1. Description of the Region

Table of Contents

Tables

Figures

Appendices

Abbreviations used in the Report

Ac-ft/yr	Acre-feet per year
BRA	Brazos River Authority
CBWC	Chocolate Bayou Water Company
CLCND	Chambers-Liberty Counties Navigation District
COH	City of Houston
FBSD	Fort Bend Subsidence District
GBEP	Galveston Bay Estuary Program
GBF	Galveston Bay Foundation
GBFIG	Galveston Bay Freshwater Inflows Group
GCD	Groundwater Conservation District
GCWA	Gulf Coast Water Authority
HGCSD	Harris Galveston Coastal Subsidence District
MGD	Million gallons per day
MUD	Municipal Utility District
MWP	Major Water Provider (2001 Regional Plan Designation)
NHCRWA	North Harris County Regional Water Authority
RWPG	Regional Water Planning Group
RHWPG	Region H Water Planning Group
SB1	Senate Bill 1 from the 1997 State Legislature
SJRA	San Jacinto River Authority
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TWDB	Texas Water Development Board
WUG	Water User Group
WWP	Wholesale Water Provider
WHCRWA	West Harris County Regional Water Authority

Water Measurements

Acre-foot (AF) = 43,560 cubic feet = 325,851 gallons
Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day
Gallons per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr
Million gallons per day (mgd) = 1,000,000 gallons per day = 1120 ac-ft/yr

County Codes used in the Tables

8	Austin County
20	Brazoria County
36	Chambers County
79	Fort Bend County
84	Galveston County
101	Harris County
145	Leon County
146	Liberty County
157	Madison County
170	Montgomery County
187	Polk County
204	San Jacinto County
228	Trinity County
236	Walker County
237	Waller County

Basin Codes used in the Tables

6	Neches River Basin
7	Neches-Trinity Coastal Basin
8	Trinity River Basin
9	Trinity-San Jacinto Coastal Basin
10	San Jacinto River Basin
11	San Jacinto-Brazos Coastal Basin
12	Brazos River Basin
13	Brazos-Colorado Coastal Basin

1.1 Regional Water Planning in Texas

In 1997 the State Legislature, through Senate Bill 1, determined that the Texas State Water Plan for the 2000 - 2050 time frame, 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 (RWPG) that have guided the development of each region's plan. In 2001 a new set of rules and guidelines from the TWDB were enacted through Senate Bill 2. With the help of the 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.

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, the lower portions of the Trinity and Brazos River Basins, and includes 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-Ft. 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 area. The Region H Water Planning Group (RHWPG) is a 25-member committee representing the diverse interests of the Region. Table 1-1 lists the RHWPG membership.

Figure 1-1: Region H Water Planning Area

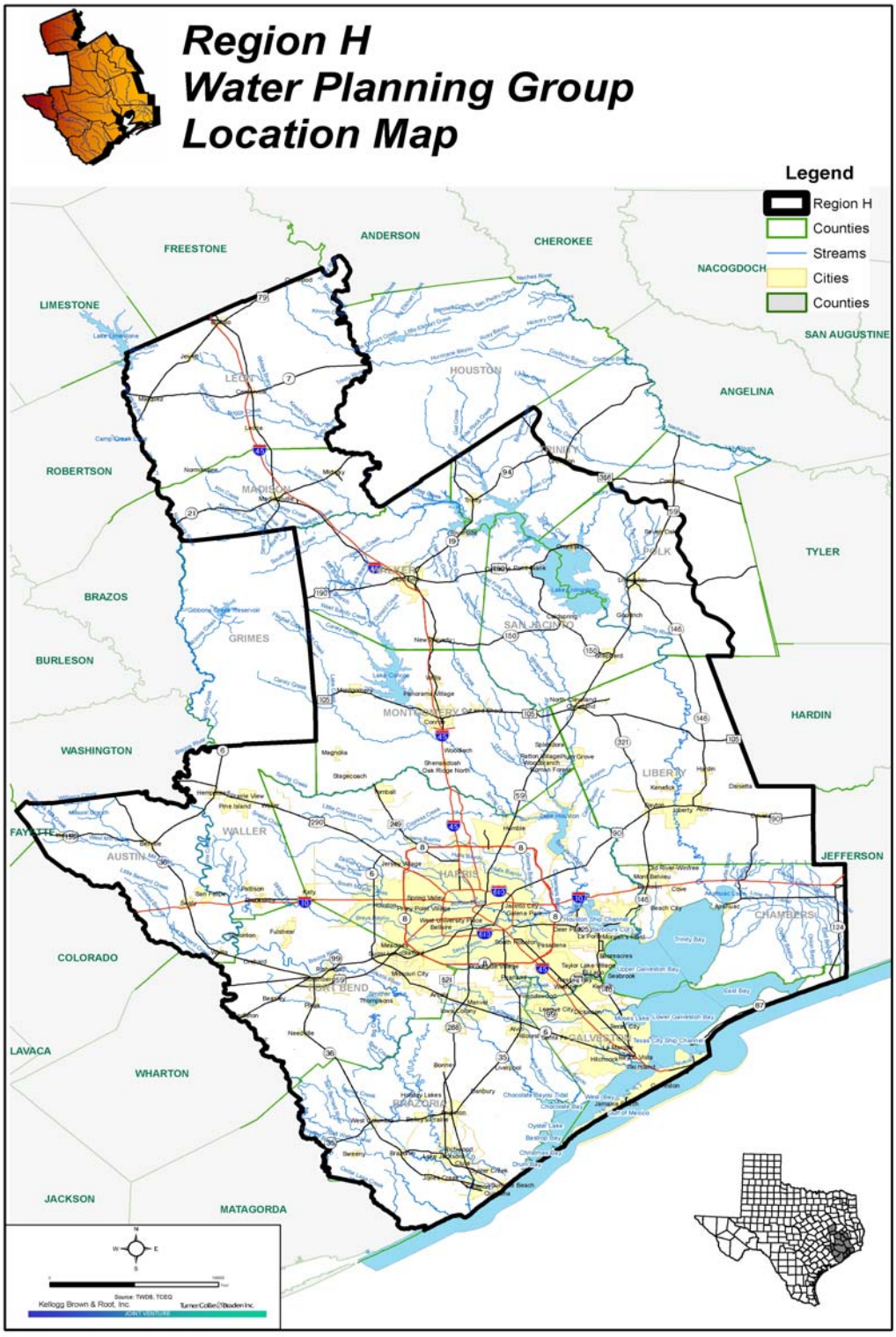


Table 1-1: Member Information for the Region H Water Planning Group

Executive Committee	
Office	**Incumbent**
Chair	Jim Adams
Vice-Chair	Mark Evans
Secretary	Ron J. Neighbors
At-Large	C. Harold Wallace
At-Large	Michael S. Sullivan
Offices	
Office	**Organization**
Administrative	Harris-Galveston Coastal Subsidence District 1660 W. Bay Area Blvd. Friendswood, Texas 775462640 Phone: 281-486-1105 Fax: 281-218-3714
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.	

Table 1-1 (continued)

Voting Membership			
Category	**Member**	**Organization**	**County (Location of Interest)**
Agriculture	David B. Jenkins July 1998 - Present	M & J Fertilizer	Chambers
	Robert Bruner March 1998 – Present	Rancher	Walker
Counties	John Blount, P.E. Sept 2004 – Present	Harris County	Harris
	Mark Evans March 1998 – Present	Trinity County	Trinity
	Jack Harris March 1998 – Present	Brazoria County	Brazoria
Electric Generating Utilities	Jason Fluharty Sept 2004 – Present	Texas Genco	Harris
Environmental	John R. Bartos March 1998 – Present	Galveston Bay Foundation	Harris
Industries	Carolyn Johnson March 1998 – Present	Dow Chemical Company	Brazoria
	James Murray March 1998 – Present	Exxon-Mobil Corp.	Harris
Municipalities	Robert Istre July 2003 – Present	Gulf Coast Water Authority	Galveston
	Jeff Taylor Oct 2002 – Present	City of Houston	Harris, Fort Bend, Montgomery
Public	Roosevelt Alexander March 1998 – Present	Retired	Waller
River Authorities	Jim Adams March 1998 – Present	San Jacinto River Authority	Montgomery (service in central portion of region)
	John Baker June 2004 – Present	Brazos River Authority	McLennan (service in west and southwest portion of region)
	Danny F. Vance March 1998 – Present	Trinity River Authority	Tarrant (service in east and southeast portion of region
Small Business	Mary Alice Gonzalez March 1998 – Present	Stewart Title - Fort Bend Division	Fort Bend
	Michael S. Sullivan March 1998 – Present	Sea-Master Marine Coatings	Harris
	Steve Tyler March 1998 – Present	Steve Tyler Creative Services	Trinity
Water Districts	Marvin Marcell July 1998 – Present	Fort Bend Subsidence District	Fort Bend
	Ron J. Neighbors March 1998 – Present	Harris-Galveston Coastal Subsidence District	Harris, Galveston
	Jack C. Searcy, Jr. March 1998 – Present	Spirit of North Harris County Coalition, Inc.	Harris

Table 1-1 (continued)

Voting Membership (continued)			
Water Utilities	C. Harold Wallace March 1998 – Present	West Harris County WSC	Harris
	James Morrison March 1998 – Present	Walker County Rural WSC	Walker
	William Teer, P.E. March 1998 – Present	Retired	Leon

Non-Voting Membership	
Member	**Organization**
Wayne G. Ahrens, P.E.	West Harris County Regional Water Authority
David Alders	East Texas Water Planning Group
Jennifer Bailey	Texas Department of Agriculture
Sabina Finnegan	Chocolate Bayou Water Company
Rick Gangluff	South Texas Project-Electric Generating Station / Lower Colorado Regional Planning Group
Larry Jacobs	Montgomery County Soil and Water Conservation District
Wayne Wilson	Agriculture Representative / Brazos G Water Planning Group
Phil Kaiser	Just Trees
Bill Roberts	Texas Water Development Board
Robert Stroder, P.E.	Lower Neches Valley Authority
Danny Vance	Region C Water Planning Group (also a voting member)
Woody Woodrow	Texas Parks & Wildlife Department

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, 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 Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), and Texas Department of Parks and Wildlife (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) in Region H have the authority to

regulate groundwater withdrawals. The Harris-Galveston Coastal Subsidence District and the Fort Bend Subsidence District have existed for some time. Three new districts were formed in 2001: the Lone Star GCD in Montgomery County, the Bluebonnet GCD which includes Austin, Grimes and Walker Counties, and the Mid-East Texas GCD which includes Leon, Madison and Freestone Counties.

