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Abbreviations used in the Report

Ac-ft/yr	Acre-feet per year
BRA	Brazos River Authority
CLCND	Chambers-Liberty Counties Navigation District
COH	City of Houston
GBEP	Galveston Bay Estuary Program
GBF	Galveston Bay Foundation
GBFIG	Galveston Bay Freshwater Inflows Group
GCWA	Gulf Coast Water Authority
MGD	Million gallons per day
MWP	Major Water Provider
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
TNRCC	Texas Natural Resource Conservation Commission
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TWDB	Texas Water Development Board
WUG	Water User Group

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. Region H Water Management Plan: Description of Region

1.1. Regional Water Planning in Texas

The 1997 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) to guide the development of each region's plan. The TWDB will combine these 16 regional plans to form the next State Water Plan.

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 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 lists the RHWPG membership.

Figure 1: Region H Water Planning Area

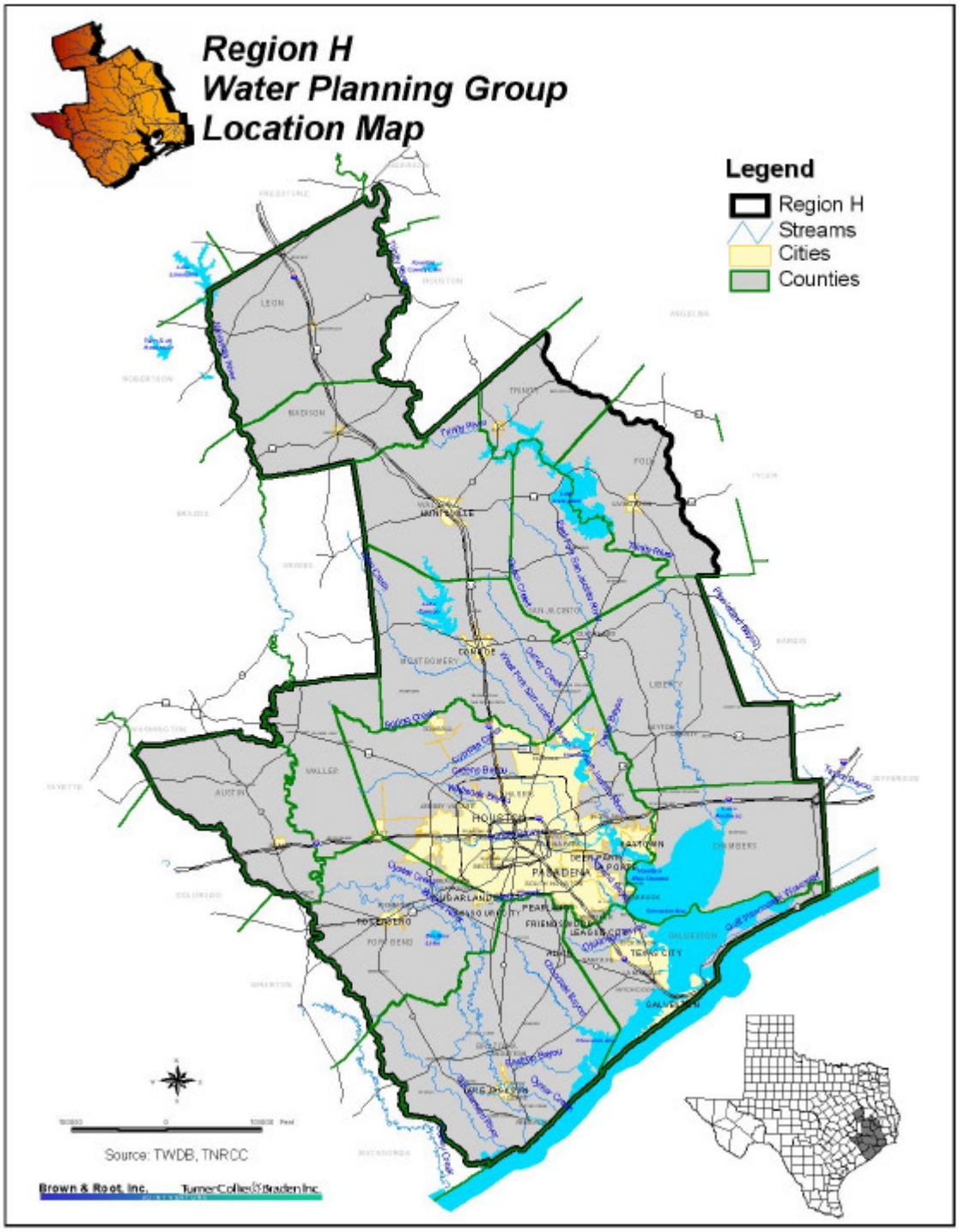


Table 1: Member Information for the Region H Water Planning Group

Executive Committee	
Office	**Officer**
Chair	Jim Adams, P.E. San Jacinto River Authority P.O. Box 329 Conroe, TX 77305-0329 Phone: (936) 588-1111 Fax: (936) 588-3043
Vice-Chair	Judge Mark Evans
Secretary	Ron Neighbors
At-Large	Michael Sullivan
At-Large	C. Harold Wallace
Offices	
Office	**Entity**
Administrative	Harris-Galveston Coastal Subsidence District
Political Subdivision	San Jacinto River Authority P.O. Box 329 Conroe, TX 77305-0329
Note: Administrative Office manages records. Political Subdivision is the entity eligible to apply for State grant funds.	

Table 1 (continued)

Voting Membership			
Interest	**Name** **Dates Served**	**Entity**	**County (Location of Interest)**
Public	Roosevelt Alexander March 1998 - Present	Retired	Waller
Counties	Judge Mark Evans March 1998-Present	Trinity County	Trinity
	Commissioner Jack Harris March 1998 - Present	Brazoria County Commissioners Court	Brazoria
	Gary Stobb, P.E. June 2000 - Present	Harris County	Harris
	Judge Robert Eckels March 1998 - June 2000	Harris County	Harris
Municipalities	Larry Taylor December 2000 - Present	City of Friendswood	Galveston
	Tom Manison March 1998 - Sept. 2000	City of Friendswood	Galveston
	Gary Oradat, P.E. November 1999 - Present	City of Houston	Harris, Ft Bend & Montgomery
	Fred A. Perrenot, P.E. April 1998 - Nov. 1999	City of Houston	Harris, Ft Bend & Montgomery
Industries	James Murray March 1998 - Present	Exxon-Mobil	Harris
	Carolyn Johnson March 1998 - Present	Dow Chemical	Brazoria

Table 1 (continued)

Voting Membership (Continued)			
Interest	**Name** **Dates Served**	**Entity**	**County (Location of Interest)**
Agricultural	Robert Bruner March 1998 - Present	Rancher	Walker
	David Jenkins July 1998 - Present	Rice Farmer	Chambers
Environmental	John Bartos March 1998 - Present	Galveston Bay Foundation	Harris
Small Businesses	Steve Tyler March 1998 - Present	Steve Tyler Creative Services	Trinity
	Mary Alice Gonzalez March 1998 - Present	Stewart Title - Fort Bend Div.	Fort Bend
	Michael Sullivan March 1998 - Present	Sea-Master Marine Coatings, Inc.	Harris
Electric Generating Utilities	Kerry Whelan April 1999 - Present	Reliant Energy	Harris
	Cynthia Schmidt March 1998 - April 1999	Houston Lighting & Power	Harris
River Authorities	Jim Adams, P.E. March 1998 - Present	San Jacinto River Authority	Montgomery (service in central part of Region H)
	Tom Ray March 1998 - Present	Brazos River Authority	McLennan (service in west and southwest part of Region H)
	Danny F. Vance March 1998 - Present	Trinity River Authority	Tarrant (service in east and southeast part of Region H)

Table 1 (Continued)

Voting Membership (Continued)			
Interest	**Name Dates Served**	**Entity**	**County (Location of Interest)**
Water Districts	J.C. Searcy, Jr. March 1998 - Present	Spirit of North Harris County Coalition	Harris
	Marvin Marcell July 1998 - Present	Fort Bend Subsidence District	Fort Bend
	Ron Neighbors March 1998 - Present	Harris-Galveston Coastal Subsidence District	Harris and Galveston
Water Utilities	James Morrison March 1998 - Present	Walker County WSC	Walker
	William Teer March 1998 - Present	Retired	Leon
	C. Harold Wallace March 1998 - Present	West Harris County Surface WSC	Harris

Table 1 (continued)

Non-Voting Members	
Name **Dates Served**	**Entity**
David Alders July 1998 - Present	East Texas RWPG (I)
Sterling Cornelius January 1999 - Dec. 2000	Texas Association of Nurserymen
Rick Gangluff July 1998 - Present	Lower Colorado RWPG (K)
Lacy Fryer April 1999 - Present	Texas Department of Agriculture
Tommy Hebert July 1998 - Present	Representative for extra-regional holder of 1,000+ acre-feet of water rights.
Larry Jacobs July 1998 - Present	Montgomery County Soil and Water Conservation District
Tony Jones July 1998 - Present	Brazos G RWPG
Phil Kaiser December 2000 - Present	Just Trees
Gordon Myers July 1998 - Present	Gulf Coast Water Authority
Ernest Rebuck March 1998 - Present	Texas Water Development Board
Danny Vance July 1998 - Present	Region C RWPG (also a voting member)
Woody Woodrow July 1998 - Present	Texas Parks and Wildlife Department

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 ten counties in the central and eastern part of the planning area, Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, 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 Natural Resource Conservation Commission (TNRCC), and Texas Department of Parks and Wildlife (TPWD). Points of contact for these state agencies are listed in Table 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. Two groundwater management districts in Region H, the Fort Bend Subsidence District and the Harris-Galveston Coastal Subsidence District, have the authority to regulate groundwater withdrawals.

During the planning period, two new regional water planning entities were formed: the North Harris County Regional Water Authority and the Mid-Brazoria County Regional Water Planning Group. Also during the planning period, Austin, Leon and Madison Counties took the initial steps towards establishing groundwater conservation districts.

