6.0 Environmental Planning

Key Finding The Planning Groups evaluated all new surface water management strategies for their impact on environmental flows.

Senate Bill 1 provided a new direction in water planning with a new set of environmental considerations. One highlight of this process was the provision that required that environmental interests be officially represented on each of the Planning Groups. However, significant involvement and input by environmental interests were not evident until very late in the planning effort.

The Planning Groups considered the environmental impacts of water management strategies with the goal of providing adequate water to maintain instream flows and freshwater inflows to bays and estuaries. One of the Planning Groups (Region H) also included a list of recommended river and stream segments of unique ecological value. The Planning Groups considered environmental impacts in varying detail. Some Planning Groups had comprehensive analyses, whereas others conducted more limited evaluations. The more comprehensive analyses addressed all items on the environmental checklist and described overall ecological impacts on habitats, fish and wildlife, water quality, instream flows, freshwater inflows to bays and estuaries, and cultural resources.

6.1 Environmental Flow Needs and Unique Stream Segments

Environmental issues that challenged Planning Groups the most were determining environmental flow needs for new diversions and reservoirs and recommending ecologically unique river and stream segments.

State and regional water planning requires use of consensus criteria to assess the environmental flow needs of all new water development strategies when site-specific field studies are not available or feasible during regional planning efforts. The criteria were developed through extensive collaboration among scientists and engineers from the State's natural resource agencies (TWDB, TPWD, and TNRCC), as well as academics, consultants, and informed citizens. The criteria are composed of multistage rules for environmentally safe operation of impoundments and diversions during above-normal streamflow conditions, below-normal conditions, and drought conditions (Figure 6-1). The criteria provide balance by sharing the adverse impacts of drought so that neither human nor environmental needs prevail over the other. However, it should be recognized that State and Federal permitting processes may require different environmental flow constraints based on the results of intensive field studies or other permitting considerations.

There are two distinct methods for determining environmental flow needs: statistical "desk-top" techniques and intensive field studies. The first method is used in water planning, particularly when several alternative water management strategies are being evaluated for meeting a water supply need. This method uses a statistical analysis of existing hydrological records for a potential water development site. The second method involves a field study and modeling assessment of the actual flow needed for environmental maintenance. The second method is generally recognized as more accurate than the statistical method and is generally required during the State and Federal permitting process.

Because many streams in Texas are fully or almost fully appropriated, opportunities are limited for making new water appropriations for the environment or for new water development projects that alone would provide flows sufficient to maintain a healthy ecosystem. In most cases, water rights issued before 1985 for development of water supply projects have no environmental requirements.

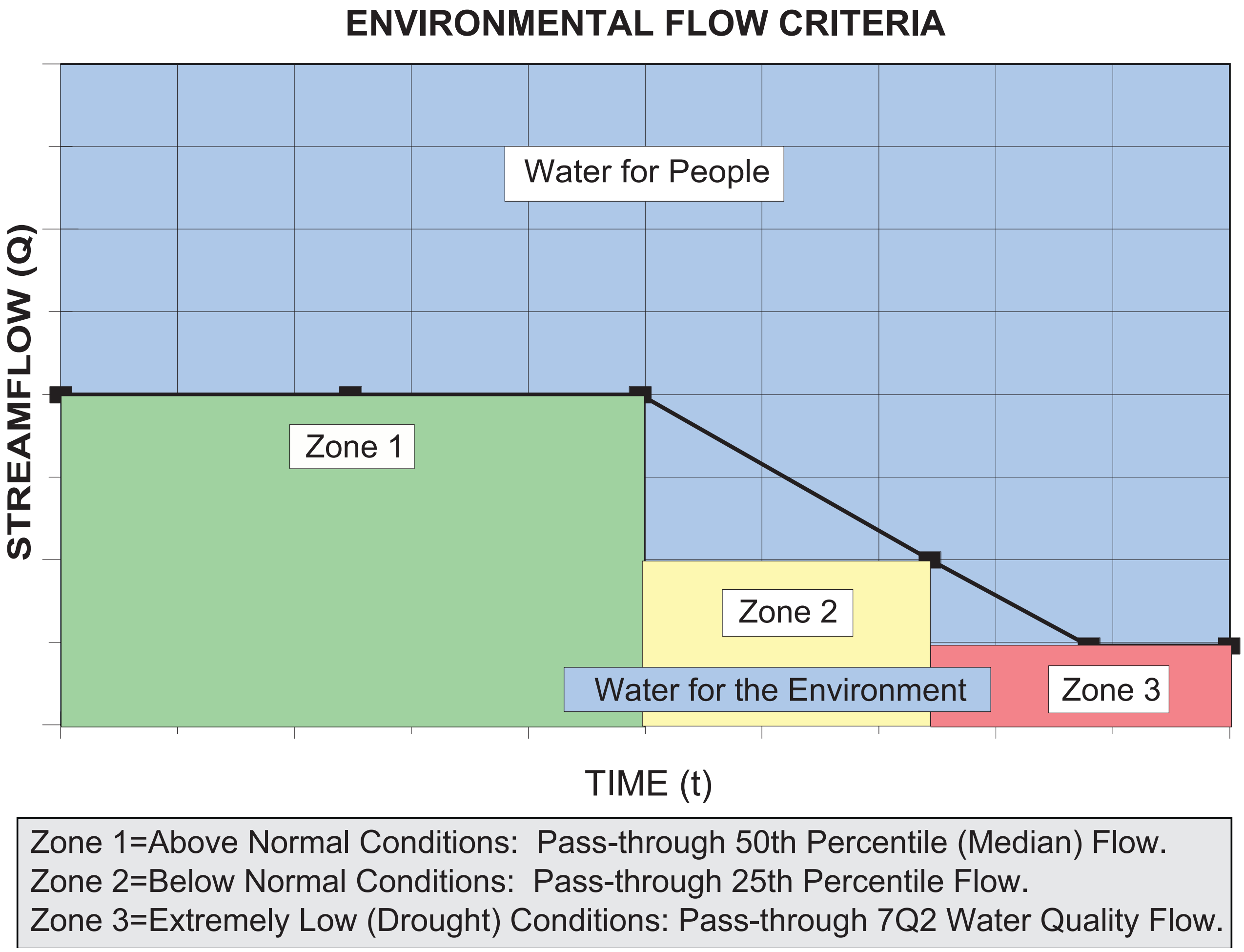

Figure 6-1. Environmental flow criteria for regional and State water planning.

The TPWD proposed a list of ecologically unique river and stream segments for each regional water planning area for the Planning Groups to consider when developing their regional water plans. However, the Planning Groups were concerned about the legal implications on future use if a river or stream were designated as ecologically unique. All but one region (Region H) chose not to make any recommendations because there was no clear legal interpretation of what restrictions might be imposed on private landowners, municipalities, or agricultural and industrial interests. The Planning Groups unanimously agreed that the Legislature needed to better define the legal implications and limit any restrictions to the development of new reservoirs in a designated segment. Senate Bill 2 clarifies that a State agency or political subdivision of the State may not finance reservoir construction in a river or stream segment of unique ecological value (Texas Water Code 16.051(f)). This clarification is anticipated to help Planning Groups in their next round of planning.