During the initial planning period, two new regional water planning entities were formed: the North Harris County Regional Water Authority and the West Harris County Regional Water Authority. Municipalities have joined informally to study regional water supply facilities in Mid-Brazoria County, North Fort Bend County and Central Harris County.

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

Texas Water Development Board

J. Kevin Ward
Executive Administrator
PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231
(512) 463-7847

William Mullican
Deputy Executive Administrator, Office of Planning
PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231
(512) 936-0813

Texas Commission on Environmental Quality (plan review)

Glenn Shankle
Executive Director
12500 Park 35 Circle, Austin, TX 78753
(512) 239-3900

Texas Parks and Wildlife Department (plan review)

Robert Cook
Executive Director
4200 Smith School Road, Austin, TX 78744-3291
(512) 389-4800

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 area provides some of the states most popular vacation spots that, in 1994, generated approximately $390 million dollars. The Port of Houston handled 161.2 million tons in 2002, to make it the sixth busiest port in the world. In 2000 the Houston area employed 1.8 million people or 18 percent of the state's total employment. Region H is generally characterized by urbanizing land uses and broad-based economic development. In areas outside of the urban core agriculture dominates 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. 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.

The region's manufacturing industry is based on the historically important energy industries. Petroleum refining and chemical production are the largest two industries in the region. Technology and biotechnology firms have contributed to the diversification of the region's economic base. Petro-chemical, 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. 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 disbursed throughout the region, with the Texas Department of Corrections a major employer at prisons located in 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 with 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 is a major contributor to the local economic base. One third of the state's commercial fishing income and one half of the state's expenditures for recreation 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 2000 census, the population for Region H is approximately 4,848,948. Approximately 65% (3,170,496) of this population resides in 98 cities and towns with populations of over 500 persons, 16 of these cities have populations in excess of 25,000.

Table 1-3 lists the cities with over 25,000 persons and their 2000 census population and associated retail water demand. The balance of the population resides in smaller communities or the unincorporated portions of the 15 counties of the region.

Table 1-3: Cities with Populations Over 25,000

City	2000 Census Population	2000 Reported Municipal Use (acre-feet/year)
Baytown	66,430	10,938
Conroe	36,811	7,175
Deer Park	28,520	4,312
Friendswood	29,037	3,968
Galveston	57,247	16,228
Houston	1,953,631	347,947
Huntsville	35,078	5,108
La Porte	31,880	4,928
Lake Jackson	26,386	3,754
League City	45,444	6,617
Missouri City	52,913	10,239
Pasadena	141,674	18,567
Pearland	37,640	5,650
Sugar Land	63,328	15,677
Texas City	41,521	6,604
The Woodlands	55,649	13,714

Source: Texas Water Development Board

The 2000 total county populations and reported 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 the Chapter 2 of this plan. In 2000 municipal uses accounted for 41 percent of the region's total reported water use. In addition to municipal water use, 2000 estimates of other water use types were prepared by the TWDB for use in the planning process.

Table 1-4: County Population and Municipal Water Demand

County	2000 Census Population	2000 Reported Municipal Use (acre-feet/year)
Austin	23,590	3,535
Brazoria	241,767	40,127
Chambers	26,031	3,908
Fort Bend	354,452	67,566
Galveston	250,158	44,544
Harris	3,400,578	598,596
Leon	15,335	1,880
Liberty	70,154	9,350
Madison	12,940	1,728
Montgomery	298,768	51,193
Polk*	33,098	4,489
San Jacinto	22,246	2,698
Trinity*	10,380	1,231
Walker	61,758	14,741
Waller	32,663	4,610
Region H Total	4,848,918	850,196

* Includes portion of the county in the Region H area
Source: Texas Water Development Board

Manufacturing uses accounted for 30 percent and irrigation uses represented 22 percent of the region's total 2000 reported use. Figure 1-2 illustrates the distribution of 2000 water demand by use type. Total water demands for each county are listed in Table 1-5.

Figure 1-2: Percentage of 2000 Total Water Demand by Use

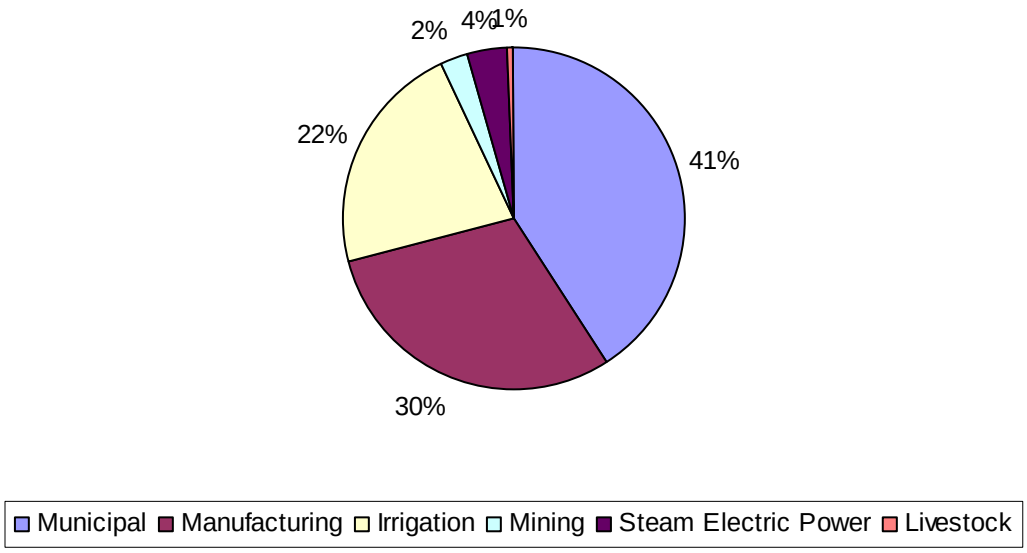


Table 1-5: Reported 2000 Non-municipal Water Use

County	MFR	IRR	MIN	POW	STK	Total
Austin	167	10,617	42	0	1,615	12,441
Brazoria	221,930	149,188	3,330	0	1,614	376,062
Chambers	9,752	117,777	31,027	5,334	462	164,352
Fort Bend	6,117	53,455	2,840	61,761	1,171	125,344
Galveston	35,381	10,342	230	6,054	325	52,332
Harris	349,420	15,300	1,011	7,606	1,133	374,470
Leon	545	542	1,740	0	1,691	4,518
Liberty	296	82,901	8,656	0	757	92,610
Madison	205	19	23	0	750	997
Montgomery	1,587	66	414	2,507	510	5,084
Polk *	0	0	24	0	134	158
San Jacinto	39	667	36	0	284	1,026
Trinity *	0	467	8	0	211	686
Walker	2,518	11	12	0	632	3,173
Waller	68	22,978	80	0	939	24,065
Region H Total	628,025	464,330	49,473	83,262	12,228	1,237,318

* Includes the portion of the county in Region H.
Source: Texas Water Development Board

1.3.1 Major Demand Centers

Major demand centers are locations or water uses that require a significant portion of the region's water supply. As would be expected major urban areas with large populations and major industrial development are typically major demand centers. In Region H major demand centers are defined for municipal, manufacturing and irrigation uses as having a reported 2000 use, by use type, exceeding 25,000 acre-feet for counties and 10,000 acre-feet for cities.

Harris County has the greatest overall water demand in the region, as was shown in Table 1-4. 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. The City of Houston used 347,947 acre-feet or 42 percent of the total regional municipal use. As shown in Table 1-6, Brazoria, Fort Bend, Galveston and Montgomery Counties are major demand centers with 2000 reported use in excess of 25,000 acre-feet. In addition to the City of Houston, municipalities identified as major demand centers (reported municipal demands in excess of 10,000 acre-feet in 2000) include the cities of Pasadena, Galveston, Baytown and Sugar Land.