Table 2: State Agencies with Oversight of Water Planning

Texas Water Development Board

William Mullican,
Director, Water Resource Planning
PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231
(512) 936-0813

Ernest Rebuck, P.E.
Assistant Director, Water Resources Planning
PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231
(512) 936-2317

Texas Natural Resource Conservation Commission

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

Texas Parks and Wildlife Department

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

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. That year the Port of Houston handled 184.9 million tons, to make it the second busiest port in the nation. In 1995 the Houston area employed 1.75 million people or 22 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 TWDB estimates the total 1996 estimated population for Region H is approximately 4,328,800. Approximately 69% (2,995,500) 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 3 lists the cities with over 25,000 persons and their 1996 estimated 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 3: Cities with Populations Over 25,000

City	1996 Population Estimate	1996 Reported Municipal Use (acre-feet/year)
Baytown	69,010	10,200
Conroe	39,837	6,124
Deer Park	30,055	4,077
Friendswood	30,583	4,012
Galveston	63,857	15,165
Houston	1,709,476	355,064
Huntsville	34,594	4,683
La Porte	31,284	3,739
Lake Jackson	24,829	3,564
League City	41,331	5,032
Missouri City	50,719	8,276
Pasadena	130,168	18,930
Pearland	25,291	3,836
Rosenberg	26,741	3,070
Sugar Land	44,009	6,516
Texas City	41,475	6,979

Source: Texas Water Development Board

The 1996 estimated total county populations and water use are listed in Table 4. Detailed information on local, county and regional population estimates and projections for the 50-year planning period are included in the Task 2 Report of this plan. In 1996 municipal uses accounted for 41 percent of the region's total reported water use. In addition to municipal water use, 1996 estimates of other water use types were prepared by the TWDB for use in the planning process.

Table 4: Estimated County Population and Municipal Water Demand

County	1996 Population Estimate	1996 Reported Municipal Use (acre-feet/year)
Austin	22,222	3,384
Brazoria	217,318	31,487
Chambers	24,165	3,735
Fort Bend	272,245	46,075
Galveston	239,292	40,614
Harris	3,087,153	586,993
Leon	13,446	1,794
Liberty	62,843	8,942
Madison	12,139	2,270
Montgomery	236,192	38,430
Polk*	27,921	4,254
San Jacinto	18,076	2,297
Trinity*	8,293	1,059
Walker	55,879	10,657
Waller	26,573	4,697
Region H Total	4,323,757	786,688

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

Manufacturing uses accounted for 34 percent and irrigation uses represented 19 percent of the region's total 1996 reported use. Figure 2 illustrates the distribution of 1996 water demand by use type. Total water demand for each county are listed in Table 5.

Figure 2: Percentage of 1996 Total Water Demand by Use

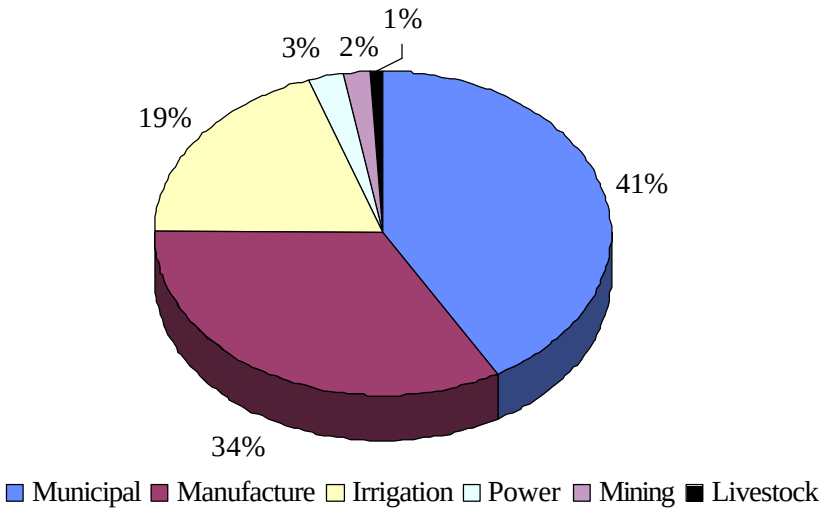


Table 5: Reported 1996 Non-municipal Water Use

County	Manu	Irrigation	Mining	Power	Livestock	Total
Austin	172	9,627	58	0	1,925	11,782
Brazoria	202,846	76,285	1,494	0	1,836	282,461
Chambers	5,393	122,752	19,490	767	448	148,850
Fort Bend	14,108	48,609	205	31,527	807	95,256
Galveston	50,705	10,342	521	1,287	198	63,053
Harris	362,849	15,300	2,470	13,223	923	394,765
Leon	290	0	2,789	0	1,768	4,847
Liberty	267	61,503	8,748	0	467	70,985
Madison	194	19	23	0	1,777	2,013
Montgomery	1,375	0	341	4,986	397	7,099
Polk*	4	0	24	0	220	248
San Jacinto	26	1	36	0	295	358
Trinity*	0	0	8	0	225	233
Walker	258	11	12	0	624	905
Waller	74	23,396	1,031	0	1,787	26,288
Region H Totals	638,561	367,845	37,250	51,790	13,697	1,109,143

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

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 1996 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 Tables 2 and 3. The next highest demands are Brazoria, Chambers, Fort Bend and Galveston counties. Harris County and the City of Houston dominate municipal water use in Region H. The City of Houston used 355,064 acre-feet or 45 percent of the total regional municipal use. As shown in Table 6, Brazoria, Fort Bend, Galveston and Montgomery Counties are major demand centers with 1996 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 1996) include the cities of Pasadena, Galveston and Baytown, although their combined demands are less than one-tenth that of the City of Houston.

Table 6: Major Municipal Demand Centers

County/City	1996 Municipal Use (acre-feet)
City of Houston	355,064
Harris County (excluding Houston)	238,669
Fort Bend	46,075
Galveston	40,614
Montgomery	38,430
Brazoria	31,487
City of Pasadena	18,930
City of Galveston	15,165
City of Baytown	10,200

Source: Texas Water Development Board

The largest manufacturing demand center is Harris County, which used 362,849 acre-feet of water in 1996 (57 percent of the regional total). Two other major demand centers are identified; Brazoria County, with reported 1996 manufacturing use of 202,846 acre-feet, and Galveston County with a reported 1996 manufacturing use of almost 51,000 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 7.

Table 7: Major Manufacturing Demand Centers

County	1996 Manufacturing Use (acre-feet)
Brazoria	202,846
Galveston	50,705
Harris	362,849

Source: Texas Water Development Board

The four largest irrigation demand centers are Chambers, Brazoria, Liberty and Fort Bend counties. Table 8 defines each county's reported 1996 irrigation use. The major irrigated crops in the region are rice, soybeans, vegetables and cotton.

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.

Table 8: Major Irrigation Demand Centers

County	1996 Irrigation Use (acre-feet)
Chambers	122,752
Brazoria	76,285
Liberty	61,503
Fort Bend	48,609

Source: Texas Water Development Board

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.

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 3 and Figure 4 illustrate these groundwater sources. Groundwater use is regulated in Harris and Galveston counties due to the potential for aquifer over-drafting, and regulations are pending for Fort Bend County. The groundwater resources of Montgomery County are being developed relatively rapidly due to urbanization and future pumpage could reach the aquifers sustainable yield. Gulf Coast Aquifer supplies within the remaining Region H counties appear to be limited. Groundwater withdrawals in 1996 accounted for approximately 34 percent of the total regional water supply.

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. The following discussion of each basin's surface water supply is based upon information in the Trans-Texas Water Program *SE Area Phase I*

