The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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WATER TRANSFER OPTIONS

ALTERNATIVE TRANSFER MECHANISMS TO MEET CHANGING DEMANDS

by Jonathan King and James Ecklund, Squire Patton & Boggs (Denver, CO)

Introduction

When an individual visits an automated teller machine, or ATM, the person and the machine conduct a quick and easy transaction that delivers money to the individual from his or her account. An ATM offers a quick and hassle-free option for a person to get some spending money that won't meet all their financial needs in life, but will easily allow them to purchase a burger and a beer, and supply some readily available cash for a short amount of time.

Alternative water **t**ransfer **m**ethods (ATMs) function similarly in the water context. As referenced in the balance of this article, ATMs encompass the temporary transfer of water rights. With this type of ATM, a municipality or some other non-traditional water interest seeks to *temporarily* lease water rights from a senior water rights holder, most often from the agricultural sector, to have the flexibility to accommodate new growth or endure a period of water stress with some added flexibility. As water stress has increased throughout the western United States, ATMs are increasingly viewed as an answer (if not *the* answer) to concerns arising from the "buying and drying" of irrigated agriculture — where water is transferred *permanently* from farms and ranches to support municipal growth.

The Need for ATMs

ATMs are legal or regulatory tools and economic activities that allow for the temporary transfer of water from one use and/or place to another. These water transfers are considered an "alternative" to traditional water transfers that permanently dry-up agricultural land. In contrast to "buying and drying," ATMs seek to accomplish the movement of water from an existing use to an emerging use in a way that considers sustainability of the existing use as well as the communities, economic, and environmental systems that have come to rely on that use. As a recent report by the Environmental Defense Fund (EDF) on ATMs in Colorado eloquently stated, "ATMs are a body of activities that represent general frameworks or concepts to be molded to the specific conditions of a place and need." EDF and WestWater Research, *Alternative Water Transfers in Colorado: A Review of Alternative Transfer Mechanisms for Front Range Municipalities (2016)* available at: www.edf.org/sites/default/files/alternative-water-transfers-colorado.pdf.

ATMs usually arise in the context of moving water out of agriculture and into other sectors, namely the environment or river systems and municipal water uses. For example, in Colorado, some ATMs need to be developed and utilized to supplement urban water supply in the expanding metro area along the Front Range of the Rocky Mountains, whereas others aim to mitigate the risk of low reservoir levels in the Colorado River system. Still other Colorado ATM efforts focus on concepts of moving water to address violations of interstate water compacts. *See* Anne Castle, et al., *Where Now with Alternative*

Alternative Transfers

Joint Benefits

Flexibility

"Buy & Dry" Costs

Key Factors

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260 North Polk Street,
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Editors: David Light
David Moon

Phone: 541/ 343-8504
Cellular: 541/ 517-5608
Fax: 541/ 683-8279
email:
thewaterreport@yahoo.com
website:
www.TheWaterReport.com

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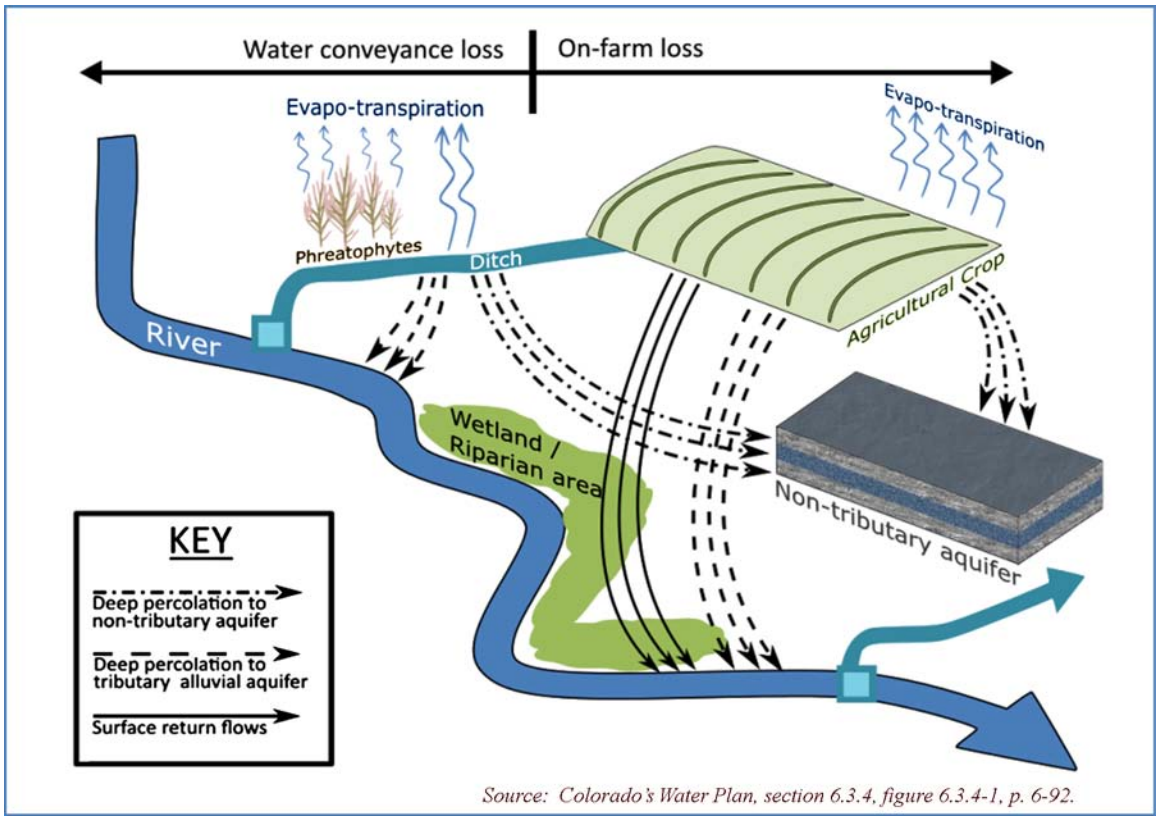
Transfer Methods—ATMs—in Colorado? Colorado Water Institute Special Report No. 31 (April 2017). In all instances, the emphasis is on joint benefits that extend beyond the initial transaction. These benefits highlight reliability and flexibility for the entity or system receiving the transferred water and the continued sustainability or viability of the entity, the land, and the community from which water is transferred.

The interest in ATMs arises out of a growing recognition that the ability to develop additional water supplies through traditional means such as large storage projects is limited. Sound water management requires the legal and regulatory frameworks that facilitate the movement of water from one place of use or sector to another with relative ease and tangible benefits for the buyer that incentivize pursuing alternatives to "buy-and-dry."

Western states' water rights frameworks are generally designed to protect existing uses. Because agriculture was a dominant driver of western settlement, the vast majority of water in the West is dedicated to agriculture. As the demands placed on water resources change and new values emerge, the need to move water from its existing agricultural uses towards denser urban settings or back into the environment has emerged. However, to do so via a permanent transfer of water rights out of agriculture without mitigation of adverse effects to affected farmland and communities comes with the undesirable consequence of eroding rural economies and lifestyles. Steep environmental costs such as fugitive dust, invasive species, and a general deadening of formerly irrigated land also occur all too often. While buy-and-dry results in key advantages to the purchaser of the water right — including a permanent new supply of water — such transactions often have adverse external costs that are absorbed by third parties and the general public. The avoidance of these adverse external costs is a driving force behind the need to develop and implement ATMs.

The EDF study analyzed the economic conditions that facilitate ATMs. The study identified fairly rapid population growth, close proximity to existing water conveyance infrastructure, and existing reliance on large-scale regional water supply projects as key characteristics that municipalities interested in pursuing ATMs shared. EDF and WestWater Research, *Alternative Water Transfers in Colorado (2016)*.



Source: Colorado's Water Plan, section 6.3.4, figure 6.3.4-1, p. 6-92.

Colorado's Experience with ATMs?

In November 2015, Colorado produced its first strategic water plan (Colorado's Water Plan is *available at:* www.colorado.gov/cowaterplan (visited on April 23, 2018)). The plan articulates Colorado's challenge: find a way to curb the rate of buy-and-dry, which, if left unaltered, will result in undesirable impacts to surrounding communities, quality of life, agricultural economies, and the state's economy as a whole. For additional information regarding Colorado's Water Plan, *see* Poppleton, *TWR* #123 and Water Briefs, *TWR* #142.

Alternative Transfers

Colorado Water Plan

Supply History

Free Market Transfer Tool

Buy & Dry Mitigation

ATM Options

Fallowing

Interruptible Supply

Sharing Use

Supply Cooperatives

Born out of a rich agricultural water policy history, Colorado's Water Plan calls for measurable objectives that must be achieved by dates certain. The gap between the state's supply and demand is duly recognized. Imbedded in this recognition is the question of, not *whether* Colorado will close it, but *how* it will close the gap. As with all plans, Colorado's Water Plan will succeed or fail on the merits of its implementation. The complexity is obvious. There are no "silver bullets." Conservation, storage, more water transfers from Colorado's Western Slope, more buy-and-dry, or ATMs will not, alone, produce our envisioned future state. Only a strategically-mixed cocktail will provide relief.

Critical to this paramount question of *how* we solve the gap is the question of buy-and-dry. An adequate understanding of why this is the case requires a quick glance at history. Colorado's Front Range area has found ways to slack its thirst as it has grown. As soon as in-basin water was deemed insufficient or unable to meet demand, civic leaders were forced to look elsewhere. For many years, water from the Western Slope of Colorado was tapped as the preferred solution. For many reasons — political, physical, legal, climatological, and environmental — this option began to fail to supply water at sufficient scale. So, in addition to looking west, forward-thinking municipal water managers turned their gaze east and purchased agricultural water rights. Buy-and-dry is the practice of purchasing water rights and transferring the associated consumptive use away from agricultural production. The underlying farm and ranch lands are thereby "dried-up" as irrigated water rights are diverted towards municipal needs.