Table 1-6: Major Municipal Demand Centers

County/City	2000 Municipal Use (acre-feet)
City of Houston	347,947
Harris County (excluding Houston)	250,649
Fort Bend	67,566
Galveston	44,544
Montgomery	51,193
Brazoria	40,127
City of Pasadena	18,567
City of Galveston	16,228
City of Baytown	10,938
City of Sugar Land	15,677

Source: Texas Water Development Board

The largest manufacturing demand center is Harris County, which used 349,420 acre-feet of water in 2000 (68 percent of the regional total). Two other major demand centers are identified; Brazoria County, with reported 2000 manufacturing use of 221,930 acre-feet, and Galveston County with a reported 2000 manufacturing use of 35,381 acre-feet. The principal water using industries in the region are Petroleum Refining, Chemical Products and Pulp and Paper Mills. The three largest manufacturing demand centers are shown in Table 1-7.

Table 1-7: Major Manufacturing Demand Centers

County	2000 Manufacturing Use (acre-feet)
Brazoria	221,930
Galveston	35,381
Harris	349,420

Source: Texas Water Development Board

The four largest irrigation demand centers are Brazoria, Chambers, Liberty and Fort Bend counties. Table 1-8 highlights each county's reported 2000 irrigation use. The major irrigated crops in the region are rice, soybeans, vegetables and cotton.

Table 1-8: Major Irrigation Demand Centers

County	1996 Irrigation Use (acre-feet)
Chambers	117,777
Brazoria	149,188
Liberty	82,901
Fort Bend	53,455

Source: Texas Water Development Board

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.

1.4 Region H Water Supply Sources and Providers

Groundwater, surface water captured in reservoirs and run-of-river sources comprise the available water supply within a river basin. Reused and recycled water and saline sources are additional supply sources utilized in Region H.

1.4.1 Groundwater Sources

Four 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 and Jasper formations and extends from near the 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 three 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, they lie above the Carrizo-Wilcox Aquifer. The Brazos River alluvium occurs along the main stem of the Brazos as it passes through the region, except in Brazoria County. Figure 1-3 and Figure 1-4 illustrate these groundwater sources. Groundwater use is regulated in Harris, Galveston and Fort Bend Counties due to the potential for over-drafting the Gulf Coast Aquifer. Groundwater Management Plans have been published for Austin, Leon, Madison Montgomery and Walker Counties. Groundwater withdrawals in 2000 accounted for approximately 34 percent of the total regional water supply.

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 based 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. The most significant spring was Gold Springs in San Jacinto County, above the town of Coldspring, with recorded flows of 32 gpm (50 ac-ft/yr) into the 1960's.

The following discussion of each basin's surface water supply is based upon information in *Water for Texa*s (1997) and (2002). Water availability estimates come from the TCEQ Water Availability Models. Figure 1-5 illustrates the region's surface water sources. A selected bibliography of related references is included at Appendix 1A.