6.2 New Environmental Assessment Tools

TWDB rules responded to Senate Bill 1 by requiring a range of environmental assessments, from environmental flow needs to wildlife habitats and cultural resources. To assist the Planning Groups as they made these assessments, the TWDB developed an environmental checklist of required and optional environmental issues to guide the regional water planning effort (Table 6-1).

Table 6-1 Environmental checklist.

Required assessments

- ❑ Description of Regional Planning Area
- ❑ Description of water sources, including major springs
- ❑ Description of natural resources
- ❑ Identification of water quality problems
- ❑ Identification of threats to natural resources

Evaluation of alternative management strategies for effects on

- ❑ Instream flows
- ❑ Bay and estuary inflows
- ❑ Wildlife habitat
- ❑ Wetlands
- ❑ Threatened and endangered species
- ❑ Cultural resources
- ❑ Evaluation of impacts of water management strategies on threats to natural resources
- ❑ Specific recommendations for water management strategies so that strategies that are environmentally sensitive are considered and pursued
- ❑ Use of environmental planning criteria or site-specific environmental information

Conditional considerations

- ❑ Recommendations for ecologically unique river and stream segments
- ❑ Recommendations that are needed and desirable to protect natural resources

Some of the Planning Groups developed new environmental assessment tools to evaluate the impacts of regional water supply projects on environmental and cultural resources. The South Central Texas Region developed a procedure to assess and compare the potential effects of 77 possible water supply options. For each category in the environmental checklist, they developed a protocol to consider regional context, relative value of resources, and the expected probability and magnitude of project-associated impacts. Within each resource category, impact scores for water management strategies were ranked, normalized, and then aggregated over the different categories to produce a total relative-impact score for each of the strategies. The East Texas Region developed a similar assessment tool on the basis of a score of the composite impacts for each strategy. The overall result is a tool that can be implemented, improved upon, and applied to future regional plans throughout the State.

7.0 Identification of Needs

When current water supply is less than projected demand, there is a need. The Planning Groups identified future needs by comparing current supplies with projected demands. Needs were identified for both individual water user groups and major water providers.

Water user groups are cities having populations of 500 or more and an aggregate of demand by county for other sectors, including manufacturing, irrigation, steam-electric power generation, mining, livestock, and county-other. Major water providers are entities that deliver and sell a significant amount of raw or treated water for municipal or manufacturing use on a wholesale or retail basis. Each region selected the quantity considered major for including entities in this category.

7.1 Water User Groups and Major Water Providers with Needs

Key Finding Total volume of needs increases from about 2.4 million AFY in 2000 to 7.5 million AFY in 2050.

Regionally, 438 water user groups and 18 major water providers had needs in 2000 (Figure 7-1 and Table 7-1, respectively). The number of water user groups nearly doubles by 2050, increasing to 883 (Figure 7-1), and major water providers with needs increases to 31 (Table 7-1). Region C and Brazos G Region identified the most water user groups with needs in 2050, closely followed by Region H and East Texas Region (Figure 7-2). East Texas Region, South Central Texas Region, and Region C identified the most major water providers with needs (Table 7-1).

The volume of needs for water user groups increases at varying rates over the 50-year planning horizon. In 2000, the largest volume of needs for water user groups by region was 652,441 AFY for the Rio Grande Region, followed by 494,873 AFY for the South Central Texas Region. By 2050, the largest volume of needs for water user groups moves to the most populous regions, with 1,203,947 AFY in Region C and 1,375,455 AFY in Region H (Figure 7-3). The volume of needs shown for the South Central Texas Region in this figure may be an underestimate because the final water availability value for the Edwards aquifer has yet to be finalized by the Edwards Aquifer Authority and the U.S. Fish and Wildlife Service. On a Statewide basis, the total volume of needs increases from about 2.437 million AFY in 2000 to 7.512 million AFY in 2050 (Figure 7-4). Throughout the 50-year planning horizon, irrigation and municipal are the categories with the greatest need (Table 7-2).

Table 7-1. Number of major water providers with projected needs in regional water planning areas.

Region	2000	2010	2020	2030	2040	2050
A	0	0	0	0	1	1
C	3	5	5	4	4	5
E	2	2	2	3	3	3
G	1	1	2	2	2	2
H	1	1	1	1	1	1
I	6	9	8	8	8	9
K	1	1	1	1	2	2
L	4	6	6	6	6	6
N	0	0	0	0	2	2
Total	**18**	**25**	**25**	**25**	**28**	**31**

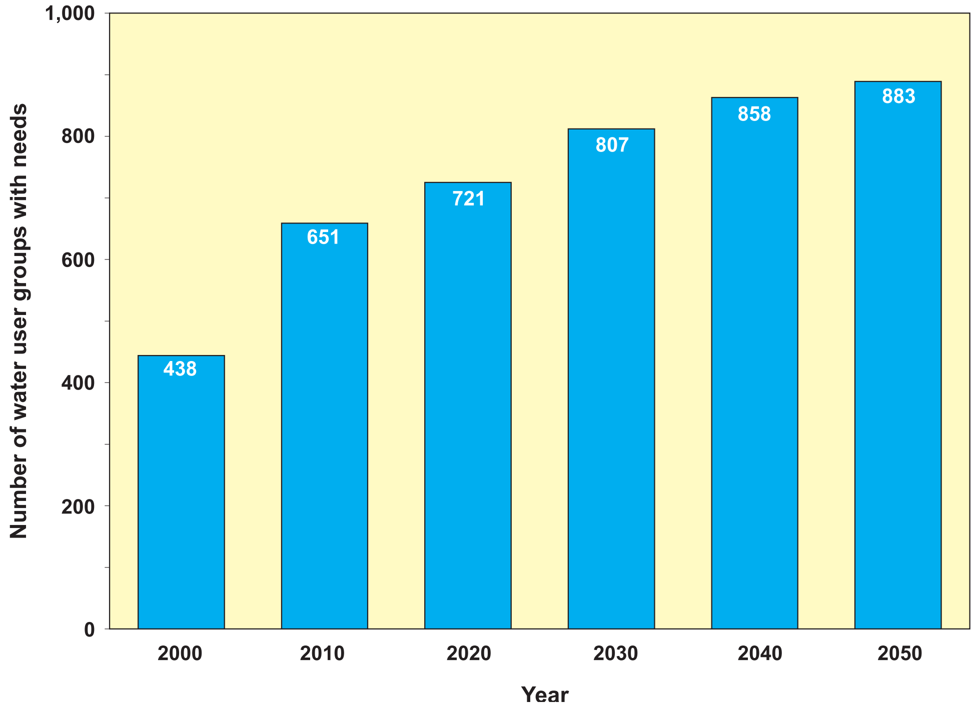

Figure 7-1. Number of water user groups with projected needs Statewide.