Despite our tendency to look for a villain in this story, we won't find one. In fact, as our Front Range municipalities began rapid growth, we placed water managers in front of the gap and gave them very few tools to use — buy-and-dry was one of them. Buy-and-dry is a direct result of the free-market, transferable, individual property right-based water system we've developed as a society. As with any of our gap-addressing tools, if used as one part of our state's solution, we can call it "good water management" and "planning for the future." Negative results arise if we, as a state, disproportionately depend on any one tool. Colorado's Water Plan estimates that Colorado stands to lose another 500,000 to 700,000 acres of agricultural production by 2050 if alternatives to the status quo are not adopted. *Id*., section 6.4, p. 6-111. Coloradans, (urban and rural, recreationists and agricultural producers), have determined that a future of rapid growth predicated solely on buy-and-dry is not a desirable solution. Fortunately, municipalities that have participated in buy-and-dry transactions have voluntarily paid fees in lieu of taxes and planted cover crops on retired agricultural lands to mitigate the impact to the surrounding community and neighbors.

Colorado Water Plan ATM Objectives

With continued good neighbor practices where buy-and-dry is occurring, Colorado's Water Plan sets a statewide ATM objective at 50,000 acre-feet of water annually in ATM transactions by 2030. *Id*., section 10.2, p. 10-6. To meet this, Colorado's Water Plan identifies six types of alternative transfer methods (*Id*., section 6.4, table 6.4-1).

ATMs currently in practice or development in Colorado include:

- **Rotational Fallowing**: Rotational fallowing keeps land in irrigated production mode while systematically fallowing specific plots. A rotation occurs to systematically fallow each plot in successive crop seasons. It allows leased water to become a base supply for a municipality, while keeping a majority of the farming operation in production. It also works very well for drought supply, drought recovery, and conjunctive use. Revegetation protection, erosion control, and weed control of the fallowed plots are important considerations for this type of ATM.
- **Interruptible Supply Agreements**: This type of ATM is between non-agricultural water users and farmers, shareholders, or a ditch company. Water is temporarily transferred from agricultural use to another use, such as municipal. Farms are fallowed during specific periods of time, and water is leased to the end user based on the historical consumptive use portion of the water right. These arrangements are done through contractual agreements that satisfy the authorizing statutes. This could also include water conservation easements. Revegetation protection, erosion control, and weed control are important considerations for this type of ATM.
- **Municipal-Agricultural Water Use Sharing**: This concept embodies a complex array of options based on continued farming operations for all lands associated with the sharing arrangement. Methods are used to reduce the consumptive use of crops, which makes water available for municipalities by sharing the historic consumptive use amount. Two main sub-categories are continued farming and deficit irrigation. In deficit irrigation, crop watering is strategically limited to save water for other uses. Plants are typically stressed, but crops are still produced.
- **Water Cooperatives**: This concept identifies periodic excess water supplies that can be used for optimization in the system. It includes use of surplus augmentation water and other supplies. (Surplus augmentation water is water remaining, *after* water from an augmentation plan is used for the purpose of the augmentation plan, that could be banked or stored). The framework for moving water from one use

Alternative Transfers

to another involves mutually beneficial transactions that work within the existing system of water rights so that no injury occurs. *Id*., *citing* J. Yahn, North Sterling Irrigation District, Lower South Platte Water Cooperative (October 2011). The Lower South Platte Cooperative is a current working example of this type of ATM.

Water Banks

- **Water Banks**: A water bank acts as an intermediary or broker based on water supply arrangements with owners of certain water rights. The bank could be used to avoid or endure a compact curtailment, for example. *Id*., *citing* Colorado River District, Colorado River Water Bank Feasibility Study Presentation (November 2013). Irrigators would be paid to reduce their consumptive uses, which could trigger fallowing of agricultural lands or deficit irrigation practices on a temporary basis. The saved water could be banked in a reservoir for later release into the system. This approach is being regularly discussed and studied in the Colorado River Basin. Revegetation protection, erosion control, and weed control are important considerations for this type of ATM.

Flexible Markets

- **Flexible Markets**: These ATMs are defined as voluntary agreements between municipal and industrial water users, agricultural water users, and environmental/conservation water users. *Id*., *citing* Colorado Corn Growers, et al., Flex Market Model Project Completion Report (June 2013), viii, 1-1, 1-2. The idea is to change the use of a senior irrigation right to include multiple end uses in addition to irrigation. Flex markets establish trading platforms to help provide water used by all participants. The goal of this approach is to allow part of the senior right to be used by cities and towns and for environmental purposes based on contractual arrangements. The economic benefit of the senior water right is kept in place by maintaining enough agricultural water to sustain robust farming operations. Revegetation protection, erosion control, and weed control are important considerations for this type of ATM.

Of the 50,000 acre-foot goal, Colorado is currently achieving about 12,000 acre-feet in ATMs per year. Note that about half of this total is attributable to the System Conservation Pilot Program, which is, as the name suggests, a pilot and not a permanent program. (Presentation by Bovee, Brett, Colorado Mesa University, EDF, and WestWater Research, LLC, (*available at:* www.coloradomesa.edu/water-center/forum/03_bovee_edf_atm_uppercoforum.pdf).

Operating ATMs

Current Colorado ATMs

While not an exhaustive list, Colorado's Water Plan describes the following ATMs currently in place in Colorado (Colorado's Water Plan, section 6.4):

Lease Agreement

- **Morgan Ditch Company & Xcel Energy** formed a voluntary lease arrangement in the South Platte River Basin. For more than 20 years, a separate water company developed under the Morgan Ditch Company has provided firm yield supply to Xcel Energy's Pawnee power station. It is located conveniently near the ditch system on the eastern plains south of Brush, which allows for several options to physically deliver the water to the power station. While a traditional water court process was used to codify the legal ability to transfer water from agricultural use to industrial use, the arrangement has built-in flexibility to handle wet, average, and dry years. The dry year deliveries typically involve temporary dry-up (fallowing) of sufficient farmland under the ditch to meet delivery requirements to Xcel. It also means that remaining farmland is fully irrigated with senior direct flows or senior reservoir rights. In those cases, the system does not operate in a deficit irrigation mode to apply water to all lands during the really dry years. The mutually beneficial agreement is desirable in the eyes of those in the system and has a proven track record of success, providing an example of how industrial interests and farmers can continue to operate.

Super Ditch Collective

- **Lower Arkansas Valley Water Conservancy District** provided an economic and engineering analysis of the Lower Arkansas Valley Super Ditch Company (Super Ditch). The Super Ditch allows irrigators under a group of ditch companies to collectively lease agricultural water for other uses, including municipal use. The Super Ditch acts as a negotiating entity for irrigators who are interested in leasing water for temporary use by cities, towns, water districts, and other users. *Id*., section 6.4 *citing* Lower Arkansas Valley Water Conservancy District, www.lavwcd.com (2011). The farmers retain ownership of their water, keeping farms in operation for agricultural sustainability. *See* Jones, *TWR* #138 for more regarding the Super Ditch.

Conservation Pilot

- **The System Conservation Pilot Program** is a program designed to explore potential solutions in regards to declining water levels in Lakes Mead and Powell, as well as the potential for long-term drought in the Upper Colorado River Basin. The program implements and tests on-the-ground water conservation opportunities which may be helpful in managing ongoing record drought conditions in the Colorado River Basin. The purpose of the program is to explore and learn about the effectiveness of temporary, voluntary, and compensated measures that could be used, when needed, to help maintain water levels in Lake Powell at a level necessary for hydroelectric power production and to protect Colorado River compact entitlements. Upper Colorado River Commission, *System Conservation Pilot Program Summary*, available at: www.ucrcommission.com/RepDoc/SCPilotP.html. *See also* MacDonnell & Castle, *TWR* #167 for more on this Program.

Lake Powell

Alternative Transfers

Colorado River Banking

Augmentation Supplies

Crop Switch

Intermittent Leases

Water Fowl Ponds

Temporary Transfers

Long-Term Planning

Inertia

• **The Water Bank Working Group** consists of the Colorado River Water Conservation District, the Southwest Water Conservation District, the Front Range Water Council, the Nature Conservancy, the Colorado Water Conservation Board (CWCB), and other interested parties. The working group is investigating the feasibility of a water banking program within the Colorado River Basin. In the short-term, the water bank could operate as part of the demand management component of the state's contingency plan to prevent Lake Powell from dropping below critical levels. In the long-term, a water bank could help prevent shortages under the Colorado River Compact and help Colorado water users during regional shortages. The Water Bank Working Group engages with agricultural users to gauge interest in participating in the program and to identify potential costs or compensation for involvement. The "*Colorado River Water Bank Feasibility Study*," released in March 2012, details potential uses for such a program as well as potential sources of supply. The preliminary study modeled the potential frequency of situations where a water bank would be useful. The study examined several scenarios that showed water bank annual use estimates and an estimate of the number of irrigators willing to participate. The CWCB is examining additional studies about the water bank.

• **City of Aurora & Rocky Ford Ditch** partnered for a creative water transfer arrangement to allow continued farming. Aurora invested to help purchase highly efficient irrigation equipment (e.g. drip or sprinkler technology) for farming operations. Farmers also received augmentation water from Aurora to supply new wells for irrigation rather than using water directly from the Rocky Ford Ditch. Several farmers have maintained strong agricultural production by using augmentation supplies for depletions from the well use on their farm. The farmers have reduced their consumptive use by switching to crops that need less water. This arrangement still maintains a healthy agricultural operation. For successful outcomes, municipalities offer strong financial commitments and the farmers offer willingness and flexibility to modify their traditional practices. *See* Darling, *TWR* #98 on Aurora's projects.

• **City of Aurora & Rocky Ford Highline Canal** partnered for a water leasing agreement in 2004 and 2005. Farmers under the Rocky Ford Highline Canal directly leased water to the City of Aurora. Coming to an agreement took a substantial amount of time and included complex contracts between the City, individual farmers, and the canal company. It also required approval of a substitute water supply plan from the Division of Water Resources at that time. However, newer statutory authorizations for interruptible water supply agreements assist in the implementation of these types of ATMs. Intermittent leases of this nature are used to fill a specific need including drought relief and the recovery of reservoir levels following drought. They could also supplement base water supplies during dry periods.

• **Ducks Unlimited partnered with Aurora Water and Colorado Corn Growers Association** to develop augmentation ponds that support water fowl.

• **The Lower Arkansas Valley Water Conservancy District and Super Ditch, LLC** submitted a pilot project proposal and then a full application to the CWCB in 2014, which was ultimately approved by the Board. The pilot began during the 2015 irrigation season, and involves temporary transfers of water from certain agricultural lands on the Catlin Canal system to the communities of Fowler, Fountain, and Security. This project will assist in helping us to learn from an actual ATM being implemented in the basin.

