



TRANS-TEXAS WATER PROGRAM

SOUTHEAST AREA

Planning Memorandum

Planning Information Update

September 27, 1996

**Sabine River Authority of Texas
Lower Neches Valley Authority
San Jacinto River Authority
City of Houston
Brazos River Authority
Texas Water Development Board**

This document is a product of the Trans-Texas Water Program: Southeast Area. The program's mission is to propose the best economically and environmentally beneficial methods to meet water needs in Texas for the long term. The program's four planning areas are the Southeast Area, which includes the Houston-Galveston metropolitan area, the North-Central Area (including Austin), the South-Central Area (including Corpus Christi) and the West-Central Area (including San Antonio).

The Southeast Area of the Trans-Texas Water Program draws perspectives from many organizations and citizens. The Policy Management Committee and its Southeast Area subcommittee guide the program; the Southeast Area Technical Advisory Committee serves as program advisor. Local sponsors are the Sabine River Authority of Texas, the Lower Neches Valley Authority, the San Jacinto River Authority, the City of Houston and the Brazos River Authority.

The Texas Water Development Board is the lead Texas agency for the Trans-Texas Water Program. The Board, along with the Texas Natural Resource Conservation Commission, the Texas Parks & Wildlife Department and the Texas General Land Office, set goals and policies for the program pertaining to water resources management and are members of the Policy Management Committee.

This is the final version of this document.

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1. Planning Information

The first step in the development of a water resources management program is to evaluate the future need for water. Development decisions regarding future water management strategies, and ultimately system facilities, are based on projected future population and water demand.

Phase I of the Trans-Texas Water Program (TTWP) proposed future population and water demands for the 32-county TTWP Southeast Area, Figure 1.

The Southeast Area is further defined within eight river and coastal basins; Sabine, Neches, Neches-Trinity, Trinity, San Jacinto, Trinity-San Jacinto, Brazos and San Jacinto-Brazos. See Appendix A for a listing of the counties within each watershed basin. Phase I population and water demand estimates were based on forecasts developed by the Texas Water Development Board (TWDB) for the 1992 report, *Water for Texas—Today and Tomorrow*. This 1992 report was re-evaluated by the TWDB in preparation for the 1996 Texas Water Plan process. Several significant procedural and technical modifications were made to the projection methodology including:

- Establishing a more involved public input and review process;
- Involving other state water management agencies, including Texas Parks and Wildlife Department, and Texas Natural Resource Conservation Commission, in the process of forecast de-

velopment and in establishing future water policy for the state;

- Recognizing the effects of generally lower population growth rates throughout the state in response to slower growth from 1990 through 1992;
- Including the projected impacts of the water conservation measures resulting from the 1991 State of Texas Plumbing Fixtures regulations.
- Revising projected water demands for various use categories based upon new national and local growth estimates.

These and many other modifications to the projection methodology were implemented resulting in the “consensus-based” planning process discussed below. The result of this process is represented by *Water for Texas—Today and Tomorrow: A 1996 Consensus—Based Update to the Texas Water Plan*.¹ The TTWP Policy Management Committee has adopted the consensus-based population and water demand projections and revised the Phase I water planning projections to remain in accordance with the proposed 1996 Texas Water Plan.

This technical memorandum summarizes the results of the revised population and water demand forecast for the TTWP Southeast Area. This revision incorporates all of the changes adopted within the Consensus Planning effort and updates previous Phase I planning projections. All future TTWP water strategies and water

system facility planning will be based on the population, water demand and water supply values contained within this memorandum.

1.1 The Consensus Water Plan and TTWP

The Texas Water Development Board initiated the consensus-based planning approach for the update of the 1996 Texas Water Plan. This Consensus Water Planning process broadens participation in the development of planning information and increases public acceptance of the Plan's recommended water management program through increased public participation in the process. The TWDB worked in cooperation with Texas Natural Resource Conservation Commission (TNRCC), and Texas Parks and Wildlife Department (TPWD). These three agencies are responsible for water resource management for the State of Texas. Their staffs assembled a broad based collaboration which included various other water interests and the general public. TWDB, TNRCC, and TPWD believe this collaborative process has: "Provide[d] Texas water planners, managers, and regulators with consensus-based population and water demand forecasts which consider water conservation and other demand management practices."²

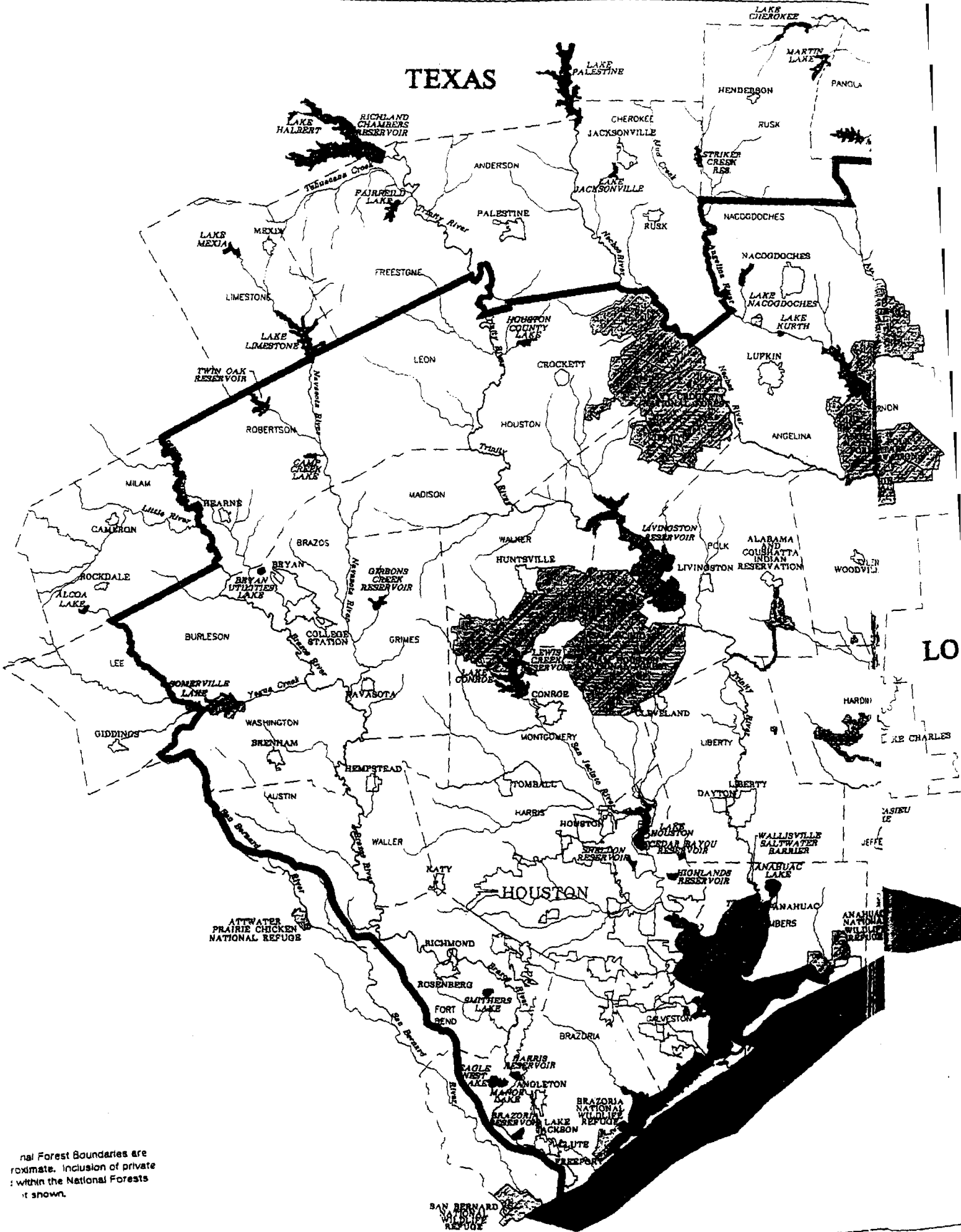
These forecasts are the base data used to create several water use "scenarios" which incorporate various assumptions about water conservation, weather conditions, economic growth and their impacts on water use. A recommended "most likely" population and water demand forecast series was selected as representative of the population growth pattern most likely to occur for each county. These "most

likely" series were approved by the TWDB Board of Directors in January 1995 to serve as a consistent basis for the planning and regulatory activities of the TWDB.

Population and water demand projections are aggregated and delineated to river and coastal basins, water resource planning regions, and metropolitan statistical areas. Data for the 32 county TTWP Southeast Area, has been extracted from the state-wide data base and assembled for use in program analysis by watershed basin and county within each basin.

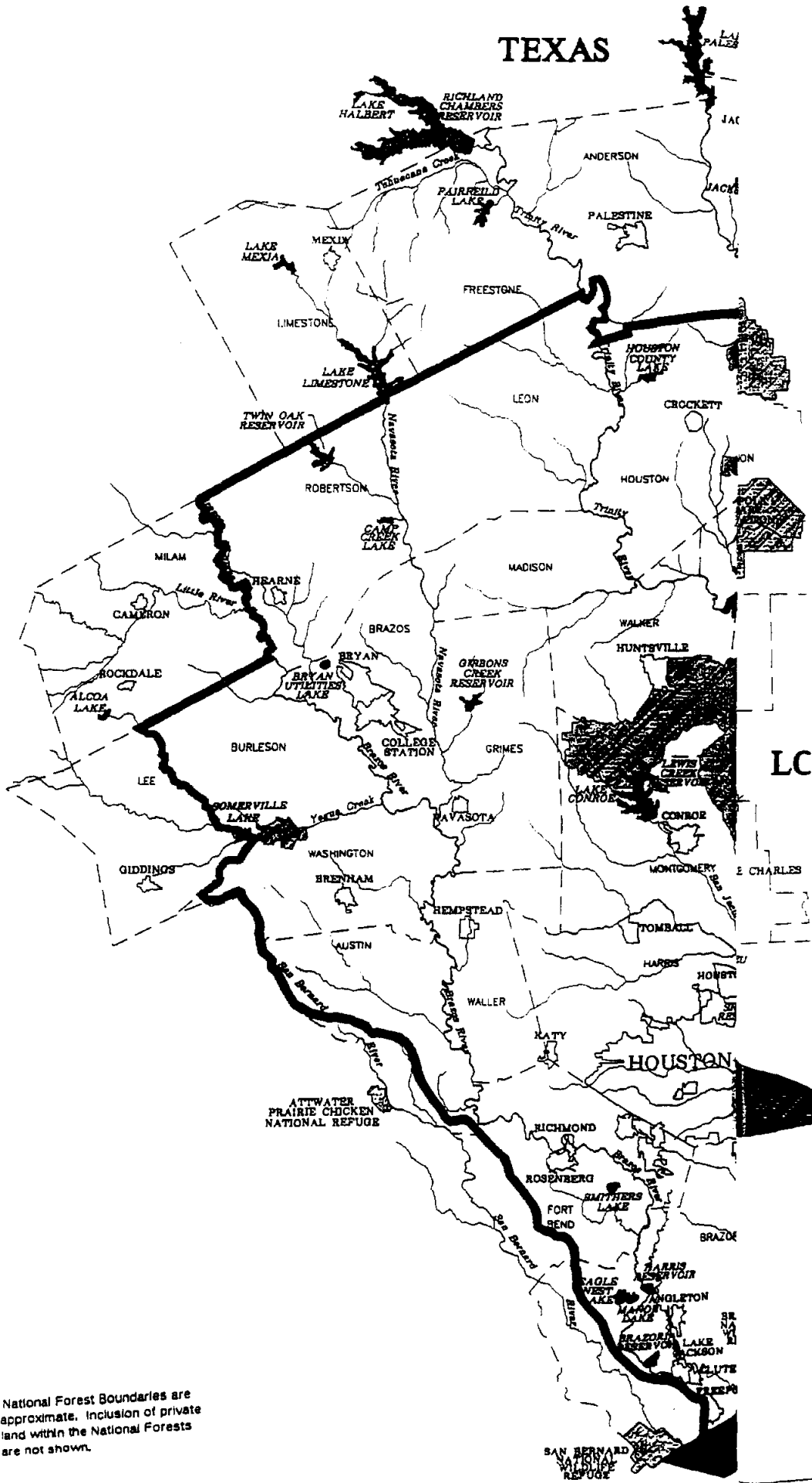
The following report details the planning information which will be used in Phase II of the TTWP. The population and water use projections developed through the Consensus Water Planning process and data developed on water supply presented in this report are the basic planning data used in the Trans-Texas Water Program Southeast Area study.

TEXAS



National Forest Boundaries are approximate. Inclusion of private land within the National Forests is not shown.

TEXAS



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* National Forest Boundaries are approximate. Inclusion of private land within the National Forests are not shown.



2. Population Projections

Population increases pressure public service providers to adequately plan for future needs. Water resource planners require reliable population forecasts to accurately predict future needs and plan for sufficient quantities of water to meet the local and regional demands today and in the future. Population increases translate into increased water demand for residential and commercial uses. For this reason the TWDB prepares population projections when developing the Texas Water Plan. The Trans-Texas Water Program uses these same data as the basis for its water demand analysis.

2.1 Methodology

The TWDB based population projections on 1990 Census data and developed future population estimates using a cohort-component procedure. This procedure computes anticipated populations based on cohorts or segments of the population (age/sex/race groups), and components of cohort change (fertility rates, survival rates and migration rates). The sum of all separate cohort projections equals the total projected population.

TWDB staff defined cohort groups as single-year-of-age (0 to 75) by sex and race/ethnic groups. The race/ethnic groups include Anglo, Black, Hispanic and other. For each cohort (population group) the components of cohort change (fertility, survival, and migration rates) are incorporated into the projection procedure to calculate the number of births, deaths and mi-

grations anticipated for the projection interval. For example, one cohort, 28-year old Hispanic females, would have specific fertility, survival and migration rates. Each cohort is computed for a time interval, *e.g.* 2000—2010, and added with all other cohort projections for that time interval for a projected total interval population. For each cohort, the population projection equation is:

$$\text{Current population} + \text{Births} - \text{Deaths} + \text{Migrations} = \text{Future population}$$

Key assumptions, with regard to cohort change components, used in developing the population projections were: Anglo female fertility rates trend downward through 2010 and are held constant at that level through 2050; Hispanic, Black, and Other female fertility rates trend downward through 2030 and hold constant at that level through 2050; and survival rates are assumed to follow national trends over the projection period

Three projection scenarios were developed. The basis for these population projection scenarios is the migration rates for each area between 1980 and 1990. The zero migration scenario assumed that only natural increases or decreases of population would occur over the 50 year time horizon. The second scenario, 0.5 migration, assumed an area would experience growth at a rate of one-half the 1980-1990 rate over the projection period. A third scenario, 1.0 migration, assumed the 1980-1990 migration rate would remain constant over the projection period. The consensus

planning Technical Advisory Committee selected a "most likely" scenario for each of the 254 Texas counties. This "most likely" scenario is county specific and reflects the rate of growth considered probable for that county over the projection period. This "most likely" scenario for each of the time intervals (2000 to 2050) is used for all TTWP projections.

2.2 Population Projections for the Southeast Area

The TTWP Southeast Area has a projected 2050 population of 9.8 million persons. This represents an increase of 104% (2% annualized) over the 1990 U.S. Census figure of 4.6 million. This rate of increase is slightly less than the State of Texas total population which is projected to increase 112% (2.2% annualized) over the 50 year time frame for a 2050 population of 36 million residents. Table 1 presents a summary of the total projected population for the Southeast Study Area. Details on the projections for each basin are in Appendix A.

As shown in Table 1, the Sabine basin is

projected to have the least total number of residents (148,000) while the San Jacinto basin will have the highest population (5,783,000).

For basins within the Southeast Area, the population increases during the study period range from a low of 28% in the Neches-Trinity Basin, to a high of 165%, in the San Jacinto-Brazos Basin. This represents annualized growth rates between .5% and 3% for each basin respectively. Highest rates of population growth are projected to occur in the San Jacinto-Brazos, Brazos and the Trinity-San Jacinto basins. Figure 2 illustrates the cumulative population growth for the Southeast Area.

2.3 Population Projections for the Houston Metro Region

The TTWP Phase I Report identified the Houston region as a particularly high growth center with a projected shortfall of available water supply. The Houston Metro region is again considered in detail in this analysis.