Figure 3: Region H Major Groundwater Sources

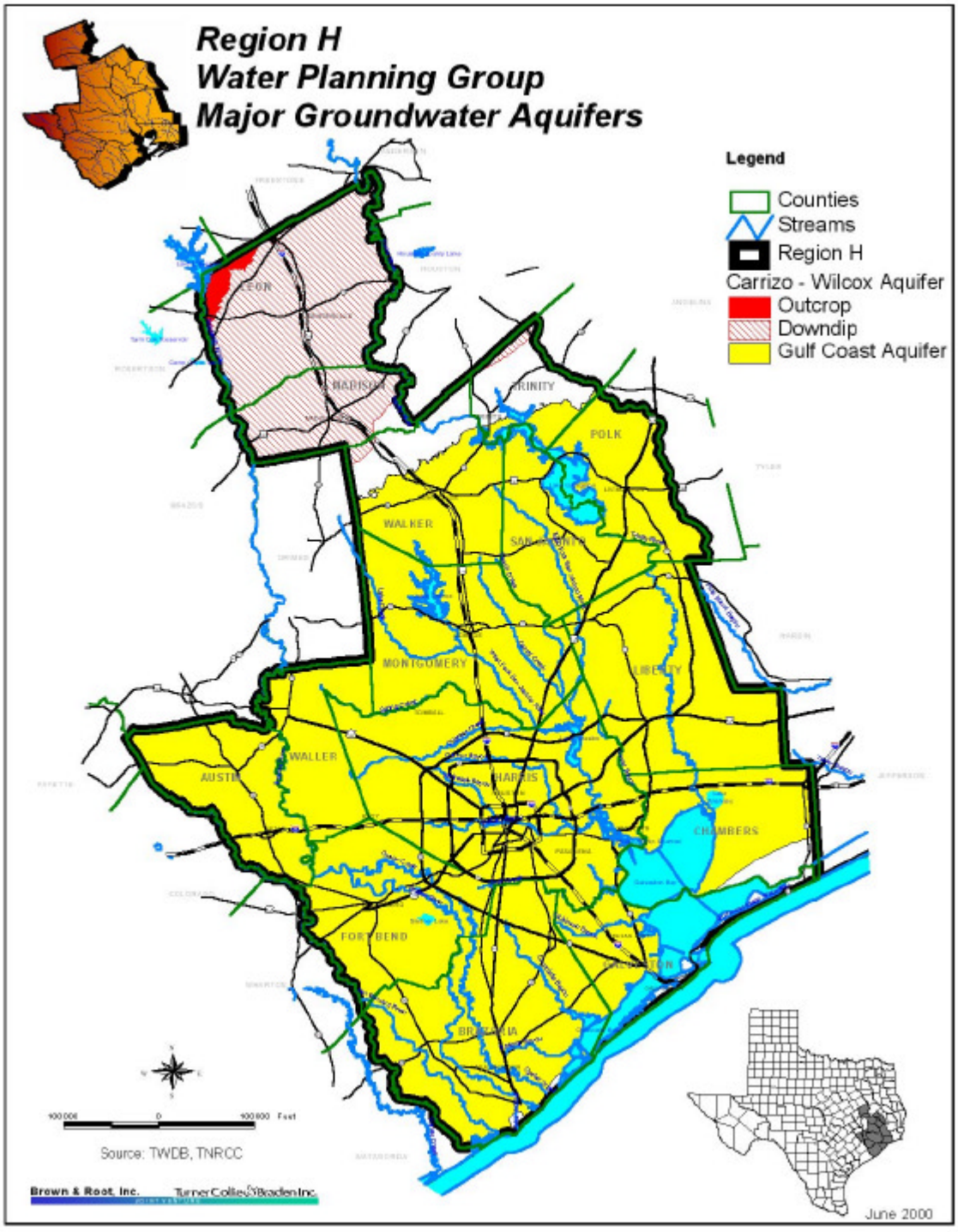


Figure 4: Region H Minor Groundwater Sources

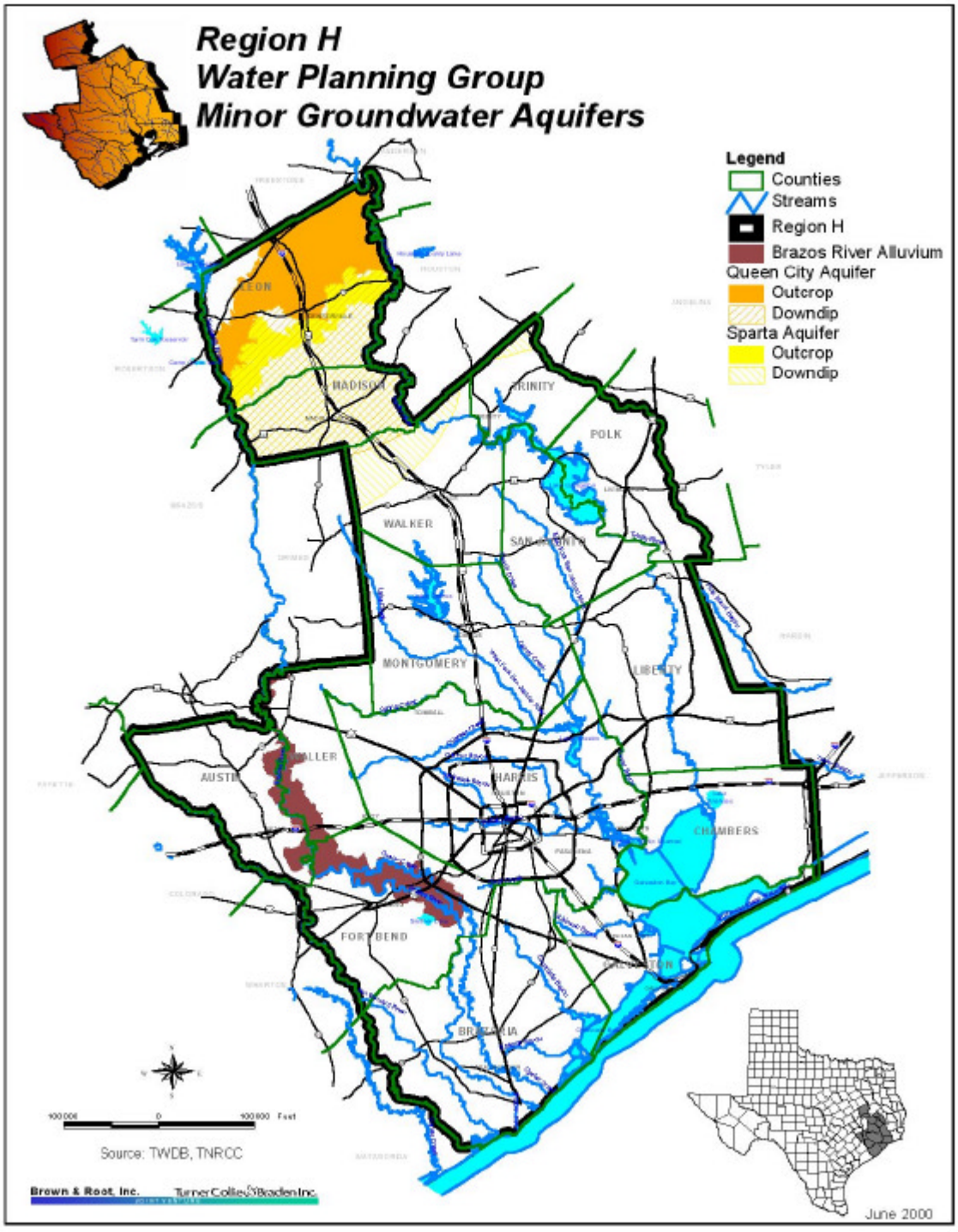
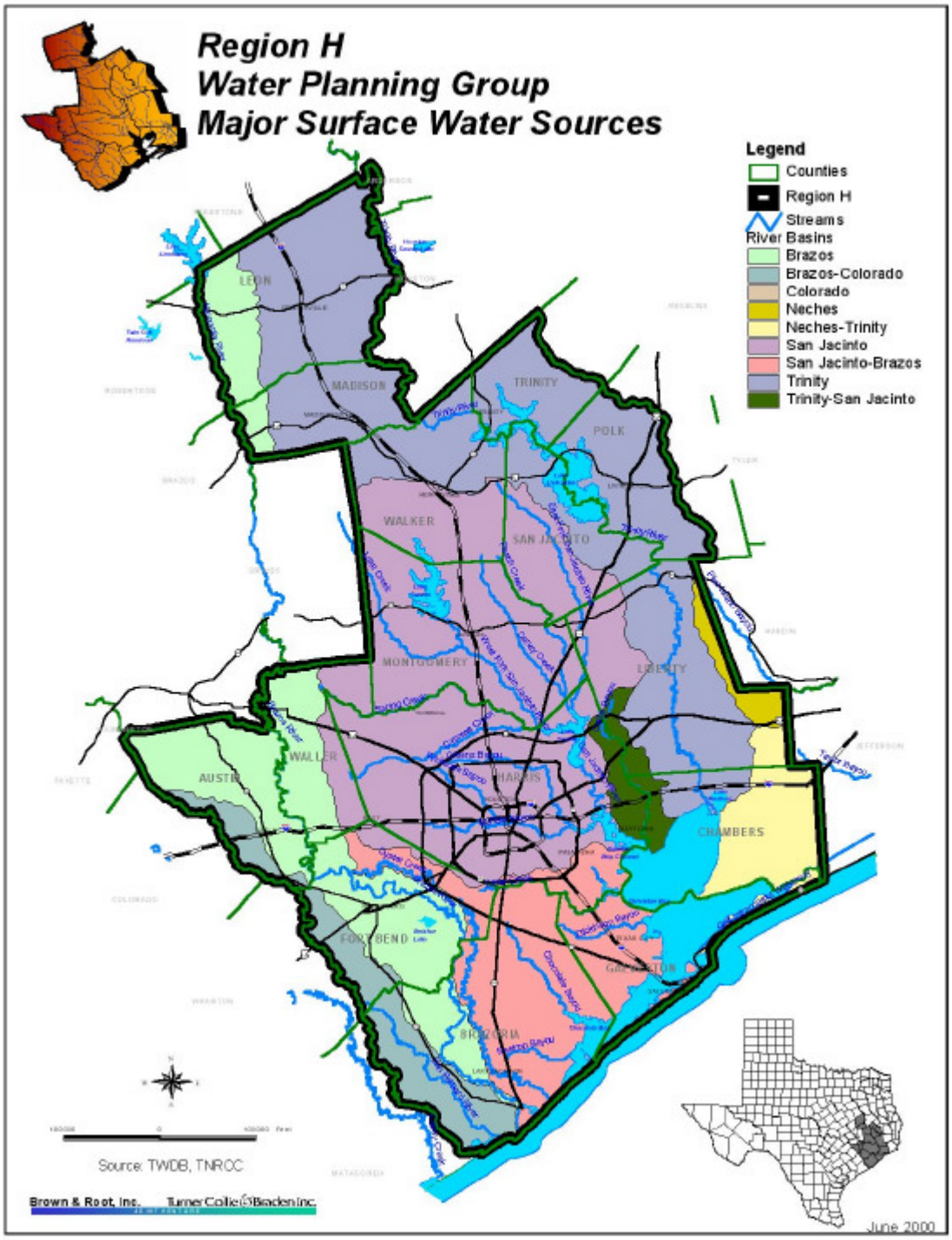


Figure 5: Region H Surface Water Sources



Report (1994) and *Planning Information Update* (1996), and *Water for Texas* (1997). Figure 5 illustrates the region's surface water sources. A selected bibliography of related references is included at Appendix A.

Trinity River Basin

The Trinity River basin contains two water projects, 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 run-of-the-river water supplies downstream of Lake Livingston total 180,320 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. Lewis Creek Reservoir has a permitted yield of 6,300 acre-feet per year and provides supply for hydroelectric power generation.

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 over 600,000 acre-feet per year. Over 450,000 acre-feet per year is committed under contracts to various entities upstream of Region H with approximately 137,300 acre-feet per year used in the Region H area. Lower-Brazos River Basin run-of-river permits in excess of 454,600 acre-feet per year have been granted. Previous studies suggest that only 211,000 acre-feet per year of run-of-river supplies may be 100 percent reliable.

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. These users include the Chocolate Bayou Water Company (80,000 acre-feet per year), Dow Chemical (280,000 acre-feet per year), and the Richmond Irrigation/Houston Lighting & Power (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.

