

Water for Texas

PART I



Texas Water in the Past, Present, and Future

The disastrous drought of the 1950s and recent bout of water shortages in 1996 left little doubt that water is a valuable and increasingly limited natural resource. With the Texas population continuing to rise, the problem of dwindling water supplies will only worsen. Plans are now being developed to attempt to meet needs for the next fifty years, not only for periods of normal weather but particularly for those times of recurring drought that are an inevitable part of the Texas climate.

However, before we begin to study, control, or legislate about the state's existing water systems, we must understand the role of water in a historical, geographical, and meteorological context. We need to examine past attempts at supply control to see how successful they were at lessening flooding and droughts; we need to gather data on water movement and recharging through the ground and on the surface; and we need to understand what

rights, claims, and legal issues affect proper water rationing and conservation.

This first section is an overview that offers a perspective on the current status of Texas water and on legislation now being developed. Joe G. Moore, Jr., notes that historically, legal plans were motivated only by a response to catastrophic events such as floods or droughts or by the "threat" of federalization of state lands. Once the panic passed, progress on meeting future needs slowed to a near standstill. By the time of the 1950s drought, state officials finally had to take a serious, long-term view of statewide water plans. However, any plans had to balance carefully the concerns of regional ownership of water rights, conservation of natural resources, nonregional needs for water, and growth of municipal centers.

George H. Ward, Jr., discusses water problems over the last century from a climatological and developmental

view. He notes that one fundamental problem with Texas water is that the “flashiness” of runoff and recharge creates an unstable situation that perpetuates a cycle of floods and droughts. He suggests that water supply development may be reaching its feasible limit due to several issues involving irrigation, municipalities, business, and power usage that will continue to grow during the twenty-first century.

Ralph A. Wurbs takes a look at the two types of water rights used in the state: riparian and prior appropriation. These two systems were melded together with some difficulty into one law that covered the different categories of water. He describes in detail the water rights permit system established pursuant to the Water Rights Adjudica-

tion Act of 1967. He also discusses the water availability modeling system, which uses historical data on water usage to help decide future permits involving surface waters located in streams, rivers, and lakes.

Rima Petrossian reviews the current plan coming out of Senate Bill 1 and compares it to plans made in 1961, after the worst drought on record. Through Senate Bill 1, sixteen new regional water planning programs were created around the state. Each program included representatives from all categories of city, agricultural, business, conservation, and energy plant concerns. She examines some of the sixteen individual plans under development and their recommendations for the next fifty years.

CHAPTER 1

A Half Century of Water Resource Planning and Policy, 1950–2000

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Abstract

Water supply crises such as floods and droughts or fears about control of water sources generate governmental attention to water resources policy in Texas. The last half century of water planning has been dominated by the drought of the 1950s (now the worst “drought of record”) and the floods that ended it. Subsequent years have seen less extensive water shortages or excesses. In the mid-twentieth century there was also concern that federal agencies, namely the U.S. Army Corps of Engineers and the Bureau of Reclamation, would preempt the state’s ability to choose its own water supply solutions. Legislation has been adopted over the years producing a series of fifty-year water plans—1968, 1984, 1990, 1992, and 1997—with a new one (using a different approach) effective in 2002. Residents in river basins, now estimated to have water in excess of their fifty-year future needs, fear that this excess will be diverted to the nearest metropolitan centers in other basins. During the decades since 1950, Texas groundwater law has moved away from the “rule of capture.”

Historically, citizen and legislative attention to Texas water supply issues has been precipitated by catastrophic physical events—droughts and floods—and by institutional threats from government, such as federal water

agency planning and implementation by Congress. Real or imagined crises generate a flurry of activity, but this is followed by periods of little or moderate progress toward meeting future water needs until a new crisis emerges. Decision makers often react to events rather than anticipating them and rarely devote attention to resolution of water problems without the stress of a crisis.

Constitutional Status of Water Resources in the State

In 1904, article 3, section 52 was added to the Texas Constitution authorizing any defined district to levy and collect taxes in order to support bonded indebtedness within specified limitations, for the purposes of “(1) the improvement of rivers, creeks, and streams to prevent overflows, and to permit the navigation thereof, or irrigation thereof, or to aid in such purposes; [and] (2) the construction on maintenance of pools, lakes, reservoirs, dams, canals and waterways for the purpose of irrigation, drainage or navigation, or in the aid thereof.”¹ This amendment was adopted because “the populace had awakened to the fact that water conservation and the utilization of water resources was one of the most important problems facing the state.” Nearly a century later there is a renewed awakening.

Article 16, section 59(a), added to the Texas Constitution in 1917, provides:

Table 1. Evolution of Texas surface water rights regimes

| Sovereign | Date | Water Rights Regime |
|-------------------|--------------|--|
| Spain | 1600–1821 | Spanish civil law |
| Mexico | 1821–1835 | Mexican civil law |
| Republic of Texas | 1836–1840 | Presumably riparian |
| | 1840–1845 | Riparian law* |
| State of Texas | 1845–1888 | Riparian law |
| | 1889–1912 | Limited prior appropriation and riparian law |
| | 1913–1966 | Mixed prior appropriation and riparian law |
| | 1967–present | Unified to prior appropriation |

Source: Ronald A. Kaiser, “Evolving Paradigms in Texas Surface Water Law,” *Texas Water Law Institute Seminar, Austin, October 23–24, 1997*, 5.

*Riparian law holds that ownership of land adjoining a lake or stream includes the right to use such waters (*Haas v. Choussard* 17 Tex 558, 1856).

The conservation and development of all of the natural resources of this State, including the control, storing, preservation and distribution of its storm and flood waters, the waters of its rivers and streams, for irrigation, power and all other useful purposes, the reclamation and irrigation of its arid, semi-arid and other lands needing irrigation, the reclamation and drainage of its overflowed lands, and other lands needing drainage, the conservation and development of its forests, water and hydro-electric power, the navigation of its inland and coastal waters, and the preservation and conservation of all such natural resources of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto.