ATM Program Implementation

While Colorado is certainly making progress with ATMs, much more legal, policy, economic, educational, and market-based work is required to achieve the goal by 2030. Indeed, permanent fallowing of agricultural land remains the easiest way for municipal users to obtain new water supplies. Anne Castle, MaryLou Smith, John Stulp, Brad Udall, Reagan Waskom, *Where Now with Alternative Transfer Methods — ATMs — in Colorado?* CWI Special Report No. 31 (April 2017) (hereinafter "Report No. 31"). It is, however, of paramount importance that Colorado resist the urge to favor short term convenience over sound long-term planning and the difficulty of implementing new ideas adapted to changing times.

There is a certain amount of inertia in developing and implementing ATMs. For example, the Arkansas Valley's Super Ditch was incorporated in 2008, but only began leasing water for the first time in 2015 (*see* Scott Campbell, *The Super Ditch: Can Water Become a Cash Crop in the West?*, The Lincoln Institute (October, 2015)). For ATMs to produce mutual benefits and to realistically meet the State's goal of 50,000 acre-feet by 2030, the state legislature extended a pilot program established in 2013 and controlled by the Colorado Water Conservation Board (CWCB) for up to ten lease-fallow pilot projects that could temporarily transfer agricultural water rights for municipal use for up to ten years. Sponsored by Representatives Jeni Arndt (D – District 53) and Barbara McLachlan (D – District 59), House Bill 17-1219 renewed the pilot program, extending the deadline for project applications from 2018 to December 31, 2023 and expanding the number of pilots from ten to 15. Appreciating the statewide need for a balanced approach, no single major river basin (Arkansas, Colorado, Platte, or Rio Grande) may host more than five pilot projects under the program.

Alternative Transfers

Colorado Water Policy

Precipitation v. Population

Hydrologic Reality

Negative Externalities

Collaboration Potential

Allocation Process

Utah Strategy

Proposals

Subordination

Colorado's Lessons

Colorado serves as the headwaters to 18 downstream states and the Republic of Mexico. Like the water itself, Colorado water policy cascades through other states and informs water management globally. Even prior to statehood, Colorado began casting stones into the pool of water policy and their ripple effects are still being felt today:

- The Doctrine of Prior Appropriation, also known as the "Colorado Doctrine," broke with Eastern US and British principles of water law. (*See The Colorado Doctrine: Water Rights, Corporations, and Distributive Justice on the American Frontier* (Yale Law Library Series in Legal History and Reference), David Schorr, November 2012, Yale University Press).
- The interstate water compact was conceived of in and for Colorado (which is party to nine such agreements). *See: Silver Fox of the Rockies*, Daniel Tyler, July 2003, University of Oklahoma Press.
- Most recently, Colorado's Water Plan is the product of the largest civic engagement exercise in state history: more than 30,000 public comments, 8 basin roundtables comprised of representative stakeholders, over a decade of public dialogue and discussion, hundreds of meetings, multiple public drafts, and two book-ending gubernatorial executive orders.

However, Colorado's experience is instructive beyond the best management practices it provides in water policy. Colorado shares similarities with many water stressed regions: the location of the majority of precipitation is often separate and distinct from the location of the majority of people. Colorado is essentially bifurcated by the Continental Divide. The western side of the state enjoys 80 percent of the state's precipitation while the eastern side is home to 90 percent of the population. This dynamic is echoed in many western US states and countries globally. A majority of California's population lies in the south while the majority of the state's precipitation falls in the north. Idaho, Nevada, New Mexico, and Wyoming also chose not to develop population centers where precipitation is highest. Similarly, water stressed countries such as China, South Africa, and Australia have placed some of their large population centers away from water resources. Similar to the metro Denver Front Range, other rapidly growing urban centers are encountering water stress, from Chennai and New Delhi to Beijing and Los Angeles. These cities are confronting water law and infrastructure designed for a fundamentally different hydrologic reality than they now confront: warmer temperatures; a longer growing season; and quicker runoffs. Many of these water markets push their thirstiest urban and suburban development to purchase water from sources historically devoted to agricultural production.

The Churchillian proverb "never waste a good crisis" is applicable here. Without taking proactive steps, water-stressed cities and productive agricultural communities will — instead of shaping the future of their state's growth and development — experience the negative externalities of water market transactions that do not account for long-term sustainability. Coloradans, traditionally opposed to changes in water policy or statewide water planning, observed that their current path left unchanged could result in the systematic loss of 700,000 more acres of irrigated agricultural land (or 20 percent of irrigated agricultural lands statewide and nearly 35 percent in Colorado's most agriculturally productive basin, the South Platte). Colorado's Water Plan, section 10.2, p. 10-5.

Other water-stressed jurisdictions facing the buy-and-dry dilemma similarly contrast a future where the status quo continues unchecked versus the future they want to achieve hanging in the balance. The time is ripe in the West for all of these jurisdictions to collaborate for cooperative management and to proactively learn from their unique yet often similar experiences.

Utah's Parallel Recognition of the Importance of ATMs

In many respects similarly situated to Colorado, Utah's water use has also historically focused on diversions for agricultural use and left the environment out of the discussion and allocation process. Utah undertook a similar planning effort to Colorado's State Water Plan when it delivered its own "Recommended State Water Strategy" in July 2017, setting forth a 50-year strategic water plan for the state. Within Utah's water strategy report, the state recognized the need to "establish basin-level councils to create benefits for farmers who help optimize regional water supplies, conserve in-stream flows, or enhance water quality" and to "create mechanisms that help agricultural water users contribute to improving water quantity and quality management." Utah's Recommended State Water Strategy (July, 2017).

Among the recommendations Utah identifies to modernize state water policy are the facilitation of temporary water transfers, subordination of water rights, and a review of constitutional requirements that preclude cities from selling surplus water. *Id*. Subordination of water rights allows voluntary agreements that permit junior water rights holders to use a senior water right out-of-priority under certain circumstances. This can be facilitated through use of water banks that allow the senior water rights holders to bank unused water that can be later leased. Officially recognizing the legality of subordination

Alternative Transfers

Forfeiture

Legislative Changes

Regional Planning

Unique Context

agreements gives senior water rights holders assurance that participating in such programs will not result in forfeiture of their water right under the legal theory of "use it or lose it." Utah's water strategy document also suggests that the state review its Constitution to determine whether cities should be allowed to market their water, but not water rights, during times of clear surplus. For additional information on Utah's strategy, *see* Water Briefs, *TWR* #164.

Not unlike many other western states, Utah's state water strategy is nascent. Given its relatively contemporaneous date of completion with Colorado's Water Plan, it will be both interesting and informative to monitor how each state approaches implementation. Utah's Executive Water Task Force has begun looking at immediate legislative changes that will assist the implementation process. Not surprisingly, many of these changes focus on facilitating ATMs. Some legislative changes considered are: establishment of regional councils; water banking and rental pools; enhanced instream flow authorizations; and shared or split season leases of water rights on a temporary or more long-term basis. Steven E. Clyde, *Utah Planning Effort Delivers Report to Governor Herbert for a 50-Year Strategic Plan — Recommended State Water Strategy*, Western Water Law & Policy Reporter, Vol. 22, No. 1 (Nov. 2017).

The intent of the Colorado River System Conservation Pilot Program is to gather data for analysis and decision making for ATMs that benefit the Colorado River system as a whole. In fact, these types of ATMs are a key component in the Upper Colorado River Basin's contingency planning effort that aims to influence reservoir elevations as conditions warrant. Colorado's Water Plan and Utah's State Water Strategy share much in common, and are well-positioned to work on an interstate basis to expand flexibility and water management options to achieve their respective water policy goals within these and other western states. ATMs will no doubt play a key role in shifting water to maintain regional river systems to adapt to a changing climate and growing demand. As Colorado and Utah (and other Upper Basin states) engage in this conversation, they will monitor parallel efforts to identify what is working and where challenges are shared.

Conclusion

Given their fact-specific nature, the continued development and implementation of ATMs in Colorado and other similarly situated states in the West will require water managers to continuously learn and adapt specific transfers to the unique contexts in which they operate. Learning to identify the particular physical, legal, political, and economic factors that influence a given transaction will be key for states like Colorado and Utah which have ambitious goals of having ATMs factor significantly into their efforts to meet changing demands with reduced hydrology.

For Additional Information:
Jonathan King, Squire Patton & Boggs, 303/ 894-6126 or jonathan.king@squirepb.com
James Eklund, Squire Patton & Boggs, 303/ 894-6194 or james.eklund@squirepb.com

Jonathan King is an associate attorney at Squire Patton Boggs who advises clients on complex legal and regulatory issues involving groundwater sustainability, water quality, and other environmental issues. Jonathan has worked extensively on Colorado River Basin policy issues in California, Arizona, Colorado, Utah, and Mexico.

James Eklund is Of Counsel at Squire Patton Boggs where he provides strategic water counsel to governmental and private sector clients. He is Colorado's representative on Colorado River issues and the state's Upper Colorado River Commissioner.

Columbia River Treaty

Transboundary Basin

1964 Treaty

Storage & Flood Control

Negotiation Powers

COLUMBIA RIVER TREATY

STATE DEPARTMENT PROVIDES UPDATE AS NEGOTIATIONS BEGIN

by Karen Trebitz and Barbara Cosens, University of Idaho (Moscow, ID)

Introduction

THE SETTING AND THE TREATY

The headwaters of the Columbia River are in the Rocky Mountains of British Columbia, Idaho, and Montana. From its headwaters, the Columbia River's mainstem flows over 1200 miles crossing the US – Canada border and emptying into the Pacific along the border between Oregon and Washington. About fifteen percent of the Basin lies in Canada (all within British Columbia). In the US, the Basin encompasses portions of seven states: Washington, Oregon, Idaho, Montana, Nevada, Utah, and Wyoming and the lands of fifteen tribal nations. The Canadian portion of the Basin includes fifteen First Nations (indigenous communities) with interests in the Basin.

For fifty-four years, the United States and Canada have cooperatively shared the management of the Columbia River under the Columbia River Treaty (Treaty), which entered into force in 1964. Prior to implementation of the Treaty, most dams on the US portion of the Columbia River mainstem generated hydropower and aided navigation but did not store substantial amounts of water. Total storage capacity on the river was approximately six percent of the average annual flow. The river has significant season-to-season variability with high spring flow driven by snowmelt. This variability led to a demand for large, upstream storage facilities to provide flood control and even-out the natural hydrograph for hydropower production. The Treaty was the mechanism to accomplish these purposes.