Use by Source

TWDB reports that Region H used 1,859,831 acre-feet of water in 1996. Of that, 653,227 acre-feet (35.1%) came from groundwater wells, and 1,242,604 acre-feet (64.9%) came from rivers and other surface sources. Industrial water users (principally chemical industry users) in the region used an additional 1,069,171 acre-feet of saline

(sea) water and the petroleum industry reported the reuse of a total of 3,164 acre-feet of treated effluent. Table 7 lists the estimated year 2050 dependable yields available from existing and under construction reservoirs in the various basins of Region H. Table 8 summarizes these data and Figure 6 illustrates the groundwater - surface water usage for each water use type

Table 9: Projected 2050 Surface Reservoir Yields Available for Use in Region H[1]

Basin/Reservoir/Run-of-River	Projected 2050 Yield (acre-feet/year)
Trinity Basin	
Lake Livingston/Wallisville	1,345,200
Run-of-River	180,320
San Jacinto River Basin	
Lake Houston	151,400
Lake Conroe	99,950
Other Reservoirs	6,300
Run-of-River	55,000
Brazos River Basin	
Brazos River Authority System[2]	137,300
Run-of-River	211,000 - 454,600
Total Existing Surface Reservoir Yield Available in the Region H Area	2,186,470 - 2,430,070

[1] Adapted from Trans-Texas Water Program Southeast Area *Phase I Report,* Table 3.3, 1994, *Planning Information Update*, Table 9, 1996, and *Water for Texas*, 1997.

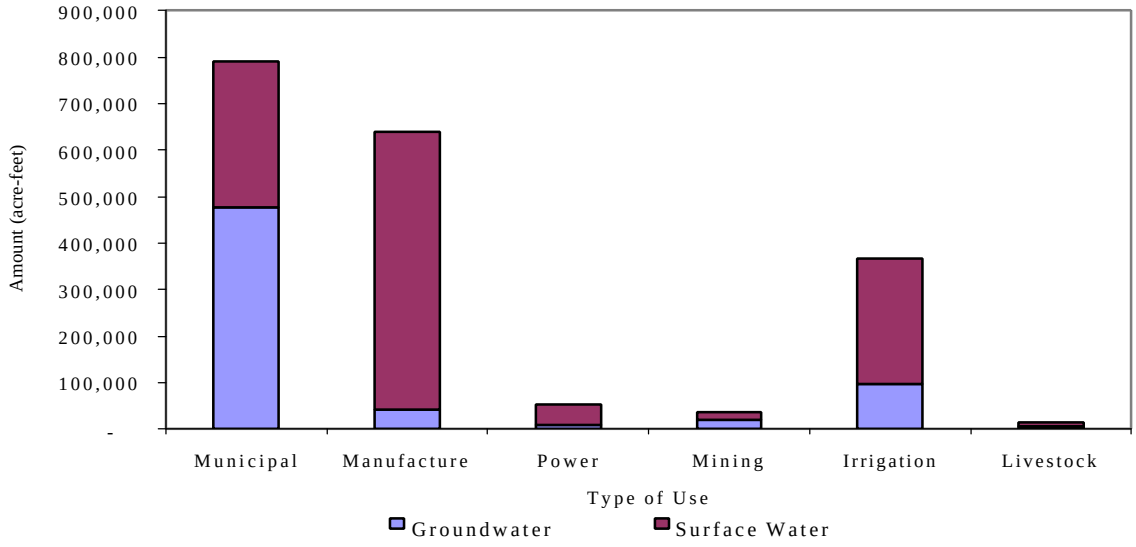
[2] Based upon long-term contract amounts.

Table 10: 1996 County Water Use by Source

County	Ground Water (acre-feet)	Surface Water (acre-feet)	Total Use (acre-feet)
Austin	13,500	1,666	15,166
Brazoria	34,623	279,325	313,948
Chambers	10,812	141,773	152,585
Fort Bend	89,802	54,529	141,331
Galveston	3,670	99,997	103,667
Harris	386,433	595,325	981,758
Leon	4,207	2,434	6,641
Liberty	25,354	54,573	79,927
Madison	4,060	223	4,283
Montgomery	41,683	3,846	45,529
Polk	2,801	1,701	4,502
San Jacinto	2,299	356	2,655
Trinity	611	681	1,292
Walker	7,175	4,387	11,562
Waller	29,197	1,788	30,985
Totals	653,227	1,242,604	1,895,831

Source: TWDB Annual Survey of Ground and Surface Water Use

Figure 6: Water Use by Source



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.[3] 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 primarily for irrigation. Additionally, portions of these supplies are not 100 percent reliable. These entities are listed in Table 11 along with other substantial water rights holders.

Table 11: Major Region H Municipal and Industrial Water Rights

Provider	Permitted Amount (acre-feet/year)
City of Houston	1,258,829
Gulf Coast Water Authority	236,932
Trinity River Authority *	403,200
Chocolate Bayou Water Co.	212,500
San Jacinto River Authority	146,421
Brazos River Authority *	137,300
Brazosport Water Authority	45,000
Chamber-Liberty County Navigation Dist.	103,146

* Portion available within Region H only

Source: TNRCC Master Water Rights

[3] TWDB Guidelines on the Definition of Major Water Providers. 1999.

A total of 2,319 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 735 municipal providers serving 500 or more customers in 1996, 5 municipal water providers reported the use of 51 percent of the total municipal supply with the City of Houston being the largest public water system provider, the largest rights holder in the region and the largest retail provider. Table 12 lists public water systems with over 10,000 connections or wholesalers that sold over 10,000 acre-feet of water in 1996. Note that many of these entities either hold significant rights or purchase their water supplies from one or more of the major rights holders identified in Table 9. 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 13, generally do not act as providers to other industrial customers.

Table 12: Other Large Wholesale and Retail Providers

System Name	Retail Connections	Retail Population	Annual Use (acre-feet/year)
City of Houston -Public Works	527,424	1,608,000	319,387
City of Pasadena	32,753	114,000	22,937
Houston - Greenspoint	24,009	76,323	10,418
Clear Lake City Water Auth.	23,138	69,414	8,838
City of Galveston	20,423	31,149	16,217
City of Baytown	18,000	70,000	10,686
City of Houston - UD #5	15,315	45,951	7,150
City of Conroe	13,205	32,000	7,449
City of Texas City	12,800	38,400	6,804
City of Huntsville	12,350	34,592	5,653
City of League City	12,000	36,000	4,234
City of Sugarland - annexed area	10,603	29,370	6,463
City of Friendswood	10,025	30,075	2,885
Soda Water Supply Corp.	471	1413	25,577
Pine Shadows Water System	160	480	12,336
Baytown Area Water Auth.	8	25	11,200
Gulf Coast Water Auth.-Webster	2	N/A	19,983
Gulf Coast Water Auth -Tx City	1	95000	18,709

Table 13: Large Industrial Water Rights Holders

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

1.5. Water Quality and Natural Resources

Water Quality

TNRCC published *The State of Texas Water Quality Inventory* in 1996 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. 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.

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.

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 14, and a location map is provided at Figure 7.

Table 14: Public Lands

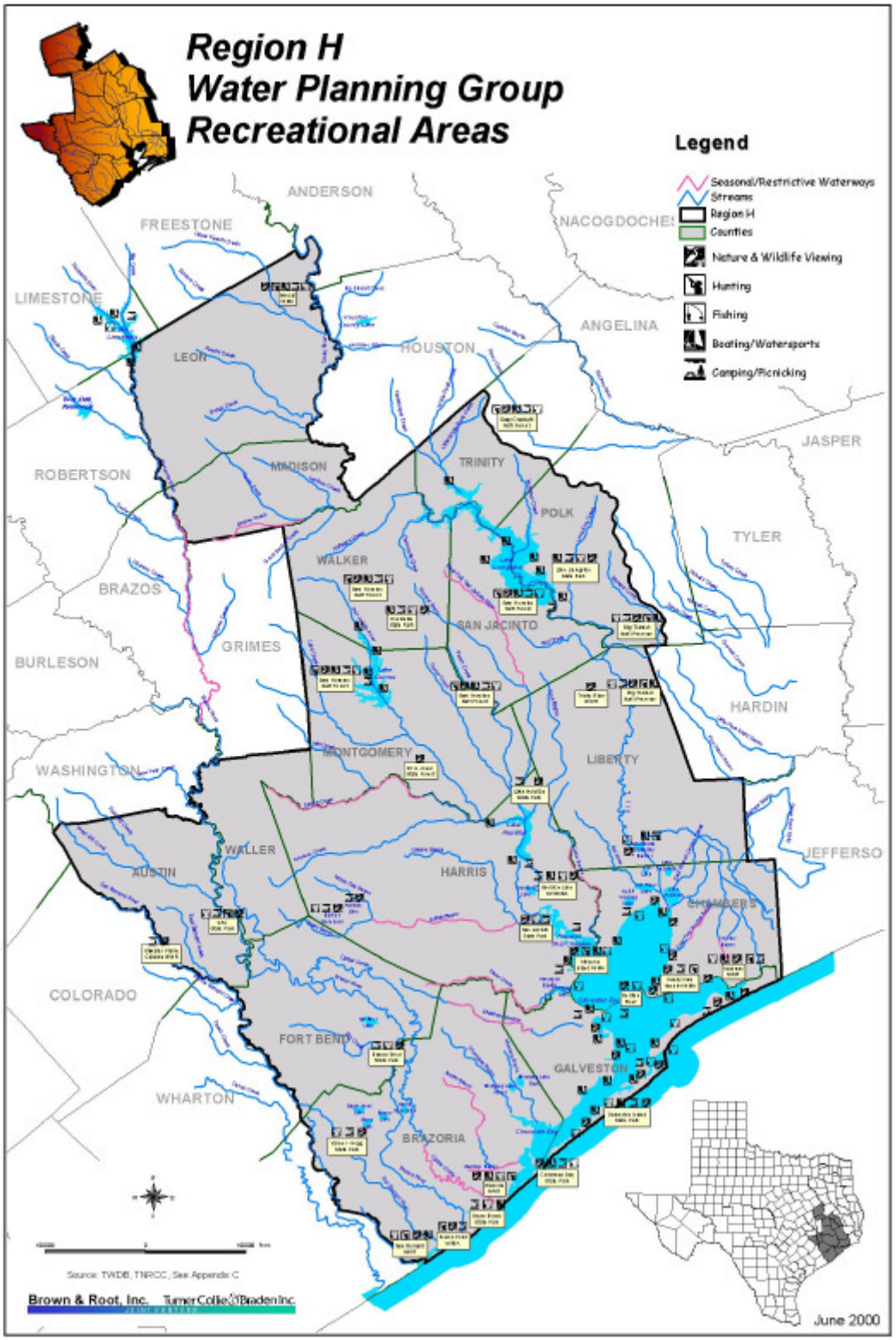
Resource Area	Acreage	County
State and National Forests		
W. Goodrich Jones State Forest	1,725	Montgomery
Davey Crockett National Forest	162,012	Total
	67,329	Trinity
Sam Houston National Forest	161,657	Total
	47,777	Montgomery
	60,247	San Jacinto
	53,633	Walker
Big Thicket National Preserve	86,000	Total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

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 Coast 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.