Figure 1-3: Region H Major Groundwater Sources

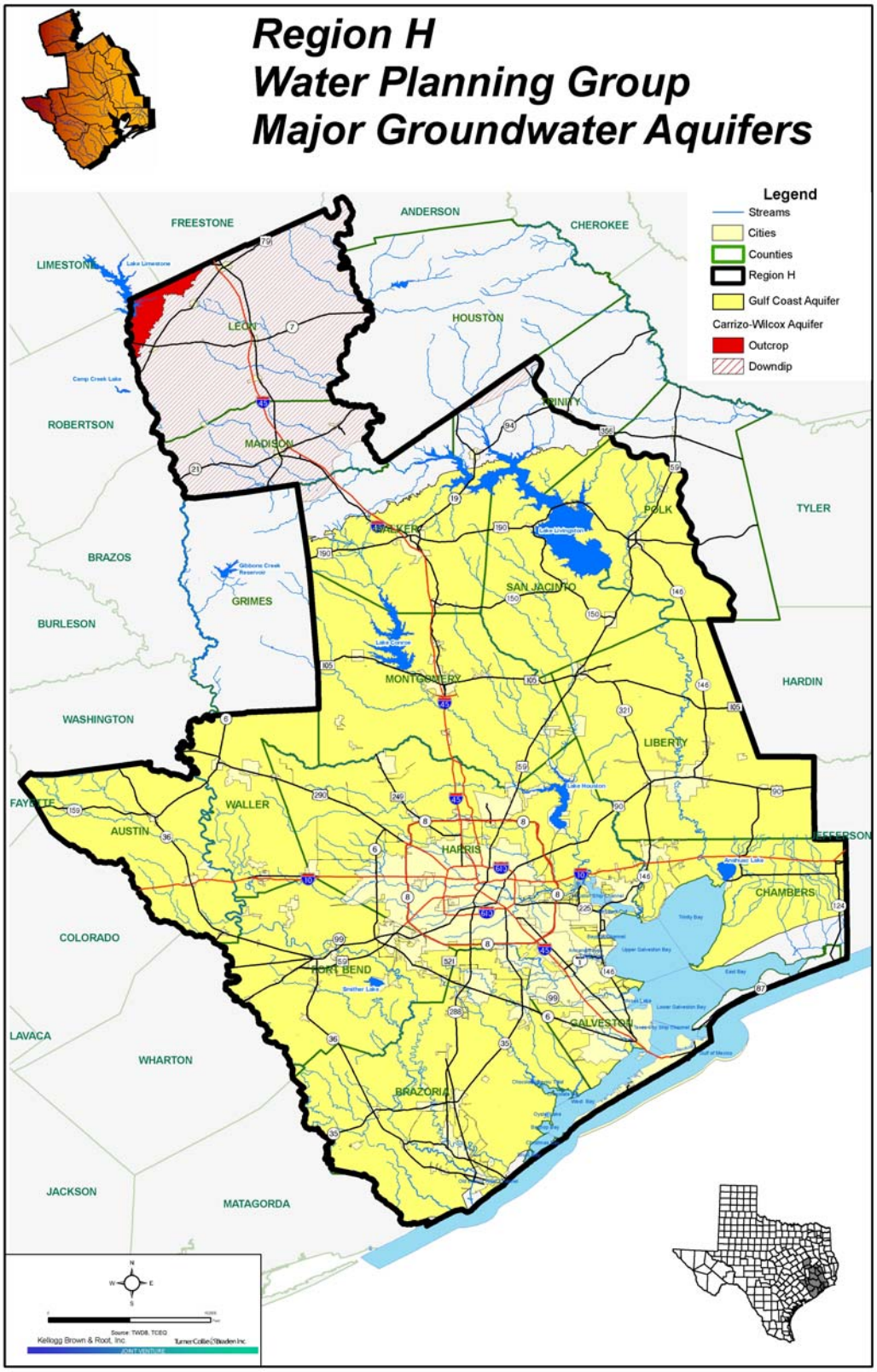


Figure 1-4: Region H Minor Groundwater Sources

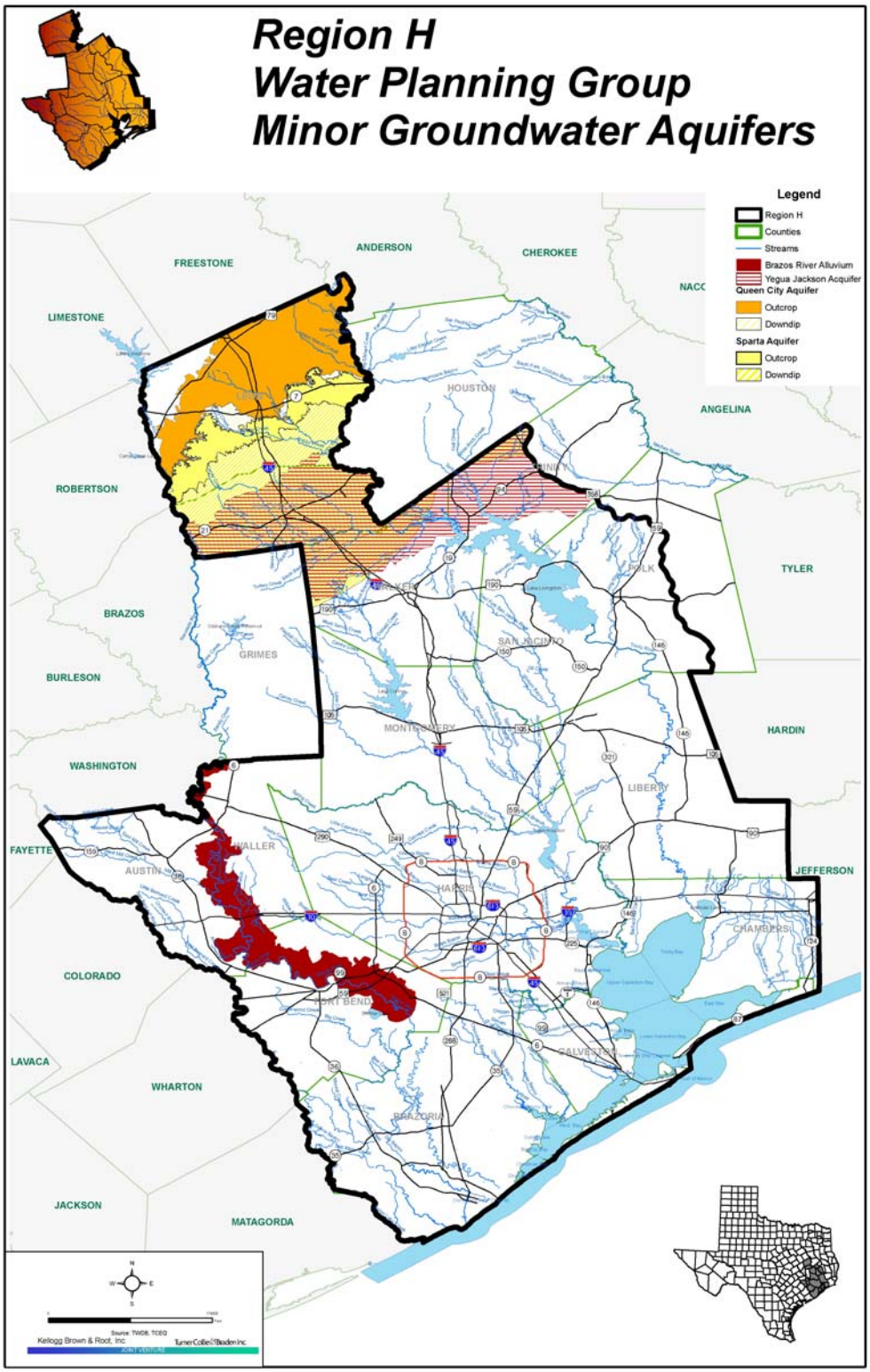
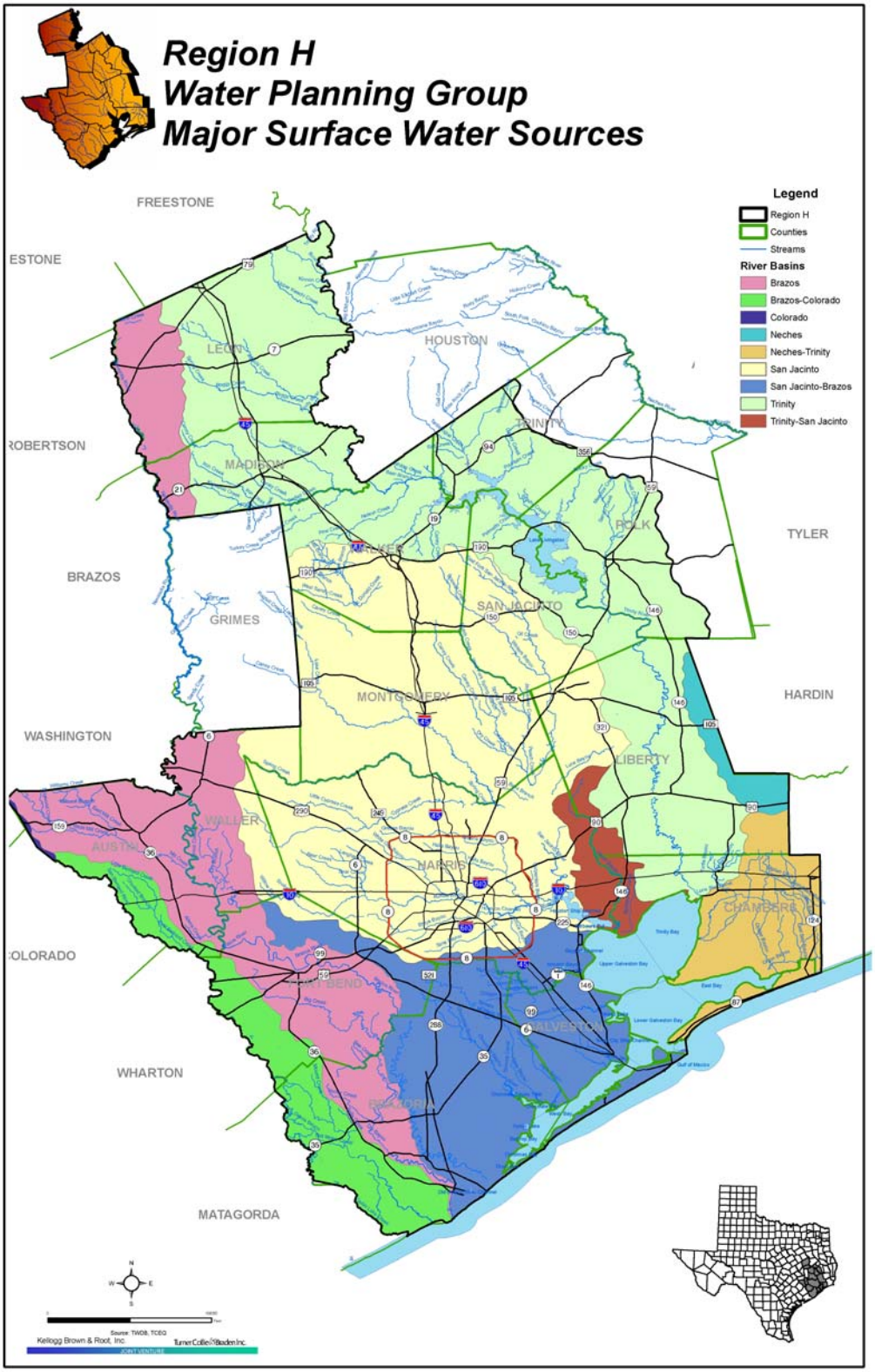


Figure 1-5: Region H Surface Water Sources



Trinity River Basin

The Trinity River basin contains two water projects in Region H, Lake Livingston and the Wallisville Salt Water Barrier. The City of Houston and the Trinity River Authority (TRA) sponsored Lake Livingston's construction. It is operated by the TRA to meet the service demands of the City of Houston and other local users in the Trinity Basin and in the Neches-Trinity Coastal Basin. The U.S. Army Corps of Engineers recently completed the Wallisville Saltwater Barrier. These two projects are operated as a system, Livingston primarily to store water and Wallisville to control the migration of salt water from Trinity Bay. Lake Livingston and Wallisville computed yields are 1,255,500 acre-feet/year and 89,700 acre-feet/year respectively. The sum of these permitted yields is the combined yield of the system (1,345,200 acre-feet per year). Additional permitted run-of-the-river water supplies downstream of Lake Livingston total 220,230 acre-feet per year. These supplies are associated with the water rights agreements established at the time of Lake Livingston permitting.

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 yield of 151,400 acre-feet/year, is owned and operated by the City of Houston for use in its service area. The City of Houston and San Jacinto River Authority (SJRA) jointly own Lake Conroe, with the City holding two-thirds of the permitted rights (66,667 acre-feet/year) and SJRA holding one-third (33,333 acre-feet/year). SJRA manages Lake Conroe, providing supply to the City of Houston and other local users. The SJRA has additional run-of-the-river water rights of 55,000 acre-feet per year.

Brazos River Basin

The Brazos River Authority (BRA) manages the water supply resources from 13 reservoirs within this basin. Several of these reservoirs are operated by BRA as a System Operation where commitments made to downstream demands can be met from any upstream reservoir storage available in the system. The U.S. Army COE owns 9 of these reservoirs and BRA owns four 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.

The total Brazos Basin supply is estimated at over 1,200,000 acre-feet per year and the estimated yield from BRA's reservoirs is almost 700,000 acre-feet per year. Over 450,000 acre-feet per year is committed under contracts to various entities upstream of Region H with approximately 130,000 acre-feet per year used in the Region H area. Lower-Brazos River Basin run-of-river permits in excess of 450,000 acre-feet per year have been granted.

San Jacinto - Brazos Coastal Basin

There are several significant water users within the San Jacinto-Brazos Coastal Basin supported by the run-of-river water supplies from the Brazos Basin. Suppliers include the Chocolate Bayou Water Company (80,000 acre-feet per year), Dow Chemical (280,000 acre-feet per year), and the Richmond Irrigation Company (40,000 acre-feet per year). Each of these entities diverts surface water from the Brazos River and enhances the reliability of their supplies through off-channel surface reservoirs.

1.4.3 Use by Source

TWDB reports that Region H used 2,087,514 acre-feet of water in 2000. Of that, 709,990 acre-feet (34%) came from groundwater wells, and 1,377,524 acre-feet (46%) came from rivers and other surface sources. Industrial water users (principally chemical industry users) in the region used approximately 1,000,000 acre-feet of saline (sea) water and the petroleum industry reported the reuse of just over 3,000 acre-feet of treated effluent. Table 1-9 summarizes the groundwater and surface water usage for each county. Table 1-10 lists the estimated year 2060 reliable yields available from existing sources to Region H.

