process for the sixth cycle of the RWP development were nominal. He provided a brief overview of the various changes relative to Water Management Strategies, drought responses, implementation, funding, and outreach.

Mr. Taucer provided information related to the status of investigation of water supply alternatives and other analyses for the 2026 Region H RWP. He provided a brief overview of the various ongoing and upcoming technical analyses.

Mr. Taucer explained that the 89th Session of the Texas Legislature begins on January 14, 2025, and concludes on June 2, 2025. He provided an overview of the previous legislative recommendations from the 2021 RWP and provided a summary of potential 2026 recommendations from the RWPGs related to infeasible WMS, projections, groundwater, conservation, IBTs, and emerging technology.

Mr. Evans provided background information related to the appointment of members to the Legislative Committee. He explained that the Legislative Committee is comprised of all the RHWPG Committee Chairs. Mr. Evans announced that the members of the Legislative Committee for the upcoming session are Marvin Marcell, Mike Turco, Kevin Ward, John Bartos, Carl Buch, and Jun Chang.

Mr. Taucer provided an update related to the development of the 2026 Region H RWP, announcing upcoming due dates for several scheduled events and tasks.

Mr. Evans announced the completion of the Interregional Planning Council Report to the TWDB now posted on their website. Ms. Max announced the Region 6 Flood Planning Group's next meeting taking place on August 8, 2024.

Mr. Taucer announced the various meetings, activities, and outreach opportunities.

Ms. Rose provided various updates from TWDB related to SWIFT funding and the TWF Implementation Plan.

10.2.1.18 Public Meeting, October 2, 2024

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on October 2, 2024, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Taucer stated that the City of Houston's East Water Purification Plant Enhancement project was considered a minor amendment by the TWDB. He explained that this enhancement would increase the overall reliability of the City of Houston's system. Mr. Taucer went on to explain the specific impacts of this amendment to the RWP.

Mr. Spear made a motion to amend the 2021 Region H RWP to incorporate the proposed City of Houston East Water Purification Plant Enhancement project. The motion was seconded by Mr. Bredehoft and carried unanimously.

Mr. Taucer explained the various aspects related to the technical analyses and provided a brief overview of the following categories: conservation and loss reduction, drought management, groundwater, reuse, other major infrastructure, other WMS elements, and water conservation plan / drought contingency plan analyses.

Mr. Taucer provided an update related to rural entity planning. He stated that in the past, obtaining responses from rural entities has been challenging due to turnover, etc. He stated that 25 out of a potential 164 responses were received this cycle.

Mr. Marcell, Chair of the Legislative Committee, stated that the committee met prior to the October 2, 2024, RHWPG meeting to discuss possible topics for the 89th Legislative Session. Mr. Marcell stated that once the legislature is in session beginning January 14, 2025, there may be topics for the committee to discuss and act upon.

Mr. Taucer provided an overview of the ecologically unique stream segments and unique reservoir sites. He explained that the planning group recommends the unique segments while the legislature designates them. Mr. Taucer stated that the Legislative Committee recommended retaining the current eight sites as designated in the prior plans. Mr. Kramer made a motion to redesignate the eight unique segments into the 2026 State Plan. The motion was seconded by Mr. Bartos and carried unanimously.

Mr. Taucer provided an update related to the development of the 2026 Region H RWP, announcing upcoming due dates for several scheduled events and tasks.

It was announced that Groundwater Management Area 14 will soon begin the process of adopting and submitting Desired Future Conditions (DFC).

Mr. Taucer announced that the Region H website will be updated in the coming months.

Ms. Rose provided various updates from TWDB related to administration and the board of directors. Mr. Scott Galloway, Financial Programs Outreach Specialist with the TWDB provided information related to TWDB funding programs.

10.2.1.19 Public Meeting, December 4, 2024

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2026 Region H RWP was held on December 4, 2024, at 10:00 a.m. as part of the regular meeting of the RHWPG. The meeting was held at the SJRA offices in Conroe. No public comments were provided.

Mr. Taucer provided a status update regarding unmet needs, sources, Water Management Strategies (WMS), projects, and ongoing efforts related to the investigation of water supply alternatives for the 2026 Region H Regional Water Plan. He provided an update regarding the potential for drought management as a WMS, stating that this was a topic for the WMS Committee. He also explained the various challenges and benefits of this potential strategy.

Mr. Taucer explained that the WMS Committee completed the potentially feasible and infeasible WMS analysis, the MSF approach, and the draft WMS analyses. He stated that the committee will provide a review of general recommendations, conservation and water loss assumptions, a path forward for drought management, messaging, Water User Group (WUG) level project assumptions, and post IPP priorities. Mr. Taucer stated that the WMS Committee will meet in early 2025.

Mr. Taucer provided a brief review of the IPP process, stating that the Water Planning Group must hold at least one public hearing, approximately one month following the submission of the IPP. He went on to explain more details related to the various requirements for the IPP process.