Table 1: Population Projections for the Southeast Study Area, 1990—2050

River Basin	Population (Thousands)						
	1990	2000	2010	2020	2030	2040	2050
Sabine	107	116	124	130	137	142	148
Neches	315	354	384	414	447	478	509
Neches—Trinity	194	210	220	231	238	244	249
Trinity	153	180	201	225	250	270	289
Trinity—San Jacinto	96	118	136	159	173	191	206
San Jacinto	2,771	3,208	3,737	4,389	4,839	5,365	5,783
San Jacinto—Brazos	705	857	1,034	1,247	1,459	1,675	1,874
Brazos	304	347	408	473	544	617	697
Total, Southeast Area	4,646	5,390	6,244	7,267	8,086	8,983	9,755

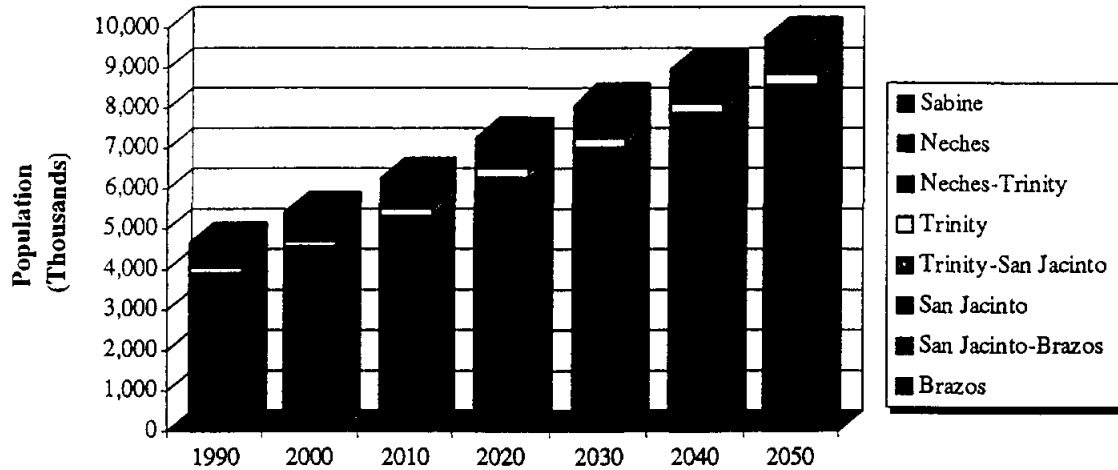


Figure 2: Projected Total Population for the Southeast Area

Within the 32 county Southeast Area of the TTWP, eight (8) counties make up the Houston Metro region. The counties are: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties. These counties comprise all or part of seven of the eight river basins in the Southeast Area including the Neches, Neches—Trinity, Trinity, Trinity—San Jacinto, San Jacinto, San Jacinto—Brazos and Brazos Basins. No portion of the Houston Metro region is within the Sabine River watershed. Population projections for the Houston Metro

region are calculated by determining the county/basin populations for each of the eight counties. These county/basin totals added together produce the Metro/basin populations for each basin in the Metro region. It should be noted that small portions of Brazoria and Fort Bend counties fall west of the Brazos River Basin and are therefore excluded from the TTWP Southeast Area and Houston Metro projections. These areas are included in the TTWP South-Central and West-Central study areas. Table 2 displays the projected population for the portion of the Metro region

Table 2: Population Projections for the Houston Metro Region

BASIN	Population (thousands)						
	1990	2000	2010	2020	2030	2040	2050
San Jacinto	2744.4	3176.3	3700.2	4346.7	4791.1	5313.3	5727.4
San Jacinto—Brazos	705.4	857.3	1033.6	1246.7	1458.9	1674.6	1873.9
Brazos	94.1	112.2	142.7	180.1	224.7	273.9	327.6
Neches	1.9	2.1	2.3	2.5	2.8	3.1	3.3
Neches—Trinity	10.8	11.6	15.0	19.1	21.8	23.2	23.1
Trinity	39.4	44.3	50.1	58.0	65.8	72.2	78.7
Trinity—San Jacinto	95.8	118.0	136.4	159.3	172.6	191.3	206.3
Metro TOTAL	3691.7	4321.8	5080.4	6012.4	6737.8	7551.5	8240.3

within each basin.

The projected 2050 population for the Houston Metro region is 8.2 million persons, an increase of four and one half million people across the 50-year time horizon. The largest component of this increase is in basins serving the City of Houston, specifically in the San Jacinto, San Jacinto - Brazos and Brazos basins. Projections indicate that the largest absolute growth in population occurs in Harris county (San Jacinto basin). The

highest rate of population increase occurs in the Fort Bend County area of each of these three basins. These projections are illustrated in Figure 3. The eight county Houston Metro region accounts for over 80 percent of the 32 county Southeast Area population. The combined populations of three of the Houston Metro region counties, Harris, Montgomery, and Fort Bend, account for 70 percent of the total Southeast Area population. Detailed data on Metro region county/basin population projections are in Appendix B.

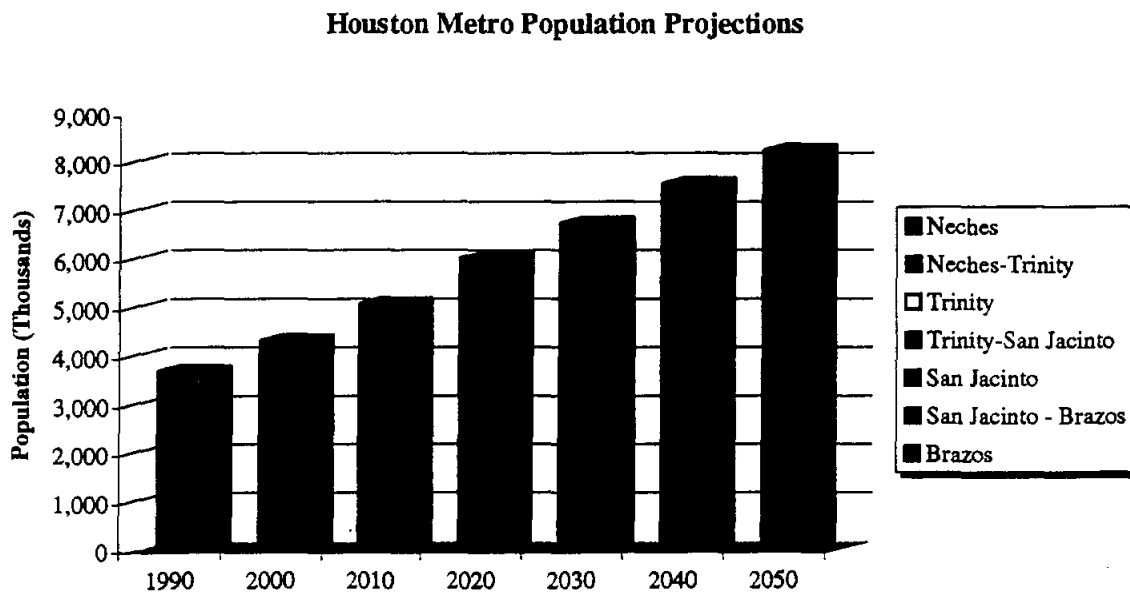


Figure 3: Population Projections for the Houston Metro Region



3. Water Use Requirements

Several water use categories have been defined for this study. Each category has specific variables affecting its demand function. Statewide water planning agencies define six water use classifications for planning purposes; municipal, manufacturing, irrigation, livestock, mining, and power. Population, weather conditions and water conservation measures in force in a community determine the amount of water required for municipal, residential and commercial purposes. Broader economic and technological factors determine manufacturing, irrigation, livestock, steam power generation, and mining water requirements.

The Texas Water Development Board (TWDB) prepared projected water use estimates for 1990—2050 as part of the *1996 Consensus-Based Update to the Texas Water Plan*. The water use projections experienced the same broad local review and comment process as the population projections. The TWDB prepared several scenarios for each water use type based upon specific water use assumptions. Technical advisory committees selected a “most likely” series for each use type. The methodologies and the water use projections by use type are summarized in the following sections. For all use types, the Southeast TTWP will use the “most likely” projections for its analysis of water demand.

3.1 Methodology

Water demand projections were developed for each city and county within the State of

Texas for each of the six water use categories listed above. The methodology employed for each use type incorporates specific key assumptions relative to that use. Projections for municipal water uses are developed at the city level using city-specific water use characteristics with county population projections used as control totals. Projections of future water use for all other water use types were developed at the county level.

Another assumption incorporated in these projections relates to the consumptive use of water. Since consumptive water use reduces the total quantity of available water supply, the reported water demand forecasts used in the TTWP are for consumptive uses only. Non-consumptive uses, such as water used for recreation purposes, are not included in the TTWP water demand forecasts.

While environmental water needs are generally considered to be non-consumptive. The *Texas Water Plan* considers environmental water needs in its planning. This is an area of on-going study by the three state water agencies but no planning model has been formally accepted. For planning purposes, the TWDB determined that “the needs of the environment will be met prior to the identification of any remaining *new* supplies for other useful purposes.”³ Environmental water needs will be identified and served during the determination of specific water resource management strategies.

3.1.1 Municipal Water Use

There are three primary components to the municipal water use forecasting method used: population projections, per capita municipal water use, and forecasts of the efficiency of conservation measures for each area. Municipal demands include residential and commercial elements, both of which are dependent on population (number of persons being served). Population projections, discussed in the previous chapter, provide forecast populations for each city and rural area within the Southeast Area for the 2000—2050 time frame.

Per capita water use rates were developed for specific urban and rural areas based upon historic use data reported to the TWDB for each community. The reported annual water use divided by an annual population estimate yields a per capita water use. Since climatic conditions, principally annual rainfall patterns, affect the quantity of water used for municipal purposes, two forecast scenarios have been created. One scenario assumes below normal rainfall patterns, and the other assumes average weather rainfall patterns. The TTWP uses the below normal rainfall, or worst case, scenario based on “the highest per capita water use recorded by an entity over the last ten years of record with an upper limit of 25 per cent above the average condition per capita water use.”⁴

The third component in the calculation adjusts for municipal water conservation practices. Estimated likely ranges of water savings from “expected” and “advanced” conservation over the 50 year planning period for each city with a population over 1000 and each county have been created.

The “expected” range identifies the potential water savings anticipated from both market forces and regulatory requirements, particularly the 1991 State of Texas Water Efficiency Plumbing Act. The “advanced” conservation scenario reflects additional conservation reductions based on two conditions: expediting the timing of savings accruing from regulatory requirements; and, adopting more aggressive conservation programs instituted at the local level.

The “most likely” municipal water use forecast is based on a scenario of below average rainfall per capita water use. This scenario, adjusted for “expected” conservation savings, is applied to the “most likely” series population forecasts. The Southeast Area TTWP uses these forecasts for its projections of municipal water requirements.

3.1.2 Other Water Use Categories

Projecting manufacturing water use requires information on several industry specific issues. These include national and statewide growth outlooks for various industry categories, regional and county shares of manufacturing output, historical water use records, and industry-specific water use efficiencies. TWDB expects reduced manufacturing water use due to lower rates of regional industrial growth. Additional savings are predicted to result from efficiencies due to the expansion of new plants or rehabilitation of older plant processes.⁵ The methodology makes two assumptions regarding industry growth; 1) industry growth reflects the expansion of existing capacity and new manufacturing locations, and 2) the historical relationship between the price of oil and industrial ac-

tivity continues over the next 50 years. Several scenarios have been prepared reflecting these assumptions. The scenario that assumes that oil prices will remain stable in the \$18—\$23 per barrel range for West Texas Intermediate Crude has been selected as the “most likely” projection series. TTWP uses this series for its analysis.

Irrigation water demand projections are based on crop-specific prices, yields, production costs, water costs, acres under production; irrigation systems and improvements in water use efficiency; and federal farm policy. The TWDB, working with Texas A&M University, developed a model to evaluate and assess factors affecting irrigation water demand in Texas. The model maximized farm income based on the profitability of specific crops and resources needed to produce those crops. Again, several series of forecasts for various scenarios were developed. The “most likely” series used in Trans-Texas Water Program analysis assumes changes in crop yields and federal farm payments, and the adoption of advanced irrigation technology.

Steam power electric generation water demand projections are based on power generation demands and an estimate of the water needed to produce that demand capacity. Power demands are based on current per capita power demand by utility-specific sectors; residential, commercial, governmental and “other.” Industrial power demands reflect utility sales records by standard industrial classification (SIC). Future demand estimates use information on historical water use patterns by power generating plants, planned plant ex-

pansions, ownership of fuel sources used for generation, plant operating characteristics and the impacts on demand of energy conservation. Two projection series were produced reflecting “high” and “low” water use scenarios. TTWP uses the “high” use series which assumes the use of existing plant technology with no change in electric power generation capacity and a water use rate equal to the average of water use between 1988 and 1991.

Calculations for livestock water demand multiply the number of livestock by the water consumption per unit of livestock. These consumption factors employ water use rates for each type of livestock. *Texas Agricultural Statistics* provided the current and historic number of various types of livestock. Water use for livestock is assumed to remain constant after the year 2000.

The mining category uses water for processing, leaching to extract ores, dust control and reclamation. Projected requirements are based on water coefficients for each type of mining operation, historical national and state trends in fuel and non-fuel production, and expected trends in the use of fuels for energy production. A single series of projections were produced due to the relatively small quantity of water consumed by mining use.

Table 3: State of Texas Total Water Demand by Water Use Type

Water Use Types	Water Demand (Acre-Feet/Year)					
	1990			2050		
	Texas	SE Area	%	Texas	SE Area	%
Municipal	3,178,398	777,542	24.5%	6,301,657	1,536,382	24.4%
Manufacturing	1,560,047	900,037	57.7%	2,564,547	1,435,446	56.0%
Irrigation	10,123,335	721,092	7.1%	8,177,217	469,917	5.7%
Livestock	274,069	27,780	10.1%	330,305	28,962	8.8%
Mining	148,839	18,263	12.3%	291,397	115,371	39.6%
Power	434,116	110,477	25.4%	937,900	253,500	27.0%
Total	15,718,804	2,555,191	16.3%	18,603,023	3,839,578	20.6%

3.2 Water Requirements for the State of Texas

Reviewing total water demand for the State of Texas provides perspective in understanding the overall relationship between the state water requirements and the Southeast Area's demands, both in the total amount of water use and the amount of water by use type. Based on the Consensus Water Planning data, total water demands for the state increase 98% over the 50 year planning horizon. This increase and the distribution of demand by water use types is reflected in Table 3. Distribution of this demand by use types changes to reflect the changing population, and manufacturing and industrial activities predicted for the state over the next 50 years.

In 1990, irrigation uses account for the largest portion of the State of Texas requirements, representing 64% of total demand. Based on the TWDB "most likely" series, the projected 2050 demand for irrigation use requires only 44% of the State's total water. This reduction in irrigation demand results from more efficient irrigation technology, conservation, and reduc-

tion of irrigated acreage. Reductions in irrigation demand are offset by increases in municipal and manufacturing categories. Population and economic growth over the 50 year study period supports projected increases in municipal and manufacturing water demand.

3.3 Water Requirements for the Southeast Area

Projected water demands for the Southeast Area have been extracted from the statewide projections. Data are arranged in tables by river basin with data on each county by water use type. Appendix C of this memorandum contains detailed water demand data tables. Table 4 is a summary of the Southeast Area's total water demand by basin. These projected demands represent only water requirements which must be satisfied through inland surface or ground water supplies.

The cumulative water demands for all eight basins in the Southeast Area increase 146% from the 2.6 million acre-feet/year required in 1990 to a projected need of 3.8 million acre-feet/year in 2050. By percentage, the largest predicted increases in

Table 4: Water Requirements for the Southeast Area

River Basin	Total Water Demand (thousands of acre-feet per year)						
	1990	2000	2010	2020	2030	2040	2050
Sabine River Basin	79.5	86.0	93.9	102.4	111.0	123.1	135.8
Neches River Basin	245.7	261.4	275.4	287.3	299.4	321.7	344.8
Neches-Trinity Coastal Basin	397.2	329.9	316.6	304.4	303.1	306.7	310.6
Trinity River Basin	141.3	138.5	141.0	144.0	148.1	159.3	174.5
Trinity-San Jacinto Coastal Basin	128.5	143.2	147.9	152.6	156.9	167.0	179.9
San Jacinto River Basin	786.4	949.7	1030.9	1128.7	1201.4	1298.3	1386.4
San Jacinto-Brazos Coastal Basin	405.1	464.2	497.8	529.7	567.7	617.9	668.4
Brazos River Basin	371.6	427.3	463.4	492.7	529.1	583.2	639.2
Total, Southeast Area	2555.3	2800.0	2967.0	3141.9	3316.8	3577.0	3839.6

demand occur in the San Jacinto, Brazos and Sabine River basins. Figure 4 displays these increases in the total water demand, as well as the incremental increases for each basin as components of the Southeast Area's total water demand. Shifts in the distribution of the total water demand by use category occur in the Southeast Area. Municipal water demands increase as the area continues to urbanize. Reductions in irrigation demand follow statewide trends as a result of improvements in conserva-

tion and irrigation technology and the re-development of cultivated and grazing acreage for municipal or industrial purposes. Figure 5 illustrates these shifts in water use demand.

Reviewing the total Southeast Area water demands relative to total water demands for the State of Texas, there is an increase in the region's share over the 50 year TTWP time horizon. In 1990, the Southeast Area water requirements represent

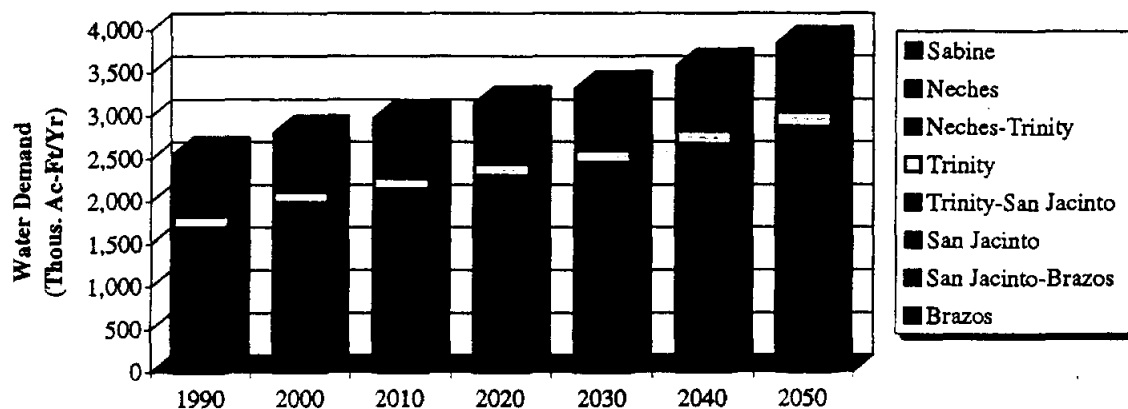


Figure 4: Cumulative Water Requirements for the Southeast

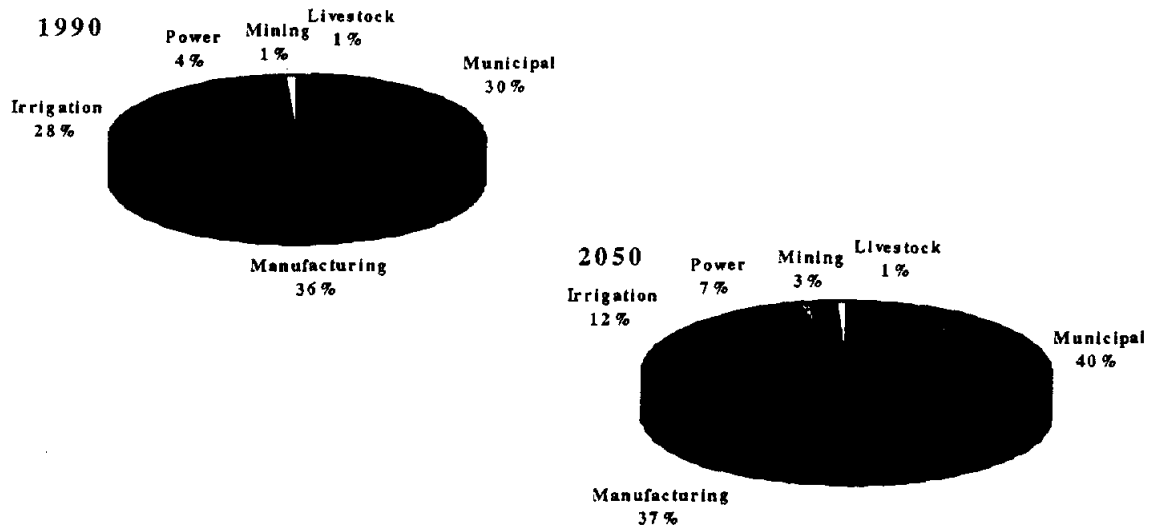


Figure 5: Shifts in Southeast Area Water Requirements, 1990 & 2050

16% of the total state water use in 1990. This percentage increases to 21% by the year 2050.