Table 7-2. Volume of needs for different water use categories (AFY).

Use	2000	2010	2020	2030	2040	2050
Municipal	310,094	710,612	1,280,291	2,080,184	2,574,946	3,037,646
Manufacturing	69,639	314,129	446,008	850,867	1,008,734	1,178,889
Steam-electric power	21,747	151,589	191,247	264,561	380,211	435,786
Mining	39,239	38,312	41,795	55,668	56,924	61,479
Irrigation	1,993,454	2,119,853	2,013,409	2,514,264	2,688,123	2,756,636
Livestock	2,847	3,956	5,386	14,677	35,174	41,731
Total	**2,437,020**	**3,338,451**	**3,978,136**	**5,780,221**	**6,744,112**	**7,512,167**

Not all identified needs were met, either in whole or in part, by the Planning Groups throughout the 50-year planning period. In 2050, 78 counties in Texas had at least one water user group with unmet needs (Figure 7-5).

7.2 Needs by River Basin

Out of the 23 basins, the Nueces and Nueces-Rio Grande Basins had the highest volume of needs for water user groups in 2000 (Table 7-3). The Trinity, Canadian, and San Jacinto Basins have the largest increases in needs between 2000 and 2050. By 2050, the Trinity, Nueces-Rio Grande, and Canadian Basins have the highest volume of needs for water user groups. Only four basins experience declining needs through 2050.

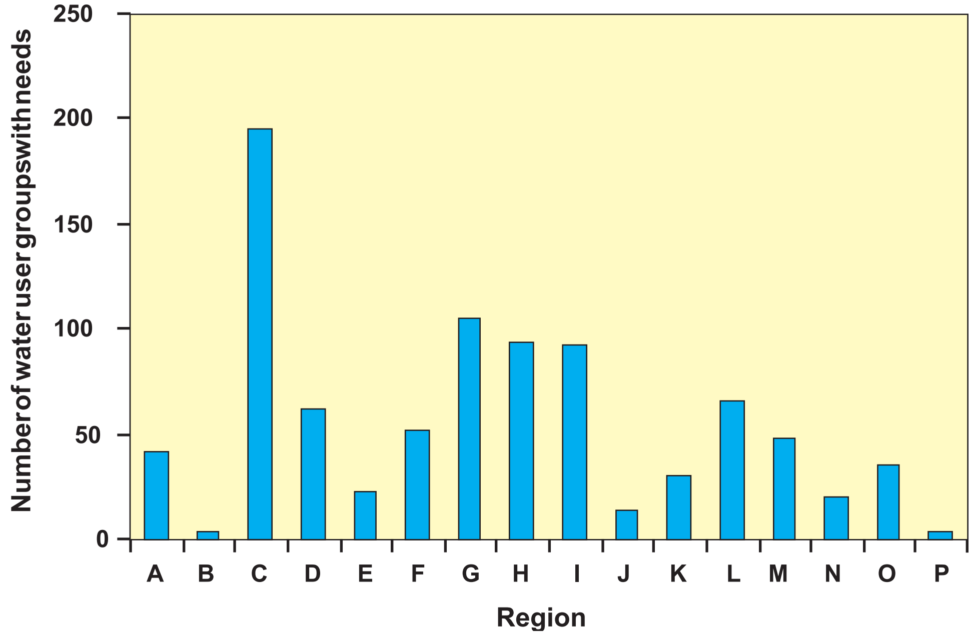

Figure 7-2. Number of water user groups with projected needs in regional water planning areas in 2050.

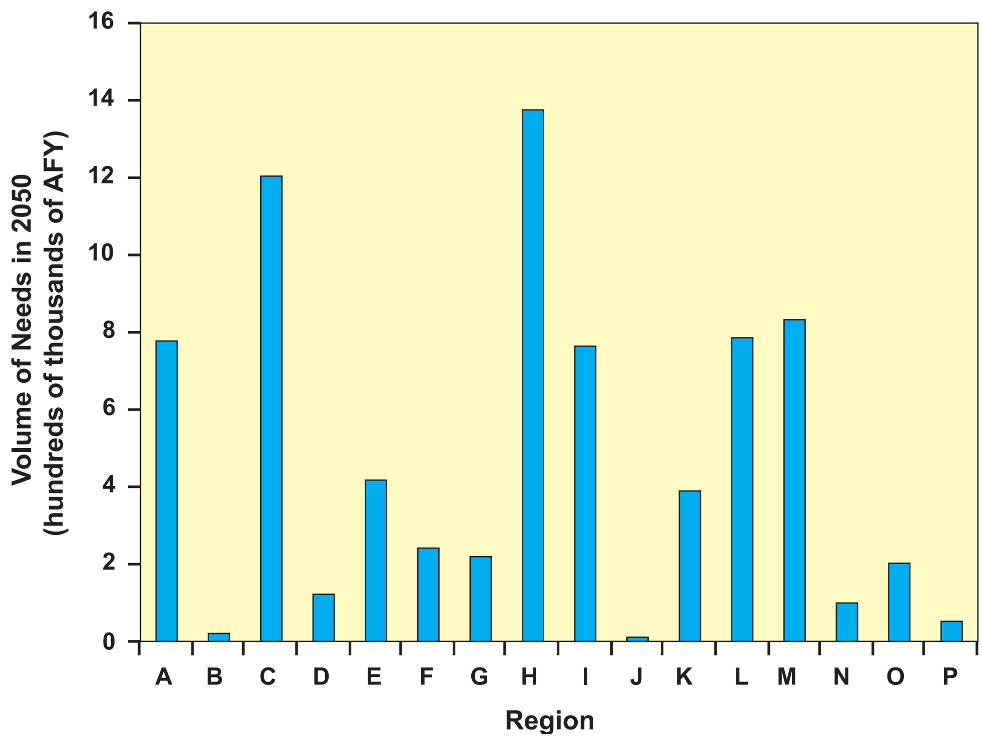

Figure 7-3. Volume of needs in regions in 2050.