The US Constitution vests the power to negotiate a treaty with the Executive branch. The Senate may appoint observers to negotiations and has done so in the past. The authority to negotiate on behalf of the President is generally delegated to the Department of State. However, the President is not limited in choice of negotiators. Testimony during Treaty hearings before the Senate Committee on Foreign Relations in 1961 indicates that the lead negotiating team was composed of Secretary of State Ivan White, General Itschner of the US Army Corps of Engineers (Army Corps), and the Interior Department under Secretary Bennett. In addition, members of the Senate Committee on Foreign Relations from the Basin (Senator Mansfield of Montana, Senator Church of Idaho and Senator Morse of Oregon) participated in negotiations in an advisory capacity.

Under the Treaty, Canada agreed to build three new dams to provide 15.5 **m**illion **a**cre-**f**eet (MAF) of storage. The US agreed to pay Canada $64.4 million for dedication of 8.45 MAF of that storage to assure flood control for sixty years and to share the added benefits from hydropower generation resulting from the release of water from three reservoirs in the United States (referred to as the "Canadian Entitlement"). The Treaty also allowed, but did not require, the US to build a dam on the Kootenai River (spelled Kootenay in Canada) that would back water up from Montana into Canada. The US exercised this option when it built Libby Dam.

With the need to coordinate storage and release across yearly and seasonal variation in water supply, the Treaty required appointment of operating entities. The US appointed the Administrator of the Bonneville Power Administration and the Division Engineer of the Army Corps Northwestern Division, and Canada selected British Columbia Hydro and Power Authority (BC Hydro), a Crown Corporation. In addition, the US Congress authorized construction of the Pacific Northwest-Pacific Southwest Intertie, which led to an interconnected North American electric grid and allowed BC Hydro to enter into thirty-year contracts for sale of the Canadian Entitlement to utilities in the US Southwest. BC Hydro continues to sell that power on the US market following expiration of the contracts.

Columbia River Treaty

Hydropower

Modification Options

Review Needs

Tribal "Common Views"

Canadian Review

US Goals

The Treaty provided both countries with significant direct benefits from flood control and power generation, and led to indirect benefits of economic growth in the Pacific Northwest. The Columbia River produces more hydroelectric power than any other river in North America. The Treaty is considered to be among the most successful transboundary water treaties, due to its focus on sharing of downstream benefits. It is also is criticized for its failure to consider the impacts of dams on the Basin's iconic salmon migration.

The Treaty contains no expiration date. The United States and Canada may mutually agree to modify or terminate the Treaty at any time under international law. Under the terms of the Treaty, either party may invoke unilateral termination beginning on September 16, 2024, by providing notice at least ten years in advance. The 2024 date coincides with the expiration date of the sixty-year period of assured flood control. This expiration and the potential for termination of the Treaty triggered review on both sides of the border and both sides quickly realized that broad review was warranted due to changes since 1964, including changes in:

- Energy markets;
- Climate;
- Viability of populations of anadromous fish (i.e. salmon and steelhead);
- Values held by society concerning the river; and
- Empowerment and expectation of involvement by local residents and interests.

Columbia River Treaty Review

Review of the Treaty began in 2009 with joint technical studies by the operating entities, but quickly evolved in 2010 to separate formal review processes on each side of the border. The Army Corps and the Bonneville Power Administration led the regional review in the US, and British Columbia led the review in Canada. To fill the gap in a basin-wide process, public university representatives known as the Universities Consortium on Columbia River Governance, held annual symposia for cross-border dialogues from 2009 through 2012. This effort also brought together Native American tribes and First Nations in the Basin.

The US Regional Review included the establishment of a sovereign review team, composed of one representative from each of the four main states in the Basin and five representatives of the fifteen Native American tribes. In a remarkable act of intertribal diplomacy, the fifteen Native American tribes in the Basin came together to develop a set of "Common Views" on the future of the Columbia River and continued to work in concert throughout the process. The sovereign review team also had comparable representation on a technical advisory body. Listening sessions were held throughout the Basin to obtain input from other interest groups and the general public. The US Regional Review team also included representatives of the eleven federal agencies with interests in the Basin.

The British Columbia review process included extensive public engagement and consultation with the First Nations claiming resources in the Basin. Although the federal government of Canada remains the final decision maker on international treaties, the delay in ratification of the original Treaty was due to negotiations between the federal government of Canada and the Province of British Columbia. The provincial government was concerned that the major negative impacts of the Treaty would be felt in British Columbia, and the major benefits of the Treaty would flow to the federal government of Canada. The provincial-federal negotiation led to a solution that would turn the operation and benefits under the Treaty over to the provincial government and divide the benefits between the United States and the Province. Thus, the provincial government has led both the implementation of the Treaty as well as the review process.

On December 13, 2013, the US Entity transmitted the Regional Recommendation to the US Department of State (*see* US Entity, *TWR* #117). On March 13, 2014, British Columbia announced its position on the future of the Treaty. Both reviews highlight the hope of modernizing the Treaty. The following paragraphs summarize the results of each review.

The United States Entity Regional Recommendation (Recommendation) outlines three primary goals for modernization of the Treaty:

1) to elevate ecosystem function to a third primary purpose of the treaty, along with hydropower and flood control;
2) to amend the formula for sharing of power benefits to more closely reflect actual operations; and
3) to continue to cooperate on the development of a flood risk management plan that reflects, among other things, the implications of climate change.

Although the Treaty currently does not address apportionment of water supply or navigation, the Recommendation calls for acknowledgement of the importance of each. It also calls for the flexibility to seek mutual benefits in use and development of storage for out-of-stream use. The Recommendation

Columbia River Treaty

Climate Uncertainty

Canadian Principles

responds to the call for greater public and sovereign participation by recommending the formation of an advisory body for negotiations and reconsideration of the composition of the US Entity for implementation of the modernized treaty. In addition, the Recommendation acknowledges the uncertainty associated with climate change and other factors in the Basin, and seeks the means to assure flexibility and adaptation going forward.

The provincial government of British Columbia seeks to "[c]ontinue the Columbia River Treaty and seek improvements within the existing Treaty framework," and sets forth fourteen principles including:

- recognition that shared benefits go beyond hydropower production and that British Columbia should be compensated accordingly;
- recognition that the impacts of the Treaty dams on Canada are ongoing and should be compensated; and
- a greater use of US storage for flood control and thus a reduced reliance on Canada.

Similar to the US Regional Recommendation, the position of the Province includes recognition of the need for adaptive mechanisms and consideration of climate change, as well as consultation with First Nations. While the Province supports continued efforts to cooperate on ecosystem function, however, it does not view this as a component that requires change to the Treaty.

2018 – The Prelude to Negotiation

In December of 2017, the US Department of State announced that negotiations would commence in 2018. Jill Smail, from the Department of State, has been appointed lead negotiator for the US. Katrine Conway, Member of the British Columbia Legislative Assembly from Kootenay West within the Basin, has been appointed lead for British Columbia. It has not been announced who, if anyone, will represent Global Affairs Canada (the counterpart to the US Department of State).

Recently Jill Smail spoke at an annual public gathering in the Basin, the Lake Roosevelt Forum, and the US negotiating team held a public town hall meeting the evening of April 25, 2018, in Spokane, Washington. This was the first public communication to the Basin by the US negotiating team.

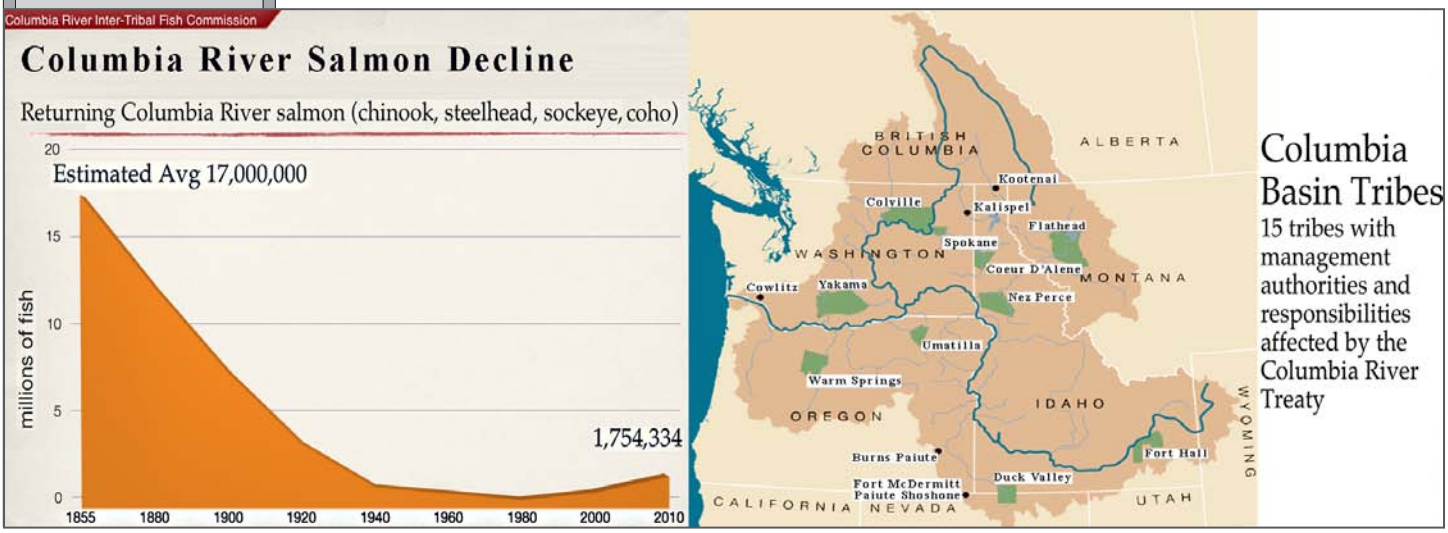
US Team

Ms. Smail began by introducing the negotiation team, presenting a brief history of the existing Treaty and the 2013 Regional Recommendation, and the decision to modernize the Treaty. She stressed that the recommendation process is not being reopened; rather, the Recommendation would be used as a starting point for negotiations. The US Department of State will lead the team, which is comprised of two women and four men: Jill Smail, David Ponganis (Army Corps Northwestern Division program director); John Roche (US Bureau of Reclamation); Paul Wagner (NOAA Fisheries); Kieran Connolly (Vice President of Operations at Bonneville Power Administration); and Gayle Lear legal advisor with the Army Corps.