Mr. Taucer provided an update related to the development of the 2026 Region H RWP, announcing upcoming due dates for several scheduled events and tasks. Ms. Alisa Max reported on the San Jacinto Flood Planning Group. Mr. Taucer stated that they attended the Texas Municipal League conference in October and discussed the State planning process. Ms. Heather Rose discussed various details related to the sixth planning cycle. It was mentioned that Texas Water would take place in March of 2025.

10.2.1.20 Public Meeting, February 5, 2025

Meeting notes to be incorporated upon adoption of minutes by RHWPG.

10.2.2 Technical Committee Meetings

In addition to regular public meetings of the full RHWPG, the RHWPG also conducted several working meetings with technical committees. In order to promote transparency and seek input from stakeholders, technical committee meetings were held as public meetings with notice posted in accordance with statutory guidance.

10.2.2.1 Population Demands Committee Meeting, June 21, 2022

A meeting of the Population Demands Committee was held on June 21, 2022, at 10:00 a.m. at the Freese and Nichols Houston Office. Topics of discussion included population and demand projections, TWDB data, and potential revisions to WUGs.

10.2.2.2 Non-Population Demands Committee Meeting, March 21, 2023

A meeting of the Non-Population Demands Committee was held on March 21, 2023, at 2:00 p.m. at the Freese and Nichols Houston Office to discuss Committee activities and schedule. A presentation on TWDB data, projections, and the process for requesting revised projections and making recommendations regarding revised projections was given and discussed. A presentation on identification of Major Water Providers for Region H was given.

10.2.2.3 Population Demands Committee Meeting, April 17, 2023

A meeting of the Population Demands Committee was held on April 17, 2023, at 1:00 p.m. at the Freese and Nichols Houston Office. Upcoming activities related to population and demand projections were discussed, including deadlines for projection revision requests to the TWDB. The methodology for developing dry-year per capita water demand levels and the calculation of plumbing code savings were discussed. The methodologies for developing draft TWDB population projections and the Joint Regulatory Plan Review were presented. Concerns about undercounts in the 2020 Census and projected population declines in some counties were noted. The methodology for surveying WUGs for input on population projections and other data for the 2026 RWP was discussed. The methodology for identifying Major Water Providers (MWPs) was presented, and recommendations were made regarding the classification of MWPs.

10.2.2.4 Alluvium Committee Meeting, July 14, 2023

A meeting of the Alluvium Committee was held on July 14, 2023, at 10:00 a.m. at the Freese and Nichols Houston Office. The Committee discussed the preliminary results of a study on the impact of Brazos Alluvium pumping on streamflow, noting the high spatial variability and data limitations. Recommendations were made to support and fund efforts to expand understanding of the alluvium, and it was decided that future meetings would be scheduled as needed.

10.2.2.5 Population Demands Committee Meeting, July 18, 2023

A meeting of the Population Demands Committee was held on July 18, 2023, at 10:00 a.m. at the Freese and Nichols Houston Office. Mr. Taucer from the consultant team provided updates on the TWDB's draft per-capita water demand projections, emphasizing the importance of not underestimating water demand due to rapid area growth. Revisions to population and water demand projections were discussed, with six entities requesting adjustments based on recent data. The committee recommended accommodating these requests for the RHWPG.

10.2.2.6 Groundwater Supply Committee Meeting, September 25, 2023

A meeting of the Groundwater Supply Committee was held on September 25, 2023, at 10:00 a.m. at the Freese and Nichols Houston Office. Mr. Taucer provided updates on the 2026 RWP schedule, recent GMA activities, and the TWDB’s updated Modeled Available Groundwater values. Discussions included the use of MAG Peaking Factors and the evaluation of existing groundwater supplies in non-relevant aquifers.

10.2.2.7 Water Management Strategy Committee Meeting, October 24, 2023

A meeting of the Water Management Strategy Committee was held on October 24, 2023, at 10:00 a.m. at the Freese and Nichols Houston Office. Mr. Taucer provided a summary of anticipated WMS committee activities and topic areas for the current planning cycle, as well as an update to the 2026 RWP schedule referencing various due dates. The Committee discussed potential timing of its next meeting, which is anticipated for the first quarter of 2024.

10.2.2.8 Legislative Committee Meeting, October 2, 2024

A meeting of the Legislative Committee was held on October 2, 2024, at 9:00 a.m. at the SJRA Office in Conroe, TX. The Committee discussed recommendations for the 2026 RWP and the 89th Legislative Session, as well as legislative outreach opportunities.

10.2.2.9 Water Management Strategy Committee Meeting, January 17, 2025

A meeting of the Water Management Strategy Committee was held on January 17, 2025, at 9:30 a.m. at the Freese and Nichols Houston Office. Mr. Taucer provided a summary of preliminary WMS and project recommendations for the 2026 RWP. The Committee discussed the potential recommendations, potential adjustment to conservation assumptions, potential for recommendation of drought management WMS, and other topics regarding recent water supply and transfer discussions.

10.3 PUBLIC REVIEW AND COMMENT ON INITIALLY PREPARED PLAN

Additional information concerning public hearings associated with the public comment on the IPP will be added once these meetings are held following IPP submittal.