Table 1-9: 2000 County Water Use by Source

County	Groundwater (acre-feet)	Surface Water (acre-feet)	Total Use (acre-feet)
Austin	15,928	48	15,976
Brazoria	50,397	365,792	416,189
Chambers	23,005	145,255	168,260
Fort Bend	122,416	70,494	192,910
Galveston	5,001	91,875	96,876
Harris	336,044	637,022	973,066
Leon	6,398	0	6,398
Liberty	40,199	61,761	101,960
Madison	2,725	0	2,725
Montgomery	55,701	576	56,277
Polk (P)	2,906	1,741	4,647
San Jacinto	3,057	667	3,724
Trinity (P)	1,601	316	1,917
Walker	16,259	1,655	17,914
Waller	28,353	322	28,675
Total	709,990	1,377,524	2,087,514

Source: TWDB Annual Survey of Ground and Surface Water Use

Table 1-10: Projected 2060 Supplies Available for Use in Region H

Groundwater	**Projected Yield (acre-feet/year)**	
Gulf Coast Aquifer	611,609	
Carrizo-Wilcox Aquifer	9,610	
Queen City Aquifer	7,906	
Sparta Aquifer	17,414	
Brazos River Alluvium	41,539	
Undifferentiated Aquifer	1,117	
Subtotal	689,195	
Basin/Reservoir/Run-of-River		
Neches Basin		
Sam Rayburn Contract1	60,727	
Neches-Trinity Coastal Basin		
Run-of-River	23,209	
Trinity Basin		
Lake Livingston/Wallisville	1,344,000	
Run-of-River, Lower Basin	220,230	
Trinity-San Jacinto Coastal Basin		
Run-of-River	34,232	
San Jacinto Basin		
Lake Houston	168,000	
Lake Conroe	74,300	
Run-of-River	69,944	
San Jacinto-Brazos Coastal Basin		
Run-of-River	39,181	
Brazos Basin		
Brazos River Authority System2	138,913	(System total 691,717)
Run-of-River, Lower Basin	472,103	
Brazos-Colorado Coastal Basin		
Run-of-River	12,019	
Local Supplies (i.e., stock ponds) all basins	32,071	
Subtotal	2,688,929	
Total	**3,378,124**	

[1] Values based on long-term contracts from LNVA to Region H customers
[2] Values based on long-term contracts from BRA to Region H customers

1.4.4 Major Water Providers

A major water provider is an entity that delivers and sells a significant amount of raw or treated water for municipal and/or manufacturing use on a wholesale and/or retail basis. Generally major providers serve as a primary water source for a significant portion of the region's municipal or industrial water users and are those entities likely to develop future major water supply projects. As in the rest of the state, Region H has relatively few entities

that hold the rights to significant amounts of water, particularly surface water, and provide retail or wholesale water supplies to a significant number of area users.

Five entities in Region H own over 100,000 acre-feet per year of municipal and/or industrial water rights. Their total holdings represent approximately 62 percent of the region's municipal and industrial water rights. The Chocolate Bayou Water Company and the Chambers-Liberty Counties Navigation District each has rights to over 100,000 acre-feet per year, but their supplies are currently used primarily for irrigation. Additionally, portions of these supplies are not 100 percent reliable. Reliability is based on modeling diversions under drought of record conditions. Irrigation rights can be issued for supplies that are available 75-percent of the time. These entities are listed in Table 1-11 along with other substantial water rights holders.

Table 1-11: Major Region H Water Rights

Provider	Permitted Amount (acre-feet/year)
City of Houston	1,220,467
Gulf Coast Water Authority	236,932
Trinity River Authority *	403,200
Chocolate Bayou Water Co.	212,500
San Jacinto River Authority	174,933
Brazos River Authority *	138,913
Brazosport Water Authority	45,000
Chamber-Liberty County Navigation Dist.	112,947

* Portion available within Region H only
Source: TNRCC Master Water Rights Database

One other group of water rights holders should be noted, industrial entities that hold large manufacturing use water rights to provide for plant operations. These entities, listed in Table 1-12, generally do not act as providers to other industrial customers. DOW Chemical, however, provides municipal water supply to the Brazosport Water Authority.

Table 1-12: Large Industrial Water Rights Holders

Industrial Water Rights Holder	Fresh Water Permits (acre-feet/year)
Dow Chemical Company	280,000
Reliant Energy / Texas Genco	166,238
Occidental Chemical Corporation	140,000
Phillips Petroleum Company	39,880

Over 2,300 public water suppliers deliver water to communities and businesses in Region H. A review of these suppliers indicates that 70 percent serve fewer than 500 customers. Of the over 700 municipal providers serving 500 or more customers, over 250 are addressed in this plan as part of collective reporting units. The North Harris County Regional Water Authority accounts for 152 Utility Districts (the two cities in the Authority, Tomball and Jersey Village,

and listed separately in the plan. The West Harris County Regional Water Authority accounts for 107 Utility Districts, with its member city (Katy) similarly listed separately. A final collective unit in the plan is The Woodlands, a planned community in Montgomery County served by a series of related utility districts.

1.5 Water Quality and Natural Resources

1.5.1 Water Quality

TNRCC published *The 15th State of Texas Water Quality Inventory* (2000) addressing water quality in light of recent Federal Clean Water Act amendments. Also that year, participating water authorities compiled and published their *Regional Water Quality Assessments* as part of the Texas Clean Rivers Program. These reports established the condition of each river and stream segment and identified those segments with water quality concerns for a number of parameters. 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.

Groundwater within the region is generally of good quality, with total dissolved solids below 1,000 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. There are many naturally occurring constituents in ground water with arsenic and radon being two of them. The current maximum contaminant level (MCL) for arsenic in water used for public supply is 0.05 mg/l with the MCL scheduled to be lowered to 0.01 mg/l in January of 2006. Currently ground water produced within Region H has an arsenic content below the existing MCL. There is a limited area within the northwest 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 and in some instances consideration is being given to treating the water from older wells to lower the arsenic content below 0.01 mg/l.

Radon is not a regulated constituent as an MCL has not been established for it. There are some areas in the west 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 from providing water to a well, production wells are constructed that produce water with low levels of radon.

Surface water throughout Region H is 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. Likewise, nutrients, dissolved minerals and elevated fecal coliform levels have been identified in the Lower Brazos River. Also of concern in the Lower Brazos River are seasonal low flows, which allow the tidal salt-wedge to reach municipal and industrial freshwater intakes in Freeport.

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 Marshes 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 as well. Wildlife in the area includes alligator, river otter, Attwater's prairie chicken, eastern brown pelican, Eskimo curlew, piping plover and whooping crane. Counties in the Gulf Prairie 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

The Region contains 325,394 acres of state and national forests, supporting hiking, camping, picnicking and horseback riding. It also contains 107,138 acres 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 12,170 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, and a location map is provided at Figure 1-6.

Table 1-13: Public Lands

Resource Area	Acreage	County
State and National Forests		
W. Goodrich Jones State Forest	1,725	Montgomery
Davey Crockett National Forest	162,012	Total
	67,329	Trinity
Sam Houston National Forest	161,657	Total
	47,777	Montgomery
	60,247	San Jacinto
	53,633	Walker
Big Thicket National Preserve	86,000	Total
National Wildlife Refuges		
Anahuac NWR	30,000	Chambers

Brazoria NWR	42,338	Brazoria
San Bernard NWR	28,000	Brazoria
Trinity River NWR	6,800	Liberty
Texas Wildlife Management Areas		
Candy Cain Abshier WMA	207	Chambers
Atkinson Island WMA	151	Harris
Keechi Creek	1,500	Leon
Peach Point	10,312	Brazoria

Source: Texas Almanac, Texas Parks & Wildlife Department

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 Threats to Agricultural and Natural Resources

The Regional Water Planning Guidelines (31 TAC 357) require planning groups to "identify threats to agricultural and natural resources of the state due to water quantity problems or water quality problems related to water supply."

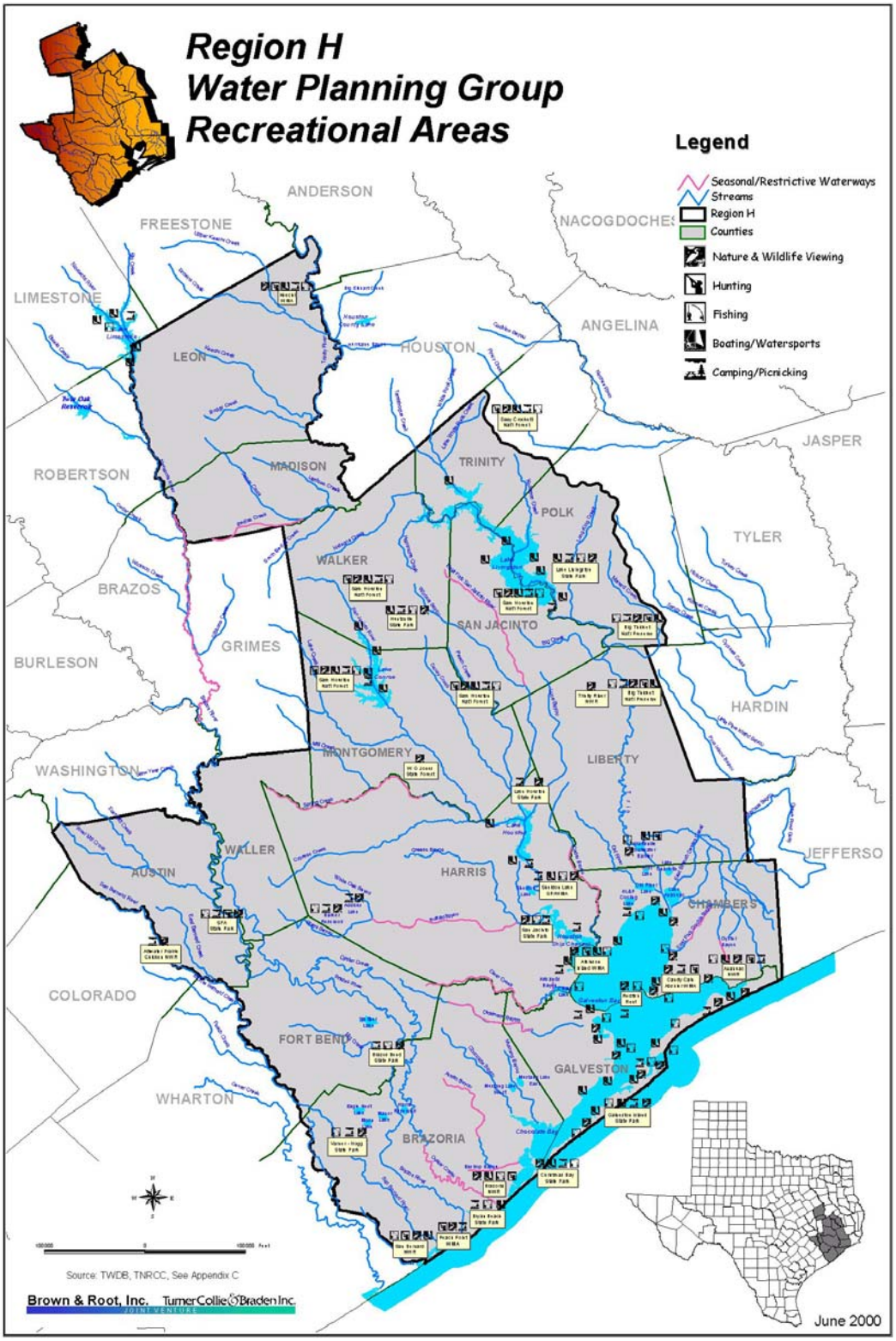
There are no water quantity problems for agriculture in Region H. However, it is common practice in the region for irrigation supply to be purchased on a year-to-year basis. The absence of long-term contracts prevents the full representation of irrigation supply as "allocated" in the regional plan. As a result, irrigation is represented as having a shortage met through water management strategies. The current plan meets all projected irrigation demands. Increased water costs, coupled with decreasing prices for rice and other irrigated crops, may cause agricultural water demand to decline in the future. No water quality concerns for agriculture have been identified.