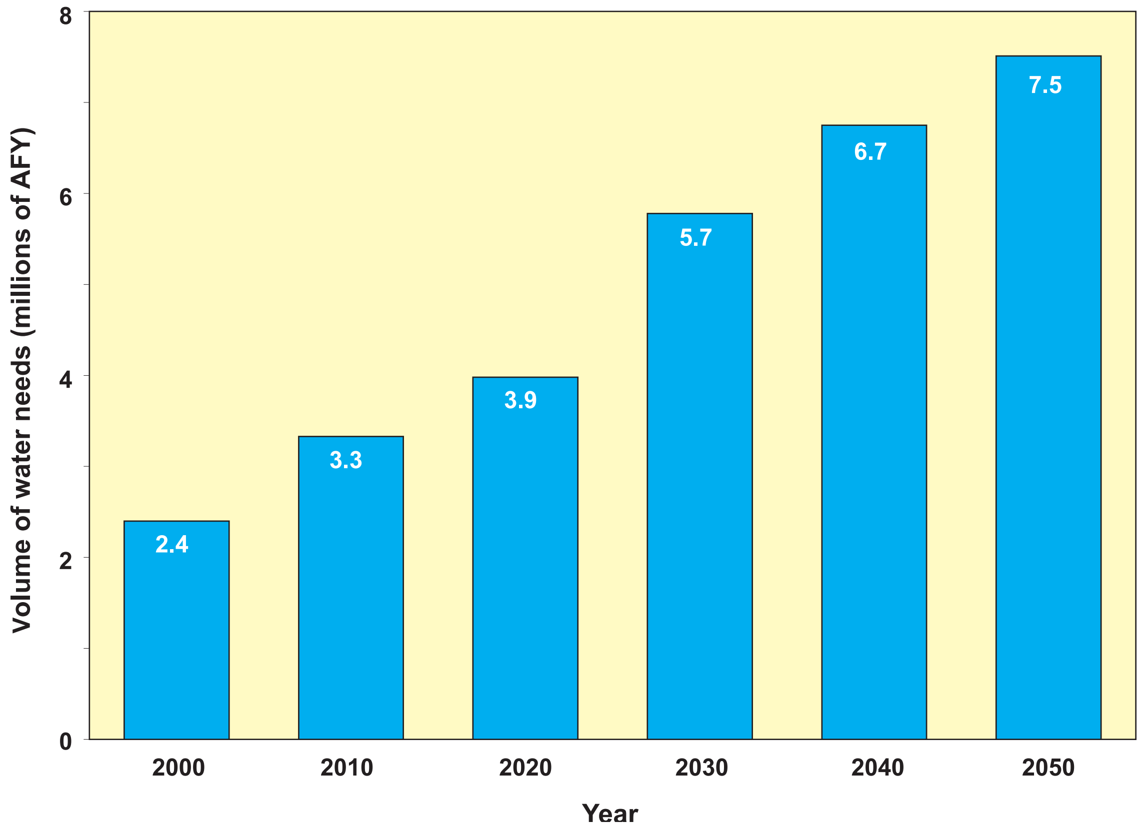

Figure 7-4. Volume of needs Statewide in 2050

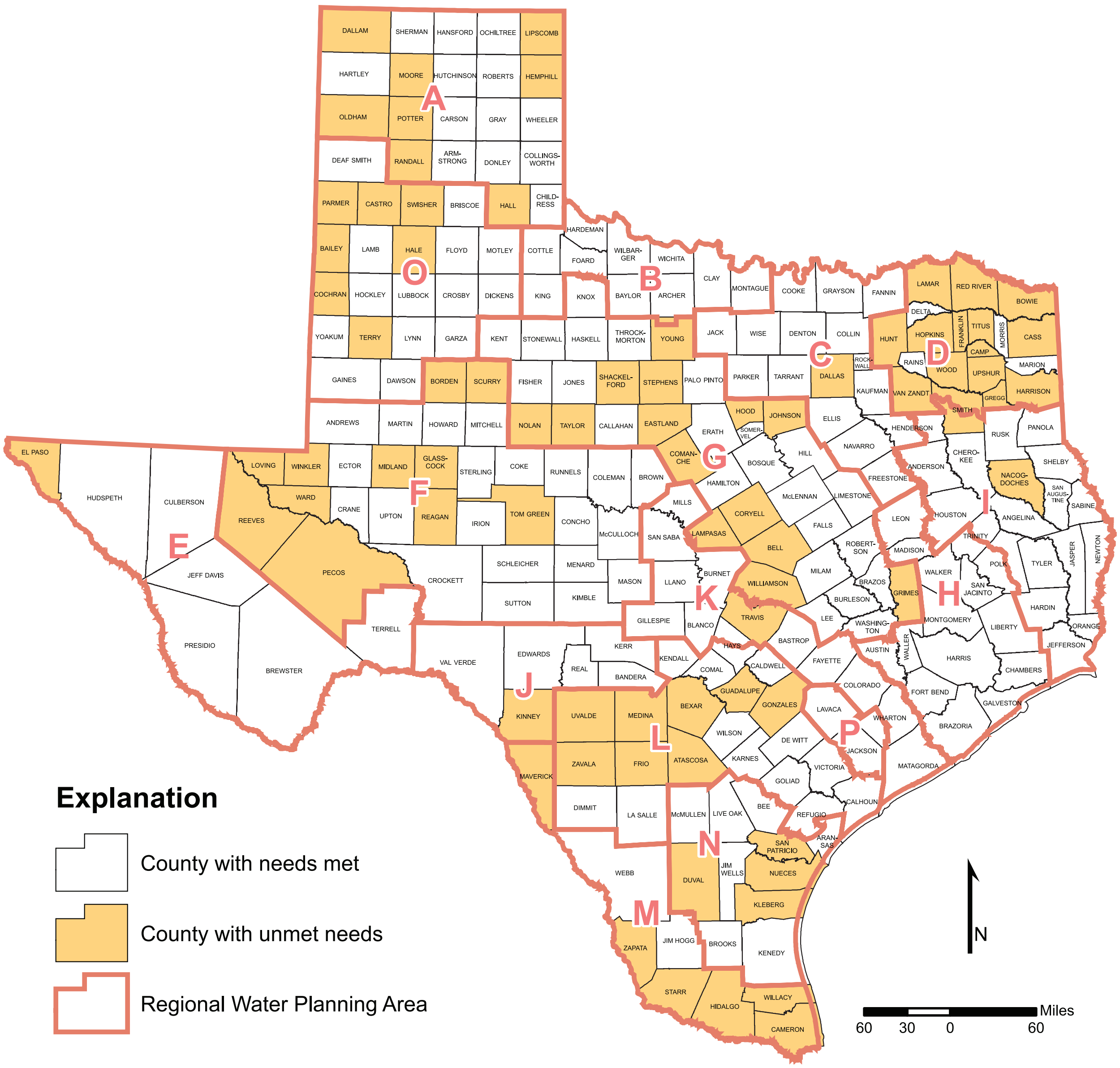

Figure 7-5. Counties in Texas with unmet needs in 2050.

Table 7-3. Volume of needs for water user groups in river basins (AFY).