Section 59(b) authorizes creation of conservation and reclamation districts. These constitutional provisions were “inspired by terrific floods in Texas during 1913 and 1914.”²² Article 3, section 49-d contains the declaration that “public waters of the state . . . are held in trust for the use and benefit of the public” and “the policy of the State” is “to encourage the optimum regional development of systems built for the filtration, treatment, and transmission of water.”

Rights to Use Texas Surface and Groundwater

In Texas, surface and groundwater are governed by two different legal concepts. While all users of surface water must secure a permit from a state agency (now the Texas

Natural Resource Conservation Commission, TNRCC), any landowner can drill a well and pump unlimited groundwater for beneficial use even though such pumping may withdraw water from under a neighbor’s land or cause a neighbor’s well to go dry.

Rights to Surface Water

Surface water law is derived from property law. Thus, Texas has experienced several regulatory regimes, as reflected in table 1.

The prior appropriation surface water rights doctrine has two significant components: (1) “first in time is first in right”; and (2) “use it or lose it.” In the event of shortage in the source, rights to quantities are supplied in chronological order, the oldest being met first. While Texas law also provides for any part of the permitted amount not used during a ten-year period to be subject to a reduction in the permit, such rights are rarely if ever involuntarily canceled for non-use. Stock tanks with a capacity of less than two hundred acre-feet of water on an owner’s land are exempt from state regulation, as is sufficient water from adjoining streams and rivers for domestic and livestock use.

Several controversies arising from Texas’ historical water rights regimes have clarified state water law or generated legislative action. The source of original land grants, either from Spain or Mexico, impacted surface water rights for irrigation. In *State v. Valmont Plantation*, the Texas Supreme Court enunciated the rule that any grant of water for irrigation had to be explicitly stated; it cannot be implied from the laws of either of these countries at the

time of the grant.³ During the 1950s drought, when the flow in the lower Rio Grande was inadequate to meet all claims based on civil law, riparian law, and the prior appropriation system, Texas filed suit to have these competing claims resolved. In *State v. Hidalgo County WCID No. 18* some three thousand parties generated \$10 million in court costs and attorneys' fees during the thirteen years of litigation.⁴ This litigation led to the enactment of the Water Rights Adjudication Act of 1967.⁵ All riparian and civil law surface water rights were to be converted to appropriative rights by court judgments to be entered for each river basin. Constitutionality of this act was affirmed by the Texas Supreme Court in 1982 and 1988.⁶ All subsequent surface water rights in Texas are now determined by the Texas Natural Resource Conservation Commission.

Rights to Groundwater

While the prior appropriation regime for rights to surface water is based on statutes enacted by the legislature, groundwater rights in Texas are based on a 1904 Texas Supreme Court ruling. In *Houston and Texas Central Railway Co. v. East*, the justices adopted language from an 1861 Ohio case stating that “the movement and course of such waters and the causes which govern and direct their movements, are so secret, occult and concealed that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty and would be, therefore, practically impossible.”⁷

Thus most groundwater underlying Texas is governed by the “rule of capture,” which states that the owner of the overlying land may “capture” and beneficially use not only the groundwater underlying his or her own land but also that from under the land of adjoining neighbors. Only if the withdrawal causes land subsidence is there liability for damages.⁸ This rule originated in English common law concerning disputes over wild animals. An 1804 New York case applies the rule to the claims of two neighbors over a dead fox.⁹ Initially applied to minerals underground, the rule was extended to oil and gas in Texas when these resources were discovered. Eventually, this application of the rule was replaced to prevent waste of these resources. However, as late as May, 1999, the Texas Supreme Court reaffirmed the rule’s application to groundwater in *Sipriano et al. v. Great Spring Water of America, Inc. Ozarka*.¹⁰

While most groundwater districts created pursuant to article 16, section 59(a), exercise limited control on the spacing of wells and on water conservation to present

waste, only eight counties in Texas are subject to real limits in groundwater pumping. In three counties—Harris, Montgomery, and Galveston—pumping is restricted by districts created to prevent land subsidence; and in Hays, Comal, Bexar, Medina, and Uvalde counties, and in parts of Atascosa and Guadalupe counties, pumping is limited to assure minimum flows from Comal Springs in New Braunfels and San Marcos Springs in San Marcos. These springs also provide a constant minimum flow downstream to the Guadalupe River. Statutes modifying the rule of capture in both these areas have been upheld as constitutional by the Texas Supreme Court.¹¹

Drought Motivates Water Planning

Average annual precipitation in Texas varies from some fifty-six inches in the Beaumont–Port Arthur area to eight inches in the vicinity of El Paso.¹² Ambient surface temperature also affects water availability through evaporation and evapotranspiration. “Mean annual net evaporation rates vary from zero inches in East Texas near the Sabine River to approximately 100 inches in the Trans-Pecos, near El Paso.”¹³

Between 1891 and 1960 Texas experienced eleven significant drought periods of varying severity and areal extent. They are ranked in the *Texas Water Plan*.

| | |
|-------------|---------|
| Most severe | 1954–56 |
| Second | 1916–18 |
| Third | 1909–12 |
| Fourth | 1901 |
| Fifth | 1953 |
| Sixth | 1933–34 |
| Seventh | 1950–52 |
| Eighth | 1924–25 |
| Ninth | 1891–93 |
| Tenth | 1937–39 |
| Eleventh | 1986–89 |

Accompanying commentary indicates how bad things were in the early 1950s: “As the 1954–1956 drought was the most severe, and since it was immediately preceded by the fifth and seventh ranked droughts comprising a continuous series of years of rainfall deficiencies, this series—1950 through 1956—comprises the most intense 7-year drought period that the State as a whole has experienced within the 70-year period of rainfall records. Dendrochronological studies [analysis of annual tree growth rings to determine dates and order of past events] in the

southwestern part of the United States suggest that the 1950–1956 drought period ranks among the most severe droughts of the past 400 years.”¹⁴ The drought ended in 1957 with a statewide flood.