While irrigation is currently the predominant use category within Texas, municipal and manufacturing uses drive future water needs within the Southeast Area. More importantly, while irrigation continues as the largest future single water use statewide, the Southeast Area demand shifts significantly from irrigation to municipal water uses. Municipal uses are projected to surpass manufacturing as the highest use category as the Southeast Area undergoes a shift from a rural to an urban environment.

3.4 Water Requirements for the Houston Metro Region

The Houston Metro demand data represents 70 percent of the total Southeast Area demand in 1990 and is projected to account for 73 percent of the total Southeast Area demand by 2050. Based on the

1990 total water demand, an additional million acre-feet per year of water demand is projected for 2050. Detailed metro data tables are included in Appendix D of this memorandum. Table 5 and Figure 6 summarize these data and display the total Metro water demand by basin.

Water demand is distributed among water use types consistent with shifts noted in both the State and Southeast Area water demand projections. Increases in municipal and manufacturing uses and decreases in irrigation use are projected to occur.

3.5 West-Central Area Water Requirements

In addition to water demands within the Southeast study area, one of the objectives of the TTWP is to evaluate the potential for “surplus” supplies in the Southeast Area to be used to serve the other study

Table 5: Water Requirements for the Houston Metro Area

River Basin	Water Demand (Thousands of Acre-Feet/Year)						
	1990	2000	2010	2020	2030	2040	2050
Neches	9	7	6	6	6	5	5
Neches-Trinity	106	87	79	72	70	68	66
Trinity	116	109	101	97	97	96	96
Trinity-San Jacinto	128	143	148	153	157	167	180
San Jacinto	782	943	1,024	1,122	1,194	1,291	1,379
San Jacinto-Brazos	405	464	498	530	567	618	668
Brazos	262	302	326	342	358	387	416
Total, Houston Metro	1,808	2,056	2,183	2,321	2,449	2,632	2,810

areas. The boundary between the Southeast Area and the West-Central Area is basically along the Brazos River. One of the objectives of the TTWP is to evaluate the feasibility of supplying water needs that occur west of the Brazos using water from east of the Brazos. The PMC has developed three water demand scenarios for water needs west of the Brazos River based on the "management plan" developed by the TWDB for the Southern Edwards aquifer region. Specifically, three scenar-

ios were developed for the West-Central water requirements, as shown in Table 6

Scenario 1: Under this plan, transfer of additional water from the southeast would begin in 2010 and would increase to 600,000 acre-feet per year by 2050.

Houston Metro Region Cumulative Water Demand

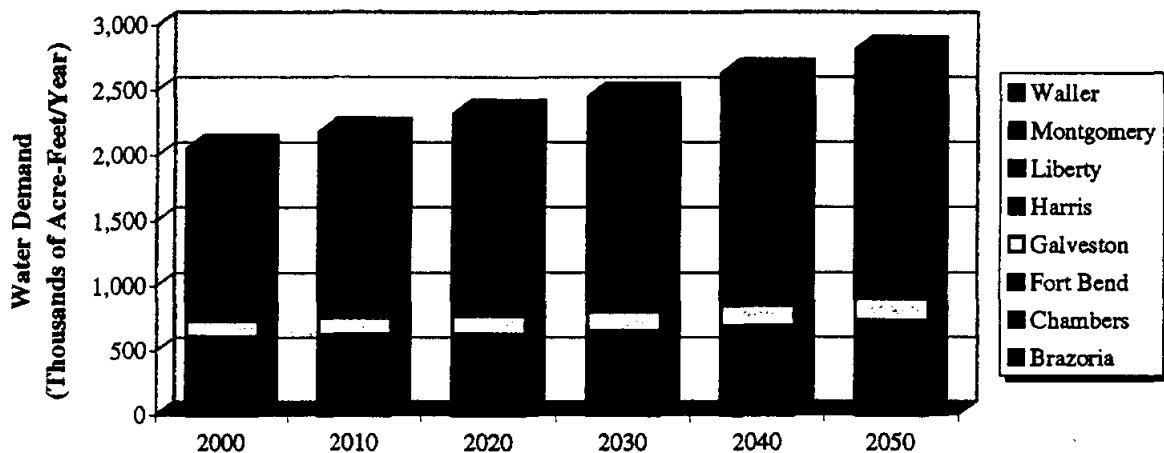


Figure 6: Houston Metro Region Cumulative Water Demand

Scenario 2: This plan begins transfers in year 2020 that increase in 2050 to 300,000 acre-feet per year.

Scenario 3: This scenario assumes zero transfers of water from the Southeast area west of the Brazos River.

Table 7 presents the total water requirements for the entire Trans-Texas Water Program study area by incorporating the Southeast area demand requirements with each of the above scenarios.

Table 6: West-Central Area Water Requirements

<i>Scenario</i>	Water Demand (Thousand Acre-Feet/Year)					
	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
1	-	-	150	300	450	600
2	-	-	-	100	200	300
3	-	-	-	-	-	-

Table 7: Trans-Texas Program Water Requirements

<i>Area</i>	Water Demand (Thousand Acre-Feet/Year)					
	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Scenario 1	2800	2967	3292	3617	4027	4440
Scenario 2	2800	2967	3142	3417	3777	4140
Scenario 3	2800	2967	3142	3317	3577	3840



4. Water Supply and Availability

Water resource planning balances a community's water requirements with its available water supply. An understanding of both current and future water requirements and of the current and future water supply are necessary in the planning process. The previous section of this report, "Water Use Requirements," discussed water demand projections for the river and coastal basins in the Southeast Area. This section defines the total available water supply for each basin in the Southeast Area. These two quantities, the available water supply and water requirements, are used to calculate the surplus or deficit water availability for each basin in the Southeast Area for the years 2000 through 2050.

Groundwater, surface water captured in reservoirs, and run-of-the-river sources comprise the available water supply within a river basin. Section 3.0 of the *Trans-Texas Water Program, Southeast Area*

*Phase I Report*⁶ defines, in detail, the sources and amounts of groundwater and surface water supplies in the Southeast Area. This information is summarized below. Additionally, some of this supply data has been revised for use in the Phase II analyses. Modifications of the original Phase I data are discussed in detail in the following sections.

4.1 Groundwater Supplies

The largest source of groundwater in the Southeast Area is the Gulf Coast aquifer. The other major aquifer in the study area is the Carrizo-Wilcox. There are also three minor aquifers in this part of the state; Sparta, Queen City and Brazos River Alluvium.

As explained in the *Phase I Report*, there are various constraints restricting the expanded use of groundwater including water quality, subsidence, and the location of the supply aquifers with respect to the demand

Table 8: Estimated Groundwater Pumpage in the Southeast Area

<i>River Basin</i>	Amount of Pumpage (Thousand Acre-Feet/Year)					
	2000	2010	2020	2030	2040	2050
Sabine	23.3	23.3	23.3	23.4	23.5	23.6
Neches	110.5	111.6	112.8	114.6	116.3	118.3
Neches-Trinity	7.5	7.9	8.3	8.7	8.8	9.0
Trinity	34.3	36.6	38.7	41.2	43.8	46.7
Trinity-San Jacinto	26.6	25.7	31.1	27.9	29.6	30.1
San Jacinto	451.7	292.3	251.1	266.3	280.5	291.8
San Jacinto-Brazos	74.9	80.9	87.1	87.8	88.8	89.7
Brazos	130.5	141.9	156.1	169.4	181.1	197.3
Total	859.3	720.2	708.5	739.3	772.4	807.4

centers. The *Phase I Report* groundwater estimates for Harris and Galveston counties are based on by the Harris Galveston Coastal Subsidence District's (HGCSO) ground water conversion plan.

HGCSO is currently updating planning forecasts on future ground water pumpage though revised projections are not yet available. The TWDB has completed preliminary analysis of updated Houston-area water demands and the application of the HGCSO's current groundwater policy. The TWDB has produced preliminary estimates of projected ground water pumpage for the area. This *Phase II Planning Update* report revises the Phase I groundwater projections by including the TWDB's groundwater estimates for Harris and Galveston counties. Table 8 reflects the adjusted estimated groundwater pumpage in the study area for the fifty year planning period.

4.2 Surface Water Supplies

Surface water supply includes both reservoir and run-of-the-river sources. The *Phase I Report* provides an explanation of the current conditions in each basin with regard to surface reservoirs and run-of-the-river supplies. It should be noted that neither the Phase I nor Phase II analysis includes *future* water development projects, even when these projects are included in the Texas Water Plan. The estimated

yields used in the Phase I analysis were obtained from the Texas Natural Resource Conservation Commission and from individual river authority reports. Phase II data incorporates several adjustments to these surface water supply estimates as detailed in the following sections.

4.2.1 Surface Reservoirs

The estimated firm dependable yields available from existing reservoirs and reservoirs under construction in the study area are listed in Table 9 extracted from the *Phase I Report*. This table summarizes a detailed analysis of the surface water supply in each basin including information on specific reservoir and system yields found in Section 3 of the *Phase I Report*. One change in the Phase II surface water supply estimates occurs in the yield of the Lake Livingston and Wallisville reservoirs. Previous estimates did not account for the full permitted supplies of Lake Livingston and Wallisville reservoirs. They were based upon consideration of higher priority upstream water rights which have not yet developed. However the permitted values can be assumed to accurately represent the system's dependable yield and the Phase II analysis reflects the system's permitted rights of 1.345 million acre-feet per year, an increase of 190,500 acre-feet per year over the previously reported amount.

A second modification in this Phase II document has been made concerning surface water supplies within the San Jacinto-Brazos coastal basin. The Phase I report assumed that surface water supplied within the Southeast Area coastal basins did not reflect dependable yields and therefore were not included as available supplies. Review of the permitted yields within the lower Brazos River Basin indicates that two permits for Brazos River flow, the Chocolate Bayou Water Company and the

Richmond Irrigation/Houston Lighting & Power, are backed-up through use of off-channel surface reservoirs within the San Jacinto-Brazos basin. These two permits total 40,000 and 17,784 acre-feet per year of dependable yield, respectively. The addition of these two permits will create a total supply of approximately 57,800 acre-feet per year within the San Jacinto-Brazos coastal basin.

Table 12, Southeast Area Water Supply Availability: 2000 - 2050, reflects the full

Table 9: 2050 Surface Reservoir Yields

<i>River Basin</i>	<i>Acre-Feet per Year</i>
<u>Sabine River Basin</u>	
Toledo Bend	1,043,300
<u>Neches River Basin</u>	
Rayburn/Steinhagen Reservoir System	664,300
Other Reservoirs	44,900
<u>Trinity River Basin</u>	
Lake Livingston	1,255,500
Wallisville Salt Water Barrier (under construction)	89,700
Other Reservoirs	11,200
<u>San Jacinto River Basin</u>	
Lake Houston	151,400
Lake Conroe	99,950
Other Reservoirs	6,300
<u>Brazos River Basin</u>	
Brazos River Authority System	188,100
Lake Limestone	63,400
Other Reservoirs	22,900
<u>San Jacinto-Brazos Coastal Basin</u>	
Off-Channel Reservoirs*	57,800
Total Existing Surface Reservoir Yield Available in the Study Area	3,698,750

*Based on Chocolate Bayou Water Company (40,000 af/y) and Richmond Irrigation/HL&P (17,784af/y) permits.

permitted yield for Lake Livingston and Wallisville reservoirs and the additional supply within the San Jacinto-Brazos coastal basin.

4.2.2 Run of River

Run-of-the-river supplies are, in some river systems, significant sources of yield due to the appreciable amount of uncontrolled drainage area between the most downstream impoundment and the available diversion points near the mouth of the river. In general, the run-of-the-river yields are estimates based upon the best available data in each basin as established by previous analyses associated with water rights adjudication in the basin. An explanation of run-of-the-river supplies for the Sabine, Neches, Trinity and Brazos Rivers is included in the *Phase I Report* and summarized in Table 10.

The Phase I report listed run-of-river yield within the Trinity River Basin for the "fixed rights" permits downstream of Lake Livingston. This yield of 180,300 acre-feet per year is considered dependable yield because it is backed-up with storage yield from Lake Livingston. Since the yield of Lake Livingston is accounted for within the Surface Reservoir Yield category, the associated fixed rights run-of-river yield will be omitted from Phase II.

Table 10: Run of River Yields

<i>Basin</i>	<i>Yield (Acre-Feet/Year)</i>
Sabine River	147,100
Neches River	137,700
Brazos River	211,000
Total, Run-of-the-River	495,800

4.3 Water Supply Availability

The determination of water supply availability for specific basins and within specific time frames is computed by comparing total water demands and the dependable water supply for each area for each period. The water demand projections used in this analysis are extracted from Table 4: Water Requirements for the Southeast Area, in Section Three of this memorandum. Projected water supply estimates were derived from data on groundwater and surface water supplies in each basin.

Estimates of future groundwater supply are taken from Table 8. Predicted surface water supply is calculated by combining the reservoir and run-of-the-river yields as reported in Table 9 and Table 10. The total water supply reported for each basin at each time period is the combined quantity of ground and surface water supplies projected for the river basin.

In addition to in-basin supplies, imported and exported water supplies are reflected in the water availability calculations. The amount of these transfers is based upon current water rights and contractual agreements established by the primary water suppliers. Section Two of the *Phase I Report*⁷ discussed these water imports and

exports. Table 11 reflects specific existing interbasin transfer permits and contracts included in the analysis of available supply. The quantity of imported supply for the Sabine, Neches, Trinity and Brazos River Basins is determined by contract and permit records. For the coastal basins, Neches-Trinity, Trinity-San Jacinto, and San Jacinto-Brazos and the San Jacinto River Basin, the quantity of imported supply is calculated as the difference between the total in-basin demand and the total in-basin supply. The level of imported supply is controlled by existing contracts and permits. This analysis assumes that exporting basins will honor existing contracts and permits. It further assumes that exporting basins will con-

tinue to export surface water but only after in-basin demands are satisfied.

Table 12: Southeast Area Water Supply Availability: 2000—2050, is the comparison of the projected future water demands and the estimated water supply for basins in the Southeast Area through the year 2050. Data is reported by river and coastal basins to indicate the approximate location and timing of water supply surplus or deficit conditions in the region. This table illustrates the total water demand, the amount of in-basin supply, the amount of transferred supply and the quantity of surface water available in each basin.

Table 11: Surface Water Imports and Exports

IMPORTS (Thousands of Acre-Feet/Year)							
Basin	1990	2000	2010	2020	2030	2040	2050
Sabine	2.6	0.9	1.0	1.0	1.0	1.0	1.1
Neches	1.0	1.4	2.0	2.6	4.1	4.6	5.1
Neches-Trinity	321.1	322.4	308.7	296.1	294.4	297.7	301.6
Trinity	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinity-San Jacinto	114.7	116.6	122.2	121.5	129.0	123.5	123.5
San Jacinto	400.9	300.3	540.9	679.9	726.2	710.9	710.9
San Jacinto-Brazos	206.4	331.5	359.1	384.8	422.1	460.8	476.3
Brazos	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	1,046.8	1073.1	1333.9	1485.9	1576.8	1598.7	1618.5

EXPORTS (Thousands of Acre-Feet/Year)							
Basin	1990	2000	2010	2020	2030	2040	2050
Sabine	0.8	1.4	2.0	2.6	4.1	4.6	5.3
Neches	230.7	280.5	279.5	266.9	265.3	268.7	272.2
Neches-Trinity	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinity	672.6	582.5	839.2	993.4	1072.6	1075.3	1075.4
Trinity-San Jacinto	0.0	0.0	0.0	0.0	0.0	0.0	0.0
San Jacinto	54.1	60.0	60.0	60.0	60.0	60.0	60.0
San Jacinto-Brazos	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazos	88.6	148.7	153.2	163.0	174.7	190.1	205.6
TOTAL	1,046.8	1073.1	1333.9	1485.9	1576.8	1598.7	1618.5

As shown, current existing Southeast Area water supplies can meet all projected demands through year 2010. The Brazos basin will experience the earliest water supply shortfalls, by year 2020. The basins within the Houston metro region will experience water supply shortfalls after approximately 2030.

Table 13 represents the Southeast Area's potential impact on the overall Trans-Texas Water Program. Each scenario, discussed in Section 3.5 of this document, assumes a different level of water demand

required for the other TTWP areas. Table 13 compares projected West-Central water demands to the existing Southeast Area available water supplies as defined in Table 12. It indicates that even assuming Scenario 1 export levels, the worst case situation for the West and South Central Areas, there would remain surplus Southeast Area supply of 70.4 thousand acre-feet per year. Surplus supplies available under Scenario 3 (no export of Southeast Area supply to other TTWP areas) are projected to be 670.4 thousand acre-feet per year.