US Objectives

Ms. Smail read a prepared statement of the US objectives for negotiations, which include several key points: the US negotiating team is focused on flood risk and reliable, economic power, and will address ecosystem concerns. The team will also be seeking to maximize coordination, and to share benefits equitably, with Canada. The Department of State understands there are interests beyond navigation, recreation, irrigation, and municipal needs. These include interests in environmental function for healthy and sustainable fisheries and the adaptability to respond to changes in snow and rain patterns. The Department of State will "continue to engage the public" and recognizes that it has a "responsibility to consult with tribes." In closing, the Treaty was described as having been a model of transboundary cooperation since 1964. The US negotiating team "is eager to move forward to help define…respective positions to shared vision…and to [arrive at] common ground."

Fisheries



Columbia River Treaty

Discussion Points

Flood Control & Hydropower Concerns

Tribal Issues

Columbia River Treaty Negotiations Begin

On May 29-30, 2018 — subsequent to the writing of this article — the US State Department announced the start of negotiations with Canada to modernize the Columbia River Treaty regime. The State Department press release noted: "As the United States enters these bilateral negotiations with our Canadian counterparts, our key objectives include continued, careful management of flood risk; ensuring a reliable and economical power supply; and better addressing ecosystem concerns. Our objectives are guided by the U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2024, a consensus document published in 2013 after years of consultations among the Northwest's Tribes, states, stakeholders, public, and federal agencies."

For information regarding upcoming Town Halls open to the public, contact: ColumbiaRiverTreaty@state.gov.

Audience members were invited to make comments and ask questions of the negotiation team. Attendees were from multiple states, tribes, and British Columbia. Diverse interests were represented, including: non-government organizations such as the Sierra Club and other conservation advocates; a ministry; the Idaho League of Women Voters; tribal representatives; public utilities; water associations on both sides of the international border; shipping commerce and deep draft navigation; irrigators; and private citizens. The audience-driven discussion points can be roughly grouped by: 1) economic concerns (in terms of flood control, hydropower, and water availability); (2) environmental concerns (ecosystem function and salmon fisheries); and (3) issues with the negotiation process itself (transparency and engagement with the public and the exclusion of the region's Tribes from the negotiation team). Whereas the first two categories received mostly statements, the latter was dominated by questions.

Economic Concerns

Statements of economic concerns were concentrated around the historic purpose and function of the Treaty, generally supporting the notion that flood control and hydropower should remain the priority of negotiations, with environmental concerns only as a secondary component. Utilities wish to continue the low-cost, reliable, and emission-free power that the Treaty ensured. Power providers are concerned that a greater focus on ecosystem function will translate directly into higher electric bills for citizens. Irrigators worry that a change in flood control operations will endanger irrigation infrastructure. Farmers would like to see ideas for more availability of irrigation water — especially given the projected changes in rainfall. Deep draft navigators stressed the commerce opportunities provided by the stability in flood control and water management. An audience member from Pasco/Tri-Cities, WA, described the area's "place-limited economics" that were built around the river flows under the Treaty, saying "remember us downstream!"

As a counterpoint, it was noted that the dams stopped water, animals, and salmon, which disrupted primary Indigenous cultural and food sources. Despite the close proximity to major dams, the Tribes "don't get cheap power." Flood control shut down ferries and commerce, a Tribal member related, and the Treaty's disregard for Indigenous lands contributes to "some of the highest poverty levels in our region." A local white citizen stated that the economy is not sustainable under present circumstances, and bemoaned that the Indigenous people — who are "most injured and know most about sustainability" — will not be given a voice.

Finally, a representative pointed out that Montana is the only "sacrificed Treaty area in the US," as Lake Koocanusa (created by Libby Dam) also flooded lands in Montana. Article 13 of the Treaty (which allows out-of-basin diversion from the Kootenai River basin, but has never been enacted) should be removed, he said, and Montana should be compensated for the water storage function behind Libby Dam in the same way as Canada.

Environmental Concerns

Audience statements signaled strong advocacy for including healthy ecosystem function as a co-equal concern in Treaty negotiations. One person described the mud flats and dust storms in the Revelstoke Lake basin, and the ecological destruction that resulted from flooding Canadian lands. Another called minimum streamflow a "public right." Many insisted that salmon should be re-introduced above the dams, not just for tribes, but to re-connect the ecosystem from source to ocean. The audience also demonstrated understanding for the complexity of their demands, as they acknowledged inevitable costs of changing flow regimes to benefit the ecosystem. Efforts should be made to "de-couple fish and wildlife from power costs," said one. There was a suggestion for shared cost-bearing based on benefits and ability to pay. Basin-wide comprehensive planning was necessary, this attendee continued, and a process should be established for citizen participation and for resolving conflict. And finally, an audience member pointed out that ecosystem function and ecosystem services are defined differently by different users, so, "how will the State department be defining it?" Ms. Smail reiterated that the definition provided by the Recommendation would be the starting point.

Negotiation Process

Audience questions surrounding the negotiation proceedings focused on decision-making, the choice of negotiation team members, and transparency towards the public. Why had the common modeling group been closed down at the point of negotiation-beginning? Ms. Smail said "[we are] transitioning into a different phase, and want to start working on government positions, [a] separate effort from the modeling group." She also said there were complaints about the group being unwieldy in a negotiation process.

Audience questions shifted to the composition of the negotiation team, and why tribes are not included among the negotiators. Ms. Smail responded that, "we looked at a variety of models of transboundary and other negotiations from a foreign policy point of view." This prompted a follow-up question, "Did you consider the [1985] US-Canada Pacific Salmon Treaty as a model? It had direct Tribal participation and was very successful." "Yes, we did consider the Pacific Salmon Treaty," Ms. Smail responded. She continued that, with the objectives in the Recommendation and with foreign policy judgment in mind, the newly established team was the best negotiation group. The audience pressed on, citing UNDRIP (the

United Nations Declaration on the Rights of Indigenous Peoples) in reference to the US sovereign nations: "Next time you come, would you invite Indigenous persons to sit with you?" Ms. Smail responded that, "[we] are developing a process by which to consult with the tribes."

The final audience respondent lamented the lack of transparency, negotiation specifics, and opportunity for further public participation: "At what point will you let us know?" Ms. Smail stated that the region had already provided input in formulating the Regional Recommendation. Ms. Smail closed the comment session with, "no firm date yet to begin negotiations, and no information yet to share."

Conclusion

As negotiations commence on the future of the Columbia River Treaty, Basin residents are both elated and concerned. They are elated to see interest in the continuation of hydropower and flood control benefits that have spurred considerable economic development in the Pacific Northwest. They are concerned that the years of dialogue leading to a regional compromise and calling for elevation of ecosystem function to a third prong of the Treaty is not reflected in the negotiating team's goal of addressing ecosystem concerns.

Ecosystem Function Concerns

At this point it is too early to tell if either the elation or the concern is justified. What is clear is that the Regional Recommendation calling for greater transparency during negotiations and the expectation that the US government will adhere to the modern definition of "consultation" with tribes are not guiding the process at this stage. Despite the substantial changes to societal expectation of transparency since 1964, there is no indication that states or tribes will even enjoy the observer status of representatives that the States enjoyed in the original negotiations.

Transparency?

For Additional Information:
Barbara Cosens, University of Idaho College of Law, 208/ 885-6298 or bcosens@uidaho.edu
Karen Trebitz, University of Idaho Water Resources Program, treb6275@vandals.uidaho.edu

Prior *TWR* articles on the Columbia River Treaty process include: Miller, *TWR* #101; Bankes & Cosens, *TWR* #105 & *TWR* #129; US Entity, *TWR* #117; and Christensen, *TWR* #125

Barbara Cosens teaches water law and law and science at the University of Idaho and has helped educate the public on the Columbia River Treaty for the past decade.
Karen Trebitz is a PhD student and IGERT fellow in the Water Resources Program at University of Idaho. She studies communication networks among collaborative water management partners in northern Columbia River Basin lakes, several of which may be impacted by the Columbia River Treaty negotiations.

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Desalination

Brackish History

1st Desalination Demonstration

DESALINATION IN TEXAS

TEXAS CAN BE A LITTLE SALTY: SALINE SOURCES & DESALINATION IN THE LONE STAR STATE

by Robert E. Mace, Ph.D., P.G.
The Meadows Center for Water and the Environment, Texas State University (San Marcos, TX)

"How much salt water thrown away in waste
To season love, that of it doth not taste!"
Shakespeare, Romeo and Juliet

Introduction

Texas has a long history of using saline water — defined here as water with total dissolved solids greater than 1,000 parts per million — particularly in the drier parts of the state where thirsters can't be choosers. Early were explorers rudely introduced to the natural salinity of the Pecos River at Horsehead Crossing, a hydrologic cruelty that offered its salty self to thirsty travelers parched from crossing the wide, waterless plains of the Llano Estacado. Horses overdrank from the salty slew and died, leaving their skulls to mark the briny ford.

In 1845, the first flowing artesian well in Texas was dug at Corpus Christi where 4000 US troops under Major General Zachary Taylor set up camp to protect the republic from Mexico while Texas worked to annex itself to the United States.

In the 1880's, a drilling frenzy to find fresh, flowing artesian wells sometimes found brackish water instead. In some places — notably in Marlin and Mineral Wells — resorts and natatoriums sprung up promoting the medicinal properties of their mineral-laden waters. Wells in Mineral Wells (the most famous proprietor was Crazy Water) had the benefit of tapping into sandy micro-aquifers of the Pennsylvanian rocks below, thus producing waters of varying total dissolved solids. The locals could tell which well you drank from by how far you made it up the hiking trail before frantically rushing down the hill in search of the nearest privy.

Figure 1: President John F. Kennedy ceremonially starting the desalination plant in Freeport, Texas, on June 21, 1961.

In 1961, Texas hosted the United States' first demonstration desalination plant at Freeport. Texas now sports the largest inland municipal desalination plant in the country at El Paso (with San Antonio expected to surpass them by 2026) and the state expects to have its first non-demonstration (production) desalination plant soon.

The purpose of this article is to provide an overview of the various sources of saline water — including groundwater, surface water, seawater, and produced and flowback water from oil and gas operations — and to discuss how the state uses or plans to use the water.

