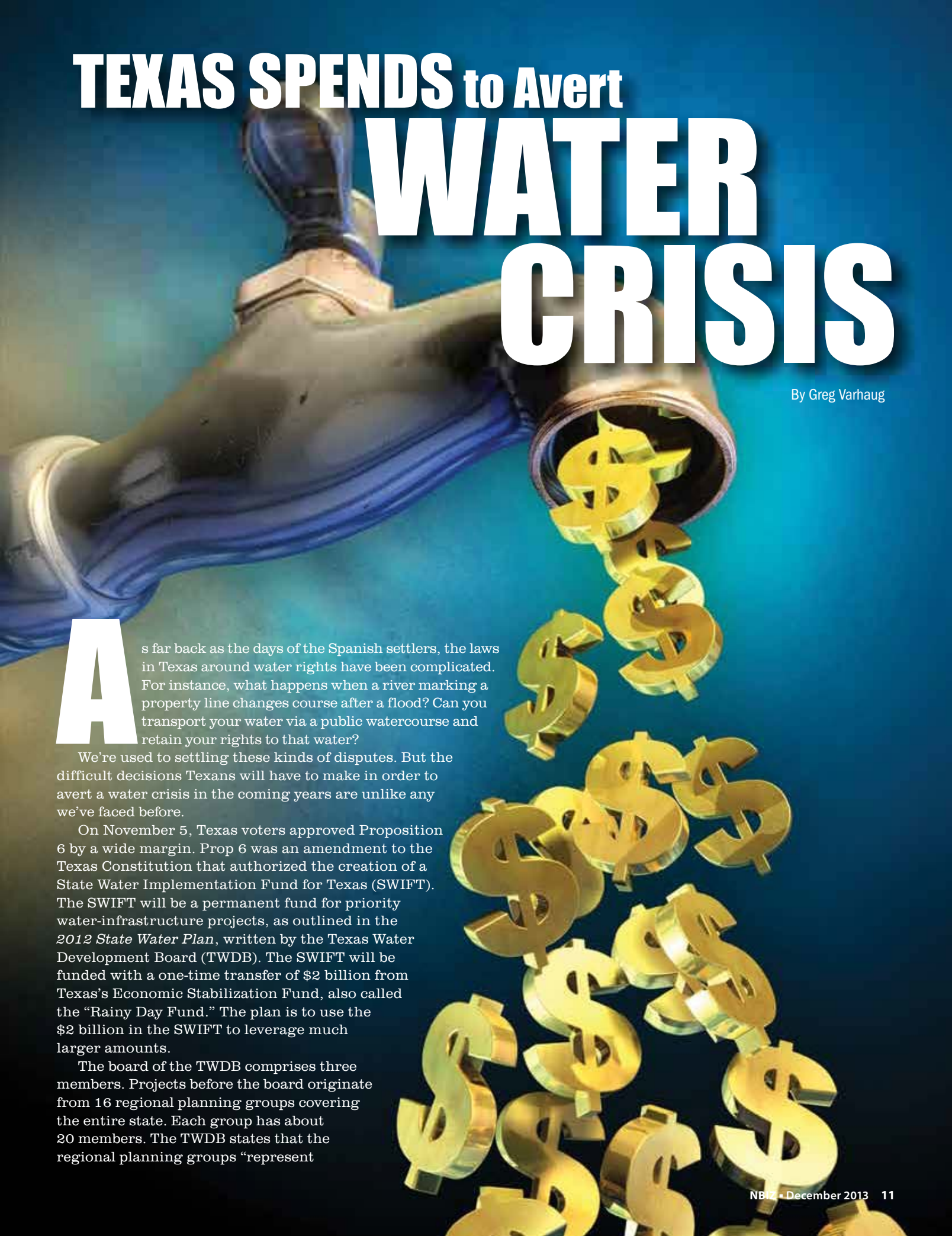
TEXAS SPENDS to Avert WATER CRISIS

By Greg Varhaug



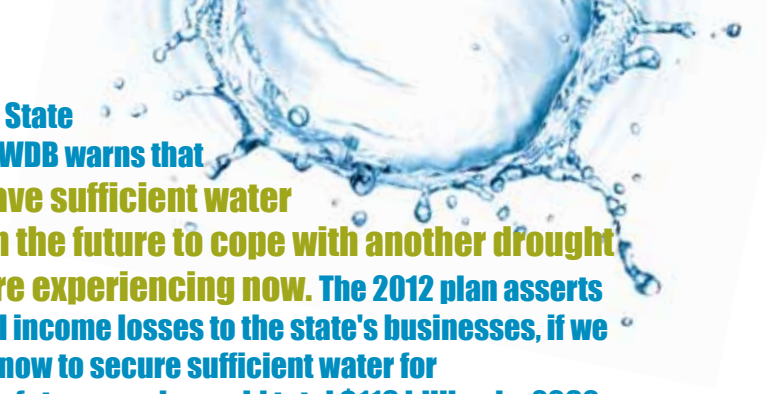
As far back as the days of the Spanish settlers, the laws in Texas around water rights have been complicated. For instance, what happens when a river marking a property line changes course after a flood? Can you transport your water via a public watercourse and retain your rights to that water?

We're used to settling these kinds of disputes. But the difficult decisions Texans will have to make in order to avert a water crisis in the coming years are unlike any we've faced before.

On November 5, Texas voters approved Proposition 6 by a wide margin. Prop 6 was an amendment to the Texas Constitution that authorized the creation of a State Water Implementation Fund for Texas (SWIFT). The SWIFT will be a permanent fund for priority water-infrastructure projects, as outlined in the *2012 State Water Plan*, written by the Texas Water Development Board (TWDB). The SWIFT will be funded with a one-time transfer of $2 billion from Texas's Economic Stabilization Fund, also called the "Rainy Day Fund." The plan is to use the $2 billion in the SWIFT to leverage much larger amounts.

The board of the TWDB comprises three members. Projects before the board originate from 16 regional planning groups covering the entire state. Each group has about 20 members. The TWDB states that the regional planning groups "represent

a variety of interests, including [those of] agriculture, industry, [the] environment, [the] public, municipalities, business, water districts, river authorities, water utilities, counties, groundwater management areas, and power generation." The idea behind the regional boards is to maintain a degree of local control over regional water issues. The different regional boards don't always support one another's proposals



In their 2012 Texas State Water Plan, the TWDB warns that Texas will not have sufficient water resources in the future to cope with another drought like the one we're experiencing now. The 2012 plan asserts that potential income losses to the state's businesses, if we don't take steps now to secure sufficient water for our future needs, could total $116 billion by 2060.