Table 12: Southeast Area Water Supply Availability: 2000—2050

Category	Amount (Thousands of Acre-Feet/Year)								
	Sabine	Neches	Neches		Trinity-		San		Total Southeast
			-Trinity	Trinity	San Jacinto	San Jacinto	-Brazos	Brazos	
2000									
In-Basin Demands	86.0	261.4	329.9	138.5	143.2	949.7	464.2	427.3	2800.2
In-Basin Supplies									
Groundwater	23.3	110.5	7.5	34.3	26.6	451.7	74.9	130.5	859.3
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	488.2	4197.6
TOTAL	1213.7	957.4	7.5	1390.7	26.6	709.4	132.7	618.7	5056.7
Transfers									
Imported Supplies	0.9	1.4	322.4	0.0	116.6	300.3	331.5	0.0	1073.1
Export Demands	1.4	280.5	0.0	582.5	0.0	60.0	0.0	142.9	1073.1
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	844.3	207.8	0.0	669.7	0.0	0.0	0.0	42.7	1764.5
2010									
In-Basin Demands	93.9	275.4	316.6	141.0	147.9	1,030.9	497.8	463.4	2966.9
In-Basin Supplies									
Groundwater	23.3	111.6	7.9	36.6	25.7	292.3	80.9	141.9	720.2
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	487.6	4196.8
TOTAL	1213.7	958.5	7.9	1393.0	25.7	550.0	138.7	629.5	4917.0
Transfers									
Imported Supplies	1.0	2.0	308.7	0.0	122.2	540.9	359.1	0.0	1333.9
Export Demands	2.0	279.5	0.0	839.2	0.0	60.0	0.0	153.2	1333.9
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	835.8	196.5	0.0	412.8	0.0	0.0	0.0	12.9	1458.1
2020									
In-Basin Demands	102.4	287.3	304.4	144.0	152.6	1,128.7	529.7	492.7	3141.9
In-Basin Supplies									
Groundwater	23.3	112.8	8.3	38.7	31.1	251.1	87.1	156.1	708.5
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	487.1	4196.3
TOTAL	1213.7	959.7	8.3	1395.1	31.1	508.8	144.9	643.2	4904.8
Surface Water Transfers									
Imported Supplies	1.0	2.6	296.1	0.0	121.5	679.9	384.8	0.0	1485.9
Export Demands	2.6	266.9	0.0	993.4	0.0	60.0	0.0	163.0	1485.9
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	826.7	199.0	0.0	257.7	0.0	0.0	0.0	-12.5	1271.0

Table 12: Southeast Area Water Supply Availability: 2000 2050, Continued.

Category	Amount (Thousands of Acre-Foot/Year)								
	Sabine	Neches	Neches -Trinity	Trinity	Trinity- San Jacinto	San Jacinto	San Jacinto -Brazos	Brazos	Total Southeast
2030									
In-Basin Demands	111.0	299.4	303.1	148.1	156.9	1,201.4	567.7	529.1	3316.7
In-Basin Supplies									
Groundwater	23.4	114.6	8.7	41.2	27.9	266.3	87.8	169.4	739.3
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	486.6	4195.8
TOTAL	1213.8	961.5	8.7	1397.6	27.9	524.0	145.6	656.0	4935.1
Surface Water Transfers									
Imported Supplies	1.0	4.1	294.4	0.0	129.0	726.2	422.1	0.0	1576.8
Export Demands	4.1	265.3	0.0	1072.6	0.0	60.0	0.0	174.7	1576.7
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	816.8	191.8	0.0	176.9	0.0	-11.2	0.0	-47.8	1126.5
2040									
In-Basin Demands	123.1	321.7	306.7	159.3	167.0	1,298.3	617.9	583.2	3577.2
In-Basin Supplies									
Groundwater	23.5	116.3	8.8	43.8	29.6	280.5	88.8	181.1	772.4
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	486.0	4195.2
TOTAL	1213.9	963.2	8.8	1400.2	29.6	538.2	146.6	667.1	4967.6
Surface Water Transfers									
Imported Supplies	1.0	4.6	297.7	0.0	123.5	710.9	460.8	0.0	1598.7
Export Demands	4.6	268.7	0.0	1075.3	0.0	60.0	0.0	190.1	1598.7
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	804.3	168.3	0.0	165.6	-13.9	-109.2	-10.5	-106.2	898.4
2050									
In-Basin Demands	135.8	344.8	310.6	174.5	179.9	1,386.4	668.4	639.2	3839.6
In-Basin Supplies									
Groundwater	23.6	118.3	9.0	46.7	31.0	291.8	89.7	197.3	807.4
Surface Water	1190.4	846.9	0.0	1356.4	0.0	257.7	57.8	485.4	4194.6
TOTAL	1214.0	965.2	9.0	1403.1	31.0	549.5	147.5	682.7	5002.0
Transfers									
Imported Supplies	1.1	5.1	301.6	0.0	123.5	710.9	476.3	0.0	1618.5
Export Demands	5.3	272.2	0.0	1075.4	0.0	60.0	0.0	205.6	1618.5
In-Basin Reserves	282.9	209.1	0.0	0.0	0.0	0.0	0.0	0.0	492.0
Net Surface Water Availability	791.0	144.2	0.0	153.2	-25.4	-186.0	-44.6	-162.1	670.4

Table 13: Trans-Texas Water Program Supply Availability: 2000-2050

<i>Category</i>	Amount (Thousands of Acre-Feet/Year)					
	2000	2010	2020	2030	2040	2050
<u>Scenario 1</u>						
Available Southeast Supply	1764.5	1458.1	1271	1126.5	898.4	670.4
West-Central Demand	-	-	150	300	450	600
Net Surface Water Availability	1764.5	1458.1	1121	826.5	448.4	70.4
<u>Scenario 2</u>						
Available Southeast Supply	1764.5	1458.1	1271	1126.5	898.4	670.4
West-Central Demand	-	-	-	100	200	300
Net Surface Water Availability	1764.5	1458.1	1271	1026.5	698.4	370.4
<u>Scenario 3</u>						
Available Southeast Supply	1764.5	1458.1	1271	1126.5	898.4	670.4
West-Central Demand	0	0	0	0	0	0
Net Surface Water Availability	1764.5	1458.1	1271	1126.5	898.4	670.4



5. Conclusion

New planning information data and the subsequent analysis of these data indicate the need to reevaluate the projected long range water management objectives for the Trans-Texas Water Program, Southeast Area. This document presents the revised data being used in the TTWP Phase II analyses. A brief review of the differences between the Phase I and Phase II information and the primary conclusions drawn from the analysis of these data may be helpful in assessing the impacts of the data revisions on the overall program.

5.1 Population

Phase II projected populations for the Southeast Area were slightly increased, about 2%, for most of the study time peri-

ods. These increases result from stronger growth in the Houston Metro region. Populations in the San Jacinto, San Jacinto-Brazos and Brazos basins, the high-growth Houston Metro Region, are projected to grow at rates higher than previously expected. The Phase II 2050 population for those areas is increased by over 3%. Decreased rates of growth are predicted for the Sabine, Neches, Neches-Trinity and Trinity basins. Figure 7 illustrates the difference between the Phase I and Phase II population projections for the Southeast Area.

5.2 Water Requirements

Projected Phase II water demand are reduced from Phase I projections by 18% through the year 2050. Figure 8 displays

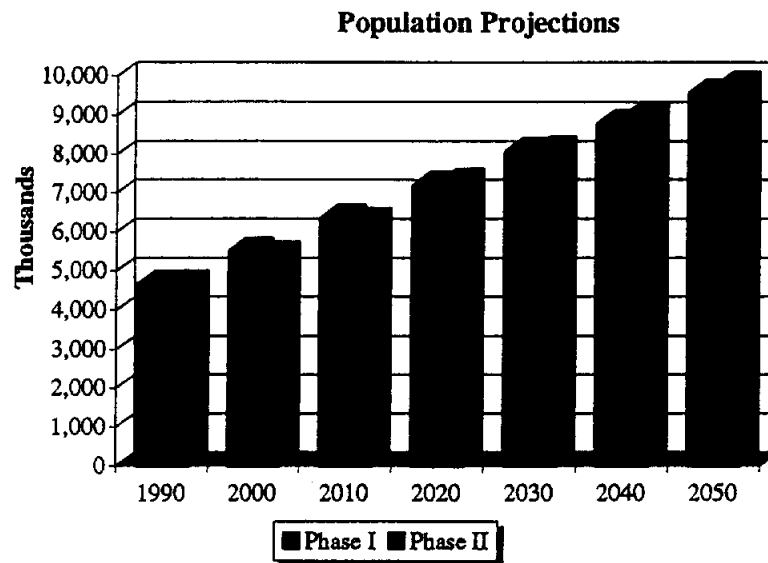


Figure 7: Comparison of Population Projections

the variance between the revised water demand projections. These reductions reflect the revised population projections; but the primary reason for the changes in the water demand projections is the application of different assumptions regarding per capita water use projections for municipal demand and regional industrial growth for manufacturing demands. Additional reductions in demand result from water conservation savings and lower irrigation demands for the area.

The Phase II projections assume lower rates for per capita water use. The new rates reflect a methodology which employed shorter periods of historical records to predict per capita use. While population projections for the Houston area indicate an increase over the Phase I estimates, the rate of per capita water use declines.

The assumption regarding manufacturing demand reflects a lower rate of regional industrial growth predicted for the Houston area by the federal Bureau of Economic Analysis in figures released in early 1990.

Application of this assumption results in significant reductions to the manufacturing water demand for the Houston area over the project period. Higher levels of conservation savings in the irrigation use category is expected due to technological improvements, market forces and shifts in land use from rural to urban.

Water demand for irrigation uses is reduced significantly, from 28% of total demand in 1990 to 12% by the year 2050, while municipal uses increase from 30% to 40% over the same time frame. There will be fewer acres under cultivation as the region undergoes a shift from rural, agriculturally centered land use to more urbanized development. This shift, coupled with the improved efficiency of irrigation technologies, results in the reduced projected irrigation demand.

5.3 Water Supply

In comparison to the information within the *Phase I Report*, existing ground water

Southeast Area Water Demand

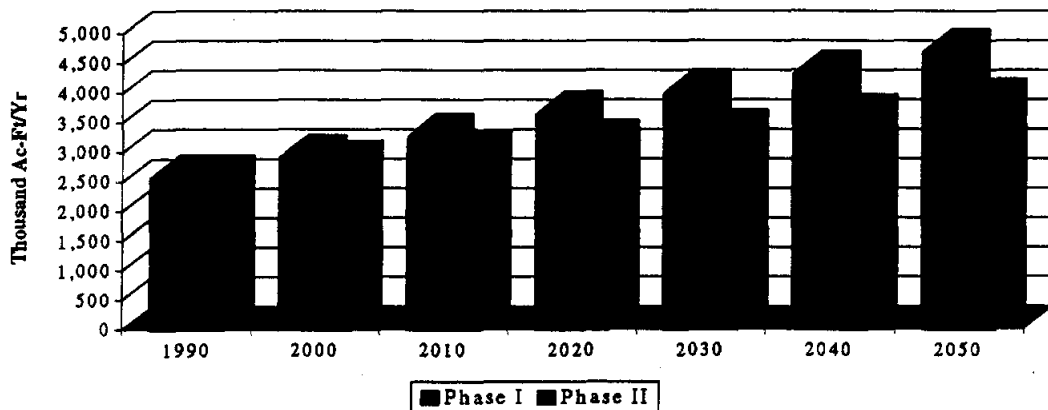


Figure 8: Comparison of Water Demand

and surface water conditions within the Southeast Area result in a net decrease of 82,100 acre-feet per year in total supply. Estimates of the 2050 surface water supply increased by 68,000 acre-feet per year, principally as a result of larger available surface water supplies in the San Jacinto - Brazos River Basin. Estimates of the 2050 available groundwater in Harris and Galveston counties decreased by 150,100 acre-feet per year.

5.4 Impacts of Data Revision

These revised Phase II data indicate a different picture of the long term water availability for the Southeast Area in comparison to the previous Phase I report.

- The revised water demands indicate that current water supplies will be adequate to satisfy the Southeast Area's needs for a longer period of time than previously expected.
- The eight county Houston Metro Region, while requiring significantly less water than previously predicted, will continue to be the major water demand center for the Southeast Area. The region will experience supply shortages by approximately 2030, twenty five years later than previously expected. While there are surplus water supplies in the Southeast Area localized shortages are still expected to occur before the end of the project period.
- Substantial surplus surface water supplies will be available through the next fifty year period in the Sabine, Neches, and Trinity River Basins. Sabine Basin supplies will be over eight times larger than projected in-basin demands in the year 2050.
- After all Southeast Area needs are met there are adequate surplus water supplies in the Southeast Area to serve all of the projected Trans-Texas Water Program projected demand requirements, including the West-Central Area.
- In the year 2050, after all of the TTWP Scenario 1 (worst case) water demands are met with existing Southeast Area supplies, an additional 70,400 acre-feet per year of supply will continue to be available. Existing Southeast Area water supplies are sufficient to serve approximately one third of the State of Texas' future water demands, over the fifty year planning period.
- Environmental water requirements are still undefined. The supply needed to provide for environmental water demands will be allocated from available supply. This additional water demand will reduce the volume of supply available.



6. References

¹Water Demand/Drought Management Technical Advisory Committee of the Consensus-Based State Water Plan. *Water for Texas—Today and Tomorrow A 1996 Consensus-Based Update to the Texas Water Plan, Volume III, Water Use Planning Data Appendix*, January 1995.

²*Ibid*, page 3.

³*Ibid*, page 8.

⁴ *Ibid*, page 13.

⁵ *Ibid*, page 19.

⁶*Trans-Texas Water Program Southeast Area Phase I Report*, Brown & Root and Freese & Nichols, February 1995.

⁷*Ibid*, pages 2-19—2-20 and Appendix J.

APPENDICES

Appendix A: Southeast Area Population Data

Appendix B: Metro Population Data

Appendix C: Southeast Area Water Demand Data

Appendix D: Metro Water Demand Data

Appendix A
SOUTHEAST AREA POPULATION DATA

BRAZOS BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
AUSTIN	16,961	19,097	21,609	24,643	27,732	31,018	34,910
BRAZORIA	13,547	15,515	16,930	18,783	21,384	23,348	26,813
BRAZOS	121,862	135,886	155,674	173,175	192,098	212,502	233,492
BURLESON	13,625	14,914	16,089	17,210	18,107	18,754	20,056
FORT BEND	62,855	75,854	99,367	129,371	165,899	207,064	249,693
GRIMES	13,397	15,180	17,158	18,972	20,604	20,153	21,523
LEON	2,285	2,537	2,859	3,193	3,495	3,820	4,130
MADISON	652	657	686	694	686	663	626
ROBERTSON	15,511	16,631	17,977	19,252	20,195	21,078	22,273
WALLER	17,716	20,811	26,384	31,910	37,451	43,502	51,044
WASHINGTON	26,062	30,019	33,061	35,471	36,429	35,581	32,891
BASIN TOTAL	304,473	347,101	407,794	472,674	544,080	617,483	697,451

NECHES BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
ANGELINA	69,884	77,252	82,800	88,464	94,101	99,436	105,173
HARDIN	41,278	49,094	53,936	58,332	62,930	68,514	74,597
HOUSTON	4,558	5,120	5,297	5,519	5,761	5,970	6,227
JASPER	19,765	20,887	22,044	23,165	24,451	25,545	26,701
JEFFERSON	55,745	60,733	62,897	65,316	66,923	68,717	70,662
LIBERTY	1,875	2,065	2,293	2,526	2,789	3,069	3,298
NACOGDOCHES	54,753	63,382	72,560	82,400	95,373	107,184	117,624
NEWTON	13	13	14	14	13	13	12
ORANGE	26,196	29,568	31,610	32,664	34,031	36,196	38,107
POLK	8,318	10,694	11,938	13,438	15,130	16,448	17,638
SABINE	2,812	3,094	3,323	3,498	3,583	3,689	3,804
SAN AUGUSTINE	7,214	7,458	7,859	8,181	8,642	8,844	9,049
SHELBY	1,939	1,986	2,023	2,090	2,165	2,237	2,307
TRINITY	3,779	3,994	4,182	4,323	4,470	4,678	4,979
TYLER	16,646	18,860	21,094	24,053	26,490	27,788	28,447
BASIN TOTAL	314,775	354,200	383,870	413,983	446,852	478,328	508,625

**Appendix A
SOUTHEAST AREA POPULATION DATA**

NECHES-TRINITY BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	7,642	9,405	12,533	16,003	18,005	19,434	20,545
GALVESTON	3,074	2,139	2,397	3,022	3,698	3,625	2,402
JEFFERSON	183,652	197,930	205,118	212,053	216,200	220,853	225,893
LIBERTY	84	92	102	116	131	144	158
BASIN TOTAL	194,452	209,566	220,150	231,194	238,034	244,056	248,998

SABINE BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
JASPER	11,337	12,267	12,941	13,589	14,329	14,964	15,556
NEWTON	13,556	14,271	14,900	15,172	15,231	14,967	14,567
ORANGE	54,313	59,943	65,092	68,949	73,382	77,802	81,949
SABINE	6,774	7,592	8,252	8,704	8,864	9,086	9,333
SAN AUGUSTINE	785	787	802	813	830	837	843
SHELBY	20,095	21,073	21,914	22,852	23,878	24,796	25,710
BASIN TOTAL	106,860	115,933	123,901	130,079	136,514	142,452	147,958