Thus for statewide water planning purposes, the period 1950–56 is generally characterized as the drought of record. Projects to meet future water requirements must be planned to assure water supply for any repeat of this drought term.

Texas Water Planning in the 1950s and 1960s

State Planning Efforts

The Texas Board of Water Engineers (TBWE) was created by the Irrigation Act of 1913 to administer a system of surface water rights that came to be known as “certified filings.” Acute concern about adequacy of the state’s water supply surfaced during the drought of record. As a result of recommendations made by the Thomas Commission, named by Governor Price Daniel, the Texas Water Development Board was created by legislative act in 1957. In a constitutional amendment adopted the same year, the board was named to administer the \$200 million Texas Water Development Fund, which supplied loans to “political subdivisions and bodies politic and corporate” for water resource development projects.¹⁵

In 1961, at the governor’s request and in response to the drought of record and federal water planning, the board delivered to Governor Daniel and the legislature *A Plan for Meeting the 1980 Water Requirements of Texas*. The document begins: “Nature within the past decade has inscribed upon the wide-spreading landscape grim warnings of greater disasters to come if development of the State’s water resources [is] neglected. . . . It was the drought beginning in 1950 and extending through 1956 that awoke Texans to the real seriousness of the problem.”¹⁶

The Texas Water Resources Planning Division was created within the board by the 1957 Planning Act, and a progress report entitled “Texas Water Resources Planning at the End of the Year 1958” was submitted to the 56th Legislature in 1959. Governor Daniel met with the board several times during development of the plan. Two significant factors were cited as constraints to the plan. The first was the Wagstaff Act, which established priority preferences for domestic and municipal (“classed as superior and coequal”) and industrial uses ahead of water for irrigation, mining, hydroelectric power, navigation, and

recreation; the act was repealed in 1997.¹⁷ The second was that “ground-water has not been subjected to state control.”¹⁸ When the report was being prepared, “14 major reservoirs” (those with five thousand acre-feet of storage or more) were under construction; “the yield of 7 of these reservoirs [was] to be utilized completely before 1980,” and only “small amounts” would remain available from the other seven. The plan proposed forty-five new major reservoirs and the enlargement of two existing ones and claimed: “This study demonstrates that Texas has water resources to meet the State’s municipal and industrial needs of 1980.”¹⁹

Federal Planning Efforts

Three cabinet departments have been involved in planning and constructing water supply projects in Texas. The U.S. Army Corps of Engineers in the Defense Department is responsible for navigation and flood control, as well as municipal and industrial water supply, primarily in the eastern part of the state. The Bureau of Reclamation of the Department of the Interior operates in the twelve contiguous western states where there is extensive federal ownership of public lands. Texas did not initially fit within the bureau’s jurisdiction, as there are no federal public lands in Texas except for those purchased by the federal government because of the compromise forced on the state at the time of its annexation. The state had to repay its then existing national debt in exchange for retaining all public lands. In 1905 and 1906, the bureau’s jurisdiction was extended to Texas, with most of its activity occurring west of the 100th meridian. The Soil Conservation Service (now the National Resources Conservation Service) of the Department of Agriculture has historically constructed small flood retardation and sediment control structures on private lands, with cooperation of landowners or soil and water conservation districts, in order to collect sediment and slow floodwaters. These projects can be authorized to include as much as five thousand acre-feet of storage for water supply. An acre-foot is enough water to cover an acre to a depth of one foot, or 325,851 gallons. Tension and competition among these federal agencies was of sufficient concern to Senator Lyndon Johnson for him to secure a memorandum of understanding executed by the secretaries of Defense, Interior, and Agriculture clearly delineating their respective federal roles in Texas water planning and development.

Three significant federal efforts have affected Texas state water resource planning. A 1953 Bureau of Reclama-

tion proposal, developed at the request of Senator Johnson, discussed large interbasin transfers of water across Texas rivers, except for the Sabine, Rio Grande, Red, and their tributaries.²⁰ Designated the Gulf Basins Project, the bureau's proposal included a canal from Beaumont to Corpus Christi and ending in the Rio Grande Valley, collecting river flows to meet coastal needs and expanded irrigation in the Valley and Coastal Bend areas. This canal came to be known as "Burleigh's Ditch" in honor of Harry Burleigh of the Austin Bureau of Reclamation office.

In 1958, a second document detailing water plans for Texas rivers was published.²¹ Covering all Texas rivers except the Red and Rio Grande and their tributaries, this product was a joint effort of the TBWE, Corps of Engineers, Soil Conservation Service, and Bureau of Reclamation.

In 1959, through the leadership of Senator Johnson, Congress created the U.S. Study Commission—Texas.²² Chaired by long-time Johnson friend and financial supporter George Brown of the Brown and Root construction firm, the commission developed a fifty-year plan for the same river basins as in the 1958 document. The plan was issued in March of 1962, elaborating the Texas Basins Project with cost estimates of \$1.1 billion by 1975 plus an additional \$3 billion by 2010.

The 1968 Texas Water Plan

John Connally became governor in 1963 after defeating Governor Price Daniel in the Democratic primary election and Ralph Yarborough in the primary runoff. Alarmed at the prospect that federal water planning and construction agencies would preempt state preferences, the Texas Water Commission (successor to the TBWE and now part of the Texas Natural Resource Conservation Commission) requested a study of state water planning needs from the Texas Research League, a business-financed, nonprofit research agency organized to minimize the costs of state government. In its report, the league concluded: "Only the State has broad enough jurisdiction to plan the most effective coordination of water project development, and up until now the State has dispatched its responsibility for such coordination very poorly."²³

With release of the bureau's Texas Basins Project report and while the league's study was under way, the Texas Water Commission Chair Joe Carter and Chief Engineer John Vandertulip met with Governor Connally in August, 1964, to request an emergency allocation of funds to un-

dertake a comprehensive water plan covering the entire state. The governor's response, in a letter dated August 12, 1964, is quoted in the 1968 *Texas Water Plan*:

The Bureau of Reclamation and Corps of Engineers have proposed broad water development projects for Texas far beyond the plans of the Texas Water Commission report, "A Plan for Meeting the 1980 Water Requirements of Texas." In my opinion, these plans fall short of satisfying the water needs for all of Texas.