Early Desalination in Texas

Texans and Texas have played a prominent role in the development of desalination for water supplies in the US. Lyndon Baines Johnson (LBJ) took an early interest in water resources of the state. As senator, LBJ asked the Senate in 1954 to approve a $400,000 appropriation for research into the conversion of salt water for municipal, industrial, and agricultural uses. Appropriations in hand, the Office of Saline Water (part of the US Department of Interior and later absorbed into the US Bureau of Reclamation) worked to establish five demonstration projects across the country. The first demonstration project started production on June 21, 1961, in Freeport, Texas. President John F. Kennedy ceremonially started the plant from Washington, DC, stating "[Desalination] is a triumph of peace and not war." (*See* Figure 1.) LBJ was at Freeport for the opening to give a speech and tour the facility.

Desalination

Brackish Groundwater

The Freeport plant used **m**ultiple-**e**ffect **d**istillation (MED) to produce a million gallons per day of desalted water (Figure 2). In an early public-private partnership, Dow Chemical donated five acres of land for the project and purchased half the water with Freeport purchasing the other half. The plant operated until 1973 when it was decommissioned (Water Desalination Report (WDR) 1973).

Inspired and informed by the demonstration plants, the Port Mansfield Utility District commissioned a brackish groundwater desalination plant in 1965 (WDR 1965). This plant produced 0.25 million gallons per day using electrodialysis on water from two wells, one with total dissolved solids of 9,000 parts per million and the other with 2,200 parts per million. The District billed the plant as the "…first demineralization plant east of New Mexico, the second saline conversion plant of any type supplying the whole need of an American community and the third municipally-owned desalting plant in the U.S."

Dell City became the fifth US city to build and use a desalination plant in 1967, with an electrodialysis facility that could produce 50,000 gallons per day (WDR 1967a, WDR 1967b). Before the city built the plant, water for the community had to be hauled in. Dell City still operates its desalination plant, the longest-running plant in Texas and fourth longest-running plant in the United States — Buckeye, Arizona (started in 1962); Coalinga, California (1965); and Key West, Florida (1967) also still desalinate water.

Brackish Aquifers

Brackish Groundwater

Texas is blessed with 30 major and minor aquifers recognized by the state, and most of them contain brackish water (total dissolved solids greater than 1,000 parts per million but less than 10,000 parts per million). There's an estimated 5.4 billion **a**cre-**f**eet (AF) of fresh groundwater in storage in the state with an additional 2.7 billion AF of brackish groundwater (the latter number is from LBG-Guyton Associates 2003: (LBG-GA (2003)). Of that brackish groundwater, 1.7 billion AF has a concentration between 1,000 and 3,000 parts per million.

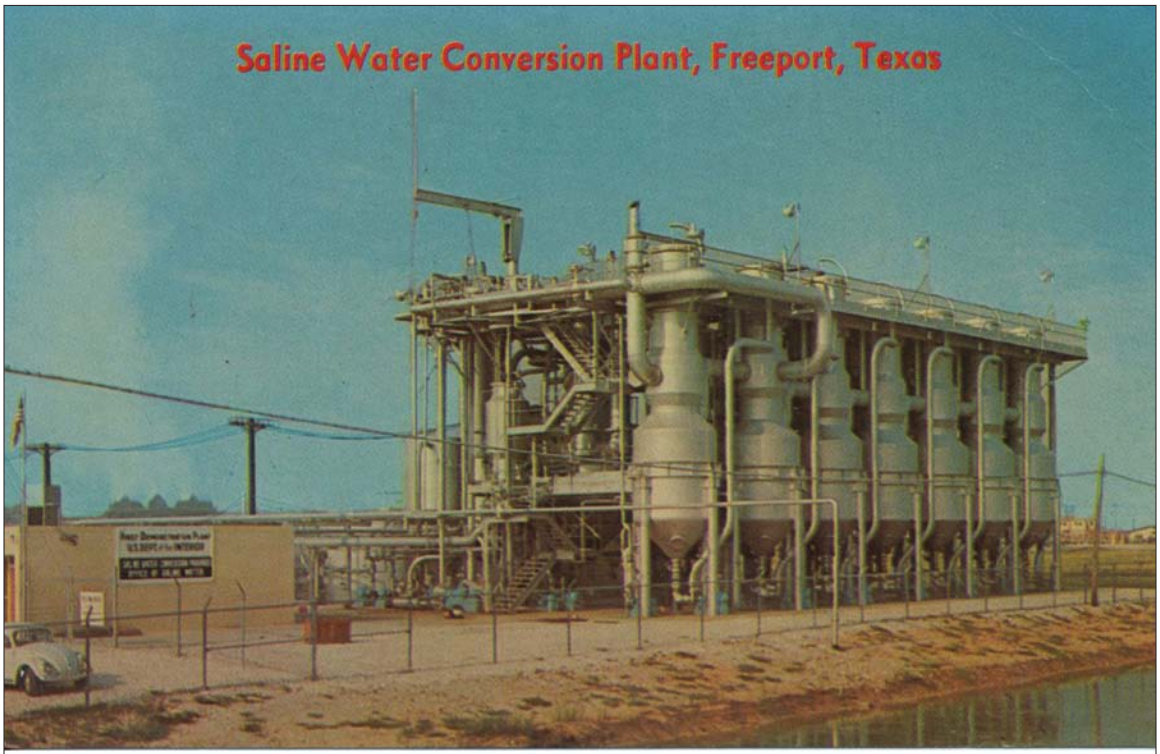

Figure 2: Postcard of the desalination plant in Freeport, Texas. On the back, the card says "The nation's first saline water conservation demonstration plant, Freeport, Texas. Completed on April 7, 1961 at a cost of $1,255,612, this Gulf Coast area plant was the first of five authorized to be built in selected area of the U.S., through the auspices of the U.S. Dept. of the Interior, to determine the best plant designs and conditions of operation to convert saline water into fresh water fit for home and industry consumption. The Freeport plant uses the Long-tube vertical multiple-effect distillation process and is designed to produce up to 1,000,000 gallons of fresh water per day."

Desalination

Supply Source

Winslow and Kister (1956) of the US Geological Survey provided the first overview of the saline water resources of Texas. This was followed by the Texas Water Development Board-funded LBG-GA (2003) study to develop a brackish groundwater manual for regional water planning groups to consider using brackish groundwater as a source of water. The Board initiated the latter study due to the lower costs of desalination and the initiation of several successful brackish groundwater desalination plants in the state. LBG-GA (2003) estimated that there was 2.7 billion AF in storage in the state's aquifers. Aquifers with more than 100 million AF of water in storage include the Carrizo-Wilcox, Pecos Valley, Gulf Coast, Trinity, Dockum, Hickory, Queen City-Sparta, and Yegua-Jackson (*see* Table 1).

Table 1: Volumes of Brackish Groundwater in Major Texas Aquifers Data from LBG-GA 2003

Aquifer	Volume in acre-feet
Carrizo-Wilcox	430,200,000
Pecos Valley	116,600,000
Edwards (Balcones Fault Zone)	38,900,000
Edwards-Trinity (Plateau)	24,300,000
Gulf Coast	522,500,000
Hueco-Mesilla Bolsons	
Hueco Bolson	24,500,000
Mesilla Bolson	2,500,000
Ogallala	36,200,000
Seymour	2,300,000
Trinity	178,200,000

- *I have rounded values to the nearest 100,000 acre-feet.*
- *The Texas Water Development Board changed the name of Cenozoic Pecos Alluvium to Pecos Valley*

Table 2: Volumes of Brackish Groundwater in Minor Texas Aquifers Data from LBG-GA 2003

Aquifer	Volume in acre-feet
Blaine	19,600,000
Blossom	1,400,000
Capitan Reef	74,700,000
Dockum	124,900,000
Edwards-Trinity (High Plains)	5,900,000
Ellenburger-San Saba	46,500,000
Hickory	118,100,000
Igneous	0
Lipan	1,300,000
Marathon	0
Marble Falls	0
Nacatoch	14,300,000
Queen City-Sparta	245,700,000
Rita Blanca	0
Rustler	36,900,000
Whitehorse-Artesia	14,900,000
Woodbine	43,700,000
Yegua-Jackson	517,900,000

- *I have rounded values to the nearest 100,000 acre-feet.*
- *the Whitehorse-Artesian was not a recognized minor aquifer at the time; however, it is now part of an expanded Blaine Aquifer.*
- *The totals for the Yegua-Jackson are not presently correctly in LBG-GA (2003); they are presented correctly here.*

The Texas Water Development Board recognized the need for more detailed information to better screen potential sources of brackish groundwater. To conduct more detailed mapping, the Board asked the legislature for funding in 2009 to create the Brackish Resources Aquifer Characterization System (BRACS). The legislature agreed, so the Board began mapping brackish groundwater resources in much greater detail than the LBG-GA (2003) study.

In a BRACS study, the Board uses existing water wells, geophysical well logs from the oil and gas industry, and previous geological reports to map the geometry of aquifers, their sand layers, and the water quality in those layers. All of the data and resulting reports are available online or by request at: www.twdb.texas.gov. The first study focused on the Pecos Valley Aquifer (Meyer and others 2012) and resulted in a more refined estimate of 85 million AF of brackish groundwater in storage (compared to the LBG-GA (2003) estimate of 116.6 million AF). More importantly, the resulting data allows communities to screen potential production areas for more detailed analysis. The Board has completed additional studies in the Gulf Coast, southwestern half of the Carrizo-Wilcox, Blaine, Lipan, Rustler, and Nacatoch aquifers as well as a small part of the Queen City-Sparta Aquifer. Ongoing studies include the Dockum, Edwards-Trinity (Plateau), and Trinity aquifers and additional parts of the Queen City-Sparta Aquifer.

In 2015, the Texas Legislature passed House Bill 30 requiring the Texas Water Development Board to designate brackish groundwater production zones. Brackish groundwater production zones are areas that can be pumped without significant impacts to other sources of water in the area. As part of the designation, the Board is required to establish the amount that can be produced and to recommend reasonable monitoring to observe the effects of brackish groundwater production within the zone.