SAN JACINTO BASIN - POPULATION TOTAL

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
FORT BEND	45,204	69,986	94,485	125,412	162,480	204,225	256,413
GRIMES	3,649	4,277	4,956	5,597	6,188	6,101	6,990
HARRIS	2,496,331	2,829,155	3,247,165	3,767,002	4,065,775	4,432,601	4,679,108
LIBERTY	14,974	16,781	19,483	22,189	25,471	27,212	29,113
MONTGOMERY	182,201	252,890	329,131	419,954	522,783	632,174	742,588
SAN JACINTO	7,479	9,959	12,546	15,164	17,506	19,706	22,148
WALKER	15,536	17,442	19,502	21,346	24,011	25,800	26,145
WALLER	5,674	7,449	9,953	12,161	14,565	17,047	20,201
BASIN TOTAL	2,771,048	3,207,939	3,737,221	4,388,825	4,838,779	5,364,866	5,782,706

**Appendix A
SOUTHEAST AREA POPULATION DATA**

SAN JACINTO-BRAZOS BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
BRAZORIA	150,868	181,414	212,265	246,602	290,601	327,348	378,142
FORT BEND	105,264	147,148	198,464	263,251	340,688	428,321	519,122
GALVESTON	214,325	246,909	285,281	331,978	380,259	413,735	436,573
HARRIS	234,922	281,856	337,603	404,870	447,322	505,245	540,069
BASIN TOTAL	705,379	857,327	1,033,613	1,246,701	1,458,870	1,674,649	1,873,906

TRINITY BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	4,204	5,233	6,688	8,714	10,056	11,052	11,783
GRIMES	1,782	2,088	2,420	2,733	3,022	2,979	3,413
HARDIN	42	49	50	55	61	69	77
HOUSTON	16,817	17,680	18,273	18,993	19,791	20,478	21,282
LEON	10,380	11,717	13,202	14,744	16,142	17,639	19,069
LIBERTY	35,172	39,109	43,414	49,304	55,790	61,100	66,938
MADISON	10,279	10,553	10,861	10,990	10,862	10,498	9,917
POLK	22,369	28,792	32,142	36,181	40,733	44,285	47,486
SAN JACINTO	8,893	11,491	14,079	16,547	18,716	20,867	23,258
TRINITY	7,666	8,090	8,470	8,755	9,057	9,478	10,085
WALKER	35,381	45,114	51,678	57,512	65,625	71,132	75,485
BASIN TOTAL	152,985	179,916	201,277	224,528	249,855	269,577	288,793

TRINITY-SAN JACINTO BASIN - POPULATION DATA

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	8,242	10,633	12,578	15,288	17,020	18,507	19,569
HARRIS	86,946	106,678	123,101	143,128	154,652	171,687	185,545
LIBERTY	621	691	761	865	977	1,075	1,184
BASIN TOTAL	95,809	118,002	136,440	159,281	172,649	191,269	206,298

Appendix A
SOUTHEAST AREA POPULATION DATA

SUMMARY TABLE

BASIN	YEAR						
	1990	2000	2010	2020	2030	2040	2050
SABINE	106,860	115,933	123,901	130,079	136,514	142,452	147,958
NECHES	314,775	354,200	383,870	413,983	446,852	478,328	508,625
NECHES-TRINITY	194,452	209,566	220,150	231,194	238,034	244,056	248,998
TRINITY	152,985	179,916	201,277	224,528	249,855	269,577	288,793
TRINITY- SAN JACINTO	95,809	118,002	136,440	159,281	172,649	191,269	206,298
SAN JACINTO	2,771,048	3,207,939	3,737,221	4,388,825	4,838,779	5,364,866	5,782,706
SAN JACINTO-BRAZOS	705,379	857,327	1,033,613	1,246,701	1,458,870	1,674,649	1,873,906
BRAZOS	304,473	347,101	407,794	472,674	544,080	617,483	697,451

Appendix B
HOUSTON METRO POPULATION DATA BY BASIN

SAN JACINTO BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
FORT BEND	45,204	69,986	94,485	125,412	162,480	204,225	256,411
HARRIS	2,496,331	2,829,155	3,247,165	3,767,002	4,065,775	4,432,601	4,679,101
LIBERTY	14,974	16,781	19,483	22,189	25,471	27,212	29,111
MONTGOMERY	182,201	252,890	329,131	419,954	522,783	632,174	742,581
WALLER	5,674	7,449	9,953	12,161	14,565	17,047	20,201
BASIN TOTAL	2,744,384	3,176,261	3,700,217	4,346,718	4,791,074	5,313,259	5,727,421

SAN JACINTO - BRAZOS BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
BRAZORIA	150,868	181,414	212,265	246,602	290,601	327,348	378,141
FORT BEND	105,264	147,148	198,464	263,251	340,688	428,321	519,121
GALVESTON	214,325	246,909	285,281	331,978	380,259	413,735	436,571
HARRIS	234,922	281,856	337,603	404,870	447,322	505,245	540,061
BASIN TOTAL	705,379	857,327	1,033,613	1,246,701	1,458,870	1,674,649	1,873,901

BRAZOS BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
BRAZORIA	13,547	15,515	16,930	18,783	21,384	23,348	26,811
FORT BEND	62,855	75,854	99,367	129,371	165,899	207,064	249,691
WALLER	17,716	20,811	26,384	31,910	37,451	43,502	51,041
BASIN TOTAL	94,118	112,180	142,681	180,064	224,734	273,914	327,551

NECHES BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
LIBERTY	1,875	2,065	2,293	2,526	2,789	3,069	3,291
BASIN TOTAL	1,875	2,065	2,293	2,526	2,789	3,069	3,291

NECHES - TRINITY BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	7,642	9,405	12,533	16,003	18,005	19,434	20,541
GALVESTON	3,074	2,139	2,397	3,022	3,698	3,625	2,401
LIBERTY	84	92	102	116	131	144	151
BASIN TOTAL	10,800	11,636	15,032	19,141	21,834	23,203	23,101

Appendix B
HOUSTON METRO POPULATION DATA BY BASIN

TRINITY BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	4,204	5,233	6,688	8,714	10,056	11,052	11,783
LIBERTY	35,172	39,109	43,414	49,304	55,790	61,100	66,938
BASIN TOTAL	39,376	44,342	50,102	58,018	65,846	72,152	78,721

TRINITY - SAN JACINTO BASIN

COUNTY	YEAR						
	1990	2000	2010	2020	2030	2040	2050
CHAMBERS	8242	10633	12578	15288	17020	18507	19569
HARRIS	86946	106678	123101	143128	154652	171687	185545
LIBERTY	621	691	761	865	977	1075	1184
BASIN TOTAL	95809	118002	136440	159281	172649	191269	206298

SMSA TOTAL	3,691,741	4,321,813	5,080,378	6,012,449	6,737,796	7,551,515	8,240,381
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Appendix C
SABINE BASIN TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE

COUNTY	1990						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,548	0	128	0	0	0	1,676
NEWTON	1,675	2,200	97	114	27	0	4,113
ORANGE	8,523	3,340	50	49,169	1	5,574	66,657
SABINE	751	0	383	0	0	0	1,134
SAN AUGUSTINE	147	0	78	0	0	0	225
SHELBY	2,794	28	1,650	1,204	0	0	5,676
BASIN TOTAL	15,438	5,568	2,386	50,487	28	5,574	79,481

COUNTY	2000						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,752	0	100	0	2	0	1,854
NEWTON	1,764	2,200	82	122	30	0	4,198
ORANGE	9,553	3,699	70	52,936	1	6,000	72,259
SABINE	927	0	337	0	0	0	1,264
SAN AUGUSTINE	98	0	87	0	0	0	185
SHELBY	3,104	27	1,635	1,436	0	0	6,202
BASIN TOTAL	17,198	5,926	2,311	54,494	33	6,000	85,962

COUNTY	2010						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,737	0	100	0	2	0	1,839
NEWTON	1,753	2,200	82	131	30	0	4,196
ORANGE	9,828	3,329	70	56,817	1	10,000	80,045
SABINE	927	0	337	0	0	0	1,264
SAN AUGUSTINE	93	0	87	0	0	0	180
SHELBY	3,052	27	1,635	1,694	0	0	6,408
BASIN TOTAL	17,390	5,556	2,311	58,642	33	10,000	93,932

COUNTY	2020						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,708	0	100	0	2	0	1,810
NEWTON	1,701	2,200	82	139	31	0	4,153
ORANGE	9,971	3,014	70	60,388	1	15,000	88,444
SABINE	917	0	337	0	0	0	1,254
SAN AUGUSTINE	89	0	87	0	0	0	176
SHELBY	3,004	27	1,635	1,944	0	0	6,610
BASIN TOTAL	17,390	5,241	2,311	62,471	34	15,000	102,447

Linked from: SMUNL.XLS;SIRR.XLS;S_LIVEST.XLS;SMANUFAC.XLS;SMINING.XLS;SPOWER.XLS.

Appendix C
SABINE BASIN TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,731	0	100	0	2	0	1,833
NEWTON	1,663	2,200	82	146	32	0	4,123
ORANGE	10,348	2,940	70	63,391	1	20,000	96,750
SABINE	913	0	337	0	0	0	1,250
SAN AUGUSTINE	87	0	87	0	0	0	174
SHELBY	3,053	27	1,635	2,189	0	0	6,904
BASIN TOTAL	17,795	5,167	2,311	65,726	35	20,000	111,034

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,752	0	100	0	2	0	1,854
NEWTON	1,577	2,200	82	154	33	0	4,046
ORANGE	10,646	2,867	70	69,938	1	25,000	108,522
SABINE	912	0	337	0	0	0	1,249
SAN AUGUSTINE	85	0	87	0	0	0	172
SHELBY	3,071	27	1,635	2,550	0	0	7,283
BASIN TOTAL	18,043	5,094	2,311	72,642	36	25,000	123,126

COUNTY	2050						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
JASPER	1,791	0	100	0	2	0	1,893
NEWTON	1,551	2,200	82	162	34	0	4,029
ORANGE	11,073	2,797	70	76,790	1	30,000	120,731
SABINE	934	0	337	0	0	0	1,271
SAN AUGUSTINE	85	0	87	0	0	0	172
SHELBY	3,158	27	1,635	2,928	0	0	7,748
BASIN TOTAL	18,592	5,024	2,311	79,880	37	30,000	135,844

Linked from: SMUNI.XLS;SIRR.XLS;S_LIVEST.XLS;SMANUFAC.XLS;SMINING.XLS;SPOWER.XLS.

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**SABINE BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY						BASIN TOTAL
	JASPER	NEWTON	ORANGE	SABINE	SAN AUGUSTINE	SHELBY	
1,990	1,676	4,113	66,657	1,134	225	5,676	79,481
2,000	1,854	4,198	72,259	1,264	185	6,202	85,962
2,010	1,839	4,196	80,045	1,264	180	6,408	93,932
2,020	1,810	4,153	88,444	1,254	176	6,610	102,447
2,030	1,833	4,123	96,750	1,250	174	6,904	111,034
2,040	1,854	4,046	108,522	1,249	172	7,283	123,126
2,050	1,893	4,029	120,731	1,271	172	7,748	135,844

**NECHES BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	1990						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	9,108	0	436	27,923	0	0	37,467
HARDIN	4,793	2,200	136	106	5,261	0	12,496
HOUSTON	571	70	663	8	54	0	1,366
JASPER	3,041	150	205	57,592	2	0	60,990
JEFFERSON	8,728	18,954	61	68,041	167	1,021	96,972
LIBERTY	287	8,454	53	0	166	0	8,960
NACOGDOCHES	10,118	280	1,593	970	12	0	12,973
NEWTON	2	0	0	0	6	0	8
ORANGE	3,366	0	40	1,339	6	0	4,751
POLK	1,063	235	160	768	0	0	2,226
SABINE	434	0	70	1,710	0	0	2,214
SAN AUGUSTINE	1,135	0	545	0	0	0	1,680
SHELBY	189	12	313	0	0	0	514
TRINITY	497	0	230	0	0	0	727
TYLER	2,043	18	287	32	0	0	2,380
BASIN TOTAL	45,375	30,373	4,792	158,489	5,674	1,021	245,724

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	10,162	0	628	27,715	36	0	38,541
HARDIN	5,806	2,146	89	111	8,600	0	16,752
HOUSTON	788	70	663	10	63	0	1,594
JASPER	3,252	150	162	56,531	2	0	60,097
JEFFERSON	9,403	14,042	65	78,470	45	3,000	105,025
LIBERTY	290	6,575	59	0	57	0	6,981
NACOGDOCHES	13,093	280	1,595	1,145	261	0	16,374
NEWTON	1	0	0	0	7	0	8
ORANGE	3,715	0	56	1,413	7	0	5,191
POLK	1,414	235	126	825	0	0	2,600
SABINE	401	0	62	1,837	0	0	2,300
SAN AUGUSTINE	1,227	0	593	0	0	0	1,820
SHELBY	251	13	312	0	0	0	576
TRINITY	677	0	282	0	0	0	959
TYLER	2,362	18	175	36	0	0	2,591
BASIN TOTAL	52,842	23,529	4,867	168,093	9,078	3,000	261,409

**NECHES BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	10,206	0	628	27,005	40	0	37,879
HARDIN	5,976	2,092	89	116	7,283	0	15,556
HOUSTON	769	70	663	12	40	0	1,554
JASPER	3,228	150	162	54,338	2	0	57,880
JEFFERSON	9,230	12,642	65	89,072	29	6,000	117,038
LIBERTY	304	5,895	59	0	36	0	6,294
NACOGDOCHES	14,206	280	1,595	1,333	280	0	17,694
NEWTON	1	0	0	0	8	0	9
ORANGE	3,741	0	56	1,469	7	0	5,273
POLK	1,479	235	126	879	0	0	2,719
SABINE	398	0	62	1,958	0	0	2,418
SAN AUGUSTINE	1,243	0	593	0	0	0	1,836
SHELBY	240	13	312	0	0	0	565
TRINITY	672	0	282	0	0	0	954
TYLER	2,526	18	175	40	0	5,000	7,759
BASIN TOTAL	54,219	21,395	4,867	176,222	7,725	11,000	275,428

COUNTY	2020						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	10,268	0	628	27,284	45	0	38,225
HARDIN	6,051	2,041	89	123	7,187	0	15,491
HOUSTON	760	70	663	14	31	0	1,538
JASPER	3,182	150	162	54,408	2	0	57,904
JEFFERSON	9,137	11,451	65	95,885	20	6,000	122,558
LIBERTY	313	5,314	59	0	29	0	5,715
NACOGDOCHES	15,369	280	1,595	1,510	312	0	19,066
NEWTON	1	0	0	0	8	0	9
ORANGE	3,653	0	56	1,474	8	0	5,191
POLK	1,568	235	126	933	0	0	2,862
SABINE	393	0	62	2,078	0	0	2,533
SAN AUGUSTINE	1,242	0	593	0	0	0	1,835
SHELBY	232	13	312	0	0	0	557
TRINITY	657	0	282	0	0	0	939
TYLER	2,661	18	175	44	0	10,000	12,898
BASIN TOTAL	55,487	19,572	4,867	183,753	7,642	16,000	287,321

**NECHES BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	10,606	0	628	26,843	51	0	38,128
HARDIN	6,286	1,990	89	129	7,191	0	15,685
HOUSTON	768	70	663	16	28	0	1,545
JASPER	3,219	150	162	52,880	2	0	56,413
JEFFERSON	9,136	11,169	65	101,887	16	6,000	128,273
LIBERTY	333	5,162	59	0	25	0	5,579
NACOGDOCHES	17,461	280	1,595	1,683	345	0	21,364
NEWTON	1	0	0	0	8	0	9
ORANGE	3,661	0	56	1,481	8	0	5,206
POLK	1,715	235	126	986	0	0	3,062
SABINE	394	0	62	2,196	0	0	2,652
SAN AUGUSTINE	1,294	0	593	0	0	0	1,887
SHELBY	233	13	312	0	0	0	558
TRINITY	663	0	282	0	0	0	945
TYLER	2,833	18	175	48	0	15,000	18,074
BASIN TOTAL	58,603	19,087	4,867	188,149	7,674	21,000	299,380