Figure 7: Public Lands within Region H



1.6. Existing Water Planning

Existing Regional and Local Water Management Plans

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 River Authority 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 and Fort Bend Subsidence Districts developed Groundwater Management Plans to address subsidence through reduced groundwater extraction within their respective regulatory areas. The Harris-Galveston Coastal Subsidence District also adopted a revised regulatory plan in 1999.

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

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 Region H area there are 97 wholesale water providers, 44 public water systems and 42 irrigators who must submit water conservation and drought contingency plans by September 1, 1999. Smaller providers (fewer than 3,300 connections) must submit plans to the TNRCC by September 1, 2000. As of October 1, 2000, forty water conservation plans and 464 drought contingency plans had been submitted from Region H. These plans are further discussed in the Task 5 report.

Recommendations included within the 1997 State Water Plan

In the 1997 State Water Plan, *Water for Texas*, the State noted specific conditions and recommended specific opportunities in the Region H area. These included:

- The conversion to surface water required by subsidence regulatory plans will require the construction of additional surface water conveyances and treatment facilities.
- The development of Allens Creek Reservoir for near-term supply within the Brazos River Basin to meet the needs of Fort Bend and Brazoria Counties.
- The reallocation of hydropower storage in Lake Whitney as water supply storage to provide almost 125,000 acre-feet of supply for Regions G and H.
- The importation of additional surface water supply from the Sabine and Trinity River Basins to meet demands in the San Jacinto basin.
- The development of wastewater reuse projects to expand existing supplies in the San Jacinto basin.

1.7. Issues for Region H

At the beginning of the Region H planning process a series of public meetings explored issues of concern to the citizens, businesses and governmental entities in the region. Surveys distributed at these meetings and through Region H WPG members questioned respondents about their perspective on water resources issues; local and regional water supply, or a particular concern about water, such as agriculture, recreation, or the environment. Twenty survey responses were received. Comments from the meetings and the survey results indicate several general areas of concern: technical issues relating to water supply and water quality, procedural issues, and specific use issues. These are discussed briefly below. A copy of the survey is included in Appendix B.

Technical Issues

- *Subsidence, the conversion from ground to surface water and conjunctive use of ground- and surface water in the counties affected by subsidence*. The Harris-Galveston Coastal and the Fort Bend Subsidence Districts have established goals of reducing groundwater use. Some conversion to surface water sources will be necessary and this will require the development of alternative supply sources for communities currently dependent upon groundwater as well as water conveyance and treatment systems.

- *Interbasin transfer of surface water from one basin to another*. Equity issues associated with these transfers, return flows, the environmental impacts of transfers and the coordination within the region and between Region H and other regions are issues of concern among respondents.

- *Multiple uses of water supply reservoirs*. The reservoirs in Region H were designed to provide water supply. They also serve as recreation sites for much of the region providing opportunities for boating, fishing and other water based uses. Conflicts may occur between these uses and operating the reservoir for water supply, especially during low flow conditions where the lowering of the reservoir pool can impact recreational uses.

- *The water quality of drinking water sources (both ground and surface water) and of streams is an area of concern throughout the region*. Several river and stream segments have been identified as having water quality problems. There is public concern over the effects of the quality of return flows from upstream users to water sources.

- *The increased reuse of wastewater in the upstream area of the region's basins.* There is concern that increased reuse of wastewater in the upper Trinity basin will decrease return flows to the streams that supply downstream reservoirs and other uses.

- *Irrigation water demand projections may be inadequate for continued rice production*. Existing TWDB projections assume constant acreage of most crops, and

a decline in rice farming. Adequate water supply cannot be allocated for agricultural demands without better projections.

Procedural Issues

- *The representation of rural counties east of the Trinity River and smaller interests in the planning process*. The TWDB selected the members of an Initial Coordinating Body for Region H, and that Initial Coordinating Body formed the Region H Water Planning Group. The Region H WPG has the authority to add members, as it believes appropriate. Several rural counties and some user groups believe their interests are under-represented on the RWPG and may be overshadowed by those of the metropolitan area.

- *The selection of water management alternatives*. The planning process defined by the state includes a public process for evaluation and selection of the water management alternatives to be incorporated in the final plan. These alternatives specify the way each community/entity with a defined water shortage will secure the needed water supply. There are questions about the method by which these alternatives will be developed, evaluated and selected.

- *Impacts of regional water planning*. There is concern about the effect regional water planning will have on local actions and local water management decisions.

Environmental Issues

- *Freshwater inflows into Galveston Bay.* The Galveston Bay Estuary is a significant natural resource for the Region, providing both fishing and recreational incomes. With the increased demand for surface water supply there are concerns about protecting the quantity, quality and timing of inflows to Galveston Bay.

- *Instream flows for rivers and streams*. Adequate quantities of instream flows are necessary for the environmental health of the river systems and adjacent lands. There are concerns that increased demand for surface water will reduce instream flows in rivers and streams, impacting aquatic ecosystems and related habitat.

Appendix A

APPENDIX A

Regional Water Planning for Region H
Selected Bibliography by Topic

Section **Page**

1. Water Planning Reports

Trans-Texas Water Program Reports

Contractual Transfers in the Southeast Area, 1998. Brown and Root

Desalinization, 1998. Brown and Root

Engineering Analysis of Interbasin Transfer Strategy 1998. Freese and Nichols

Environmental Analysis of Potential Transfer Routes, 1998. Freese and Nichols

Galveston Bay Freshwater Inflows Study, 1998. Brown and Root

Operation Studies and Opinions of Cost for Allens Creek Reservoir; Volumes I and II and Status of Environmental Issues for Allens Creek Reservoir, 1997. Freese and Nichols

System Operation of Surface Water Supply Sources in the Houston Area, 1997. Freese and Nichols

System Operation Study for Livingston / Wallisville and San Jacinto Basin for the Trans-Texas, September 1997. Freese and Nichols

Trans-Texas Water Program Southeast Area Phase I Report, March 1994. Brown and Root and Freese and Nichols

Trans-Texas Water Program Report, Planning Information Update, April 1996. Brown and Root and Freese and Nichols

Trans-Texas Water Program Southeast Area Phase II Report, April 1998. Brown and Root and Freese and Nichols

Wastewater Reclamation, 1998. Brown and Root

Water Conservation, 1998. Brown and Root

Water for Texas - A Consensus-Based Update to the Texas Water Plan, Volume II, Technical Planning Appendix, 1997, Texas Water Development Board

Water for Texas - Today and Tomorrow: A 1996 Consensus-based Update to the Texas Water Plan, Volume III, Water Use Planning Data Appendix, 1996, Water Demand/Drought Management Technical Advisory Committee of the Consensus-Based State Water Plan

City / Agency Water Plans

City of Houston Final Water Conservation Plan, March 1997. Montgomery Watson

Cinco MUD No. 1 Water Supply and Wastewater Master Plan Update, 1997 Turner Collie & Braden Inc

Cinco Ranch Reclaimed Water Reuse Study, 1992 Turner Collie & Braden Inc.

Fairfield Village Regional Facilities Master Plan, 1993 Turner Collie & Braden Inc.

Feasibility Investigation of Allens Creek Reservoir, 1997, Turner, Collie and Braden, Inc. for the Fort Bend County Surface Water Supply Corporation

Feasibility Study, Interbasin Transfer, Sabine to San Jacinto, October 1988. Wayne Smith and Associates

Harris County UD 5 - Water and Wastewater Master Plan Investigation, 1994 Turner Collie & Braden Inc.

Long Range Water Supply Plan 1990 - 2050 to the City of Dallas, Texas, December 1989. Turner Collie & Braden

Preliminary Engineering Report for Modifications and Improvements to the Livingston Regional Water Supply System, 1991 Turner Collie & Braden Inc.

Regional Water Supply Plan for the Tarrant County Water Control and Improvement District Number One and the Texas Water Development Board, October 1990. Freese and Nichols and Alan Plummer and Associates

Regional Water Supply Planning Study, Fort Bend County, Texas, 1992. Turner Collie & Braden Inc. for Fort Bend Surface Water Supply Corporation

Regional Water Planning Study for the Harris-Galveston Coastal Subsidence District, 1991, update 1996, Turner Collie & Braden Inc.

Reservoir System Operation Plan for the City of Houston, May 1996. Montgomery Watson / Georgia A. Wilson & Associates

Review of the Water System Master Plan for the Bartonville Water Supply Corporation for Highland Shores, Inc.", 1991 Turner Collie & Braden Inc.

San Jacinto River Authority Water Resources Development Plan, Water Supply Plan, 1988. Pate Engineers

Trinity River Basin Master Plan, February 1989. Trinity River Authority of Texas

Water Conservation and Drought Contingency Plan for the Woodlands Planning Area, 1989 Turner Collie & Braden Inc.