The Board is not allowed to designate zones in the following areas:

- Edwards Aquifer under the jurisdiction of the Edwards Aquifer Authority
- Barton Springs Edwards Aquifer Conservation District
- Harris-Galveston Subsidence District
- Fort Bend Subsidence District
- In a brackish source of water already being used for municipal, domestic, or agricultural purposes
- Any area being used for wastewater or the disposal of water from oil and gas operations

To date, the Board has made one designation in the Carrizo-Wilcox Aquifer, four designations in the Gulf Coast Aquifer, three in the Rustler Aquifer, and none in the Blaine Aquifer (TWDB 2016). Although the Board has not yet

Desalination

Governor's Funding Veto

Desalination Capacity

Concentrate Disposal

made designations, contractors recommend designating three zones in the Blossom Aquifer (LBG-GA 2017), four zones in the Nacatoch Aquifer (Laughlin 2017), and no zones in the Lipan Aquifer (Robinson and others 2018). Board members are expected to make formal designations later this year.

Although House Bill 30 directed the Board to make designations for all the major and minor aquifers of the state, additional work has been put on hold after the Governor used his line item veto power to remove funding provided in the 2018–2019 state budget to implement the Act. The Governor's proclamation stated that "The Texas Water Development Board has already completed several studies on brackish groundwater in various regions of the state. I therefore object to and disapprove of this appropriation." (Abbott 2017). However, others believe the veto was due to personal politics between the governor and the author of the bill (Fikac 2018, Garcia 2018). Although work on designations will soon grind to a halt, the Board will continue mapping work funded with previous appropriations.

Texas has 34 municipal desalination plants having a capacity greater than 0.023 million gallons per day, for a total design capacity of 73 million gallons per day (TWDB 2016). There are several notable brackish desalination plants in the state. One is the Southmost Regional Water Authority Desalination Plant near Brownsville which was built in 2002 with a capacity of 7.5 million gallons per day. The Southmost plant was expanded to 10 million gallons per day in 2015 and disposes of its concentrate in a canal at the back of the property that discharges to the hypersaline Laguna Madre. Another notable project is the Kay Bailey Hutchison Desalination Plant in El Paso, built in 2007 with a capacity of 27.5 million gallons per

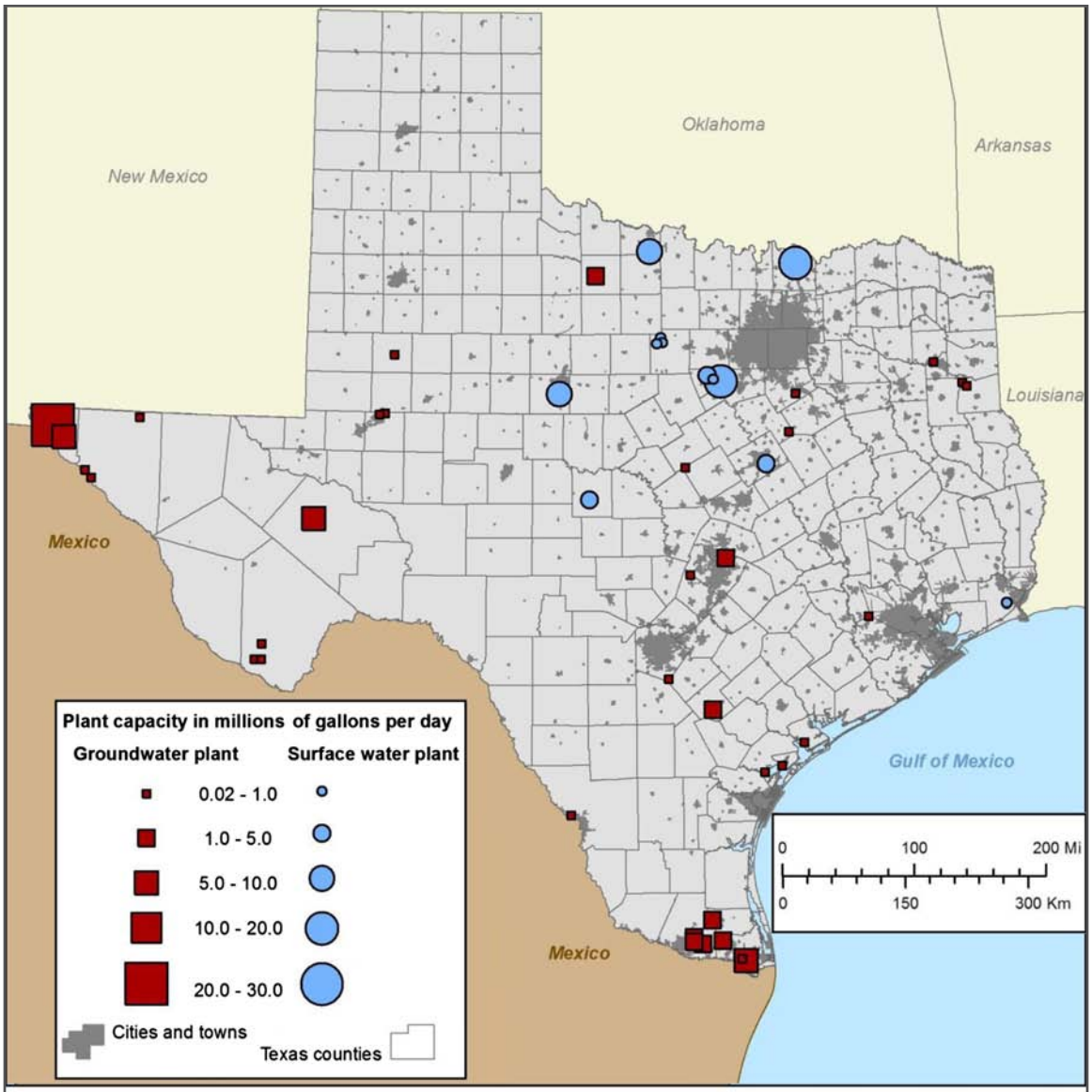

Figure 3. Distribution, size, and source water of existing municipal brackish desalination facilities in Texas with a design capacity of more than 0.023 million gallons per day.

Adapted from TWDB, *The Future of Desalination in Texas—2016 Biennial Report*

Desalination

Minerals Harvest

Injection Wells

State Water Plan

day for desalting raw water with total dissolved solids of 2,500 to 3,500 parts per million. At present, the plant disposes of its concentrate through injection wells; however, Enviro Water Minerals Company, working with NorrisLeal, is building a plant to harvest minerals from the plant's concentrate stream as well as from additional brackish groundwater wells. One more notable project is San Antonio's Brackish Groundwater Desalination Plant in southern Bexar County, built in 2016 for a capacity of 12 million gallons per day, desalting raw water with total dissolved solids of 1,160 to 1,460 parts per million. San Antonio disposes of concentrate using injection wells. San Antonio expects to increase the size of this plant in the near future.

The most recent state water plan for Texas — the 2017 State Water Plan — anticipates an additional 99 million gallons per day of brackish desalination to meet needs by 2070 (TWDB 2017). This is about 1.3 percent of recommended water management strategies by volume in the plan. In total, this represents 39 projects with clusters of projects in the Lower Rio Grande Valley (15 projects), I-35 growth corridor between Austin and San Antonio (5), north of Houston (4), and El Paso (4 projects), with other projects along the Gulf Coast (4), in West Texas (6), and the Hill Country (1). These projects represent $2.2 billion in capital costs resulting in a weighted average unit cost of $713 per acre-foot (TWDB 2016).

Brackish Surface Water

Surface Water

The Pennsylvanian and Permian rocks of Texas are layered with the salts of long-ago evaporated seas. As groundwater discharges from local formations, it carries dissolved salts into rivers and streams. Downstream, once rivers flow past the salty formations, fresh groundwater and even fresher and more abundant rainfall dilutes this natural salting. Unfortunately, communities up basin have to work with what they have, and what they have is salt-laced surface water.

Saline Source Control

There have been attempts at source control to lower downstream concentrations of salt. For example, the US Army Corps of Engineers (Army Corps) built a ring dike around Estelline Springs in 1964 to prevent its 44,000 parts per million from flowing into the Prairie Dog Town Fork of the Red River. The Army Corps also uses an inflatable dam on the South Fork of the Wichita River to pump saline spring flow 22 miles to a saline storage reservoir northwest of Truscott. However, in most cases, communities have built desalination plants to treat saline surface water. For example, Abilene, Brady, Granbury, Robinson, and Wichita Falls have used desalination plants on their surface water. In all, Texas has 12 municipal desalination plants with a capacity greater than 0.023 million gallons per day for a total design capacity of 50 million gallons per day (TWDB 2016).

Surface Water Desalination

The most recent state water plan for Texas (2017 State Water Plan) anticipates an additional 3 million gallons per day of brackish surface water desalination capacity by 2070 (TWDB 2017). Projects include those by the Colorado River Municipal Water District to benefit Big Spring, Midland, Odessa, and Snyder, among others, for about 500,000 AF per year. There is also the Lavaca-Navidad River Authority — for which supplies are not linked to a water user group; in other words, a strategy with no identified beneficiaries — for 2.8 million gallons per day (not included in the total above). There isn't more surface-water desalination in the plan since most surface water is already permitted in this part of the state.

Permit Limitation

Gulf of Mexico

Seawater Desalination

Besides the demonstration plant built by the US Department of Interior in Freeport in 1961, an operational seawater desalination plant has not been built in Texas; however, the state remains deeply interested in tapping into this nearly limitless, drought-proof supply. Between 2002 and 2010, the Texas Water Development Board funded feasibility studies for the cities of Brownsville, Corpus Christi, and Freeport and pilot-plant studies for Brownsville and South Padre Island. In all cases, seawater desalination was technically feasible, and the pilot-plant studies were successful. In the case of Brownsville, less expensive alternatives for water (including brackish groundwater) have prevented the construction of a plant. At one point, South Padre Island appeared ready to build a seawater desalination plant but ultimately decided to build an indirect potable reuse plant for less cost. During the 2010–2015 drought, there was chatter about building a seawater desalination plant in the Freeport area, but rains have brought consideration of other options.