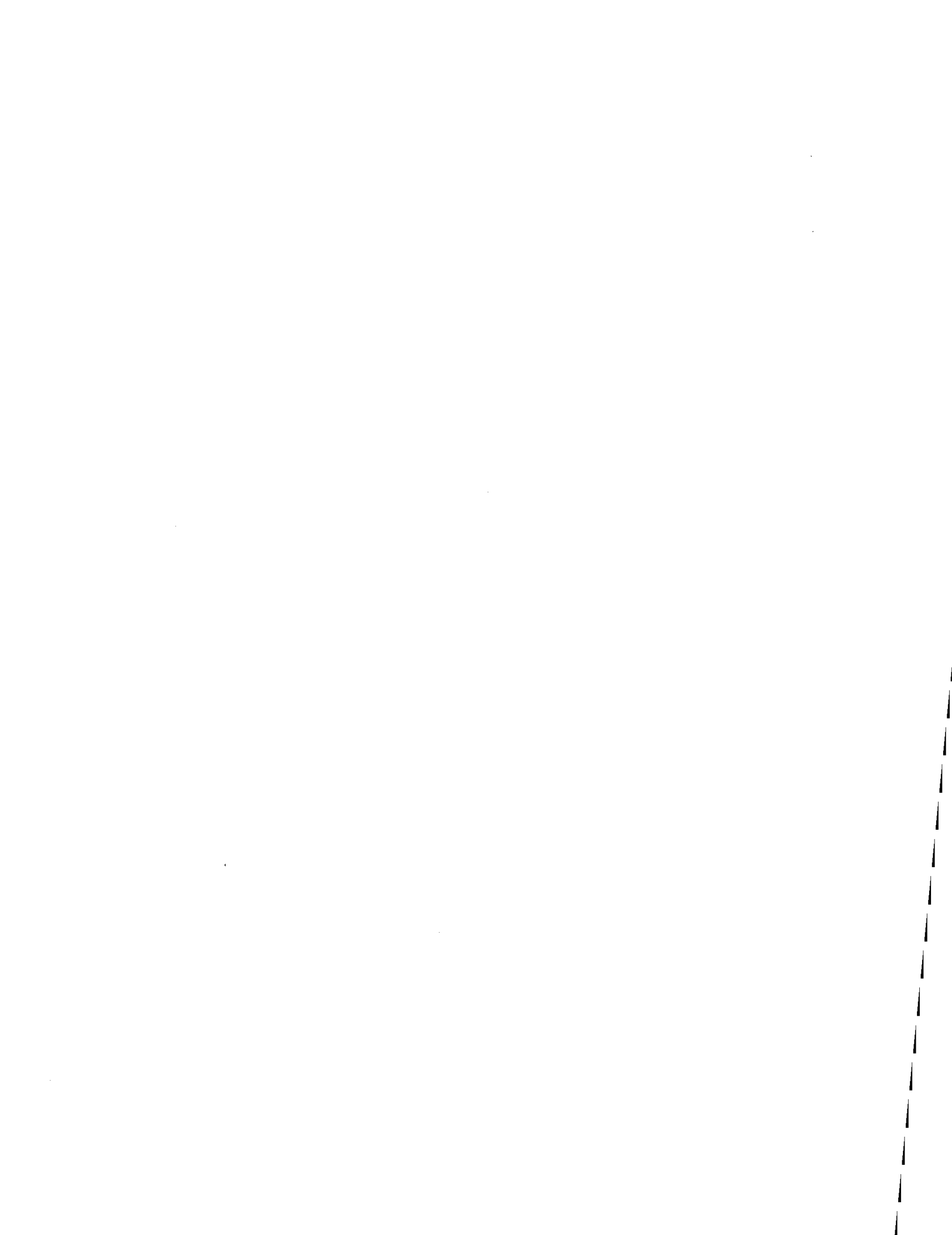
COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	10,842	0	628	28,143	57	0	39,670
HARDIN	6,516	1,941	89	138	7,307	0	15,991
HOUSTON	771	70	663	19	25	0	1,548
JASPER	3,267	150	162	55,011	2	0	58,592
JEFFERSON	9,195	10,895	65	112,948	13	6,000	139,116
LIBERTY	356	5,013	59	0	24	0	5,452
NACOGDOCHES	19,257	280	1,595	1,967	378	0	23,477
NEWTON	1	0	0	0	8	0	9
ORANGE	3,758	0	56	1,487	8	0	5,309
POLK	1,809	235	126	1,039	0	0	3,209
SABINE	397	0	62	2,313	0	0	2,772
SAN AUGUSTINE	1,302	0	593	0	0	0	1,895
SHELBY	231	13	312	0	0	0	556
TRINITY	674	0	282	0	0	0	956
TYLER	2,883	18	175	53	0	20,000	23,129
BASIN TOTAL	61,259	18,615	4,867	203,118	7,822	26,000	321,681

**NECHES BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
ANGELINA	11,360	0	628	29,496	64	0	41,548
HARDIN	7,019	1,893	89	147	7,475	0	16,623
HOUSTON	798	70	663	21	24	0	1,576
JASPER	3,374	150	162	57,224	2	0	60,912
JEFFERSON	9,426	10,626	65	123,990	12	6,000	150,119
LIBERTY	378	4,868	59	0	25	0	5,330
NACOGDOCHES	21,094	280	1,595	2,269	415	0	25,653
NEWTON	1	0	0	0	8	0	9
ORANGE	3,903	0	56	1,519	8	0	5,486
POLK	1,919	235	126	1,090	0	0	3,370
SABINE	408	0	62	2,427	0	0	2,897
SAN AUGUSTINE	1,330	0	593	0	0	0	1,923
SHELBY	235	13	312	0	0	0	560
TRINITY	711	0	282	0	0	0	993
TYLER	2,943	18	175	57	0	25,000	28,193
BASIN TOTAL	64,899	18,153	4,867	218,240	8,033	31,000	345,192

**NECHES BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR																BASIN TOTAL
	ANGE- LINA	HARDIN	HOUSTON	JASPER	JEFFER- SON	LIBERTY	NACOG- DOCHES	NEWTON	ORANGE	POLK	SABINE	SAN AUGUS- TINE	SHELBY	TRINITY	TYLER	
1990	37,467	12,496	1,366	60,990	96,972	8,960	12,973	8	4,751	2,226	2,214	1,680	514	727	2,380	245,724
2000	38,541	16,752	1,594	60,097	105,025	6,981	16,374	8	5,191	2,600	2,300	1,820	576	959	2,591	261,409
2010	37,879	15,556	1,554	57,880	117,038	6,294	17,694	9	5,273	2,719	2,418	1,836	565	954	7,759	275,428
2020	38,225	15,491	1,538	57,904	122,558	5,715	19,066	9	5,191	2,862	2,533	1,835	557	939	12,898	287,321
2030	38,128	15,685	1,545	56,413	128,273	5,579	21,364	9	5,206	3,062	2,652	1,887	558	945	18,074	299,380
2040	39,670	15,991	1,548	58,592	139,116	5,452	23,477	9	5,309	3,209	2,772	1,895	556	956	23,129	321,681
2050	41,548	16,623	1,576	60,912	150,119	5,330	25,653	9	5,486	3,370	2,897	1,923	560	993	28,193	345,192



**NECHES - TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	1990						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	925	88,213	330	0	505	0	89,973
GALVESTON	935	0	11	0	0	0	946
JEFFERSON	26,838	191,645	401	72,476	17	0	291,377
LIBERTY	23	14,838	17	0	0	0	14,878
BASIN TOTAL	28,721	294,696	759	72,476	522	0	397,174

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,225	76,364	553	0	226	0	78,368
GALVESTON	608	0	9	0	43	0	660
JEFFERSON	32,134	130,046	423	80,120	171	0	242,894
LIBERTY	12	7,895	20	0	40	0	7,967
BASIN TOTAL	33,979	214,305	1,005	80,120	480	0	329,889

COUNTY	2010						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,498	68,775	553	0	194	0	71,020
GALVESTON	615	0	9	0	24	0	648
JEFFERSON	31,584	118,284	423	87,176	71	0	237,538
LIBERTY	12	7,383	20	0	27	0	7,442
BASIN TOTAL	33,709	194,442	1,005	87,176	316	0	316,648

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,811	62,215	553	0	111	0	64,690
GALVESTON	659	0	9	0	14	0	682
JEFFERSON	31,224	108,211	423	92,011	43	0	231,912
LIBERTY	13	6,931	20	0	16	0	6,980
BASIN TOTAL	33,707	177,357	1,005	92,011	184	0	304,264

Linked from:NTMUNI.XLS, NTIRR.XLS, NT_LIVES.XLS, NTMANFU.XLS,NTMINING.XLS,NTPOWER.XLS.

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**NECHES - TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,008	60,034	553	0	73	0	62,668
GALVESTON	713	0	9	0	4	0	726
JEFFERSON	31,077	105,550	423	95,852	34	0	232,936
LIBERTY	14	6,731	20	0	5	0	6,770
BASIN TOTAL	33,812	172,315	1,005	95,852	116	0	303,100

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,142	57,929	553	0	57	0	60,681
GALVESTON	693	0	9	0	1	0	703
JEFFERSON	31,024	102,953	423	104,287	25	0	238,712
LIBERTY	15	6,536	20	0	1	0	6,572
BASIN TOTAL	33,874	167,418	1,005	104,287	84	0	306,668

COUNTY	2050						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,260	55,897	553	0	47	0	58,757
GALVESTON	573	0	9	0	0	0	582
JEFFERSON	31,611	100,421	423	112,445	22	0	244,922
LIBERTY	16	6,348	20	0	0	0	6,384
BASIN TOTAL	34,460	162,666	1,005	112,445	69	0	310,645

Linked from:NTMUNI.XLS, NTIRR.XLS, NT_LIVES.XLS, NTMANFU.XLS,NTMINING.XLS,NTPOWER.XLS.

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**NECHES - TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY				BASIN
	CHAMBERS	GALVESTON	JEFFERSON	LIBERTY	TOTAL
1,990	89,973	946	291,377	14,878	397,174
2,000	78,368	660	242,894	7,967	329,889
2,010	71,020	648	237,538	7,442	316,648
2,020	64,690	682	231,912	6,980	304,264
2,030	62,668	726	232,936	6,770	303,100
2,040	60,681	703	238,712	6,572	306,668
2,050	58,757	582	244,922	6,384	310,645

**TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	656	39,917	58	0	5,836	0	46,467
GRIMES	163	0	308	0	0	0	471
HARDIN	5	0	0	0	0	0	5
HOUSTON	3,078	218	1,343	163	76	0	4,878
LEON	1,601	0	1,675	162	131	0	3,569
LIBERTY	5,015	64,337	232	38	2	0	69,624
MADISON	2,067	50	922	73	18	0	3,130
POLK	3,417	0	173	0	1	0	3,591
SAN JACINTO	1,068	0	138	0	0	0	1,206
TRINITY	1,304	4	247	3	0	0	1,558
WALKER	6,397	21	375	10	4	0	6,807
BASIN TOTAL	24,771	104,547	5,471	449	6,068	0	141,306

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	668	31,436	100	0	9,986	0	42,190
GRIMES	262	0	344	0	2	0	608
HARDIN	5	0	1	0	0	0	6
HOUSTON	3,204	218	1,340	196	102	0	5,060
LEON	1,835	0	1,587	178	1,247	0	4,847
LIBERTY	5,470	52,556	255	43	8,703	0	67,027
MADISON	2,312	50	1,162	78	25	0	3,627
POLK	4,038	0	136	0	26	0	4,200
SAN JACINTO	1,394	0	85	0	16	0	1,495
TRINITY	1,222	4	303	3	6	0	1,538
WALKER	7,537	21	290	11	7	0	7,866
BASIN TOTAL	27,947	84,285	5,603	509	20,120	0	138,464

**TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2010						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	781	28,650	100	0	7,518	0	37,049
GRIMES	279	0	344	0	1	0	624
HARDIN	5	0	1	0	0	0	6
HOUSTON	3,146	218	1,340	232	104	0	5,040
LEON	1,941	0	1,587	191	890	0	4,609
LIBERTY	5,710	48,531	255	49	9,661	0	64,206
MADISON	2,267	50	1,162	82	25	0	3,586
POLK	4,215	0	136	0	26	0	4,377
SAN JACINTO	1,556	0	85	0	11	0	1,652
TRINITY	1,209	4	303	4	4	0	1,524
WALKER	7,968	21	290	11	7	10,000	18,297
BASIN TOTAL	29,077	77,474	5,603	569	18,247	10,000	140,970

COUNTY	2020						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	943	26,223	100	0	7,086	0	34,352
GRIMES	297	0	344	0	1	0	642
HARDIN	5	0	1	0	0	0	6
HOUSTON	3,121	218	1,340	254	84	0	5,017
LEON	2,047	0	1,587	192	391	0	4,217
LIBERTY	6,088	44,998	255	52	11,034	0	62,427
MADISON	2,192	50	1,162	85	26	0	3,515
POLK	4,459	0	136	0	27	0	4,622
SAN JACINTO	1,697	0	85	0	6	0	1,788
TRINITY	1,178	4	303	4	2,289	0	3,778
WALKER	8,321	21	290	12	8	15,000	23,652
BASIN TOTAL	30,348	71,514	5,603	599	20,952	15,000	144,016

Linked from: t_muni.xls; t_irr.xls; t_livest.xls; t_manufac.xls; t_mining.xls; t_power.xls.

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**TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,060	25,304	100	0	7,055	0	33,519
GRIMES	318	0	344	0	0	0	662
HARDIN	5	0	1	0	0	0	6
HOUSTON	3,163	218	1,340	274	79	0	5,074
LEON	2,187	0	1,587	193	274	0	4,241
LIBERTY	6,684	43,700	255	54	12,407	0	63,100
MADISON	2,118	50	1,162	87	26	0	3,443
POLK	4,858	0	136	0	27	0	5,021
SAN JACINTO	1,844	0	85	0	2	0	1,931
TRINITY	1,183	4	303	5	5,232	0	6,727
WALKER	9,086	21	290	13	9	15,000	24,419
BASIN TOTAL	32,506	69,297	5,603	626	25,111	15,000	148,143

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,139	24,418	100	0	6,939	0	32,596
GRIMES	304	0	344	0	0	0	648
HARDIN	6	0	1	0	0	0	7
HOUSTON	3,190	218	1,340	308	74	0	5,130
LEON	2,330	0	1,587	194	230	0	4,341
LIBERTY	7,106	42,439	255	59	13,782	0	63,641
MADISON	1,995	50	1,162	94	27	0	3,328
POLK	5,114	0	136	0	28	0	5,278
SAN JACINTO	1,991	0	85	0	0	0	2,076
TRINITY	1,194	4	303	5	10,800	0	12,306
WALKER	9,567	21	290	13	10	20,000	29,901
BASIN TOTAL	33,936	67,150	5,603	673	31,890	20,000	159,252

Linked from: tmuni.xls; tirr.xls; t_livest.xls; tmanufac.xls; tmining.xls; tpower.xls.

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**TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,198	23,561	100	0	6,982	0	31,841
GRIMES	344	0	344	0	0	0	688
HARDIN	6	0	1	0	0	0	7
HOUSTON	3,290	218	1,340	343	75	0	5,266
LEON	2,497	0	1,587	195	235	0	4,514
LIBERTY	7,708	41,215	255	64	15,312	0	64,554
MADISON	1,885	50	1,162	99	28	0	3,224
POLK	5,416	0	136	0	29	0	5,581
SAN JACINTO	2,182	0	85	0	0	0	2,267
TRINITY	1,256	4	303	6	14,728	0	16,297
WALKER	9,897	21	290	14	11	30,000	40,233
BASIN TOTAL	35,679	65,069	5,603	721	37,400	30,000	174,472

**TRINITY BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY											BASIN TOTAL
	CHAMBERS	GRIMES	HARDIN	HOUSTON	LEON	LIBERTY	MADISON	POLK	SAN JACINTO	TRINITY	WALKER	
1990	46,467	471	5	4,878	3,569	69,624	3,130	3,591	1,206	1,558	6,807	141,306
2000	42,190	608	6	5,060	4,847	67,027	3,627	4,200	1,495	1,538	7,866	138,464
2010	37,049	624	6	5,040	4,609	64,206	3,586	4,377	1,652	1,524	18,297	140,970
2020	34,352	642	6	5,017	4,217	62,427	3,515	4,622	1,788	3,778	23,652	144,016
2030	33,519	662	6	5,074	4,241	63,100	3,443	5,021	1,931	6,727	24,419	148,143
2040	32,596	648	7	5,130	4,341	63,641	3,328	5,278	2,076	12,306	29,901	159,252
2050	31,841	688	7	5,266	4,514	64,554	3,224	5,581	2,267	16,297	40,233	174,472

**TRINITY - SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	1990						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,264	2,594	68	4,268	3,519	1,103	12,816
HARRIS	12,951	11,269	62	67,478	0	0	91,760
LIBERTY	77	23,827	16	0	0	0	23,920
BASIN TOTAL	14,292	37,690	146	71,746	3,519	1,103	128,496

COUNTY	2000						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,674	2,246	115	4,675	3,021	1,100	12,831
HARRIS	18,402	9,792	93	73,781	0	0	102,068
LIBERTY	87	21,587	18	0	6,569	0	28,261
BASIN TOTAL	20,163	33,625	226	78,456	9,590	1,100	143,160
	41%	-11%	55%	9%	173%	0%	11%

COUNTY	2010						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,809	2,023	115	5,052	1,667	1,100	11,766
HARRIS	20,137	9,323	93	79,490	0	0	109,043
LIBERTY	90	19,919	18	0	7,087	0	27,114
BASIN TOTAL	22,036	31,265	226	84,542	8,754	1,100	147,923
	9%	-7%	0%	8%	-9%	0%	3%

COUNTY	2020						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,013	1,830	115	5,229	958	1,100	11,245
HARRIS	22,263	8,891	93	83,630	0	0	114,877
LIBERTY	95	18,456	18	0	7,918	0	26,487
BASIN TOTAL	24,371	29,177	226	88,859	8,876	1,100	152,609

Linked from: tjsmuni.xls; tsirr.xls; ts_live.xls; tsjmanuf.xls; tjmining.xls; tspanpower.xls

**TRINITY - SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,145	1,766	115	5,383	579	1,100	11,088
HARRIS	23,538	8,587	93	86,834	0	0	119,052
LIBERTY	105	17,924	18	0	8,749	0	26,796
BASIN TOTAL	25,788	28,277	226	92,217	9,328	1,100	156,936

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,257	1,704	115	5,792	392	1,500	11,760
HARRIS	25,520	8,293	93	94,190	0	0	128,096
LIBERTY	111	17,407	18	0	9,580	0	27,116
BASIN TOTAL	27,888	27,404	226	99,982	9,972	1,500	166,972

COUNTY	2050						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,362	1,644	115	6,207	315	5,000	15,643
HARRIS	27,349	8,009	93	101,242	0	0	136,693
LIBERTY	121	16,905	18	0	10,490	0	27,534
BASIN TOTAL	29,832	26,558	226	107,449	10,805	5,000	179,870

**TRINITY - SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY			BASIN TOTAL
	CHAMBERS	HARRIS	LIBERTY	
1990	12,816	91,760	23,920	128,496
2000	12,831	102,068	28,261	143,160
2010	11,766	109,043	27,114	147,923
2020	11,245	114,877	26,487	152,609
2030	11,088	119,052	26,796	156,936
2040	11,760	128,096	27,116	166,972
2050	15,643	136,693	27,534	179,870

**SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	12,117	7,558	70	2,148	7	0	21,900
GRIMES	399	0	423	0	0	0	822
HARRIS	441,790	20,544	648	225,215	758	10,242	699,197
LIBERTY	2,133	839	73	0	0	0	3,045
MONTGOMERY	26,851	20	401	1,330	67	5,921	34,590
SAN JACINTO	904	0	137	21	0	0	1,062
WALKER	1,852	324	355	203	1	0	2,735
WALLER	912	20,832	340	31	885	0	23,000
BASIN TOTAL	486,958	50,117	2,447	228,948	1,718	16,163	786,351

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	13,281	7,055	72	2,494	24	0	22,926
GRIMES	540	0	472	0	61	0	1,073
HARRIS	568,329	19,840	958	242,912	689	15,000	847,728
LIBERTY	2,359	816	80	443	61	0	3,759
MONTGOMERY	38,395	20	420	1,670	196	6,000	46,701
SAN JACINTO	1,153	0	85	24	60	0	1,322
WALKER	2,977	324	275	217	8	0	3,801
WALLER	1,289	20,076	347	35	609	0	22,356
BASIN TOTAL	628,323	48,131	2,709	247,795	1,708	21,000	949,666

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	17,056	6,586	72	2,843	20	0	26,577
GRIMES	575	0	472	0	44	0	1,091
HARRIS	621,429	19,161	958	260,470	567	15,000	917,585
LIBERTY	2,578	793	80	502	41	0	3,994
MONTGOMERY	46,121	20	420	1,935	98	6,000	54,594
SAN JACINTO	1,331	0	85	27	41	0	1,484
WALKER	3,120	324	275	234	9	0	3,962
WALLER	1,585	19,347	347	39	290	0	21,608
BASIN TOTAL	693,795	46,231	2,709	266,050	1,110	21,000	1,030,895

LINKED FROM: SJMUNI.XLS;SJIRR.XLS;SJ_LIVES.XLS;JSMANUFA.SLS;SJMININ.XLS;SJPOWER.XLS.