Texas's existing water infrastructure is aged and outmoded, but we're not alone. States and municipalities in the United States expect to spend more than $300 billion for water-system improvements in the next 20 years alone. A report from the American Society of Civil Engineers points to an annual funding gap of more than $54 billion for water infrastructure projects for 2010. Water projects are never cheap. A small water-treatment plant, with connecting pipelines, can easily cost $40 million or more.

The TWDB wants to spend $53 billion to complete 562 separate water projects over the next 50 years. In their *2012 Texas State Water Plan*, TWDB warns that Texas will not have sufficient water resources in the future to cope with another drought like the one we're experiencing now. The 2012 plan asserts that potential income losses to the state's businesses, if we don't take steps now to secure sufficient water for our future needs, could total $116 billion by 2060.

The TWDB estimates that the state's population is on course to grow by 82 percent by 2060. By that time, demand for potable water is expected to increase by 22 percent. Agricultural demand is actually expected to decrease as a result of more efficient irrigation and water management. Most new demand is expected to come from municipalities.

Texans get most of their water from above-ground reservoirs, fed by rivers. The rest comes from underground sources like wells, aquifers, and underground streams. These sources are continually renewed and kept in balance by the natural water cycle: water is taken into the air by evaporation and plant respiration, then returns to the earth as rain. All water is recycled. It may be disturbing to think about, but everybody's tap water was once someone else's waste water.

Regardless of how well we manage them, our water supplies are tied to the rains. We are absolutely dependent on rain to replenish our aquifers and rivers—and Texas is experiencing the second worst drought in its recorded history. In the last year, we've seen wildfires in Marfa and Bastrop, and dust storms in Lubbock. The drought contributed to the unusually large algae blooms in the waters along the Gulf Coast, a suspected cause of the large numbers of dead dolphins that washed up on Texas beaches last year.