Water and Wastewater Master Plan for Wood Trace, Montgomery County, 1991 Turner Collie & Braden Inc.:

Other Studies

Feasibility of Water Reuse (prepared for City of Houston), May 1992 Espey, Huston & Associates

Fort Bend Subsidence District Groundwater Management Plan, 1998. Brown and Root

Harris-Galveston Coastal Subsidence District Groundwater Management Plan, 1998. Brown and Root

Preliminary Feasibility Study, Interbasin Water Transfer from the Sabine River to the San Jacinto River Authority Service Area, November 1989. Freese and Nichols

Water Availability Model Selection and Project Management, ongoing, Parsons ES (in association with Turner Collie & Braden Inc. and Sarma)

Yield Analysis and Cost Estimate for Allens Creek Reservoir, (prepared for BRA), 1989. Freese and Nichols

2. Surface Water Studies and Reports

US Geologic Survey Reports

Analysis of Minimum 7-Day Discharges and Estimation of Minimum 7-Day, 2-Year Discharges for Streamflow-Gaging Stations in the Brazos River Basin, Texas; T.H. Raines and W.H. Asquith, 1997

Documented and Potential Extreme Peak Discharges and Relation Between Potential Extreme Peak Discharges and Probable Maximum Flood Peak Discharges in Texas; By W.H. Asquith and R.M. Slade, Jr. , 1995

Floods in Central Texas, December 1991; By H.R. Hejl, Jr., R.M. Slade, Jr., and M.E. Jennings, 1995

Index of Stations-Surface-Water Data-Collection Network of Texas, September 1993; S.C. Gandara and R.E. Jones, 1995

Index of Stations-Surface-Water Data-Collection Network of Texas, September 1995; Compiled by S.C. Gandara and R.E. Jones, 1996

Peak Data for U.S. Geological Survey Gaging Stations, Texas Network; and Computer Program to Estimate Peak-Streamflow Frequency; By R.M. Slade, Jr., and W.H. Asquith, 1996

Regional Equations for Estimation of Peak-Streamflow Frequency for Natural Basins in Texas; By William H. Asquith and Raymond M. Slade, Jr, 1996.

Stratigraphic Nomenclature and Geologic Sections of the Gulf Coastal Plain of Texas; E.T. Baker, Jr., 1994

Streamflow to the Gulf of Mexico; By L.J. Judd, 1995

Streamflow Analysis of the Apalachicola, Pearl, Trinity, and Nueces River Basins, Southeastern United States; By K.E. Greene and R.M. Slade, Jr. , 1995

Summary of Surface-Water Hydrologic Data for the Houston Metropolitan Area, Texas, Water Years 1964-89; Fred Liscum, D.W. Brown\x13and\x13Mark C. Kasmarek, 1996

Techniques to Estimate Generalized Skew Coefficients of Annual Peak Streamflow for Natural Basins in Texas; By L.J. Judd, W.H. Asquith, and R.M. Slade, Jr. , 1996

Topographic Data Sets for Texas by River Basin; L.L. Tan, 1997

Water-Quality Assessment of the Trinity River Basin, Texas-Pesticides in a Coastal Prairie Agricultural Area, 1994-95; By M.F. Brown, 1996

Other Studies

Bon Weir Project, 1990 Bureau of Reclamation

Lake Livingston Project, Lake Livingston, Texas Area and Capacity Tables, December 1991. Bureau of Reclamation

Proposed Allens Creek Reservoir Feasibility Study, 1998 Turner Collie & Braden Inc.

Reconnaissance report: Local flood protection: Little Fossil Creek- Haltom City, Texas, 1972, U.S. Army Engineer District, Fort Worth.

Trinity River & Tributaries -Wallisville Lake Non-Overflow Dam, 1985. U. S. Army Corps of Engineers

Trinity River Yield Study, Phase I, II, & III, 1983. Espey, Huston & Associates

3. Groundwater Studies and Reports

US Geological Survey Reports

Approximate Land-Surface Subsidence in Fort Bend County, Texas, 1943-87 and 1973-87; By R.K. Gabrysch and L.S. Coplin, 1998

Estimated Depth to the Water Table and Estimated Rate of Recharge in Outcrops of the Chicot and Evangeline Aquifers near Houston, Texas; By J.E. Noble, P.W. Bush, M.C. Kasmarek, and D.L. Barbie, 1996

Ground-Water Resources of the Houston District, Texas, 1944; By W.N. White, N.A. Rose, and W.F. Guyton

Water-Level Altitudes 1998, Water-Level Changes 1977-98 and 1997-98, and Compaction 1973-97 in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas; By L.S. Coplin, 1998

Water-Level Altitudes 1998 and Water-Level Changes 1990-98 and 1997-98 in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas; By L.S. Coplin and Horacio X. Santos, 1998

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas, January-February 1992, 1993, and 1994; by M.C. Kasmarek, 1997

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas, January-February 1992, 1993, and 1994; by M.C. Kasmarek, 1997

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas, January-February 1990; by M.C. Kasmarek, 1997

Report 82-431	Ground-Water Withdrawals and Changes in Water Levels in the Houston District, Texas 1975-1979, August 1982; By R. K. Gabrysch
Report 82-571	Ground-Water Withdrawals and Land-Surface Subsidence in the Houston-Galveston Region, Texas 1906-1980, 1982; By R. K. Gabrysch

Report 86-57	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1980-1984, 1986; By James F. Williams III, L.S. Coplin, C.E. Ranzau, Jr. and W.B. Lind
Report 88-4154	Flow Pattern in Regional Aquifers and Flow Relations Between the Lower Colorado River Valley and Regional Aquifers in Six Counties in Southeastern Texas, 1989; By Dennis G. Woodward
Report 90-4012	Ground-Water Withdrawals, Water-Level Changes, Land-Surface Subsidence, and Ground-Water Quality in Fort Bend County, Texas 1969-1987, 1990; By Glenn L. Locke
Report 90-588	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1985-1989, 1991; By Glenn L. Locke
Report 90-594	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1985-1989, 1991; By Glenn L. Locke
Report 90-598	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Harris and Galveston Counties, Texas, 1984-1989, 1991; By L.S. Coplin and Al Campodonico
Report 92-4180	Ground-Water Withdrawals, Water Levels, and Ground-Water Quality in the Houston District, Texas, With Emphasis on 1985-1989, 1993; By Dana L. Barbie and Glenn L. Locke
Report 96-4018	Estimated Depth to the Water Table and Estimated Rate of Recharge in Outcrops of the Chicot and Evangeline Aquifers Near Houston, Texas, 1996; By J. E. Noble, P.W. Bush, M. C. Kasmarek. and D.L. Barbie

Texas Water Development Board Reports

Report 41	Ground Water in the Flood-Plain Alluvium of the Brazos River, Whitney Dam to Vicinity of Richmond, Texas, March 1967; By James G. Cronin and Clyde A. Wilson
Report 68	Ground-Water Resources of Austin and Waller Counties, Texas, December 1967; By Clyde A. Wilson
Report 72	Ground-Water Resources of Liberty County, Texas, April 1968; By R.B. Anders, G.D. McAdoo, and W.H. Alexander, Jr.
Report 80	Ground-Water Resources of San Jacinto County, Texas, August 1968; By W.M. Sandeen
Report 123	Records of Water-Level Measurements in Wells in Galveston County, Texas, December 1970; By R.K. Gabrysch, Gene D. McAdoo, and C.W. Bonnett
Report 133	Ground-Water Resources of Chambers and Jefferson Counties, Texas August 1971; By Saul Aronow
Report 136	Ground-Water Resources of Montgomery County, Texas, November 1971; By Barney P. Popkin
Report 139	Records of Wells, Drillers' Logs, and Chemical Analyses of Ground Water in Galveston County, Texas, December 1971; By R.K. Gabrysch, Gene D. McAdoo and W. L. Naftel
Report 152	Development of Ground Water in the Houston District, Texas, 1966-1969, June 1972; By R.K. Gabrysch
Report 155	Ground-Water Resources in Fort Bend County, Texas, August 1972; By J. B. Wesselman
Report 163	Ground-Water Resources of Brazoria County, Texas, February 1973; By William M. Sandeen and John B. Wesselman

Report 178	Ground-Water Data for Harris County, Texas Volume II, Records of Wells 1892-1972, January 1974; By R.K. Gabrysch, W. L. Naftel, Gene D. McAdoo and C.W. Bonnett
Report 201	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1966-1974, March 1976; By W. L Naftel, Kenneth Vaught, and Bobbie Fleming
Report 202	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1966-1974, March 1976; By W. L Naftel, Bobbie Fleming, and Kenneth Vaught
Report 238	Groundwater Availability in Texas, Estimates and Projections through 2030, September 1979
LP-103	A Digital Model for Simulation of Ground-Water Hydrology in the Houston Area, Texas , 1979; By Walter R. Meyer and Jerry E. Carr
Report 241	Development of Ground Water in the Houston District, Texas 1970-1974, January 1980; By R. K. Gabrysch
Report 277	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1975-1979, July 1983; By Karl W. Ratzlaff, C.E. Ranzau, and W.B. Lind
Report 280	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1975-1979, September 1983; By Karl W. Ratzlaff, C.E. Ranzau, and W.B. Lind
Report 285	Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Harris and Galveston Counties, Texas, 1975-1979, March 1984; By Karl W. Ratzlaff, C.W. Bonnet, and L.S. Coplin
Report 289	Digital Models for Simulation of Ground-Water Hydrology of the Chicot and Evangeline Aquifers along the Gulf Coast of Texas, May 1985; By Jerry E. Carr, Walter R. Meyer, William M. Sandeen, and Ivy R. McLane

Report 295	Hydrology of the Jasper Aquifer in the Southeast Texas Coastal Plain, October 1986; By E. T. Baker, Jr.
Report 309	Ground-Water Conditions in Texas, 1980-1985, October 1988; Compiled By Ground Water Unit
Report 332	Ground-Water Resources of the Carrizo-Wilcox Aquifer in the Central Texas Region, September 1991; By David Thorkildsen and Robert D. Price

Texas Groundwater Protection Committee Publications

Joint Groundwater Monitoring and Contamination Report - 1996; TNRCC Publication Number SFR-56, June 1997.

Activities of the Texas Groundwater Protection Committee, Report to the 75th Legislature; TNRCC Publication Number SFR-47, December 1996.