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**SAN JACINTO - BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	1990						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	22,046	102,586	755	28,258	359	0	154,004
FORT BEND	14,987	8,208	185	15,901	92	0	39,373
GALVESTON	32,752	20,685	233	58,077	33	1,229	113,009
HARRIS	37,111	0	65	60,036	3	1,418	98,633
BASIN TOTAL	106,896	131,479	1,238	162,272	487	2,647	405,019

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	26,022	101,924	637	32,203	348	0	161,134
FORT BEND	27,491	9,508	188	17,692	169	0	55,048
GALVESTON	40,016	18,216	173	64,614	41	1,500	124,560
HARRIS	52,064	0	96	69,737	13	1,500	123,410
BASIN TOTAL	145,593	129,648	1,094	184,246	571	3,000	464,152

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	28,519	95,076	637	36,112	308	0	160,652
FORT BEND	34,875	8,477	188	19,723	173	0	63,436
GALVESTON	43,282	16,681	173	70,905	39	1,500	132,580
HARRIS	58,653	0	96	79,856	7	2,500	141,112
BASIN TOTAL	165,329	120,234	1,094	206,596	527	4,000	497,780

COUNTY	2020						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	31,375	88,968	637	38,369	280	0	159,629
FORT BEND	44,055	7,589	188	21,323	183	0	73,338
GALVESTON	47,509	15,338	173	75,743	41	1,500	140,304
HARRIS	66,396	0	96	87,425	5	2,500	156,422
BASIN TOTAL	189,335	111,895	1,094	222,860	509	4,000	529,693

Linked from: SJ-BMUNI.XLS; SJ-BIRR.XLS; SJB-LIVE.XLS; SJ-BMANU.XLS; SJBMINING.XLS; SJBPOWER.XLS.

**SAN JACINTO - BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	35,835	85,717	637	40,286	263	0	162,738
FORT BEND	56,003	7,084	188	22,872	192	0	86,339
GALVESTON	52,813	14,777	173	80,269	40	1,500	149,572
HARRIS	71,550	0	96	94,475	4	2,500	168,625
BASIN TOTAL	216,201	107,578	1,094	237,902	499	4,000	567,274

COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	39,420	82,586	637	44,158	263	0	167,064
FORT BEND	69,424	6,612	188	25,378	202	0	101,804
GALVESTON	56,577	14,235	173	88,858	41	1,500	161,384
HARRIS	78,726	0	96	106,367	4	2,500	187,693
BASIN TOTAL	244,147	103,433	1,094	264,761	510	4,000	617,945

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	45,190	79,569	637	47,973	271	0	173,640
FORT BEND	84,009	6,172	188	27,707	213	0	118,289
GALVESTON	59,988	13,713	173	97,460	44	1,500	172,878
HARRIS	82,576	0	96	118,375	4	2,500	203,551
BASIN TOTAL	271,763	99,454	1,094	291,515	532	4,000	668,358

**SAN JACINTO - BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY				BASIN TOTAL
	BRAZORIA	FORT BEND	GALVES- TON	HARRIS	
1990	154,004	39,373	113,009	98,633	405,019
2000	161,134	55,048	124,560	123,410	464,152
2010	160,652	63,436	132,580	141,112	497,780
2020	159,629	73,338	140,304	156,422	529,693
2030	162,738	86,339	149,572	168,625	567,274
2040	167,064	101,804	161,384	187,693	617,945
2050	173,640	118,289	172,878	203,551	668,358

**SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	21,635	6,147	72	3,115	12	0	30,981
GRIMES	611	0	472	0	25	0	1,108
HARRIS	689,123	18,506	958	275,100	387	17,500	1,001,574
LIBERTY	2,761	770	80	563	24	0	4,198
MONTGOMERY	55,474	20	420	2,128	53	6,000	64,095
SAN JACINTO	1,499	0	85	31	24	0	1,639
WALKER	3,241	324	275	248	10	0	4,098
WALLER	1,828	18,644	347	45	145	0	21,009
BASIN TOTAL	776,172	44,411	2,709	281,230	680	23,500	1,128,702

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	27,523	5,738	72	3,346	4	0	36,683
GRIMES	655	0	472	0	9	0	1,136
HARRIS	729,624	17,873	958	287,600	312	20,000	1,056,367
LIBERTY	3,088	747	80	627	7	0	4,549
MONTGOMERY	67,096	20	420	2,317	30	6,000	75,883
SAN JACINTO	1,666	0	85	34	8	0	1,793
WALKER	3,534	324	275	263	10	0	4,406
WALLER	2,126	17,967	347	50	73	0	20,563
BASIN TOTAL	835,312	42,669	2,709	294,237	453	26,000	1,201,380

COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	34,003	5,356	72	3,925	2	0	43,358
GRIMES	625	0	472	0	3	0	1,100
HARRIS	780,370	17,262	958	314,930	251	20,000	1,133,771
LIBERTY	3,211	726	80	694	2	0	4,713
MONTGOMERY	79,508	20	420	2,604	19	6,000	88,571
SAN JACINTO	1,826	0	85	38	2	0	1,951
WALKER	3,711	324	275	277	11	0	4,598
WALLER	2,451	17,313	347	56	24	0	20,191
BASIN TOTAL	905,705	41,001	2,709	322,524	314	26,000	1,298,253

LINKED FROM: SJMUNI.XLS;SJIRR.XLS;SJ_LIVES.XLS;JSMANUFA.SLS;SJMININ.XLS;SJPOWER.XLS.

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**SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE 1990 - 2050**

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING.	POWER	
FORT BEND	42,528	4,999	72	4,545	1	0	52,145
GRIMES	708	0	472	0	2	0	1,182
HARRIS	818,404	16,672	958	342,126	236	20,000	1,198,396
LIBERTY	3,390	705	80	762	0	0	4,937
MONTGOMERY	93,703	20	420	2,897	15	6,000	103,055
SAN JACINTO	2,023	0	85	41	0	0	2,149
WALKER	3,671	324	275	292	12	0	4,574
WALLER	2,892	16,685	347	61	0	0	19,985
BASIN TOTAL	967,319	39,405	2,709	350,724	266	26,000	1,386,423

LINKED FROM: SJMUNI.XLS;SJIRR.XLS;SJ_LIVES.XLS;JSMANUFA.SLS;SJMININ.XLS;SJPOWER.XLS.

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**SAN JACINTO BASIN
TOTAL WATER DEMAND IN ACRE-FEET**

YEAR	COUNTY								BASIN TOTAL
	FORT BEND	GRIMES	HARRIS	LIBERTY	MONT- GOMERY	SAN JACINTO	WALKER	WALLER	
1990	21,900	822	699,197	3,045	34,590	1,062	2,735	23,000	786,351
2000	22,926	1,073	847,728	3,759	46,701	1,322	3,801	22,356	949,666
2010	26,577	1,091	917,585	3,994	54,594	1,484	3,962	21,608	1,030,895
2020	30,981	1,108	1,001,574	4,198	64,095	1,639	4,098	21,009	1,128,702
2030	36,683	1,136	1,056,367	4,549	75,883	1,793	4,406	20,563	1,201,380
2040	43,358	1,100	1,133,771	4,713	88,571	1,951	4,598	20,191	1,298,253
2050	52,145	1,182	1,198,396	4,937	103,055	2,149	4,574	19,985	1,386,423

**BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESTK.	MANU.	MINING	POWER	
AUSTIN	2,728	675	1,233	92	20	0	4,748
BRAZORIA	1,678	3,535	193	153,173	0	0	158,579
BRAZOS	25,644	9,875	1,603	168	21	10,076	47,387
BURLESON	1,868	6,900	1,060	117	11	0	9,956
FORT BEND	9,937	18,516	663	860	62	62,805	92,843
GRIMES	2,212	125	1,003	248	0	11,088	14,676
LEON	344	0	546	0	0	0	890
MADISON	80	0	171	0	0	0	251
ROBERTSON	2,610	21,253	1,587	34	20	0	25,504
WALLER	3,975	5,538	878	8	20	0	10,419
WASHINGTON	4,015	205	1,604	470	93	0	6,387
BASIN TOTAL	55,091	66,622	10,541	155,170	247	83,969	371,640

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	2,985	660	1,494	112	78	0	5,329
BRAZORIA	2,241	4,250	164	176,937	113	0	183,705
BRAZOS	31,701	9,399	1,547	194	27	5,000	47,868
BURLESON	2,126	6,612	1,318	131	29	0	10,216
FORT BEND	13,423	21,994	674	953	53	70,000	107,097
GRIMES	1,976	125	1,117	280	76	10,000	13,574
LEON	347	0	518	0	212	0	1,077
MADISON	138	0	217	0	17	0	372
ROBERTSON	2,936	20,745	1,704	42	39	15,000	40,466
WALLER	4,603	5,336	891	9	78	0	10,917
WASHINGTON	4,387	205	1,503	495	118	0	6,708
BASIN TOTAL	66,863	69,326	11,147	179,153	840	100,000	427,329

Linked from BMUNII.XLS, BIRR.XLS, BMANUFAC.XLS, BPOWER.XLS, B_LIVEST.XLS, BMINING.XLS.

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**BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	2010						TOTAL
	MUNI.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	3,162	644	1,494	138	62	0	5,500
BRAZORIA	2,291	3,863	164	200,901	99	0	207,318
BRAZOS	34,516	8,945	1,547	221	27	5,000	50,256
BURLESON	2,158	6,337	1,318	145	24	0	9,982
FORT BEND	16,490	19,433	674	1,050	48	70,000	107,695
GRIMES	2,069	125	1,117	314	37	10,000	13,662
LEON	364	0	518	0	155	0	1,037
MADISON	137	0	217	0	11	0	365
ROBERTSON	3,032	20,248	1,704	51	4,310	20,000	49,345
WALLER	5,326	5,142	891	10	61	0	11,430
WASHINGTON	4,512	205	1,503	519	116	0	6,855
BASIN TOTAL	74,057	64,942	11,147	203,349	4,950	105,000	463,445

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	3,406	629	1,494	165	47	0	5,741
BRAZORIA	2,403	3,526	164	214,220	85	0	220,398
BRAZOS	36,508	8,514	1,547	244	28	5,000	51,841
BURLESON	2,183	6,072	1,318	158	18	0	9,749
FORT BEND	20,383	17,242	674	1,118	33	70,000	109,450
GRIMES	2,147	125	1,117	351	3,004	10,000	16,744
LEON	381	0	518	0	117	0	1,016
MADISON	132	0	217	0	7	0	356
ROBERTSON	3,104	20,053	1,704	61	8,599	25,000	58,521
WALLER	6,092	4,955	891	11	47	0	11,996
WASHINGTON	4,560	205	1,503	538	116	0	6,922
BASIN TOTAL	81,299	61,321	11,147	216,866	12,101	110,000	492,734

Linked from BMUNI1.XLS, BIRR.XLS, BMANUFAC.XLS, BPOWER.XLS, B_LIVEST.XLS, BMINING.XLS.

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**BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	3,716	613	1,494	194	33	0	6,050
BRAZORIA	2,640	3,397	164	225,799	72	0	232,072
BRAZOS	39,623	8,103	1,547	262	30	5,000	54,565
BURLESON	2,228	5,819	1,318	171	15	0	9,551
FORT BEND	25,591	16,094	674	1,183	18	70,000	113,560
GRIMES	2,251	125	1,117	391	6,857	10,000	20,741
LEON	404	0	518	0	110	0	1,032
MADISON	128	0	217	0	2	0	347
ROBERTSON	3,208	19,479	1,704	72	17,166	30,000	71,629
WALLER	6,930	4,775	891	12	33	0	12,641
WASHINGTON	4,557	205	1,503	569	117	0	6,951
BASIN TOTAL	91,276	58,610	11,147	228,653	24,453	115,000	529,139

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	4,052	599	1,494	234	28	0	6,407
BRAZORIA	2,808	3,274	164	248,482	2	0	254,730
BRAZOS	42,910	7,712	1,547	295	32	5,000	57,496
BURLESON	2,241	5,594	1,318	182	13	0	9,348
FORT BEND	31,465	15,023	674	1,289	13	70,000	118,464
GRIMES	2,133	125	1,117	435	11,570	10,000	25,380
LEON	428	0	518	0	97	0	1,043
MADISON	120	0	217	0	0	0	337
ROBERTSON	3,317	18,921	1,704	84	25,742	40,000	89,768
WALLER	7,889	4,602	891	12	29	0	13,423
WASHINGTON	4,310	205	1,503	616	120	0	6,754
BASIN TOTAL	101,673	56,055	11,147	251,629	37,646	125,000	583,150

**BRAZOS BASIN
TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESTK	MANU.	MINING	POWER	
AUSTIN	4,550	584	1,494	278	27	0	6,933
BRAZORIA	3,187	3,154	164	271,026	1	0	277,532
BRAZOS	46,946	7,340	1,547	329	34	5,000	61,196
BURLESON	2,358	5,344	1,318	194	13	0	9,227
FORT BEND	37,720	14,023	674	1,387	12	70,000	123,816
GRIMES	2,246	125	1,117	483	19,281	10,000	33,252
LEON	458	0	518	0	100	0	1,076
MADISON	114	0	217	0	0	0	331
ROBERTSON	3,506	18,379	1,704	98	38,607	42,500	104,794
WALLER	9,124	4,434	891	14	30	0	14,493
WASHINGTON	4,007	205	1,503	663	124	0	6,502
BASIN TOTAL	114,216	53,588	11,147	274,472	58,229	127,500	639,152

**BRAZOS BASIN
TOTAL WATER DEMANDS IN ACRE-FEET**

YEAR	COUNTY											BASIN TOTAL
	AUSTIN	BRAZ- ORIA	BRAZOS	BURLE- SON	FORT BEND	GRIMES	LEON	MADISON	ROBERT- SON	WALLER	WASHING- TON	
1990	4,748	158579	47,387	9,956	92,843	14,676	890	251	25,504	10,419	6387	371,640
2000	5329	183705	47868	10216	107097	13574	1077	372	40466	10917	6708	427,329
2010	5500	207318	50256	9982	107695	13662	1037	365	49345	11430	6855	463,445
2020	5741	220398	51841	9749	109450	16744	1016	356	58521	11996	6922	492,734
2030	6050	232072	54565	9551	113560	20741	1032	347	71629	12641	6951	529,139
2040	6407	254730	57496	9348	118464	25380	1043	337	89768	13423	6754	583,150
2050	6933	277532	61196	9227	123816	33252	1076	331	104794	14493	6502	639,152

Appendix D
HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE

NECHES BASIN

COUNTY	1990						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	287	8,454	53	0	166	0	8,960
BASIN TOTAL	287	8,454	53	0	166	0	8,960

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	290	6,575	59	0	57	0	6,981
BASIN TOTAL	290	6,575	59	0	57	0	6,981

COUNTY	2010						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	304	5,895	59	0	36	0	6,294
BASIN TOTAL	304	5,895	59	0	36	0	6,294

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	313	5,314	59	0	29	0	5,715
BASIN TOTAL	313	5,314	59	0	29	0	5,715

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	333	5,162	59	0	25	0	5,579
BASIN TOTAL	333	5,162	59	0	25	0	5,579

COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	356	5,013	59	0	24	0	5,452
BASIN TOTAL	356	5,013	59	0	24	0	5,452

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
LIBERTY	378	4,868	59	0	25	0	5,330
BASIN TOTAL	378	4,868	59	0	25	0	5,330

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

NECHES BASIN

YEAR	COUNTY	BASIN TOTAL
	LIBERTY	
1990	8,690	8,690
2000	6,981	6,981
2010	6,384	6,384
2020	5,715	5,715
2030	5,579	5,579
2040	5,452	5,452
2050	5,330	5,330

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

NECHES - TRINITY BASIN

COUNTY	1990						TOTAL
	MUNL.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	925	88,213	330	0	505	0	89,973
GALVESTON	935	0	11	0	0	0	946
LIBERTY	23	14,838	17	0	0	0	14,878
BASIN TOTAL	1,883	103,051	358	0	505	0	105,797

COUNTY	2000						TOTAL
	MUNL.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	1,225	76,364	553	0	226	0	78,368
GALVESTON	608	0	9	0	43	0	660
LIBERTY	12	7,895	20	0	40	0	7,967
BASIN TOTAL	1,845	84,259	582	0	309	0	86,995