Furthermore, the Congress is presently considering a Federal water pollution control bill, which will supplant state authority in this field. I have long been concerned that the State exercises its responsibility in all areas of water conservation and development. The recently enacted Water Resources Act of 1964 does provide an opportunity for state participation in federal water research programs. . . .

I cannot properly evaluate some proposed federal projects without a longer-range State Water Plan for Texas. Therefore, . . . I hereby request the Texas Water Commission . . . to begin at once to develop a comprehensive State Water Plan. In the public interest and to aid the economic growth and general welfare of the State, I urge that you explore all reasonable alternatives for development and distribution of all our water resources to benefit the entire State, including proposals contained in preliminary reports to the federal agencies.²⁴

In the 1965 legislative session, Governor Connally proposed a detailed water planning statute; a constitutional amendment to enlarge the purposes for which proceeds from bond sales in the Texas Water Development Fund might be spent; and a Water Rights Adjudication Act to clarify all surface water rights in the state and compel conversion of any riparian rights to state permits. In the planning statute, water resource planning was transferred from the Texas Water Commission to the Texas Water Development Board. Senator George Parkhouse of Dallas sponsored these proposals.

During the evolution of the planning legislation, legislators from East Texas became alarmed at the prospect that surface water from rivers or reservoirs in their area might be transported to meet metropolitan or irrigation water demands in other river basins. Senator Jack Strong of Longview spoke for East Texas interests; he was also sponsor of Governor Connally's education legislation

relating to public school teachers' pay. Governor Connally directed his staff to accommodate Senator Strong's views on interbasin transfers of surface water. Compromise language in 1965 provided that the Water Development Board "shall not prepare or formulate a plan that contemplates or results in the removal of surface water from the river basin of origin if the water supply involved will be required for reasonably foreseeable water supply requirements within the river basin of origin during the next ensuing 50-year period, except on a temporary, interim basis."²⁵ Since a water plan had to be reviewed and if necessary revised every five years, East Texas legislators deemed this language adequate protection for their future needs.

Also being considered was the constitutional amendment authorizing Texas Water Development Fund bond proceeds to be spent "for the additional purposes of acquiring and developing storage facilities, and any system or works necessary for the filtration, treatment and transportation of water."²⁶ Senator Strong insisted on the addition of language in the amendment so that neither the Texas Water Development Fund nor "any other state fund" could be used to finance any project that would have the same results as those prohibited in the planning statute. In a Senate Constitutional Amendment Committee hearing, Senator Parkhouse mistakenly advised his colleagues that the proposed amendment doubled the Water Development Fund by adding \$200 million to the authorized total of bonds that could be issued; at his insistence, the necessary change was made to increase the fund from \$200 to \$400 million to "keep him honest." The people of Texas approved the amendment on November 6, 1966. No further increase in total bond proceeds for water supply development projects was approved until November 5, 1985. The Water Rights Adjudication Act proved too complex and too controversial for adoption in the 1965 session. It was passed in 1967.

Two major issues dominating water resource planning in the 1960s were irrigation and inflows to the bays. Irrigation farmers on the Texas High Plains overlying the Ogallala aquifer, and their supporters, insisted that their need for water to replace groundwater being mined from the aquifer must be met. Annual recharge to the aquifer is roughly one-tenth of the amount withdrawn. Meeting this need would require water importation from out of state. The final 1968 plan contemplated two significant parts: (1) The Trans-Texas Division, distributing 7.5 million acre-feet to West Texas for irrigation, 1 million acre-feet for municipal and industrial use, and 1.5 million acre-

feet to New Mexico, for a total of 10 million acre-feet; and (2) the Coastal Division, distributing 1.8 million acre-feet for irrigation, 0.5 million acre-feet for municipal and industrial use, and 2.5 million acre-feet for fish, wildlife, and freshwater inflows to Texas bays and estuaries, for a total of 4.8 million acre-feet.²⁷ Of the 14.8 million acre-feet to be transported in the two divisions, 12–13 million acre-feet were required from the Mississippi River, with only 1.8–2.8 million acre-feet coming from interbasin transfers within Texas. In addition to the two major canal systems, the plan proposed some sixty-two new major reservoirs and two salt water barriers. As of 2000, only six of these had been constructed.

The total cost of the intrastate facilities in the plan was \$9 billion in 1967 dollars for its implementation to the year 2020.²⁸ The Texas Legislature proposed a constitutional amendment to authorize an additional \$3.5 billion in Texas Water Development Fund bonds, and it was on the election ballot on August 5, 1969. It failed in a vote of 315,793 against and 309,516 for, a margin of 6,277 votes; a major factor in defeat of the proposal was organized vocal opposition by the Sierra Club.²⁹ Meeting irrigation water shortages on the Texas High Plains because of overdrafting the Ogallala aquifer frustrated Texas water planners for the ensuing sixteen years.

The other major issue was allocation for freshwater inflows to the bays and estuaries. Noncoastal water users felt such an allocation was a waste. At a conference on "Texas Water Problems and Possible Solutions" held at Southwest Texas State Teachers College (now Texas State University–San Marcos) on July 20, 1954, during the drought of record, Guy C. Jackson, president of the Texas Water Conservation Association, listed one of several problems as "increased water escaping into the sea" with the "mean annual unused run-off at 54 million acre-feet" compared with then "consumptive uses at 8 million acre-feet."³⁰

Water Planning Efforts in the 1970s

Despite the defeat of the bond issue that would have financed the start of implementation of the 1968 water plan, residents and political leaders on the Texas High Plains continued to advocate delivery of water to replace depletion of the Ogallala. The Public Works Appropriation Act of 1967 authorized the Bureau of Reclamation, Corps of Engineers, and Mississippi River Commission to analyze a project to divert Mississippi River water to West Texas and eastern New Mexico.³¹ The final 1973 report, *West Texas and Eastern New Mexico Import Project*, con-

cluded that the \$16.6 billion cost, with a cost-benefit ratio of 0.27, “could not be justified economically or financially using present procedures.” Still West Texas persisted in its support of an import scheme.³²