At present, the state's major aquifers are not being replenished at a sustainable rate. Our rivers and lakes are drying up because of the drought,

coupled with increased demand. The hot, dry weather of the past few years is causing groundwater to evaporate more quickly. The water levels of Texas lakes like Sam Rayburn, Canyon Lake, and Lake Conroe have fallen to well below capacity. The TWDB reports that monitored reservoirs feeding into the Colorado River are less than 30 percent full. Many reservoirs in west Texas, like Sweetwater and E. V. Spence, are at less than 25 percent of capacity. Overall, the state's monitored water supplies are at 61 percent of capacity as of October 2013, compared to 68 percent this same time a year ago. Because of the drought, water in some Texas river basins is already over-appropriated, meaning that the accumulated rights to the water are greater than the available water supply. If the rivers don't reach the Gulf, then the bays and estuaries, and the life they support, are at risk.

And the drought isn't over. John Nielsen-Gammon, a Texas A&M professor and Texas State climatologist, spoke at a civic forum hosted last August by the Rice Design Alliance entitled *Challenges of Climate Change*, where he stated, "We are in the middle of a period of drought susceptibility within the state due to temperature patterns in both the Pacific and Atlantic oceans." He noted that we've been in this pattern for about ten years, and predicted that it could last another ten years.

1950s Droughts and Floods

The current drought in Texas is being compared to the drought of 1950–57, the state's "drought of record." During the 1950s drought, some areas of the state received no rain for over a year. Farmers and ranchers throughout the state suffered tremendous losses.

In west Texas, the seven-year drought was punctuated by catastrophic floods. Years of dry weather left the ground bare and parched, unable to absorb the rain. During one rainy day in 1954, the Pecos River, banked by miles of high, vertical limestone cliffs, became a violent torrent, 90 feet deep in some places. It wiped out the Highway 90 bridge, reducing it to pieces of mangled steel deposited along the riverbank downstream. The cost of the new bridge was over $1 million.

Elsewhere in the state, the drought broke in the spring of 1957, when an unusual weather pattern produced a series of intense rainstorms. Between April and June of that year, devastating floods swept across the state. The Brazos River crested at 53.4 feet, its second-highest recorded level. In Lampasas, Sulphur Creek overtook its banks and flooded the entire town, leaving some folks stranded on the flat tops of buildings in the town square and killing five people. Austin was also hard hit. Houston's big flood that year happened in June, when Hurricane Audrey made landfall in Louisiana. Insurance companies, overwhelmed with claims from the floods, threatened to pull out of the affected areas. (There was no such thing as federal flood insurance until 1968.)

Texas Desalination PROJECTS

The latest state water plan includes several desalination projects. Back in 2002, Governor Rick Perry directed the TWDB to create a proposal for a seawater-desalination plant. House Bill 1370, passed in the Texas Legislature in 2003, authorized the TWDB to undertake studies in preparation for the construction of a seawater-desalination plant. Though there are currently no plants in Texas for desalinating seawater, TWDB envisions seawater desalination as a means of supplying at least small amounts of water to the Houston area by 2050. Even though it's an expensive and energy-intensive process, desalination is in use in more than 20 countries. Some Texas communities are looking to the desalination of brackish groundwater to meet their future water needs—and Texas already has several plants for desalinating brackish groundwater, including those in San Antonio and El Paso.

In underground reservoirs, fresh water rises to the top. As you drill deeper, the water tends to become more saline. These brackish underground waters are far less salty than seawater and are therefore far cheaper to desalinate. Texas has a wealth of these deep, brackish pools, and in many places throughout the state, access to these waters is almost entirely unregulated. Entrepreneurs are working on new, greener, cheaper technologies to separate salts and other impurities from water.

Taming the Rivers

The 1957 floods were a wake-up call for Texans, who realized they needed a statewide water-management plan. The TWDB was the result. The new agency released its first State Water Plan in 1961; it addressed the state's projected water needs through 1980. The Board recognized several problems. First, they needed to devise a means to meet the water needs of a growing population. Secondly and simultaneously, they needed to control flooding and water pollution. Thirdly, they had to prevent the depletion of vital water supplies. These are all issues we're wrestling with today.

Texas has only one natural lake, Caddo Lake in east Texas. The rest are manmade. Starting in the 1930s, in response to severe floods in 1929, the state began work on a series of dams, creating lakes and reservoirs to control the flow of its unruly rivers—like the Brazos, the Colorado, and the Trinity—as they made their way to the Gulf. Back then, providing water for nearby communities was a secondary consideration. In the decades since, we've created dozens of lakes throughout the state. Taken together, they represent a major engineering accomplishment.