Galveston Bay estuary is the 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. The estuary is capable of withstanding to natural flood and drought cycles, but the amplified affects of water diversions during a drought may pose a threat to this resource. Target inflow amounts and frequencies for Galveston Bay are discussed in Chapter 3, and inflows with and without water management strategies are analyzed in Chapter 4.

Other natural resources within the region also enjoy in-stream flows. As with Galveston Bay, peak diversions during drought periods may reduce flows to the point that detrimental affects are felt by the environment. Texas is currently developing policies and procedures to

determine and protect the required minimum flows in the streams and estuaries of the State. Threatened and endangered species are discussed in Chapter 7.

Figure 1-6: Public Lands within Region H



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. It was incorporated into the State Water Plan in 2002. The Region H Water Plan recommended several water management strategies to ensure that all water demands in the Region were met. First, advanced water conservation was recommended for all municipalities with projected shortages. Next, supplies that were identified as surplus in one area were recommended for contract or sale to water users in other areas. These transfers included moving TRA water supply from Lake Livingston to Harris County, moving surplus water from Houston into Galveston County, and reducing BRA contract commitments in the upper Brazos basin to supply the lower basin. Three new reservoirs were recommended: Allens Creek Reservoir in Austin County to capture peak flows in the Brazos River, Bedias Reservoir in Madison County to create additional supply for the northern third of the region, and Little River Reservoir in Milam county to supply Region H and the Brazos G Region. In areas with limited groundwater, irrigation conservation was recommended as a means of increasing groundwater for municipal supply.

Before this, the Region H area was 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 II Report* (1998) identified a regional long-term shortage by the year 2035. To meet that need, the following 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, and export water to Central Texas (Regional Planning Regions L and N). Various management strategies would need to be implemented to accommodate growth in the different geographic areas across the fifty-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 Allen's Creek Reservoir in the Brazos River Basin, with a yield of approximately 70,000 acre-feet per year, 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 previously completed regional water supply plans include the City of Houston Master Plan, Brazos Valley Long-Range Resource Plan, the San Jacinto River Authority Water Resources Development Plan, and the Trinity River Basin Master Plan. Within Region H, the BRA plan also recommends development of the Allen's Creek Reservoir. The SJRA plan

recommended development of two reservoirs, Lake Creek and Spring Creek. These projects were tabled when the SJRA purchased part of the Devers Canal Systems water rights, which allowed the transfer of approximately 50,000 acre-feet per year from the Trinity River Basin. The TRA recommends development of thirteen potential reservoirs, six of which are located in Region H. The largest, Bedias Creek, could potentially provide 109,000 acre-feet per year, and is located to allow use in the Trinity, San Jacinto or Brazos River Basins.

The Harris-Galveston Coastal Subsidence District and Fort Bend Subsidence District developed Groundwater Management Plans to address subsidence through reduced groundwater extraction within their respective regulatory areas. These districts adopted regulatory plans in 1999 and 2003, respectively, setting limits on groundwater use as a percentage of total water demand. Three of the four new groundwater conservation districts in the region, Bluebonnet, Lone Star and Mid-East Texas, have published groundwater management plans and started the collection of well data needed to consider if a regulatory plan is needed.

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

1.6.2 Current Preparations for Drought

The 1997 State Legislature mandated water conservation and drought contingency planning for all holders of municipal, industrial and non-irrigation water rights of 1,000 acre-feet or more and irrigation rights holders of 10,000 or more acre-feet. Previously, all water rights permit applications required a water conservation and drought contingency plan but existing rights holders were not required to prepare or implement plans. New regulations also distinguish between water conservation and drought contingency plans and extend the requirement to prepare and implement drought contingency plans to all holders of water rights as noted above and to public water systems with over 3,300 connections.

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 of this report.

1.7 Recommendations Made in the 2001 Region H Water Plan

In the 2001 Region H Water Plan, the RHWPG recommended thirteen water management strategies to meet projected water demands through the year 2050. The Plan was amended in 2004 to add nine additional water management strategies. The planning group recommended six stream segments and three reservoir sites as unique, and also recommended regulatory, administrative and legislative changes to the Legislature. Those recommendations are listed below. Recommendations which have been acted upon are noted in italics.

1.7.1 Water Management Strategies Recommended in the 2001 Regional Plan

The RHWPG considered a variety of strategies for meeting the projected shortages and solicited input from the public before adopting a management plan. A detailed analysis process was developed to define potential water management strategies. The process addressed the specific shortages of the 93 WUGs discussed above and then developed associated specific strategies assuming the MWPs would be the vehicle to solve WUG shortages. The process generally consisted of the following:

1. Contract Extension - For all WUGs currently served by a MWP, first extend the existing contracts throughout the planning period for the current contracted amount of water.
2. Contract Extension and Increase - If the current contracted amount of water is insufficient for a Municipal WUG now served by a MWP, then increase the contracted supply from the MWP to meet future water needs of those Municipal WUGs. This could not be applied to collective WUGs, such as manufacturing.

Steps 1 and 2 solved the supply needs for 42 of the 93 WUGs with shortages. The remainder of the WUGs with shortages required additional actions:

3. MWP Association - For the Municipal WUGs not now served by a MWP, for the Municipal County-Other WUGs and for the Non-Municipal WUGs with shortages, associate each of these WUGs with a MWP.
4. Allocation of Uncommitted Supplies - Determine the total supply required to meet shortages of the WUGs defined in Steps 1 through 3 for each MWP. Allocate uncommitted supplies of each MWP to these WUGs until the existing MWP supplies are fully allocated.
5. Define Strategies - Determine the remaining water supplies needed to satisfy the water shortages remaining for each MWP. Define potential water management strategies for each MWP based on its identified water shortages.

Management strategies that involved adjoining regions were coordinated with the appropriate water planning group. This allowed the consideration of larger projects.

The water management strategies selected to meet the MWPs' shortages are as follows:

- **Municipal Conservation**--The conservation strategy is applied at the WUG level and decreases WUG demands on the associated MWP, allowing the MWP to allocate its supplies elsewhere. Projected water savings total 30,383 ac-ft/yr in year 2030 and 30,563 ac-ft/yr in year 2050.
- **Irrigation Conservation**--Also applied at the WUG level, this strategy allows allocation of MWP supplies to other users. Projected water savings are 24,312 ac-ft/yr in Brazoria County, 14,259 ac-ft/yr in Fort Bend County, and 5,010 ac-ft/yr in Waller County.
- **Contractual Transfer**--This strategy involves the transfer of 28,500 ac-ft/yr of manufacturing water rights to irrigation water rights within the boundaries of the Brazos River Authority service area.
- **Allen's Creek Reservoir**--This proposed reservoir creates 99,650 ac-ft/yr of supplies for the City of Houston and for the Brazos River Authority.
- **Little River Reservoir**--This proposed reservoir creates 101,000 ac-ft/yr for the Brazos River Authority (of which 30,000 ac-ft/yr are consumed outside Region H) and 28,000 ac-ft/yr for the Gulf Coast Water Authority.
- **Bedias Reservoir**--This proposed reservoir creates 90,700 ac-ft/yr for the San Jacinto River Authority and the Trinity River Authority.
- **Wastewater Reclamation**--This strategy proposes that 90,700 ac-ft/yr of Houston's municipal wastewater be treated and reused by industries along the Houston Ship Channel.
- **Luce Bayou**--This conveyance project enables the City of Houston to transfer water it owns in the Trinity basin to Lake Houston to meet projected growth in north and northwest Harris County.
- **Houston/Trinity River Authority Contract**--Under this strategy, the City of Houston will purchase up to 200,000 ac-ft/yr of uncommitted supplies from the Trinity River Authority.
- **Brazos River Authority Voluntary Redistribution**--The Brazos River Authority is in the process of re-purchasing unused supplies from current customers in the upper Brazos basin and will then be able to sell up to 75,000 ac-ft/yr of this water to customers in Region H.
- **Bedias Reservoir to San Jacinto River Authority Transfer**--In conjunction with the Bedias Reservoir construction, this strategy is the conveyance system to facilitate the interbasin transfer of 75,000 ac-ft/yr to the San Jacinto River Authority service area.
- **Houston to Gulf Coast Water Authority Transfer**--To meet 2050 demands of the Gulf Coast Water Authority, this strategy calls for the sale of 23,000 ac-ft/yr of Houston's raw water supplies. Included is a pumping station and pipeline to convey the water to the GCWA's Texas City reservoir.