The Texas Water Development Board contracted with an engineering firm in Little Rock, Arkansas, which in December, 1976, produced “An Assessment of Surface Water Supplies of Arkansas with Computations of Surplus Supplies and a Conceptual Plan for Import to Texas.” The report concluded: “Mutual benefits can be derived by both Arkansas and Texas if surplus water is exported from Arkansas to the water short areas of Texas. Should New Mexico, Oklahoma and Louisiana join with Texas and Arkansas in a water transfer plan, the water supply and delivery system could probably be enlarged and a more cost effective system designed and constructed. The leadership to explore this concept could be provided by the Arkansas-White-Red Basins Inter-Agency Committee (AWRBIAC).” The latter agency was the vehicle for negotiating the Red River Compact.³³

An attempt in 1976 to double the Water Development Fund to \$800 million failed, despite twenty “forums” sponsored by the Water Development Board around the state. The vote was 1,234,451 against and 937,921 in favor.³⁴

In May of 1977, a draft report titled *Continuing Water Resources Planning and Development for Texas, Phase I* was issued by the Texas Department of Water Resources, into which the TWDB had been incorporated by the legislature. No final phase I report was ever issued, and a draft for phase II was not produced.

Congressman George Mahon of Lubbock was chair of the U.S. House Committee on Appropriations during these years. In 1976, Congress appropriated funds to the U.S. Department of Commerce “to examine the feasibility of various alternatives to provide adequate water supplies” for the six-state High Plains region and “to assure the continued growth and vitality of the region.”³⁵ Because the Ogallala underlies the parts of six states, the governors of those states formed a High Plains Study Council. No significant actions were initiated following the report of High Plains Associates in March, 1982, addressed to the commerce secretary, the Honorable Malcolm Baldrige.³⁶ The advent of the Carter and Reagan administrations and the elimination of substantial federal funding for water supply projects ended hope for substantial water importation.

In the 1990 TWDB plan, the agency stated: “Under present circumstances and during the 50-year planning horizon used in this update, major interstate importation

of water, distinguished from local efforts to import ground water and interstate division of surface water within a shared river basin through existing or interstate compact agreements, is not necessary to meet projected demands.”³⁷

The surface waters of all interstate rivers and their tributaries—the Canadian, Red, Sabine, Pecos, and Rio Grande—are allocated according to compacts with the states in those basins, administered by compact commissions. In addition, allocation of the waters of the Rio Grande from El Paso to Brownsville is governed by treaties with Mexico administered through the International Boundary and Water Commission, a unit of the U.S. State Department, headquartered in El Paso, Texas.

In the same 1990 report, the TWDB notes that “the 69th Texas Legislature created the Multi-State Water Resources Planning Commission to study the water importation question and actions to work with other states in an attempt to identify available water supplies and cost-effective import supply alternatives. However, the Multi-State Commission was never provided funding by the Legislature to begin a program of work.”³⁸

Various measures to provide additional state water resources funding were attempted by several governors and Texas legislatures. None were successful, largely because of opposition from the Sierra Club.³⁹ While Texas environmental groups had mustered sufficient strength to prevent adoption of policies adverse to their interests, they were not yet sufficiently strong to compel adoption of their ideas.

Accommodation in the 1980s

Accommodation between water developers and some environmental groups was finally achieved in the 1980s. When a new constitutional amendment for water project funding failed in 1981, many leaders recognized that additional money could be provided only if the Sierra Club and its allies were satisfied.

The first significant formal revision of the 1968 water plan was produced by the TWDB in November, 1984. Coincidentally, the state was experiencing one of its periodic droughts. The plan contemplated the construction of forty-four major reservoirs between 1984 and 2020.⁴⁰ For the first time, estimates of substantial freshwater inflows to bays and estuaries were included as water requirements, and water conservation and direct reuse were discussed as means to reduce demand.⁴¹

In the 1985 legislative session, a compromise approach

to assuring freshwater inflows was at last achieved. Simultaneously, the legislature proposed constitutional amendments including (1) an additional \$400 million for the Water Development Fund for water supply storage, transportation, and treatment projects; (2) \$200 million for flood control; (3) \$250 million for an insurance program to guarantee repayment of bonds issued by local political subdivisions for water supply and wastewater projects; and (4) provisions for a \$200 million program administered by TWDB that would lend money to irrigators for installation of efficient irrigation equipment.⁴² The environmental community was split in the election at which these amendments were considered. “The Sierra Club, the Sportsmen’s Clubs of Texas (the state’s National Wildlife Federation affiliate), the League of Women Voters, and others remained neutral or supported adoption of the amendments. Only the Audubon Society and the Texas Committee on Natural Resources (TCNR), led by Dallas attorney Edward Fritz, publicly opposed the package. [It] was approved by a vote of 705,678 to 251,031 in November 1985.”⁴³

Further Planning in the 1990s

The TWDB issued three water plans in the 1990s. The first extended the planning horizon to 2040. A number of recommendations were made and explained.⁴⁴ Among them was the proposal that the legislature should “remove the requirement that only surface water in excess of the 50-year water supply requirements of an originating basin may be considered for interbasin water transfers.”⁴⁵ In 1991 the legislature eliminated this provision from the planning statute. The TWDB subsequently contracted with HDR Engineering, Inc., to develop what became known as the Trans-Texas Water Program. The program included only those areas of the state in which future water shortage would most likely be affected by interbasin transfers, such as the Beaumont–Port Arthur–Orange, Houston, Austin, San Antonio, and Corpus Christi metropolitan areas, and the available water resources in these regions.⁴⁶ The fears of residents in basins of origin for water transfers were rekindled, and this effort was overtaken by the planning process mandated by Senate Bill 1, passed in 1997.