Basin	2000	2010	2020	2030	2040	2050
Canadian	0	1,813	24,492	499,244	648,488	674,297
Red	7,884	9,083	11,198	21,888	98,150	140,043
Sulphur	4,009	6,840	8,599	14,563	15,830	16,709
Cypress	289	10,025	10,105	10,511	11,878	12,218
Sabine	23,051	57,498	84,512	113,879	144,000	198,468
Neches	37,116	143,716	165,062	193,377	217,117	247,723
Neches-Trinity	24,928	380,220	385,553	389,825	398,455	407,278
Trinity	91,862	340,267	600,766	847,496	1,052,349	1,221,249
Trinity-San Jacinto	0	6,755	89,671	111,773	121,295	131,404
San Jacinto	10,912	97,823	234,567	546,578	612,273	664,365
San Jacinto-Brazos	47,122	88,700	117,372	244,111	290,302	346,890
Brazos	233,556	285,794	350,734	428,408	537,411	602,935
Brazos-Colorado	189,308	184,469	178,797	173,018	169,522	168,276
Colorado	200,702	221,148	226,101	259,792	269,833	299,060
Colorado-Lavaca	138,374	132,918	128,791	124,876	121,084	117,450
Lavaca	86,216	82,965	79,196	75,718	72,450	69,443
Lavaca-Guadalupe	148	917	906	1,000	1,117	1,241
Guadalupe	16,913	30,391	40,029	53,721	66,972	88,655
San Antonio	166,722	198,112	239,817	309,418	368,976	413,885
San Antonio-Nueces	96	33	0	0	7,773	18,738
Nueces	324,739	305,723	286,202	322,753	309,026	301,435
Nueces-Rio Grande	574,129	513,268	477,441	478,815	613,884	727,422
Rio Grande	258,944	239,973	238,225	559,457	595,927	642,983
Total	**2,437,020**	**3,338,451**	**3,978,136**	**5,780,221**	**6,744,112**	**7,512,167**

8.0 Recommended Water Management Strategies

A water management strategy is a specific plan to increase water supply or maximize existing supply to meet a specific need. For example, if a Planning Group determines that a city has a need for additional water supplies in 2050, the Planning Group identifies, evaluates, and then recommends a strategy or strategies to meet that need. The Planning Groups evaluated and recommended strategies for cities, major water providers, and other water uses, including rural, manufacturing, irrigation, steam-electric power generation, mining, and livestock. Sometimes it was not possible to identify a strategy to meet a need or at least some portion of that need. In these cases, the Planning Groups were required to identify those needs for which no water management strategy was feasible.

This section describes water management strategies recommended by the Planning Groups and also a few alternative strategies suggested for consideration by the TWDB. Recommended water management strategies are presented in two ways: a Statewide summary of strategies is presented in this chapter and a region-by-region summary of strategies adopted by the Planning Groups is included in Chapter 11.0. The region-by-region summaries include (1) information on the location of cities with needs; (2) a comparison of industrial, municipal, and agricultural demand with current supplies and supplies implementing water management strategies; (3) a comparison of water user groups with needs; (4) a comparison of types of water management strategies used to meet needs; and (5) a list of key elements included in the regional water plan. If all of the water management strategies recommended in the regional water plans are implemented, then at least on a volumetric basis, available supplies will be greater than projected demands in 2050 (Figure 8-1).

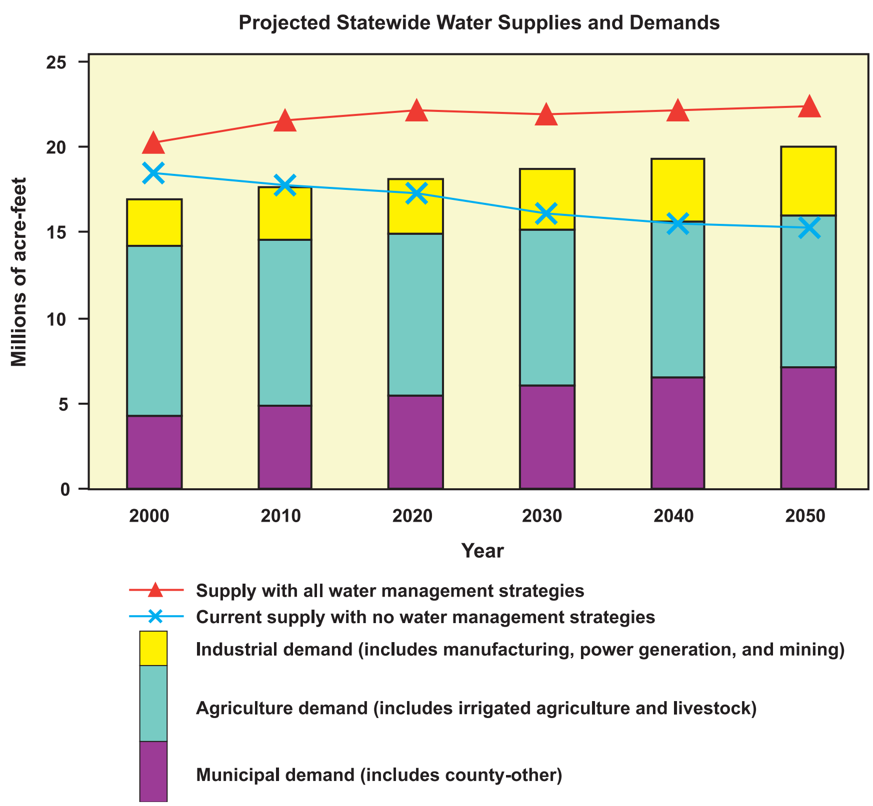

Figure 8-1. Statewide comparison of demands versus supplies with and without implementation of the regional water plans.

The Planning Groups evaluated the following water management strategies:

- water conservation,
- demand management,
- reuse of wastewater,
- expanded use of existing supplies (including systems optimization and conjunctive use of resources),
- reallocation of reservoir storage to new uses,
- subordination of existing water rights through voluntary agreements,
- enhancements of yields of existing sources,
- improvement of water quality (including control of naturally occurring chlorides),
- new supply development (including construction and improvement of surface water and groundwater resources),
- brush control,
- precipitation enhancement,
- desalination,
- aquifer storage and recovery,
- interbasin transfers, and
- other strategies.

The Planning Groups evaluated and compared all identified water management strategies on the basis of quantity, reliability, cost of water, and environmental impacts. These evaluations also included factors for calculating infrastructure debt payments, present costs, and discounted present-value costs. During the Planning Groups' evaluations, effects of strategies on environmental water needs were considered. Impacts on other water resources of the State, including other water management strategies and groundwater/surface water interactions, were also evaluated. In addition, the Planning Groups were required to consider provisions for interbasin transfers, including any social or economic impacts.

After evaluating different strategies, the Planning Groups then chose which strategies to recommend for meeting needs. As much as possible, the Planning Groups chose strategies that satisfied the directives and existing plans of water users in their region. This process implements the concept of Senate Bill 1 to have the water planning process conducted at the local/regional level and to improve local entities' participation in the implementation of recommended strategies.