Texas Groundwater Program Directory; TNRCC Publication Number GI-226, October 1996.

Texas Ground-Water Data Dictionary; TNRCC Publication Number AS-109, August, 1996.

Joint Groundwater Monitoring and Contamination Report - 1995; TNRCC Publication Number SFR-36, April 1996.

Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater; Draft TNRCC Publication, March 1996.

Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater (Educational Brochure); TNRCC Publication Number GI-141, June 1995.

Joint Groundwater Monitoring and Contamination Report - 1994; TNRCC Publication Number SFR-20, April 1995.

Activities of the Texas Groundwater Protection Committee, Report to the 74th Legislature; TNRCC Publication Number SFR-14, December 1994.

Texas Groundwater Protection (Educational Brochure); Texas Natural Resource Conservation Commission (TNRCC) Publication Number GI-88, November 1994.

Joint Groundwater Monitoring and Contamination Report - 1993; Texas Natural Resource Conservation Commission Report SFR-6, May 1994.

Joint Groundwater Monitoring and Contamination Report - 1992; Texas Natural Resource Conservation Commission Report SFR-1, November 1993.

Activities of the Texas Groundwater Protection Committee, Report to the 73rd Legislature; Texas Water Commission Report R 93-01, January 1993.

Joint Groundwater Monitoring and Contamination Report - 1991; Texas Water Commission Report R 92-02, May 1992.

Texas Ground Water Protection Profiles; unpublished Texas Water Commission Report, June 1991.

Texas State Management Plan for Agricultural Chemicals in Ground Water; Agricultural Chemicals Subcommittee, June 1991.

Joint Groundwater Monitoring and Contamination Report - 1990; Texas Water Commission Report Z-104, April 1991.

Activities of the Texas Groundwater Protection Committee, Report to the 72nd Legislature; Texas Water Commission Report Z-96, January 1991.

Joint Groundwater Monitoring and Contamination Report; Texas Water Commission Report Z-94, April 1990.

Groundwater Protection Committee (GPC), Texas Groundwater Protection Strategy; TWC Report Z-80, January 1988.

Texas Ground Water Protection Activities - 1986; Texas Water Commission (TWC) Report Z-79, October 1986.

Texas Board of Water Engineers

Ground-Water Resources of Brazoria County, Texas, November 1947; By C.R. Follett

Ground-Water Resources of Liberty County, Texas, 1950; By W. H. Alexander, Jr.

Texas Water Commission

Availability and Quality of Ground Water in Leon County, Texas, May 1965; By Richard C. Peckham, Bulletin 6513

Ground Water Protection and Management Strategies for Fort Bend County, March 1990; By John Austin Williamson

Other

Managing Texas' Groundwater Resources Through Groundwater Conservation Districts, November, 1998, By Guy Fipps. Texas A&M System, Texas Agricultural Extension Service, B-1612/11-98.

4. Agricultural Studies and Reports

Water Use and Management in the Texas Rice Belt Region, 1984, Ronal C. Griffin, Gregory M. Perry and Garry N. McCauley

Potential Rice Irrigation Water Conservation Measures, Water Planning Group - Region H, James A. Stansel, Texas A&M University System, July 2000

5. Environmental and Water Quality Reports

Texas Natural Resources Conservation Commission Reports

1996 Regional Assessment of Water Quality; Brazos River Basin including the Oyster Creek Watershed, 1996 Brazos River Authority

1996 Regional Assessment of Water Quality, 1996, Harris-Galveston Area Council of Governments

1996 Regional Assessment of Water Quality, 1996, Trinity River Authority of Texas

Assessment of Water Quality and Fish Kills in Upper Oyster Creek Segment 1245 (SR 92-05), 1992, TNRCC

State of Texas 1996 Water Quality Assessment, Texas Natural Resources Conservation Commission, 1997

State of Texas Water Quality Inventory, TNRCC, 1996

Waste Load Evaluation for Dissolved Oxygen in the Intracoastal Waterway in the Neches-Trinity Coastal Basin, Segment 0702. TNRCC, 1993.

Texas Parks and Wildlife Department Reports

Wildlife Habitat Appraisal for the Proposed Allens Creek Reservoir Site. Lovelace et al., 1995. University of Houston Clear Lake.

A Fisheries Inventory and Assessment of Allens Creek and the Brazos River, Austin County, Texas. Linam et al., 1994. Resource Protection Division, Texas Parks & Wildlife Department, Final Report to TWDB, Research and Planning Fund Contract No. 93-483-364.

Status of Environmental Issues for Allens Creek Reservoir. Paul Price & Associates, 1996. Trans-Texas Water Program, Southeast Area Memorandum Report to the TWDB.

Macroinvertebrate Assessment of Allens Creek and the Brazos River, Austin County, Texas. Wood et al., Department of Biology-Aquatic Station, Southwest Texas State

University, San Marcos, Texas, 1994. Final Report submitted to Texas Parks & Wildlife Department, for TWDB Research and Planning Fund Contract No. 93-483-364.

Utilization of Marsh and Associated Habitats along a Salinity Gradient in the Galveston Bay. Zimmerman et al., National Marine Fisheries Service, U.S. Department of Commerce, 1990. Technical Memorandum NMFS-SEFC-250.

Planning Report/Final Environmental Statement for the San Jacinto Project, Texas. U.S. Bureau of Reclamation, 1988.

Ecologically Significant River and Stream Segments of Region H, Regional Water Planning Area, Chad W. Norris and Gordon W. Linam, TPWD, October 1999.

US Geological Survey Reports

Nutrient Loading and Selected Water-Quality and Biological Characteristics of Dickinson Bayou Near Houston, Texas, 1995-97; J.W. East, E.M. Paul, and S.D. Porter, 1998

Water-Quality Assessment of the Trinity River Basin, Texas-Nutrients and Pesticides in the Watersheds of Richland and Chambers Creeks, 1993-95; L.F. Land, 1997

Light Attenuation in a Shallow, Turbid Reservoir, Lake Houston, Texas; By Roger W. Lee and Walter Rast, 1997

Occurrence and Distribution of Organochlorine Compounds in Biological Tissue and Bed Sediment From Streams in the Trinity River Basin, Texas, 1992-93; J. Bruce Moring, 1997

Water-Quality Assessment of the Trinity River Basin, Texas-Pesticides in Streams Draining an Urban and an Agricultural Area, 1993-95; L.F. Land and M.F. Brown, 1996

Trends in Nutrient Inflows to the Gulf of Mexico from Streams Draining the Conterminous United States, 1972-93; By David D. Dunn, 1996

Water-Quality Assessment of the Trinity River Basin, Texas-Nutrients in Streams Draining an Agricultural and an Urban Area, 1993-95; By L.F. Land and A.A. Shipp, 1996

Summary Statistics and Graphical Comparisons of Specific Conductance, Temperature, and Dissolved Oxygen Data, Buffalo Bayou, Houston, Texas, April 1986-March 1991; By D.W. Brown and E.M. Paul, 1995

Reports from Other Agencies

1998 Annual Water Quality Report, Brazos River Authority, 1998

Certified Report of Water Quality Management Study for Lower Oyster Creek, 1983, Espey, Huston & Associates

Characterization of non-point sources and loadings to Galveston Bay; Charles J. Newell, Hanadi S. Rifai, Philip B. Bedient. PUB/DATE: Galveston Bay National Estuary Program, 1992.

Environmental impact statement: Limestone electric generating station and Jewett mine in Freestone, Limestone, and Leon counties, Texas; U.S. Environmental Protection Agency, Region 6 ; prepared in cooperation with U.S. Soil Conservation Service, Texas Railroad Commission, Texas Historical Commission, Texas Dept. of Water Resources, Texas Air Control Board, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, and U.S. Dept. of Interior Office of Surface Mining. PUB/DATE Dallas, TX: The Agency, 1981.

Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determination of Needs. Longley (ed.), TWDB and TPWD, 1994.

Freshwater Inflow Recommendation for the Trinity-San Jacinto Estuary. Texas Parks & Wildlife Department, Coastal Studies Program, Austin, Texas, 1998.

Guidelines for Water Resources Permitting: Nutrient Requirements for Maintenance of Galveston Bay Productivity. Brock et al. Final TWDB Report to Near Coastal Waters Program, U.S. EPA, Region 6, 1996.

Lake Livingston 1991 Sedimentation Survey, 1992, Bureau of Reclamation

Potential Aquatic Ecological Impacts of Interbasin Water Transfers in the Southeast, West-Central, and South-Central Study Areas. Geo-Marine, Inc., Plano, Texas, 1995. Report Prepared for TWDB and U.S. Army Corps of Engineers, Fort Worth District, Contract No. DACA63-93-D-0014.

Regulatory effectiveness study for the Armand Bayou Coastal Preserve; Gary Mitchell and Duane Windsor. PUB/DATE: Galveston Bay National Estuary Program, 1991.

Regulatory effectiveness study for the Christmas Bay Coastal Preserve; Gary Mitchell. PUB/DATE: Galveston Bay National Estuary Program, 1991.

Segmentation development for Galveston Bay; prepared by Jones and Neuse, Inc., Environmental and Engineering Services. Galveston Bay National Estuary Program, 1992.

Toxic contaminant characterization of aquatic organisms in Galveston Bay: a pilot study; prepared by James M. Brooks, et al. PUB/DATE: Galveston Bay National Estuary Program, 1992.

Trinity River Basin Regional Assessment of Water Quality, Trinity River Authority, 1996

Trinity River & tributaries: regional environmental impact statement; US Army Corps of Engineers, Fort Worth District. PUB/DATE Fort Worth, TX: The District, 1987.

Trinity-San Jacinto Estuary: A Study of the Influence of Freshwater Inflows. Texas Department of Water Resources (now TWDB), 1981. Report No. LP-113.

Appendix B

SURVEY OF WATER SUPPLY INTERESTS AND CONCERNS

REGION H REGIONAL WATER PLANNING AREA

Public Meetings - March 1999

PURPOSE: The purpose of this survey is to provide information for use in planning water supplies for Region H as designated by the Texas Water Development Board under Senate Bill 1 passed by the Legislature in 1997.