In 1992, the TWDB issued an update of its 1990 plan.⁴⁷ It contains about one hundred pages of recommendations and “Area/Project Assessments.” Many of the recommendations in the 1990 and 1992 plans are still valid and worthy of consideration by the legislature.

Texas was again plagued with a severe drought in 1996. Before the 1997 legislative session, Lieutenant Governor Bob Bullock requested recommendations for water legislation from the Texas Natural Resource Conservation Commission, the Texas Parks and Wildlife Department, and the Texas Water Development Board in order to enable the state to mitigate repeated water shortages and drought. These agencies responded with a twenty-five-page document addressed to Governor George Bush, Lieutenant Governor Bullock, and House Speaker Pete Laney.⁴⁸ With these recommendations as a basis, Bullock developed a legislative proposal that became Senate Bill 1 in the 1997 Texas legislative session, sponsored by Senator “Buster” Brown, chair of the Natural Resources Committee. It was enacted after extended hearings and considerable debate in both houses.

Significant provisions restructured the state water resources planning process. Instead of the traditional “top-down” approach from the TWDB at the state level, Senate Bill 1 ordered a “bottom-up” approach from planning groups operating within regions designated by the TWDB prepared regional plans. The board delineated sixteen regions after publication of proposed boundaries, a comment period, and revisions. By law, each regional water planning group (RWPG) must have members representing counties, municipalities, industries, agriculture, environmental groups, small businesses, electric generating utilities, river authorities, water districts, water utilities, the public, and any other interest groups appropriate to the region. The TWDB named the initial members in its rule establishing the RWPGs. The regional planning period is fifty years, and regional plans are submitted to the TWDB upon completion. Each region is required to coordinate its plan with all adjoining regions. Any unresolved conflicts between plans were to be resolved by the TWDB and consolidated into a statewide plan by September 1, 2001 (extended to January 1, 2002). Any water resource project requiring a state permit during the five years following the completion of the initial and subsequent plans must be included in the final plans before a permit will be granted. The process must be repeated every five years to update initial plans. Executive Administrator Craig D. Pedersen reported that as of September, 2000, the process had been successful with remarkable consistency among the plans.⁴⁹

The most critical statutory changes in Senate Bill 1 that affect future water resource planning and supply are those restricting interbasin transfers of surface water. First, the legislature provided that any such proposed transfer will

be “junior” in priority to any water right in the receiving basin.⁵⁰ Since all Texas river basins are over-appropriated (i.e., there are verified rights to more water than is normally available in the basin), any right to transferred water becomes very uncertain during periods of low surface water flow. In addition, the law requires the applicant to provide a long list of specific information about the proposed transfer to any person without cost.⁵¹ These provisions severely inhibit future interbasin transfers.

Provisions of Senate Bill 1 requiring water conservation plans for any utility seeking a permit should provide a basis for reducing future demand. Similar requirements for drought management plans should enable the state eventually to develop a statewide plan. Also, groundwater districts were required to file management plans detailing how they would conserve water.

The TWDB was in the process of updating its 1992 plan as Senate Bill 1 was being formulated. That process ended with publication of *Water for Texas, A Consensus-Based Update of the State Water Plan* in August, 1997.⁵² This publication is particularly significant since it constitutes the baseline against which the current “bottom-up” planning effort will be measured.

In Texas, the twentieth century ended with incipient drought. The year 2000 ended with widespread heavy rainfall that produced scattered local flooding. Thus there is added motivation to prepare to meet the water demands of Texas’ multiplying population in the new century. Proposals by Ozarka to pump more East Texas groundwater in areas where there are springs and a proposal by T. Boone Pickens, an oil and gas entrepreneur and Panhandle rancher, to pump some 100,000–200,000 acre-feet of Ogallala groundwater from Parker County to Dallas–Fort Worth or San Antonio at prices competitive with surface water guarantee further attention to the rule of capture. At the request of Senator Brown of the Senate Natural Resources Committee, the TWDB funded “a study to work with stake-holders to build consensus recommendations for improving groundwater management in Texas.” Five proposed statutory changes resulted: (1) support the TWDB’s groundwater availability modeling; (2) continue and expand the TWDB’s grants for groundwater conservation equipment purchases; (3) make the current voluntary groundwater use survey mandatory; (4) expand the state’s real-time groundwater and well level monitoring network; and (5) appropriate additional funds to the TWDB to provide pay for flexibility to enable TWDB to hire and retain qualified modeling and data collection personnel.⁵³

Some of the Senate Bill 1 RWPG plans in the eastern half of the state propose meeting water requirements with new surface water reservoirs. Meeting San Antonio’s projected needs includes further interbasin transfers and desalination of Gulf seawater. Both the Senate and House Natural Resources Committees held hearings throughout the state during the interim between the 1999 and 2001 legislative sessions, and their members generated additional proposals for legislation. Senate Bill 2, sponsored by Senator Brown in the 2001 legislative session, was adopted after substantial controversy and amendment. It strengthens the role of groundwater districts in regulating withdrawals to accommodate a reliable “firm annual yield” and to limit exports. The most pressing issues remain: (1) achieving adequate levels of water conservation; (2) integrating planning and use of groundwater and surface water; (3) regional or local modification of the rule of capture for groundwater; (4) assuring reasonable environmental protection and instream and estuarine water requirements; and (5) simplifying interbasin transfers of surface water by removing the many obstacles added in 1997, while protecting the “reasonably foreseeable water supply requirements within the river basin of origin during the next ensuing fifty year period.”⁵⁴

Observations after Fifty Years of Water Resource Planning in Texas Drought

Periodic drought is inevitable in Texas. Water use for all purposes has reached levels such that at least one region of the state is likely to experience water shortage every three to five years, and widespread drought may occur in ten- to fifteen-year cycles. Advance preparation to minimize hardship is essential. The TWDB and the TNRCC should be given authority to prescribe standards for determining when a region, or the state, is experiencing drought. They should also develop regional and statewide triggers for various stages of water use reductions during droughts. The duty to declare a regional or more extensive drought, and the definition of the affected geographical area, should be assigned to the TWDB; the TNRCC should be charged with enforcement of water use restrictions during drought in each region or the entire state.