Projects in the State Water Plan

TWDB's recommended projects include constructing 26 new reservoirs and 44 water-conveyance projects. At present, some existing reservoirs have no pipelines to transport water to users. Most of the 26 new reservoir projects in the 2012 Plan are east of the I-35 corridor. Other projects include aquifer storage and recovery, wastewater reuse, new treatment plants, desalination, brush control, and conservation. TWDB has to coordinate with more than 40 river authorities and special water-related law districts, together with more than 90 groundwater conservation districts operating in the state, as well as with federal agencies.

One new reservoir project is the Lake Palo Pinto Storage Restoration Project, also called the Turkey Peak Reservoir. Located about 12 miles from Mineral Wells, the shallow Lake Palo Pinto has accumulated a high volume of sediments since it was completed in 1965. (Once they're created, lakes have to be regularly maintained, because the waters that feed them also deposit a steady stream of sediment that collects on the lake bottom. Without maintenance, some lakes can choke from accumulated sediments in less than a century.)

Lake Palo Pinto, like many Texas lakes, has seen increased rates of evaporation in the past few years. It's now filled to about 34 percent of capacity. Reservoirs may not always be the best way to store water because so much is regularly lost to evaporation; in many above-ground reservoirs, the amount of water that evaporates is actually greater than the amount used in our freshwater systems. An alternative for some areas is to store water underground. "Aquifer storage and recovery" refers to injecting clean water into a well or aquifer so it can be recovered later. This approach has been in use around the world for at least 50 years.

The legal and environmental issues involved in creating a new reservoir are complex. From planning to implementation usually takes 10 years or more. Finding a suitable location is the first hurdle. The best sites for new reservoirs are those that have been previously used for farming, where the biodiversity is already compromised, and where there are already invasive plant species. The TWDB is also seeking changes in permitting to get access to existing surface water sources that aren't now legally available.

Conflicts Between Regional Boards

Some new reservoir projects, like the proposed Marvin Nichols I (in Red River County) and II (in Titus County to the south), have generated controversy. The Marvin Nichols I would be located on the Sulphur River, about eight miles south of Clarksville. This area falls geographically in TWDB's Region D. About 120 miles away, Dallas is looking to the Marvin Nichols as a future water supply. Dallas falls in TWDB's Region C. The Marvin Nichols project is an integral part of TWDB's Region C plan but is not recommended in the Region D plan.

The Region D plan is devoted almost entirely to listing reasons why, in their view, the Marvin Nichols I and II are ill-advised, unnecessary, and just plain un-neighborly.

Region D planners object to flooding valuable hardwood forests and displacing wildlife, as well as forcing out families who have lived on their lands continuously for generations. Region D planners believe that Region C has other viable options besides the Marvin Nichols. A series of court filings has ensued, and a district court recently ruled that the TWDB must resolve its interregional conflicts internally.

Water Conveyance

Because we don't have the means of transporting large amounts of water over great distances, mitigating the problems associated with drought has to be done on a localized basis. Even so, Texas has a number of pipelines that transport "raw water" over short distances. These pipeline systems allow planners to operate several reservoirs as a single system in order to optimize their use.

The Brazos River Authority (BRA) operates a 28-mile, 48-inch raw-water pipeline from Lake Stillhouse Hollow to Lake Georgetown. The BRA also operates another pipeline that carries raw water from Possum Kingdom Lake over a short distance to a small number of customers.

The Tarrant Regional Water District (TRWD) and the City of Dallas are teaming up to build an 80-inch pipeline spanning over 130 miles between Benbrook Lake, southwest of Fort Worth, and Lake Palestine. When it is completed in 2018, the Integrated Pipeline will also connect to lakes Joe Pool, Waxahachie, and Bardwell, and to the Richland Chambers and Cedar Creek reservoirs, before terminating at Lake Palestine. There is already a pipeline running from Benbrook to the Richland Chambers Reservoir. The new pipeline will parallel the existing raw-water line. One of the main reasons for a new pipeline is that improved technology promises a major savings in energy over the existing line. The TRWD was also the first district in the state to create artificial wetlands so that treated wastewater could be filtered naturally before it is released into a supply lake—a strategy that reduces water-treatment costs.

Another consideration is that water issues are tied to energy issues, for a couple of different reasons. Water projects come with a carbon footprint. Pumping and water treatment both use huge amounts of electricity, the cost of which falls heavily on municipalities. Water costs for end users are tied to energy costs. As the cost of electricity increases, so does the cost of getting water to our homes and businesses. N

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