Texas Water Code §11.134(b) includes a provision that the TNRCC grant a water rights application only if the proposed appropriation addresses a water supply need in a manner that is consistent with the State Water Plan and an approved regional water plan. Texas Water Code §16.053(j) includes a provision that the TWDB provide financial assistance to political subdivisions only if the proposed project addresses needs in a manner that is consistent with a regional water plan that has been approved by the TWDB. Both the TNRCC and the TWDB may determine that conditions warrant a waiver of these requirements. After the regional water plan is approved by the TWDB and the TWDB has adopted a State Water Plan, the projects included in the recommended water management strategies meet the criteria.

Summaries of the recommended water management strategies are included in the next section. Details of recommended strategies are included in Volume II and in the individual regional water plans included in Volume III.

8.1 Water Conservation

Regional water plans indicate that the current water supply will not be able to meet the demand for water over the next 50 years. The Planning Groups recommended that water conservation be utilized to meet the needs, at least partly, of 205 water user groups. Fifty-nine of these are irrigation water user groups. Thus, about 21 percent of the water user groups with needs recommend conservation as a water management strategy. The total projected savings from these conservation-based water management strategies are approximately 987,914 AFY by 2050. Based on a volumetric comparison, approximately 13.5 percent of the water to meet needs in the regional water plans will result from a variety of water conservation strategies (Figure 8-2).

In addition to the conservation-based water management strategies, the plans project that if conservation practices are improved on a continuing basis, Statewide municipal water demand will decrease by an average of 22 gallons per capita per day (GPCD), from 181 GPCD in 2000 to 159 GPCD in 2050. This 12 percent reduction in municipal demand, due in part to more efficient plumbing fixtures, is equivalent to 976,000 AFY by 2050. When combined, these recommended and required conservation efforts are projected to result in savings of 2.0 million AFY by 2050.

The decline in irrigation water demand from 57 percent of the State's total demand in 2000 to about 42 percent in 2050 is due to reductions in groundwater supplies, more water-efficient irrigation practices, and the voluntary transfer of surface water rights from agricultural users to municipal users. The Planning Groups recommended changing of crop varieties and types, utilizing genetic engineering, voluntarily converting irrigated acreage to dry-land production, utilizing conservation tillage methods, installing efficient irrigation equipment, and lining of irrigation canals to ensure efficiency of delivery systems for meeting future irrigation demands. Additional conservation techniques include laser leveling of fields and automated water delivery control systems.

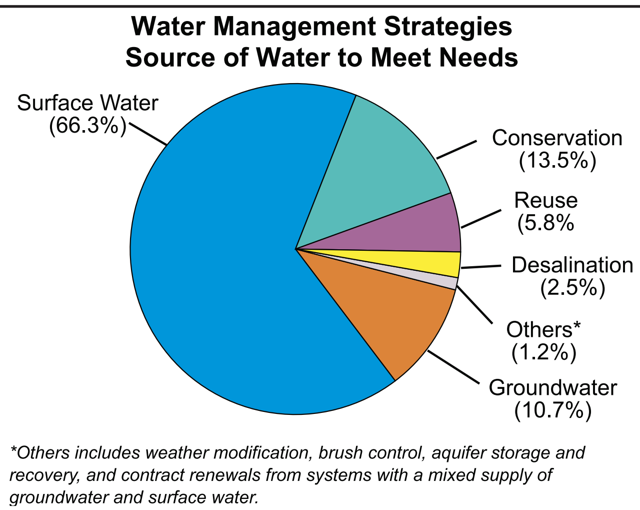

Figure 8-2. Volumetric comparison of the various sources of water utilized by recommended water management strategies to meet needs in the regional water plans.

Awareness and understanding of water conservation and water use efficiency have grown since the 1997 State Water Plan because drought conditions have impacted most regions of the State. So-called water-rich regions often could not meet demands because of rapid growth, and arid regions were pushed to extreme limits with hot, dry weather. This awareness can be a starting point in helping to meet future water demands in Texas.

Per capita demand projections vary greatly around the State. Although most regions of the State project a decrease in per capita use, some areas project an increase. Water demand can change because of population growth and changes in the socioeconomic characteristics of a community. Although water demand may increase, ensuring that water is being used as efficiently as possible is still prudent. Many communities around the State have taken great strides in ensuring wise water use and have found conservation programs to be a cost-effective method of meeting increased water demands while postponing expensive supply or capacity expansion. Austin, Corpus Christi, El Paso, Houston, and San Antonio all have active conservation programs that promote water use efficiency. Each of these cities has used water conservation for different reasons: Austin wants to lower demand to meet a growing customer base; Corpus Christi wants to postpone the need for additional supply; El Paso has a limited long-term supply; Houston needs to reduce its use of groundwater to reduce subsidence; and San Antonio has limited water availability, especially during drought conditions.

Water conservation is not limited to the larger cities. Many small and medium-size systems are committed to increasing water use efficiency. Programs such as bill explanation, plant tours, school programs, and working with local Cooperative Extension offices in educational and outreach activities have proven beneficial. Many smaller systems have partnered with neighboring water systems in public-awareness campaigns to increase exposure, limit confusion, and reduce costs by providing a unified conservation message.

Strategies identified for reaching levels of conservation needed to meet water demand in the 2002 State Water Plan include aggressive plumbing fixture replacement programs and water-efficient landscaping codes.

8.2 Groundwater

Groundwater management strategies recommended by the Planning Groups would result in an additional 779,000 AFY of water supply in 2050.

- The most common groundwater management strategy was installing new wells. These new wells would produce about 631,000 AFY by 2050.
- Regional plans recommended strategies for additional pumping of existing wells, which would produce approximately 122,000 AFY of additional supply.
- The Lower Colorado and South Central Texas Regions recommended artificial recharge strategies that would result in 26,000 AFY in 2050.
- Two Planning Groups proposed groundwater transfers (long distance transfers through pipelines) that would result in transfers of 173,000 AFY by 2050. This volume is included in other items in this list.

8.3 Surface Water

Surface water management strategies would result in approximately 4.8 million AFY of additional water supply in 2050. Some strategies may be included in more than one item in this list.