Region H consists of all or part of 15 counties: Leon, Madison, Walker, Trinity, Polk, San Jacinto, Liberty, Chambers, Montgomery, Harris, Waller, Austin, Fort Bend, Brazoria and Galveston. The 24-member Regional Water Planning Group representing different interests in the area will develop the regional water plan.

INSTRUCTIONS: Please complete the information below based on the perspective of your interest in water resources. Your interest may be the water supply in your community or area within the region in which you live, or you may belong to a group that has a particular concern about water, such as agriculture or an environmental organization.

If you prefer to complete the survey after the meeting, please return the survey to: Glenda Callaway, Ekistics Corporation, 2727 Kirby Drive, Suite 523, Houston, Texas 77098 by March 31, 1999. This address is printed on the last page of the survey. Just fold and staple the survey, and provide the first class postage.

If you have any questions or need additional information, please contact Glenda at 713-520-9031or Mr. Jim Adams, Chair Region H Water Planning Group, at SJRA, 409-588-1111.

OPTIONAL INFORMATION:

1. Name _____

2. Address _____

   _____

3. Telephone/Fax/E-mail _____

WATER INTEREST INFORMATION:

4. County of Residence _____

5. Community (location within county) or Group of Interest: _____

   _____

6. Please circle your primary interest group (circle only one):

Municipal (urban)	Municipal (rural)	Small Business	Water Utility
Water District	County	Agriculture	Industry
Recreational	Environmental	General Public	

   Other (please specify) _____

7. What kinds of water supply problems has your community or interest group experienced in the last five years? (Please check all items that are appropriate.)

   _____ Problems with or Inadequate Surface Water Supply

   _____ Problems with or Inadequate Groundwater Supply

   _____ Poor Quality of Surface Water Supply

   _____ Poor Quality of Groundwater Supply

_____ Problems with Drinking Water Treatment

_____ Problems with Drinking Water Distribution

_____ Other (please specify) _____

_____

_____

8. What type of constraints limit your community or group's ability to solve its water supply problems? (Please check all items that are appropriate.)

_____ Funds for Facility Construction

_____ Funds for Operation and Maintenance

_____ Lack of Citizen Support

_____ State Regulations

_____ Federal Regulations

_____ Need for Technical Assistance

_____ Other (please specify) _____

_____

_____

9. What problems or threats to the water supply for your community/group do you expect to have in the next <u>five to twenty years</u>?

_____ Problems with or Inadequate Surface Water Supply

_____ Problems with or Inadequate Groundwater Supply

_____ Poor Quality of Surface Water Supply

_____ Poor Quality of Groundwater Supply

_____ Problems with Drinking Water Treatment

_____ Problems with Drinking Water Distribution

_____ Inadequate Water Supply to Maintain Stream Flows or Inflows to Bays

_____ Other (please specify) _____

_____

10. Does your community or group have the following:

	Yes	No	Don't Know
Water Conservation Plan	☐	☐	☐
Drought Management Plan	☐	☐	☐
Long-term Water Supply Plan	☐	☐	☐

11. To meet your water supply needs over the next twenty years, which of the following options should be considered to meet your community's or group's needs?

	Yes	No	Don't Know
New Dams and Lakes	☐	☐	☐
New Water Wells	☐	☐	☐
Municipal and Industrial Water Conservation	☐	☐	☐
Agricultural Water Conservation	☐	☐	☐
Reuse of Treated Wastewater	☐	☐	☐
Recharge of Aquifers	☐	☐	☐
Transfer of Water from Another Area to Your Area	☐	☐	☐
Brush Control	☐	☐	☐

Conjunctive Surface Water and Groundwater Use	☐	☐	☐
Purchase Water Rights	☐	☐	☐
Surface Water Exchanges	☐	☐	☐
Desalination	☐	☐	☐

Other options that should be considered: _____

_____

12. To meet your long-term water supply needs from 20-50 years in the future, which of the following options should be considered to meet your community's or group's needs?

	Yes	No	Don't Know
New Dams and Lakes	☐	☐	☐
New Water Wells	☐	☐	☐
Municipal and Industrial Water Conservation	☐	☐	☐
Agricultural Water Conservation	☐	☐	☐
Reuse of Treated Wastewater	☐	☐	☐
Recharge of Aquifers	☐	☐	☐
Transfer of Water from Another Area to Your Area	☐	☐	☐
Brush Control	☐	☐	☐
Conjunctive Surface Water and Groundwater Use	☐	☐	☐
Purchase Water Rights	☐	☐	☐
Surface Water Exchanges	☐	☐	☐
Desalination	☐	☐	☐

Other options that should be considered: _____

_____

13. What factors should be considered in developing a regional water plan that will meet the long-term water supply needs of your community or group?

_____

_____

_____

_____

14. Please make any additional comments you wish.

_____

_____

_____

_____

15. Please indicate the method you prefer for receiving updates on the Region H Regional Water Planning Group's activities.

_____ Letter

_____ Email

_____ Newspaper

_____ Newsletter

_____ Public Meetings

_____ Other (please specify) _____

16. What time of day would you prefer public meetings to be held?

_____ 10:00 a.m. _____ 7:00 p.m.

_____ 2:00 p.m. _____ Other (please specify) _____

17. If your interest group has a newsletter and would like updates provided to it, please give us the name of the organization and a contact address or telephone number.

_____

_____

18. Do you wish to be placed on a list for future mailings from the Region H Regional Water Planning Group? If so, please note below and complete the address information in Questions 1 - 3.

Yes No

☐ ☐

Thank you for completing this survey.

Region H Survey, Spring 1999

Responses to Open-Ended Questions

7. Water supply problems in last five years -- other:

#2 Red water.

#3 Declining static water levels in wells.

#6 Many houses have shallow wells that run dry during summers and the quality is poor.

#8 Had to rework #1 well; drill new #2 well; over .05 ML Arsenic in #2 well, still investigating.

#10 Summers of drought test our limits; not looking to drill second well.

#11 Distribution to all needed areas.

#14 Distance between rural communities (some cases it's miles).

#17 Leaks.

#20 Concern over freshwater inflows to Galveston Bay.

8. Constraints limiting resolution -- other:

#3 Need for an authority to begin development of a surface water infrastructure for north and west Harris County.

#4 Okay for now, but we must convert to surface water.

#13 Lack of public awareness; apathy.

#14 Time involved as process is proceeding.

9. Water supply problems in next 5-20 years -- other:

#3 Must begin conversion to surface water.

#8 Inadequate surface water supply to meet HGCSD conversion requirements. Need entity to represent all MUDs to contract for water and build infrastructure. Lindsay's bill should solve.

#13 Silting of Trinity River and Lake Livingston.

#15 Concerns about freshwater inflows to Galveston Bay and having enough instream flows to our rivers so that they remain alive.

11. Consider as options for next 20 years -- other:

#4 Teach people landscaping that uses much less water.

#10 Co-op of MUDs in west and northwest Houston to supply water and/or transmission system.

#20 Comment: reuse of treated wastewater should be considered, but it is not a solution.

12. Consider as options for 20-50 years -- other:

#4 Teach people landscaping that uses much less water.

#10 A/A.

13. Factors to consider in developing regional water plan:

#1 Adequate water supplies while not degrading the status of the groundwater aquifers.

#2 Equity for all interests given the available supply.

#3 New lake/dam in Montgomery County; Allen's Creek project.

#7 Plan for providing more conservation, less groundwater, more interbasin transfers -- higher cost.

#8 RWPG H appears to be covering the bases in accordance with SB-1 based on meetings I have attended.

#9 The emphasis I would place on planning is achieving a balance between people/industrial/agricultural needs, and the needs of the environment and ecosystems so that the Trinity and other rivers and Galveston and Trinity Bays, fisheries, marshes, wetlands and other habitats and ecosystems are preserved and enhanced.

#10 Setting up a transmission network of pipelines to supply water at a set price (one) for all within the Region H system. City of Houston should not control this system!!

#11 Adequate source, storage and replacement.

#13 Population growth, residence and industrial use and agricultural use, environmental concerns have been playing a big part, but Health should be High priority.

#18 It has got to be economically feasible. It has got to allow for resident representation. This is too important an issue to remove it from voter input.

#13 Balance between human and ecological needs--conservation, wise use, population growth.

14. Additional comments:

#3 Area should work to create hard surface water sources in the north and west part of Harris - Montgomery - Waller, etc.

#4 We need to be educating the public--newspapers, etc. These are real problems and some will require voting for bonds. People must be told and told again -- we don't accept bad news easily.

#9 If more costly measures (such as desalination technology) are required to achieve the balance referred to in #13 above, perhaps an exploratory group of environmental, eco-tourist industry and other interested groups/agencies could raise the funds to purchase an economic study (such as was discussed by Ted Eubanks at the GBF Annual Meeting on 2-26-99) to determine the value of Galveston Bay-Trinity Bay and how to preserve and nurture these resources (specifically including fresh water supply requirements). If the dollar value is found to be substantial, political support for developing and implementing the technological means of safeguarding/insuring fresh water supplies could be garnered, such as in the form of tax incentives to water utility suppliers and industrial and agricultural users who assist in developing and using the technology.

#10 Costs should be distributed evenly by number of end users and after system is built, each additional end user should be charged tap fees and a principal sum of money to the pipeline system.

#11 Keep water coming.

#18 Any public-private sector partnership deal is likely to remove all control from the voters and put too much emphasis on making a profit and not enough emphasis on finding a solution which provides water at a reasonable cost.

15. Methods -- other:

#8 Public meetings -- to have opportunity to ask questions.

#18 Fax

17. Groups/newsletters suggested:

Cypress Creek United Civic Association, Lisa Eggebrecht, Editor, 11402 Gatesden, Tomball TX 77375; 281-370-3709/Fax 281-370-3833/ brian@hummingbird-designs.com.

Galveston Bay Estuary Program Website, c/o Marie Nelson, 281-332-9937, mnelson@tnrcc.state.tx.us.

Spirit of North Harris County Coalition *Update Bulletins* c/o Al Rendl, 17535 Ponderosa Pines, Houston, TX 77090.