COUNTY	2010						TOTAL
	MUNL.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	1,498	68,775	553	0	194	0	71,020
GALVESTON	615	0	9	0	24	0	648
LIBERTY	12	7,383	20	0	27	0	7,442
BASIN TOTAL	2,125	76,158	582	0	245	0	79,110

COUNTY	2020						TOTAL
	MUNL.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	1,811	62,215	553	0	111	0	64,690
GALVESTON	659	0	9	0	14	0	682
LIBERTY	13	6,931	20	0	16	0	6,980
BASIN TOTAL	2,483	69,146	582	0	141	0	72,352

COUNTY	2030						TOTAL
	MUNL.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	2,008	60,034	553	0	73	0	62,668
GALVESTON	713	0	9	0	4	0	726
LIBERTY	14	6,731	20	0	5	0	6,770
BASIN TOTAL	2,735	66,765	582	0	82	0	70,164

LINKED FROM:SMSAMUN.XLS; SMSAIRR.XLS; SMSALIVE.XLS; SMSAMANI.XLS; SMSAMINI.XLS; SMSAPOW.XLS

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

NECHES - TRINITY BASIN

COUNTY	2040						TOTAL
	MUNI.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	2,142	57,929	553	0	57	0	60,681
GALVESTON	693	0	9	0	1	0	703
LIBERTY	15	6,536	20	0	1	0	6,572
BASIN TOTAL	2,850	64,465	582	0	59	0	67,956

COUNTY	2050						TOTAL
	MUNI.	IRR.	IVESK	MANU.	ININ	POWER	
CHAMBERS	2,260	55,897	553	0	47	0	58,757
GALVESTON	573	0	9	0	0	0	582
LIBERTY	16	6,348	20	0	0	0	6,384
BASIN TOTAL	2,849	62,245	582	0	47	0	65,723

LINKED FROM:SMSAMUN.XLS; SMSAIRR.XLS; SMSALIVE.XLS; SMSAMAN1.XLS; SMSAMIN1.XLS; SMSAPOW.XLS

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

NECHES - TRINITY BASIN

YEAR	COUNTY			BASIN TOTAL
	CHAMBERS	GALVESTON	LIBERTY	
1990	89,973	946	14,878	105,797
2000	78,368	660	7,967	86,995
2010	71,020	648	7,442	79,110
2020	64,690	682	6,980	72,352
2030	62,668	726	6,770	70,164
2040	60,681	703	6,572	67,956
2050	58,757	582	6,384	65,723

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

TRINITY BASIN

COUNTY	1990						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	656	39,917	58	0	5,836	0	46,467
LIBERTY	5,015	64,337	232	38	2	0	69,624
BASIN TOTAL	5,671	104,254	290	38	5,838	0	116,091

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	668	31,436	100	0	9,986	0	42,190
LIBERTY	5,470	52,556	255	43	8,703	0	67,027
BASIN TOTAL	6,138	83,992	355	43	18,689	0	109,217

COUNTY	2010						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	781	28,650	100	0	7,518	0	37,049
LIBERTY	5,710	48,531	255	49	9,661	0	64,206
BASIN TOTAL	6,491	77,181	355	49	17,179	0	101,255

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	943	26,223	100	0	7,086	0	34,352
LIBERTY	6,088	44,998	255	52	11,034	0	62,427
BASIN TOTAL	7,031	71,221	355	52	18,120	0	96,779

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,060	25,304	100	0	7,055	0	33,519
LIBERTY	6,684	43,700	255	54	12,407	0	63,100
BASIN TOTAL	7,744	69,004	355	54	19,462	0	96,619

COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,139	24,418	100	0	6,939	0	32,596
LIBERTY	7,106	42,439	255	59	13,782	0	63,641
BASIN TOTAL	8,245	66,857	355	59	20,721	0	96,237

Linked file

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

TRINITY BASIN

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,198	23,561	100	0	6,982	0	31,841
LIBERTY	7,708	41,215	255	64	15,312	0	64,554
BASIN TOTAL	8,906	64,776	355	64	22,294	0	96,395

Linked file

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

TRINITY BASIN

YEAR	COUNTY		BASIN TOTAL
	CHAMBERS	LIBERTY	
1990	46,467	69,624	116,091
2000	42,190	67,027	109,217
2010	37,049	64,206	101,255
2020	34,352	62,427	96,779
2030	33,519	63,100	96,619
2040	32,596	63,641	96,237
2050	31,841	64,554	96,395

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

TRINITY - SAN JACINTO BASIN

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,264	2,594	68	4,268	3,519	1103	12,816
HARRIS	12,951	11,269	62	67,478	0	0	91,760
LIBERTY	77	23,827	16	0	0	0	23,920
BASIN TOTAL	14,292	37,690	146	71,746	3,519	1,103	128,496

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,674	2,246	115	4,675	3,021	1,100	12,831
HARRIS	18,402	9,792	93	73,781	0	0	102,068
LIBERTY	87	21,587	18	0	6,569	0	28,261
BASIN TOTAL	20,163	33,625	226	78,456	9,590	1,100	143,160

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	1,809	2,023	115	5,052	1,667	1100	11,766
HARRIS	20,137	9,323	93	79,490	0	0	109,043
LIBERTY	90	19,919	18	0	7,087	0	27,114
BASIN TOTAL	22,036	31,265	226	84,542	8,754	1,100	147,923

COUNTY	2020						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,013	1,830	115	5,229	958	1100	11,245
HARRIS	22,263	8,891	93	83,630	0	0	114,877
LIBERTY	95	18,456	18	0	7,918	0	26,487
BASIN TOTAL	24,371	29,177	226	88,859	8,876	1,100	152,609

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,145	1,766	115	5,383	579	1100	11,088
HARRIS	23,538	8,587	93	86,834	0	0	119,052
LIBERTY	105	17,924	18	0	8,749	0	26,796
BASIN TOTAL	25,788	28,277	226	92,217	9,328	1,100	156,936

Linked file

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

TRINITY - SAN JACINTO BASIN

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,257	1,704	115	5,792	392	1500	11,760
HARRIS	25,520	8,293	93	94,190	0	0	128,096
LIBERTY	111	17,407	18	0	9,580	0	27,116
BASIN TOTAL	27,888	27,404	226	99,982	9,972	1,500	166,972

COUNTY	2050						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
CHAMBERS	2,362	1,644	115	6,207	315	5000	15,643
HARRIS	27,349	8,009	93	101,242	0	0	136,693
LIBERTY	121	16,905	18	0	10,490	0	27,534
BASIN TOTAL	29,832	26,558	226	107,449	10,805	5,000	179,870

Linked file

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

TRINITY - SAN JACINTO BASIN

YEAR	COUNTY			BASIN TOTAL
	CHAMBERS	HARRIS	IBERT	
1990	12,816	91,760	23,920	128,496
2000	12,831	102,068	28,261	143,160
2010	11,766	109,043	27,114	147,923
2020	11,245	114,877	26,487	152,609
2030	11,088	119,052	26,796	156,936
2040	11,760	128,096	27,116	166,972
2050	15,643	136,693	27,534	179,870

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

SAN JACINTO BASIN

COUNTY	1990						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	12,117	7,558	70	2,148	7	0	21,900
HARRIS	441,790	20,544	648	225,215	758	10,242	699,197
LIBERTY	2,133	839	73	0	0	0	3,045
MONTGOMERY	26,851	20	401	1,330	67	5,921	34,590
WALLER	912	20,832	340	31	885	0	23,000
BASIN TOTAL	483,803	49,793	1,532	228,724	1,717	16,163	781,732

COUNTY	2000						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	13,281	7,055	72	2,494	24	0	22,926
HARRIS	568,329	19,840	958	242,912	689	15,000	847,728
LIBERTY	2,359	816	80	443	61	0	3,759
MONTGOMERY	38,395	20	420	1,670	196	6,000	46,701
WALLER	1,289	20,076	347	35	609	0	22,356
BASIN TOTAL	623,653	47,807	1,877	247,554	1,579	21,000	943,470

COUNTY	2010						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	17,056	6,586	72	2,843	20	0	26,577
HARRIS	621,429	19,161	958	260,470	567	15,000	917,585
LIBERTY	2,578	793	80	502	41	0	3,994
MONTGOMERY	46,121	20	420	1,935	98	6,000	54,594
WALLER	1,585	19,347	347	39	290	0	21,608
BASIN TOTAL	688,769	45,907	1,877	265,789	1,016	21,000	1,024,358

COUNTY	2020						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	21,635	6,147	72	3,115	12	0	30,981
HARRIS	689,123	18,506	958	275,100	387	17,500	1,001,574
LIBERTY	2,761	770	80	563	24	0	4,198
MONTGOMERY	55,474	20	420	2,128	53	6,000	64,095
WALLER	1,828	18,644	347	45	145	0	21,009
BASIN TOTAL	770,821	44,087	1,877	280,951	621	23,500	1,121,857

Linked from: SMSAMUN.XLS; SMSAIRR.SLX; SMSALIVE.XLS; SMSAMANI1.XLS; SMSAMINI1.XLS; SMSAPOW.XLS

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

SAN JACINTO BASIN

COUNTY	2030						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	27,523	5,738	72	3,346	4	0	36,683
HARRIS	729,624	17,873	958	287,600	312	20,000	1,056,367
LIBERTY	3,088	747	80	627	7	0	4,549
MONTGOMERY	67,096	20	420	2,317	30	6,000	75,883
WALLER	2,126	17,967	347	50	73	0	20,563
BASIN TOTAL	829,457	42,345	1,877	293,940	426	26,000	1,194,045

COUNTY	2040						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	34,003	5,356	72	3,925	2	0	43,358
HARRIS	780,370	17,262	958	314,930	251	20,000	1,133,771
LIBERTY	3,211	726	80	694	2	0	4,713
MONTGOMERY	79,508	20	420	2,604	19	6,000	88,571
WALLER	2,451	17,313	347	56	24	0	20,191
BASIN TOTAL	899,543	40,677	1,877	322,209	298	26,000	1,290,604

COUNTY	2050						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
FORT BEND	42,528	4,999	72	4,545	1	0	52,145
HARRIS	818,404	16,672	958	342,126	236	20,000	1,198,396
LIBERTY	3,390	705	80	762	0	0	4,937
MONTGOMERY	93,703	20	420	2,897	15	6,000	103,055
WALLER	2,892	16,685	347	61	0	0	19,985
BASIN TOTAL	960,917	39,081	1,877	350,391	252	26,000	1,378,518

Linked from: SMSAMUN.XLS; SMSAIRR.SLX; SMSALIVE.XLS; SMSAMANI.XLS; SMSAMINI.XLS; SMSAPOW.XLS

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

SAN JACINTO BASIN

YEAR	COUNTY					BASIN TOTAL
	FORT BEND	HARRIS	LIBERTY	MONTGOMERY	WALLER	
1990	21,900	699,197	3,045	34,590	23,000	781,732
2000	22,926	847,728	3,759	46,701	22,356	943,470
2010	26,577	917,585	3,994	54,594	21,608	1,024,358
2020	30,981	1,001,574	4,198	64,095	21,009	1,121,857
2030	36,683	1,056,367	4,549	75,883	20,563	1,194,045
2040	43,358	1,133,771	4,713	88,571	20,191	1,290,604
2050	52,145	1,198,396	4,937	103,055	19,985	1,378,518

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

SAN JACINTO - BRAZOS BASIN

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	22,046	102,586	755	28,258	359	0	154,004
FORT BEND	14,987	8,208	185	15,901	92	0	39,373
GALVESTON	32,752	20,685	233	58,077	33	1,229	113,009
HARRIS	37,111	0	65	60,036	3	1,418	98,633
BASIN TOTAL	106,896	131,479	1,238	162,272	487	2,647	405,019

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	26,022	101,924	637	32,203	348	0	161,134
FORT BEND	27491	9,508	188	17,692	169	0	55,048
GALVESTON	40016	18,216	173	64,614	41	1,500	124,560
HARRIS	52064	0	96	69,737	13	1,500	123,410
BASIN TOTAL	145,593	129,648	1,094	184,246	571	3,000	464,152

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	28,519	95,076	637	36,112	308	0	160,652
FORT BEND	34,875	8,477	188	19,723	173	0	63,436
GALVESTON	43,282	16,681	173	70,905	39	1,500	132,580
HARRIS	58,653	0	96	79,856	7	2,500	141,112
BASIN TOTAL	165,329	120,234	1,094	206,596	527	4,000	497,780

COUNTY	2020						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	31,375	88,968	637	38,369	280	0	159,629
FORT BEND	44,055	7,589	188	21,323	183	0	73,338
GALVESTON	47,509	15,338	173	75,743	41	1,500	140,304
HARRIS	66,396	0	96	87,425	5	2,500	156,422
BASIN TOTAL	189,335	111,895	1,094	222,860	509	4,000	529,693

Linked from: smsamun.xls; smsairr.xls; smsalive.xls; smsaman1.xls; smsamin1.xls; smsapow.xls.

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

SAN JACINTO - BRAZOS BASIN

COUNTY	2030						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	35,835	85,717	637	40,286	263	0	162,738
FORT BEND	56,003	7,084	188	22,872	192	0	86,339
GALVESTON	52,813	14,777	173	80,269	40	1,500	149,572
HARRIS	71,550	0	96	94,475	4	2,500	168,625
BASIN TOTAL	216,201	107,578	1,094	237,902	499	4,000	567,274

COUNTY	2040						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	39,420	82,586	637	44,158	263	0	167,064
FORT BEND	69,424	6,612	188	25,378	202	0	101,804
GALVESTON	56,577	14,235	173	88,858	41	1,500	161,384
HARRIS	78,726	0	96	106,367	4	2,500	187,693
BASIN TOTAL	244,147	103,433	1,094	264,761	510	4,000	617,945

COUNTY	2050						TOTAL
	MUNI.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	45,190	79,569	637	47,973	271	0	173,640
FORT BEND	84,009	6,172	188	27,707	213	0	118,289
GALVESTON	59,988	13,713	173	97,460	44	1,500	172,878
HARRIS	82,576	0	96	118,375	4	2,500	203,551
BASIN TOTAL	271,763	99,454	1,094	291,515	532	4,000	668,358

Linked from: smsamun.xls; smsairr.xls; smsalive.xls; smsamanl.xls; smsaminl.xls; smsapow.xls.

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

SAN JACINTO - BRAZOS BASIN

YEAR	COUNTY				BASIN TOTAL
	FORT BEND	HARRIS	MONTGOMERY	WALLER	
1990	154,004	39,373	113,009	98,633	405,019
2000	161,134	55,048	124,560	123,410	464,152
2010	160,652	63,436	132,580	141,112	497,780
2020	159,629	73,338	140,304	156,422	529,693
2030	162,738	86,339	149,572	168,625	567,274
2040	167,064	101,804	161,384	187,693	617,945
2050	173,640	118,289	172,878	203,551	668,358

**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

BRAZOS BASIN

COUNTY	1990						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	1,678	3,535	193	153,173	0	0	158,579
FORT BEND	9,937	18,516	663	860	62	62,805	92,843
WALLER	3,975	5,538	878	8	20	0	10,419
BASIN TOTAL	15,590	27,589	1,734	154,041	82	62,805	261,841

COUNTY	2000						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	2,241	4,250	164	176,937	113	0	183,705
FORT BEND	13,423	21,994	674	953	53	70,000	107,097
WALLER	4,603	5,336	891	9	78	0	10,917
BASIN TOTAL	20,267	31,580	1,729	177,899	244	70,000	301,719

COUNTY	2010						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	2,291	3,863	164	200,901	99	0	207,318
FORT BEND	16,490	19,433	674	1,050	48	70,000	107,695
WALLER	5,326	5,142	891	10	61	0	11,430
BASIN TOTAL	24,107	28,438	1,729	201,961	208	70,000	326,443

COUNTY	2020						TOTAL
	MUNL.	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	2,403	3,526	164	214,220	85	0	220,398
FORT BEND	20,383	17,242	674	1,118	33	70,000	109,450
WALLER	6,092	4,955	891	11	47	0	11,996
BASIN TOTAL	28,878	25,723	1,729	215,349	165	70,000	341,844

Linked from: smsamun.xls; smsairr.xls; smsalive.xls; smsamanl.xls; smsaminl.xls; smsapow.xls

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY USE TYPE**

BRAZOS BASIN

COUNTY	2030						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	2,640	3,397	164	225,799	72	0	232,072
FORT BEND	25,591	16,094	674	1,183	18	70,000	113,560
WALLER	6,930	4,775	891	12	33	0	12,641
BASIN TOTAL	35,161	24,266	1,729	226,994	123	70,000	358,273

COUNTY	2040						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	2,808	3,274	164	248,482	2	0	254,730
FORT BEND	31,465	15,023	674	1,289	13	70,000	118,464
WALLER	7,889	4,602	891	12	29	0	13,423
BASIN TOTAL	42,162	22,899	1,729	249,783	44	70,000	386,617

COUNTY	2050						TOTAL
	MUNL	IRR.	LIVESK.	MANU.	MINING	POWER	
BRAZORIA	3,187	3,154	164	271,026	1	0	277,532
FORT BEND	37,720	14,023	674	1,387	12	70,000	123,816
WALLER	9,124	4,434	891	14	30	0	14,493
BASIN TOTAL	50,031	21,611	1,729	272,427	43	70,000	415,841

Linked from: smsamun.xls; smsairr.xls; smsalive.xls; smsamanl.xls; smsaminl.xls; smsapow.xls.

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**HOUSTON METRO TOTAL WATER DEMAND IN ACRE-FEET
BY DECADE**

BRAZOS BASIN

YEAR	COUNTY			BASIN TOTAL
	BRAZORIA	FORT BEND	WALLER	
1990	158,579	92,843	10,419	261,841
2000	183,705	107,097	10,917	301,719
2010	207,318	107,695	11,430	326,443
2020	220,398	109,450	11,996	341,844
2030	232,072	113,560	12,641	358,273
2040	254,730	118,464	13,423	386,617
2050	277,532	123,816	14,493	415,841