Water Conservation and Reuse

The people of Texas cannot conserve enough water from current uses to meet projected fifty-year water requirements. St. Augustine lawn grass and tropical shrubbery should be outlawed except where it can survive with

normal rainfall. Every municipal and existing water utility should establish ten-year goals for gallons per capita per day (gpcd) of water use, and the TNRCC should monitor progress toward achieving these goals. The TNRCC should develop guidelines for all major industrial and commercial water users against which their uses can be evaluated to assure maximum conservation. All major irrigation water users should be required to adopt timetables, with state assistance if necessary, for installing the most efficient irrigation equipment consistent with economic efficiency. Properties with water-based landscaping and recreational facilities such as swimming pools and fountains should be penalized with higher water rates. Reuse of treated municipal and industrial wastewater should be practiced whenever possible, consistent with the protection of public health and downstream surface water rights.

Water for the Environment

A reasonable level of instream water requirements and freshwater inflow to bays and estuaries is as legitimate a water use as are needs for municipal, industrial, commercial, and irrigation activities. Refinement of the quantities required and timing of deliveries should continue as these flows are essential to the preservation of these ecosystems.

Weather Modification

While precipitation enhancement is popular in the public imagination, it will not deliver the quantities of water where they will be needed by Texans in the next fifty years. Rainfall occurring in one place precludes it occurring in another place. The potential range of legal liabilities, as well as evidence of benefits being limited, restricts this alternative within the fifty-year planning time frame.

Desalination

Promoting desalting of Gulf of Mexico salt water provides solace and comfort for those unable or unwilling to consider more practical solutions that should be initiated now to avoid inevitable shortage. Costs—especially for transporting the desalted water to points of use—and environmental consequences are speculative for the short term. Investment in improving the technology, however, should continue.

River Basin Reservoir and Groundwater Management

Where this is not already practiced, all major surface reservoirs in a river basin should be operated jointly so as to optimize distribution of the available surface water.

Efforts should begin now to determine for each major aquifer underlying part of any river basin an annual maximum groundwater withdrawal amount that can be sustained for the drought of record—that is, a “firm annual yield” similar to that for surface water reservoirs. The state legislature should formulate new laws that will allow joint planning, management, and use of all surface water in a river basin and the supplies of groundwater from any major aquifers or parts of aquifers underlying that basin. Where major aquifers underlie more than one surface water basin, methods should be devised for allocating the groundwater between them.

Bottom-Up Planning

The initial results of the Senate Bill 1 planning process are impressive, but the devil may lie in the details. It pays to be skeptical of a product with “consensus” in its title. Almost any solution to a significant fifty-year water supply shortage in any part of Texas is controversial. Large or expensive projects that are initially acceptable are often derailed as the plans and costs become more definitive. Even if all stakeholders are pleased at first, there are risks that the solutions were ill-defined or not well understood and that the consequences (in cost or perceived environmental or other damage or loss) have not been documented or fully explored. Water development and distribution in Texas will remain volatile issues as the potential shortages are fully revealed.

Use of Models to Assist Decision Making

All computer models are extensions of human imagination; they are not a substitution for the human brain—they cannot decide. Models have limitations, and their output should be carefully evaluated, as would the product of any other tool available to assist in the making of choices. Too often, model results are presented as the absolute truth; they are only way stations.

Data

The most glaring shortcoming of all current water resource planning efforts in Texas is the fact that the state today is collecting less water data from fewer locations than it was thirty-five years ago. Discontinuance of monitoring data not only shortchanges the future; it also invalidates the past. A terminated data chain makes the data already collected useless. Often, data collection and analysis fall victim to real or imagined state or local budget crises; at those times, the numbers have no defenders. All agencies involved in water resource planning should de-

velop a statewide essential data needs inventory that will survive scrutiny by the legislature, and they should initiate a program to obtain public support for its implementation.

New Surface Reservoirs

Prospects for new surface water reservoirs are dim. It takes twenty-five years from initiating a plan for a reservoir before water is impounded. There are major environmental considerations—endangered species, loss of habitat, alteration of ecosystems, archeological considerations, etc. Unless all water now used for irrigation is to be converted to municipal, commercial, and industrial use, and groundwater dangerously depleted, additional surface water reservoirs are an absolute necessity at some future date. Efforts must continue to assure their timely completion to meet expected needs after all other alternatives are exhausted.

Aquifer Storage and Recovery

Storing surface or groundwater excess to current needs in empty existing aquifers avoids substantial evaporation and seepage losses that occur in surface reservoirs. Prospects are favorable for this solution in appropriate areas of the state.

The Rule of Capture for Groundwater

Continued modification of the rule of capture is inevitable. Proposals for pumping and transport of substantial quantities of groundwater generate attention. Although this rule was once thought to be protective of the surface landowner's right to water under the land, plans for extensive well fields and long-distance transport of groundwater demonstrate the fragility of the presumed right to groundwater. Outright termination of the rule is unlikely; the number of groundwater districts and their areal extent militate against a radical change. Modifications to meet local concerns are probable.

Interbasin Transfers of Surface Water

Texans have demonstrated their unwillingness to reside “where the water is.” They expect the water to be moved to where they want to live. Further interbasin transfer of surface water is inevitable. When there is unused water available in other river basins, people will not accept severe restrictions on their water use, especially during drought. Despite public perception, water in Texas does not “belong” to residents within a basin; all surface water is held in trust for all the people of the state. Redistribu-

tion to population concentrations is a people problem, a political issue; it will be resolved politically. When a majority of Texans conclude that restrictions on interbasin transfers are a serious threat to their livelihoods and quality of life, they will repeal or modify such limits to suit the majority of Texans.