- **San Jacinto River Authority/Chambers-Liberty Counties Navigation District Contract**--Under this strategy, the San Jacinto River Authority will purchase 30,000 ac-ft/yr of uncommitted supplies from the Chambers-Liberty Counties Navigation District.

The following water management strategies were added to the 2001 Water Plan under Amendment 1:

- **Expanded Use of Groundwater** - This strategy differentiates between existing well capacity and future well capacity, and reflects the addition of future well capacity as a management strategy.
- **Redesignation of Existing Water Rights** - Local surface water providers recognizing land use changes within their service areas should add appropriate usage types to their water rights permits, in anticipation of future demands.
- **Additional Lake Houston Yield** – This strategy recognizes the water right permit application made by the City of Houston and the San Jacinto River Authority for 32,500 ac-ft/yr of firm yield in Lake Houston.
- **Interruptible San Jacinto River Supply** – This strategy recognizes the water right permit application made by the City of Houston and the San Jacinto River Authority for 80,000 ac-ft/yr of interruptible supply in the San Jacinto River above Lake Houston. Diverting this supply, when available, reduces interbasin transfers from the Trinity Basin.
- **Interruptible Bayous Supply** – This strategy recognizes the water right permit application made by the City of Houston for 160,000 ac-ft/yr of interruptible supply in the lower San Jacinto basin. Diverting this supply, when available, reduces interbasin transfers from the Trinity Basin.
- **SJRA Indirect Reuse** – This strategy recognizes the San Jacinto River Authority water right permit for reuse of 14,944 ac-ft/yr of wastewater return flows above Lake Houston.
- **City of Houston Indirect Reuse** – This strategy recognizes the water right permit application made by the City of Houston for 490,223 ac-ft/yr of wastewater return flows from city-owned facilities. This is in addition to the direct reuse strategy for industry.
- **NHCRWA Indirect Reuse** – This strategy recognizes the planned water right permit application by the North Harris County Regional Water Authority for up to 157,000 ac-ft/yr of wastewater return flows from member-district facilities.
- **BRA System Operations Permit** – This strategy recognizes the water right permit application made by the Brazos River Authority for 421,499 ac-ft/yr of run-of-river yield and wastewater return flows, made firm through system operation of the authority's reservoirs.

1.7.2 Unique Streams Segments Recommended in the 2001 Regional Plan

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value. The selection criteria established within the Texas Water Code are as follows:

- Biological Function
- Hydrologic Function
- Riparian Conservation Area
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value
- Threatened or Endangered Species/Unique Natural Communities

After consideration of the above factors, the following six streams were recommended for designation as Streams of Unique Ecological Value in Region H:

Table 1-14: Recommended Unique Stream Segments

Stream Segments (not in priority order)	County
Armand Bayou	Harris
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Lake Creek	Brazoria
Menard Creek	Liberty, Hardin*, Polk (Hardin County is in Region I)

The entire stream segment length was recommended for Armand Bayou and Menard Creek (segment within Region H). For the remaining four streams, only those portions adjacent to or within riparian conservation areas were recommended as unique streams. The Legislature has not yet designated any unique streams.

1.7.3 Unique Reservoir Sites Recommended in the 2001 Regional Plan

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected three surface water reservoir projects for inclusion within the Regional Water Plan. The RHWPG has decided to recommend the locations of each of these projects as unique sites. To date, the Legislature has only designated Allens Creek Reservoir as unique.

The three sites are:

Table 1-15: Recommended Unique Reservoir Sites

Name	County	General Location
Allen's Creek	Austin	1 Mile N. of the City of Wallis
Bedias	Madison (Principally)	Bedias Creek, 3.5 Miles W. of State Hwy 75
Little River	Milam	Main Stem of Little River, Immediately Upstream of its Confluence with the Brazos River

1.7.4 Regulatory and Administrative Recommendations from the 2001 Plan

Revise Population Projections

A number of Municipal WUGs within Region H strongly disagree with the current set of population and water demand projections. Various Municipal WUGs have transmitted evidence that their specific communities have year 2000 populations significantly higher or lower than the projections used in the current regional planning effort. An opportunity exists to rectify this situation with completion of the year 2000 Census. Accurate, consistent information should exist for each Region H Municipal WUG as a result of the Census.

The Region H Water Planning Group recommends that the TWDB immediately revise the existing population and water demand projections upon official acceptance of the Census information. These revised population and water demand projections should then be transmitted to the regional planning groups for amendment, if necessary, of the current regional water plan.

The current round of regional water planning is based on the 2000 census, and every second round of planning will coincide with the release of the US Census data.

Water Management Strategy Flexibility

Section 357.7(a)(8) of the TWDB Regional Water Planning guidelines requires "specific recommendations of water management strategies to meet near term needs…" The TWDB interpretation of these requirements suggests a direct relationship between a defined water shortage with one specific water management strategy. We are concerned that this requirement decreases the local control and flexibility that have been an important part of successful efforts to meet water needs in Region H and throughout the state. Changing circumstances can alter the preferred alternative for new water supplies very quickly. We are also concerned that limiting the options of water suppliers may make negotiations to obtain needed land or water (through contract, for instance) more difficult and drive up the cost of new water supplies.

The Region H Water Planning Group recommends that the TWDB and the TNRCC (now TCEQ) interpret existing legislation to give the maximum possible flexibility to water suppliers. Legislative and regulatory changes should be made to remove this requirement for specificity from the regional water planning guidelines and allow plans to present multiple sources of supply where appropriate.

Contract Expiration Policy

TWDB has interpreted its current regulations to require regional water planning groups to assume that contract water will not be made available after the expiration date of the current contracts. In reality, buyers and sellers of water virtually always renew their contract commitments. The existing TWDB policy therefore appears to create a worst case scenario in regard to the long-term availability of water for WUGs with contracts. Subsequently, this assumption causes an unrealistically enormous estimate of socioeconomic impacts. These impacts occur as a result of projected water shortages, which are based on the assumption that expiring contracts will not be renewed. For some municipalities, these expiring contracts represent the majority of their supply, and the projected impacts (loss of population, loss of industry, etc.) are severe. The magnitude of the socioeconomic impacts in Region H might cause a public official or the public in general to be unduly alarmed, when in fact sufficient water supplies are in existence to address near-term water needs.

The Region H Water Planning Group recommends that the TWDB change its policy to allow water planning groups to assume that current contracts will be extended beyond the current expiration date unless specific information suggests otherwise.

The TWDB has incorporated this assumption into the current round of planning, but still requires that contract expiration dates be recorded in the Planning Database, when available.

Notification Procedures for Regional Plan Amendments

The same notification requirements associated with adoption of a regional water plan should not be used upon amendment of a specific component of the plan. The RHWPG anticipates a number of plan amendments prior to review of the entire plan in approximately five years. These plan amendments will only affect certain aspects of the plan and certain communities and water suppliers. The current notification requirements for the entire plan are expensive.

The Region H Water Planning Group recommends adoption of a revised set of notification procedures for regional water plan amendments.

WAM Analysis Assumptions

The current TNRCC (now TCEQ) Water Availability Modeling (WAM) effort will produce a wealth of information that may assist in the development of future regional water plans. The current TNRCC rules regarding construction of the WAMs are based on a need for water rights permitting (strict prior appropriation doctrine) whereas the regional water planning efforts need WAMs based on a water supply planning basis. This distinction can create very different results.

The Region H Water Planning Group recommends adoption of WAMs predicated on planning based water models that represent current operations of regional water suppliers.

Regional Water Planning Area Definition

There may be a tendency to revise the current water planning regional boundaries. Planning region revision could potentially require large-scale re-analysis of the current plans. Additionally, it is anticipated that modifications to the plans would become more difficult to assess with an added burden of revising the existing regional definitions.

The Region H Water Planning Group recommends maintenance of the current boundary definitions of the sixteen regional water planning areas.

1.7.5 Legislative Recommendations from the 2001 Regional Plan

Permit Exemption from Cancellation for Nonuse

Existing Texas Water Law provides for the potential cancellation of a water right due to 10 years of nonuse of the permitted water supplies. Water rights associated with relatively large water supply projects may be developed many years in advance of the actual need. These projects and their associated water rights are a result of prudent planning and a financial commitment to develop such a project. Cancellation of water rights associated with such a project defeats the purpose of performing long-term planning and project development.