- Expanded use or acquisition of existing supplies, including systems optimization, and conjunctive use of surface water and groundwater, was recommended in 8 regions and will provide an additional 390,000 AFY of water supply.
- Five regions used reallocation of reservoir storage for new uses for an additional water supply of 107,000 AFY.
- 2,456,000 acre-feet of surface water supply comes from voluntary redistribution of existing water resources, including water marketing, sales, leases, and options in 12 regions.
- Two regions will utilize 151,000 acre-feet of water supply by enhancing yields of existing sources.
- Four regions recommended major interbasin transfer as water management strategy that will generate additional surface water supplies of 2,444,000 AFY by 2050.
- Seven regions included major reservoir development in their surface water management strategies that increase firm yield by approximately 1,116,000 AFY. Eight reservoirs having greater than 5,000 acre-feet of storage capacity are recommended as water management strategies to meet needs (Figure 8-3):
- Prairie Creek and Marvin Nichols I Reservoirs in the North East Texas Region,
- Lower Bois d'Arc Reservoir in Region C,
- Little River Reservoir in Brazos G Region,
- Allens Creek Reservoir and Bedias Reservoir in Region H,
- Brownsville Weir and Channel Dam in the Rio Grande Region, and
- Lake Eastex in the East Texas Region.

In addition, 10 reservoirs having less than 5,000 acre-feet of storage capacity are recommended as water management strategies to meet needs (Figure 8-3):

- Muenster Reservoir in Region C;
- New Throckmorton Reservoir, Meridian Off-Channel Reservoir, Groesbeck Off-Channel Reservoir, Somervell County Off-Channel Storage Reservoir, and Brushy Creek Reservoir in the Brazos G Region; and
- Llano Off-Channel Reservoir, Goldthwaite On-Channel Dam, Goldthwaite Off-Channel Dam, and Mills County Reservoir in the Lower Colorado Region.

The total capital costs for the 8 major and 10 minor reservoirs is estimated at approximately $3.05 billion.

8.4 Reuse

Reuse of wastewater was recommended as a water management strategy in 10 regions. These recommended strategies would result in 423,268 AFY of additional water supplies by 2050. This estimate compares with current (1999) reuse estimates from 190 utilities located in 115 counties reporting approximately 180,000 AFY of municipal reuse.

8.5 Desalination

Desalination was recommended as a water management strategy in four regions. In the Far West Texas Region and Coastal Bend Region, desalination of brackish groundwater was used as a strategy to provide 66,954 AFY in additional supplies. The desalination of coastal waters was recommended by the South Central Texas Region as a water management strategy to provide an additional 84,012 AFY. Region B included desalination in two recommended water management strategies for a total of 28,808 AFY. Currently in Texas, municipal desalination capacity is 25,750 AFY.

8.6 Brush Control

Brush control was utilized as a recommended strategy in only two regions (Brazos G Region and South Central Texas Region). Because this is a water management strategy that cannot be relied upon to produce reliable water supply during drought conditions, no capital costs or estimates of additional water supply were included in the regional water plans.

8.7 Major Conveyances

In order to deliver water supplies to the areas of need identified and addressed in the regional water plans, several new water conveyance systems will need to be constructed. Although precise determination of conveyance routes is beyond the level of detail required for regional water planning, the general location of the recommended conveyance structures illustrates that most of the water supplies will be conveyed to the larger urban areas of the State (Table 8-1, Figure 8-4).

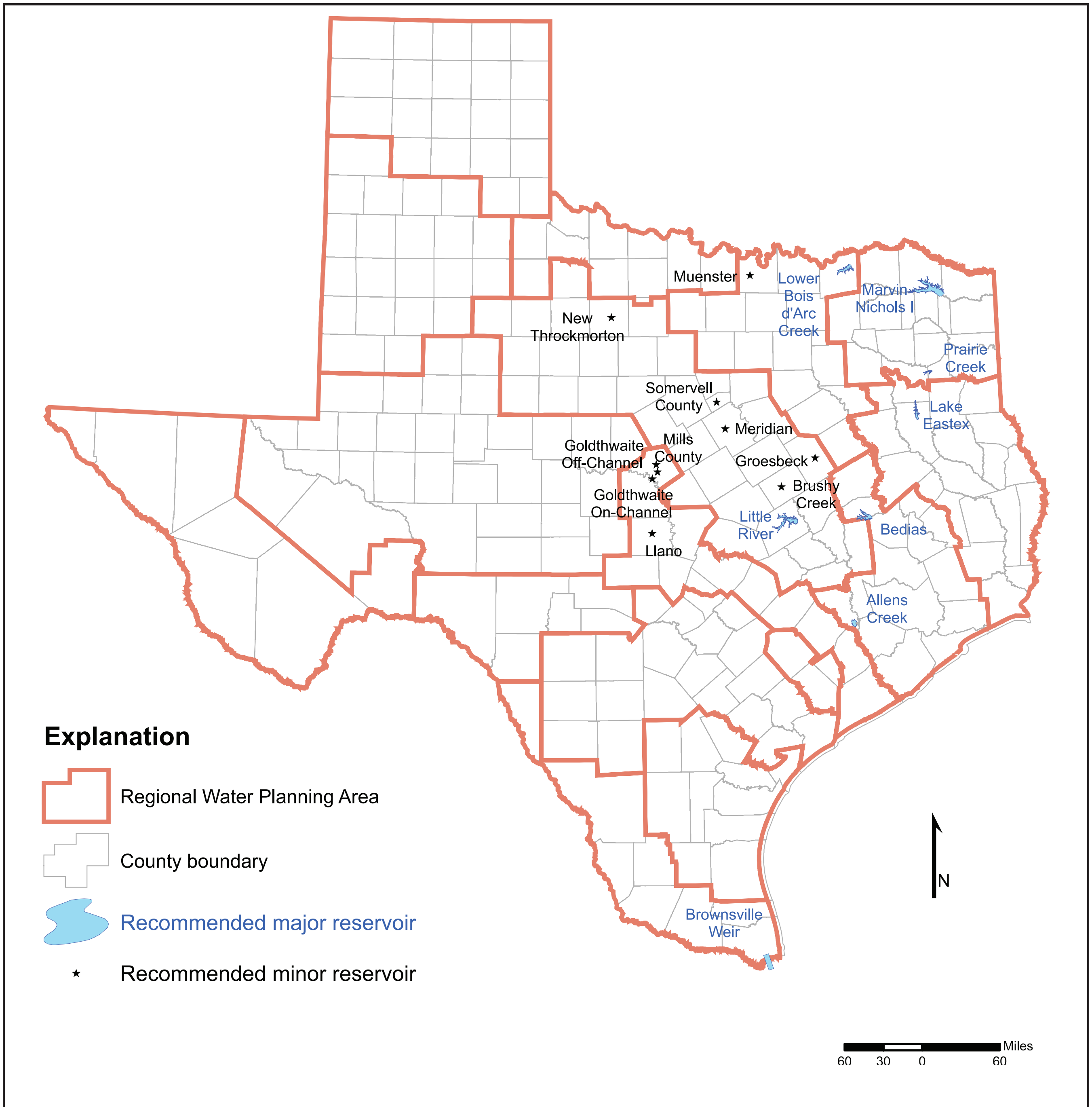

Figure 8-3. Major and minor reservoirs recommended in the regional water plans to meet needs.

Table 8-1. Major water conveyances proposed by Planning Groups.