Notes

1. *Vernon's Annotated Constitution of the State of Texas*, vol. 1A (West Publishing Co.), 402.
2. *Ibid.*
3. *State v. Valmont Plantation*, 355 SW 2d 502 (1962).
4. *State v. Hidalgo County WCID No. 18*, 433 SW 2d 728, Texas Civ. App.—Corpus Christi (1969), writ ref'd, n.r.e.; Ronald A. Kaiser, “Evolving Paradigms in Texas Surface Water Law,” Texas Water Law Institute Seminar, Austin, October 23–24, 1997, 7, footnote 30, citing Caroom and Elliot, “Water Rights Adjudication—Texas Style,” *Texas Bar Journal* 1183 (November, 1981).
5. Water Rights Adjudication Act of 1967, Texas Water Code 3311, 301–41.
6. *In re Adjudication of Water Rights of the Upper Guadalupe Segment*, 642 SW 2d 438, Tex. (1982) and *In re Adjudication of Water Rights of Brazos III Segment*, 746 SW 2d 207, Tex. (1988).
7. *Houston and Texas Central Railway Co. v. East* 98 Tex. 146, 81 SW 279 (1904); *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861).
8. *Friendswood Development Co. v. Smith—Southwest Industries, Inc.* 576 SW 2d 21, Tex. (1978).
9. *Pierson v. Post*, 3 Cai R 175, N.Y. Sup. Ct. (1804).
10. *Sipriano et al. v. Great Spring Water of America, Inc. Ozarka* SW 2d 1-29-98, Tex. (1999).
11. *Beckendorf v. Harris-Galveston Coastal Subsidence District* 558 SW 2d 75, Tex. (1978), affirmed; *Barshop, et al. v. Medina County Underground Water Conservation District, et al.* no. 95-881, slip op. 20, Tex. (June 28, 1996).
12. *Water for Texas: A Comprehensive Plan for the Future*, 2 vols., Texas Water Development Board, Document GP-4-1 (November, 1984), fig. 5, 1:16.
13. *Ibid.*, 2:3.
14. *The Texas Water Plan*, Texas Water Development Board, Austin (November, 1968), II-2, II-3.
15. Article 3, sec. 40-c.
16. *A Plan for Meeting the 1980 Water Requirements of Texas*, Texas Board Water Engineers (May, 1961), 5.
17. S.B. 93, Chapter 128, *General Laws of Texas* (1931), 42nd Legislative, Regular Session.
18. *Plan for Meeting the 1980 Water Requirements*, 7.
19. *Ibid.*, 3.
20. *Water Supply and the Texas Economy: An Appraisal of the Texas Water Problem*, U.S. Senate Document 57, 83rd Congress (1953).

21. *Water Development and Potentialities of the State of Texas*, Senate Document III, 85th Congress (1958).
22. U.S. Congress PL 85-843 (1959).
23. Texas Research League, "A Pattern of Intergovernmental Relations for Water Resource Management in Texas," Austin (February, 1966), 10.
24. *Texas Water Plan* (November, 1968), vii–viii.
25. *Vernon's Texas Codes Annotated, Water*, vol. 1, sec. 16.052.
26. Article 3, sec. 49-d.
27. *Texas Water Plan* (November, 1968), 12, 14.
28. *Ibid.*, table 1-4, I-25–I-28.
29. "The Texas Water Plan: Biggest Boondoggle in History," *Texas Observer*, August 1, 1969, entire issue.
30. *Bulletin of Southwest Texas State Teachers College* 20, no. 4 (December, 1954): 32.
31. The Public Works Appropriation Act of 1967, PL 89-689.
32. See Gregory Curtis, "Lubbock, World's Largest City with No Water," *Texas Monthly*, December, 1974, 76.
33. "An Assessment of Surface Water Supplies of Arkansas with Computations of Surplus Supplies and a Conceptual Plan for Import to Texas." Report to Texas Water Development Board, December, 1976.
34. *Ibid.*, TWDB, 111.
35. PL 94-587, sec. 193, 90 Stat. 2943.
36. *Six State High Plains Ogallala Aquifer Regional Study*, High Plains Associates (March, 1982).
37. *Water for Texas, Today and Tomorrow*, Texas Water Development Board, Document no. GP-5-1 (December, 1990), 4-11.
38. *Ibid.*
39. TWDB, December, 1976, 104–14.
40. *Water for Texas: A Comprehensive Plan for the Future* (November, 1984), vol. 1, fig. 15, 39.
41. *Ibid.*, table 3, 36, and 29–33.
42. *Texas Constitution*, Article 3, secs. 49-d.2, 49-d.3, 49-d.4, 50-d.
43. TWDB, December 1985, 143–44.
44. *Water for Texas Today and Tomorrow*, Texas Water Development Board Document no. GP-5-1 (December, 1990), 4-1 through 4-46.
45. *Ibid.*, 4-8.
46. For example, see *Trans-Texas Water Program*, West Central Study Area, Phase II, Summary Report of Water Supply Alternatives, HDR Engineering, Inc. (March, 1998).
47. *Water for Texas, Today and Tomorrow*, Recommendations for the 1992 update of the Texas Water Plan, Texas Water Development Board, Document no. GP-6-1 (December, 1992).
48. *Water for Texas, Today and Tomorrow*, "Legislative Summary of the 1996 Consensus-based Update of the State Water Plan," prepared by the Texas Water Development Board in conjunction with the Texas Natural Resources Conservation Commission [and the] Texas Parks and Wildlife Department (January, 1997), with transmittal letter dated January 20, 1997.
49. "Senate Bill 1 Planning: Status, Challenges and Implementation," *Texas Water Law 2000*, Texas Water Law Institute, September 15, 2000, Austin, Texas.
50. *Texas Water Code*, sec. 11.085(a).
51. *Ibid.*, secs. 11.085(b) and (c). The TNRCC must consider a similar laundry list of factors before granting a permit for the transfer, as specified in sec. 11.085(k).
52. *Water for Texas, A Consensus-Based Update of the State Water Plan*, vol. 2, "Technical Planning Appendix," Document no. GP-6-12. Austin: Texas Water Development Board, 1997.
53. "Future of Groundwater Management in Texas, A Consensus Building Effort," Texas Water Development Board (May 2, 2000–August 31, 2000), 2.
54. *Ibid.*