The Region H Water Planning Group supports modification of current Texas Water Law to exempt from cancellation certain water rights that have not been utilized for 10 years or more.

Senate Bill 2 of the 77th Legislature amended the Water Code to exempt certain water rights from cancellation, including reservoirs of 50,000 acre-feet or more and permits obtained to meet demonstrated long-term water supply or electric generation needs.

Permit Exemption of Water Rights of Project Sponsor

Existing Texas Water Law is indiscriminate in regards to potential cancellation proceedings. The sponsors of water supply projects that secure water rights resulting with development of water supplies developed by that project sponsor should be exempt from any potential cancellation proceedings. Water supply project sponsors invest a significant amount of time, energy and capital in the development of water supply projects. These investments should not be subject to forfeiture due to nonuse of the developed water supplies.

The Region H Water Planning Group supports adoption of new legislation to exempt from cancellation those water rights secured by the project sponsor of a water supply project.

Senate Bill 2 of the 77th Legislature amended the Water Code to exempt certain water rights from cancellation, including permits obtained as a result of the construction of a reservoir in whole or in part by the permit holder.

Interbasin Transfers

Senate Bill One states that water rights developed as a result of an interbasin transfer become junior to other water rights granted before the interbasin transfer permit. The effect of this change is to make obtaining a permit for interbasin transfer significantly more problematic

than it was under prior law and thus discourages the use of interbasin transfers for water supply. This is undesirable for several reasons:

Current supplies greatly exceed projected demands in some basins, and the supplies already developed in those basins can only be used via interbasin transfers (Trinity basin within Region H.)

Interbasin transfers have been used extensively in Texas and are an important part of the state's current water supply. For example, three of the five Region H Major Water Providers (City of Houston, Trinity River Authority and San Jacinto River Authority) maintain current permits for interbasin transfers collectively of over 1,000,000 acre-feet per year. Virtually all future water demands within the San Jacinto basin (Harris County in particular) of Region H must rely on interbasin transfers.

Emerging regional water supply plans for major metropolitan areas in Texas (Dallas-Fort Worth and San Antonio) rely on interbasin transfers as a key component of their plans. It is difficult to envision developing a water supply for these areas without significant new interbasin transfers.

The Region H Water Planning Group recommends that the legislature revise the current law on interbasin transfers and remove the unnecessary and counterproductive barriers to such transfers that now exist.

Rule of Capture

Groundwater is a vital resource within Region H. This is especially true within the rural counties of the region that are predominantly dependent on groundwater. Current groundwater law based on the Rule-of-Capture has facilitated orderly development of groundwater systems throughout the State of Texas and, barring the intrusion of private interests, could continue to serve the water usage interests throughout the state. It appears that the Rule-of-Capture could continue per the status quo to serve the groundwater interests within the region.

The Region H Water Planning Group 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.

Groundwater Conservation Districts

Region H communities, particularly those within the rural areas of the region, are dependent on groundwater supplies. Groundwater is a very valuable resource to this region. Region H contains counties, specifically Austin, Leon and Madison where some municipalities, water supply corporations and property owners believe groundwater conservation districts (GCD) are needed to retain long-term groundwater supplies within their respective counties. Region H also has several counties, including Brazoria, Waller and Montgomery, where groundwater supplies will, in theory, reach their maximum sustainable yield due solely to projected in-county water usage rates. A GCD is a potential vehicle for these counties to manage and protect groundwater supplies from over-development within each respective county. The

potential of losing these supplies to outside interests before the county of origin can maximize the use of these supplies would create a burden on local water users.

The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.

Senate Bill 2 of the 77th Legislature authorized the formation of four new GCDs in Region H (Bluebonnet, Brazoria County, Lone Star and Mid-East Texas).

Ongoing RWPG Activities

It is apparent that the RWPGs will have to meet periodically to address changed conditions related to the adopted regional water management plans. Ongoing activities will include, but not be limited to:

Consideration of additions and modifications to the adopted plans

Serving as communications liaisons with the water user communities within each region

Assisting in the reconciliation of inter-regional water issues

It will be necessary to consider additional funding to support maintenance of the RWPGs. Also, the administrative provisions of Senate Bill One and the subsequent policies that have been enacted should be reviewed to determine if the appropriate organizational structure exists to accomplish the work of the RWPGs. Additional funding should be developed to support technical studies necessary to support the needs of the RWPGs.

The Region H RWPG recommends that the TWDB request additional funding and adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs.

The current round of Regional Water Planning is funded by the TWDB, with no requirement for local funding participation.

Texas Bays and Estuaries Program Funding

The RHWPG has adopted specific language associated with establishment of freshwater inflows to maintain the health and productivity of the bay. Galveston Bay is an important economic and recreational resource for our region. Current levels of funding within the State of Texas Bay & Estuary program are insufficient to continue the needed monitoring, study and development of management strategies for the bay.

The Region H Water Planning Group recommends establishment of additional funding to pursue necessary future efforts of the Galveston Bay & Estuary program.

Water Supply Project Financing Mechanism

The Region H Regional Water Plan includes development of several surface water reservoirs and other supply projects. The capital cost to develop these projects is significantly higher

than the historic cost of water supply projects. The projected costs are such as to dissuade local communities from making a financial commitment to support future projects. These financing issues will delay the implementation of needed projects.

To address this situation, the Region H Water Planning Group supports establishment of financing methods by the State of Texas to capitalize a fund to support development of water supply projects recommended within adopted regional water management plans.

Following completion of the 2001 Regional Plans, the Regions conducted an Infrastructure Financing Survey among their WUGs with projected infrastructure needs, and reported those results to the Legislature. This is now a required task within the cyclic regional water planning process.

Unique Stream Segments and Reservoirs

While the RHWPG adopted both unique stream segment and reservoirs, there appears to be some confusion on the definition and legislative intent of the designations for each of these elements. It is clear that conflicts may be created for stream segments that might be used for both water supply conveyance and recreational purposes. To assist in the adoption of future unique stream segments and/or unique reservoir sites the RHWPG requests additional legislative clarification.

The Region H Water Planning Group supports clarification and definition of the legislative intent of the unique stream segments and of the unique reservoir sites.

Senate Bill 2 of the 77th Legislature amended the Water Code to restrict political subdivisions from taking certain actions within unique stream segments and unique reservoir sites.

Groundwater Availability Modeling Funding

Many areas of Region H are totally dependent on groundwater to support the long-term viability of these areas. The current Groundwater Availability Modeling effort is supported since it is the most comprehensive groundwater assessment and analysis effort of the previous 20 years. The current GAMs effort, however, is omitting minor aquifers and other groundwater considerations that are vital for certain local communities.

The Region H Water Planning Group supports continued funding for the GAMs effort, and recommends comprehensive analysis of all groundwater resources within the state.

The TWDB, in conjunction with the USGS, is continuing the GAM process.

Agricultural and Irrigation Conservation Funding

The Region H water management plan includes a number of irrigation conservation based water management strategies. It is apparent that adoption of irrigation conservation practices may benefit the irrigation and agricultural industry in addition to local communities that may take advantage of water supply savings resulting from irrigation conservation. Additionally,

the RHWPG supports further research and development of water-efficient and drought-resistant crop and species.

The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.

Desalination

The RHWPG considered desalination of brackish groundwater as a potential water source, but did not include it in the final plan because this strategy was more costly than other strategies. However, the RHWPG recognizes that the cost of desalination technology is decreasing, and that this strategy may merit consideration in future plans. It would be helpful and appropriate for the state to establish a program promoting desalination research and development. Such a program might offer financial assistance or incentives for project implementation.

The Region H Water Planning Group recommends that a research and development program for desalination be established in Texas, and that it include financial assistance and/or incentives for desalination project implementation.

Governor Perry is currently sponsoring a seawater desalination initiative, to study seawater desalination along the Texas Coast as a future source of supply.

Water Conservation

The RHWPG strongly supports water conservation at all levels, and has incorporated it in the regional water plan as a management strategy. However, realizing advanced conservation savings in municipal county-other areas may be difficult, as these practices require some management, funding and oversight. While the RHWPG does not advocate a one-size-fits-all conservation program for the State of Texas, they recommend that the legislature address water conservation and provide some guidance and ability for county and local governments to implement these programs.

The Region H Water Planning Group supports water conservation and recommends that the legislature address and improve water conservation activities in the state.

78th Legislature appointed a Water Conservation Task Force to study water conservation policies and best management practices, and to report their results to the 79th Legislature in 2005.

1.8 Recommendations Made in the 2002 State Water Plan

Water for Texas 2002, the updated State Water Plan, consolidated the plans and recommendations regions. As noted above, many of the legislative recommendations proposed by the Regional Water Planning Groups received some attention during the subsequent legislative sessions. Specific actions that affected Region H included:

- Completion of the Water Availability Modeling program, which is now the basis of surface water planning.

- Initiation of the Groundwater Availability Modeling program, which is on-going and will become the basis for groundwater planning
- Two of the three reservoir sites recommended as unique by Region H (Bedias and Little River) were recommended to the legislature as unique. The third site, Allens Creek, was previously designated as unique by the legislature. The legislature has not acted on these reservoir sites.
- All six of the stream segments recommended by Region H as unique were recommended to the legislature as unique. The legislature has not acted on this recommendation.