ID	Conveyance from	To
1	Palo Duro Reservoir	Hansford, Hutchinson, and Moore Counties
2	Lake Diversion	Wichita Falls
3	Marvin Nichols I	Lavon Lake
4	Lavon Lake	Dallas County
5	Lavon Lake	Lewisville Lake
6	Lewisville Lake	Eagle Mountain Lake
7	Eagle Mountain Lake	Benbrook Lake
8	Oklahoma	Eagle Mountain Lake
9	Lower Bois d'Arc Reservoir	North Texas Municipal Water District
10	Lake Texoma	Grayson County Centroid
11	Benbrook Lake	Weatherford
12	Oklahoma	Chapman Lake
13	Lake Palestine	Dallas Water Utilities
14	Lake Fork Reservoir	Dallas Water Utilities
15	Moss Lake	Gainesville
16*	Jeff Davis and Presidio Counties	El Paso County
17*	Hudspeth County	El Paso
18*	Culberson County	Hudspeth County
19	Winkler County	Midland
20	McCulloch County	O.H. Ivie Reservoir
21	Winkler County	Colorado River Municipal Water District
22	Proctor Lake	Stephenville
23	Possum Kingdom Lake	Abilene
24	O.H. Ivie Reservoir	Abilene
25	Lake Graham	Throckmorton
26	Stillhouse Hollow Lake	Lake Georgetown
27	Lake Georgetown	Round Rock
28	Lake Travis	Round Rock
29	Houston	Gulf Coast Water Authority
30	Bedias Reservoir	San Jacinto River Authority
31	Luce Bayou: Trinity River	Lake Houston
32	Sam Rayburn Reservoir	Lufkin
33	Toledo Bend Reservoir	Rusk and Gregg Counties
34	Lake Eastex Reservoir	Cherokee County
35	Lake Eastex	Smith and Rusk Counties
36	Canyon Lake	Blanco, Wimberley, and Woodcreek
37	Lake Travis	Hays County
38	City of Austin	Hays County
39	Lower Guadalupe River	Bexar County
40	Lower Colorado River (Matagorda County)	Bexar County
41	Canyon Lake	Bexar and Comal Counties
42	Canyon Lake	Kendall County
43	Milam, Lee, and Bastrop Counties	Bexar County
44	Bastrop and Gonzales Counties	Comal and Guadalupe Counties
45	Gonzales and Wilson Counties	Bexar County
46	Gonzales County	Seguin and Schertz
47	Colorado River	Lake Texana
48	Canyon Lake	Hays County
49	Cedar Creek/Richland-Chambers System	Tarrant Regional Water District
50	City of Alice	Duval County
51	Lake Alan Henry	Lubbock
52	Lower Colorado River (Bastrop County)	Hays County
53.	San Antonio Bay (Calhoun County)	Bexar County

* The Far West Texas Planning Group approved these strategies on the condition that they be studied further before they are fully implemented.

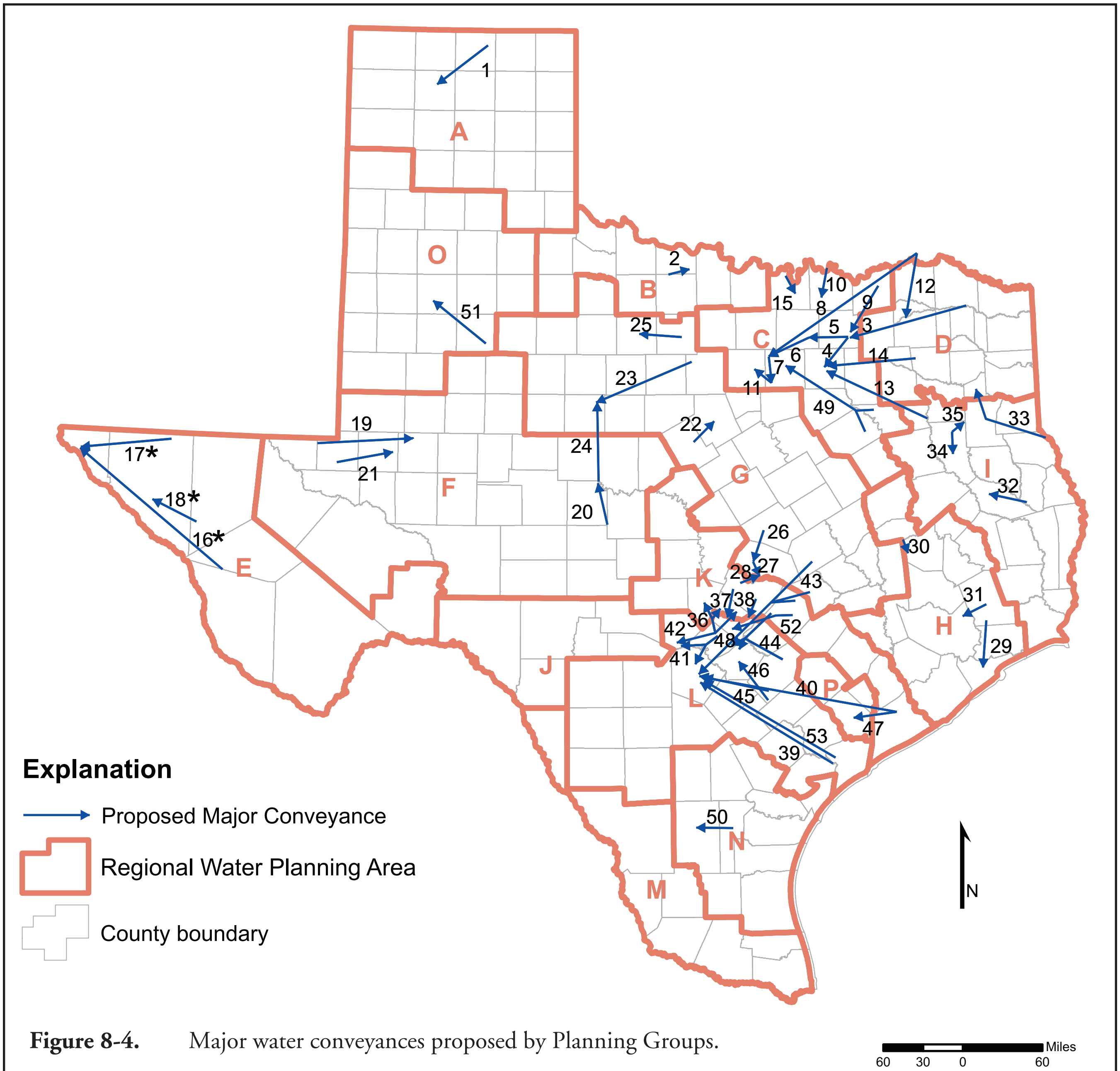

Figure 8-4. Major water conveyances proposed by Planning Groups.