Cost Issue

Corpus Christi and the Port of Corpus Christi, also affected by the drought, have both studied seawater desalination options. An Italian company, M&G Plastics, built a six-million-gallons-per-day seawater desalination plant to supply their polyethylene terephthalate manufacturing facility on a ship channel in the Corpus Christ area. However, the company filed for bankruptcy before completing construction of their plastics plant. The Port of Corpus Christi placed a bid for the plant but lost to Corpus Christi Polymers, who appears intent on finishing the plant (Cobler 2018). Undeterred, the Port of Corpus Christi just applied to the Texas Commission on Environmental Quality for a permit to build a 19.1 million gallon per day

Desalination

Water Plan Estimates

Average Unit Cost

Oil & Gas Operations

Injection Wells

Quality & Cost Issues

Reuse

Brackish Groundwater Potential

Saline Surface Water

Seawater Desalination

plant in the city of Gregory to meet industrial needs for water (Cobler 2018). Corpus Christi and the San Patricio Municipal Water District are also exploring the possibility of building a seawater desalination plant. Given all the activity and interest in the Corpus Christi area, I expect that Texas will have its first non-demonstration (production) seawater desalination plant by the end of the decade.

The 2017 State Water Plan of Texas anticipates 103 million gallons per day of seawater desalination capacity to meet needs by 2070 (TWDB 2017). This is about 1.4 percent of recommended water management strategies by volume in the plan. The Region H Regional Water Planning Group included a strategy for a 10-million-gallons-per-day plant in Freeport by 2040. The South Central Texas (Region L) Regional Water Planning Group included a 75 million gallons per day seawater desalination plant for the city of San Antonio starting in 2040. The Rio Grande (Region M) Regional Water Planning Group included a 2.5-million-AF-per-year seawater desalination plant for Brownsville for 2020 (with expansions to 25 million AF per year by 2070). The Coastal Bend (Region N) Regional Water Planning Group included a 20-million-gallons-per-day plant in their plan for 2030 to serve Nueces and San Patricio counties. These projects represent $2.1 billion in capital costs resulting in a weighted average unit cost of $1,431 per acre-foot (TWDB 2016).

Produced and Flowback Water

Another potential source of saline water is produced or flowback water from oil and gas operations. Produced water is naturally occurring water that is produced during oil production while flowback water refers to the injected water that flows back after hydraulic fracturing.

Over a million oil and gas wells have been drilled in Texas (Nicot 2009). As of 2012, the volume of produced water in Texas was 7.4 billion barrels a year — almost a million AF per year (about 850 million gallons per day) (Veil 2015). An estimated 3 to 3.7 million barrels of this water was disposed of through injection wells (Veil 2015, assuming that offsite commercial disposal is also deep well injection).

Treating produced and flowback water has several challenges. The quality can range from fresh to total dissolved solids over 400,000 parts per million (USGS 2018), and there are often organics and naturally occurring radioactive constituents in the mix (Lyons 2014). The composition of produced water generally means that more expensive types of desalination have to be used, such as thermal or mechanical distillation ($2-3 per barrel) or crystallization ($3.50 per barrel) as compared to reverse osmosis at $0.30 per barrel (which is susceptible to fouling and requires source water with salinity less than twice that of seawater, about 70,000 parts per million) (Lyons 2014).

Despite the challenges, some companies — such as Apache — are desalinating produced and flowback fluids. The Texas Water Recycling Association has been working to remove regulatory barriers that didn't anticipate reusing and desalinating produced and flowback fluids. The Texas Water Development Board is funding a study this year on the feasibility of irrigating with produced water.

Conclusion

Texas has a long history with desalination with the United States' first demonstration desalination plant starting operation in Freeport in 1961 and two of the first five municipal desalination plants in the country, one of which, in Dell City, is still running (with updated equipment) after half a century.

Texas has a great deal of potential in its 2.7 billion AF of brackish groundwater. There are already 34 municipalities tapping into this resource with plants bigger than 0.023 million gallons per day for a total design capacity of 73 million gallons per day. The Southmost Project near Brownsville, the Kay Bailey Hutchison Desalination Plant in El Paso, and San Antonio's Brackish Groundwater Desalination Plant in southern Bexar County are notable projects for desalting brackish groundwater due to their capacities but also because they've inspired others in their regions and across the state to consider the technology. The 2017 State Water Plan calls for an additional 99 million gallons per day of brackish desalination to meet needs by 2070.

Due to Texas' geology, many rivers and streams in the west-central part of the state are saline and require desalination to meet municipal and industrial needs. In all, Texas has 12 municipal desalination plants with a capacity greater than 0.023 million gallons per day for a total design capacity of 50 million gallons per day. Because most surface water has been permitted in this part of the state, with no additional surface water available for use, the 2017 State Water Plan only anticipates an additional 3 million gallons per day of brackish surface water desalination capacity by 2070.

Despite Texas hosting the first desalination plant (which was also the first seawater desalination plant) in the country, the state has yet to build a production seawater desalination plant. However, a great deal of interest in the Corpus Christi area points to the state getting its first production plant, probably for industry, in the next few years. The 2017 State Water Plan anticipates 103 million gallons per day of seawater desalination capacity to meet needs by 2070, including projects for Brownsville, the Corpus Christi area, Freeport, and San Antonio.

Desalination

Growing Needs

The oil and gas industry in Texas results in about 850 gallons per day of produced and flowback water, about half of which is estimated to be injected into deep wells. There's some interest in treating this water and reusing it. However, produced and flowback water can be challenging to treat with organics, radioactive materials, and total dissolved solids measured in the hundreds of thousands of parts per million, thus requiring more expensive desalination techniques.

As Texas marches forward with a growing population and industry, it needs every potential source of water to meet the needs of its people, its economy, and its environment. Saline water will undoubtedly be one of those sources. Texas can be a little salty, but Texas also knows how to go on a low-salt diet.

For Additional Information:

Robert Mace, Texas State University, 512/ 245-6021 or rem142@txstate.edu; 2017 State Water Plan website: www.twdb.texas.gov/waterplanning/swp/

Robert Mace is an Associate Director and the Chief Water Policy Officer at The Meadows Center for Water and the Environment and a Professor of Practice in the Department of Geography at Texas State University. Robert has over 30 years of experience in hydrology, hydrogeology, stakeholder processes, and water policy, mostly in Texas. Before joining Texas State University in 2017, Robert worked at the Texas Water Development Board for 17 years, ending his career there as the Deputy Executive Administrator for the Water Science & Conservation office. While at the Board, Robert worked on understanding groundwater and surface water resources in Texas; advancing water conservation and innovative water technologies such as desalination, aquifer storage and recovery, reuse, and rainwater harvesting; and protecting Texans from floods. Prior to joining the Texas Water Development Board, Robert worked nine years at the Bureau of Economic Geology at The University of Texas at Austin as a hydrologist and research scientist. Robert has a B.S. in Geophysics and an M.S. in Hydrology from the New Mexico Institute of Mining and Technology and a Ph.D. in Hydrogeology from The University of Texas at Austin.

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WALKER LAKE CASE NINTH CIRCUIT DECISION

WATER RIGHT CHANGES, INJURY, AND THE PUBLIC TRUST DOCTRINE

by David Moon, Editor

Introduction

Nevada's Walker Lake, the terminus of the Walker River, is the subject of a recent Ninth Circuit Court of Appeals (Ninth Circuit) decision. *Nevada State Eng'r v. U.S. Bd. Of Water Comm'rs*, Case No. 15-16316 (May 22, 2018). The desert lake in northwestern Nevada "has suffered since the 1860s, when the River's waters were first diverted for agriculture, and the Lake's volume has plummeted precipitously in recent years." *Slip Op*. at 17. The Ninth Circuit ruling deals with a clash between a voluntary water rights leasing program that seeks to "employ free market forces to restore a natural balance between the competing demands of agriculture and conservation" and irrigators who assert the water right changes injure their existing water rights. *Id*.

In response to Walker Lake's decline, federal, state, tribal, local, and private organizations organized to save the Lake utilizing a federal water rights leasing program managed by the National Fish and Wildlife Foundation (NFWF). The voluntary program is set up to convey water from the Walker River downstream to the Lake as part of the Walker Basin Restoration Program (Program), established by Congress in 2009. NFWF leases or purchases flow and storage rights from willing sellers to convey water downstream to the Lake.

NFWF filed "change" applications to change the place of use where water was diverted and also change the purpose of use from irrigation to wildlife purposes. Change applications — proposed changes in purpose or place of use — must be approved by the appropriate state agencies. Applicants with Nevada water rights submit applications to the Nevada State Engineer, and applicants with California water rights request approval from the California State Water Resources Control Board (SWRCB). The farmers ("Farmers") objected to the changes, claiming that injury to their water rights would result from the changes proposed.

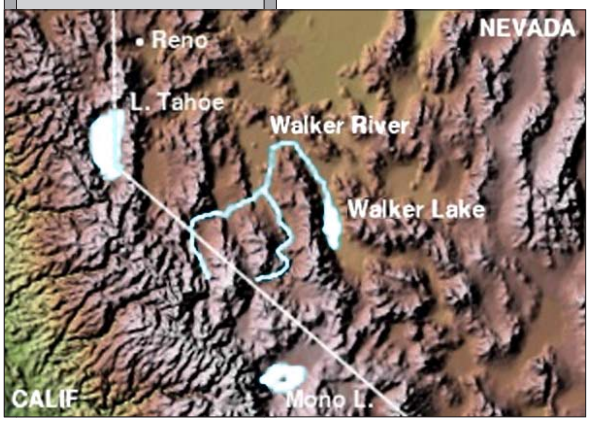
Agency Approvals and Federal District Court's Decision

The Nevada State Engineer and SWRCB approved the necessary water right change applications for the Program over the Farmer's objections. The Nevada State Engineer found that no party would suffer injury from the changes because NFWF agreed to limit its in-stream water use to the historic consumptive use portion of its decreed water rights (i.e., the amount actually used and consumed by agriculture historically), and to dedicate the non-consumptive portion to mitigate hydrological system loss. *See Slip Op*. at 26-28.

SWRCB approved the separate application of the Walker River Irrigation District (WRID) to temporarily change its decreed water storage rights, based on its finding that the Farmers who objected failed to show they had any right to the stored water that would be injured. *See Slip Op*. at 28-30. SWRCB found that "…under California law, changes to the purpose or place for which WRID releases reservoir water under its control cannot give rise to an injury, because WRID — not the Farmers — holds the statutory and decreed right to distribute this water to legal appropriative users." *Slip Op*. at 29.

The Farmers brought their complaints over the agencies' approvals to the federal district court, which has maintained jurisdiction over the waters of Walker River since 1902 in accordance with the Walker River Decree of 1936 (known as the "Decree court"). The Decree court rejected the state agencies rulings, and found that the program, as proposed, would injure the Farmers' water rights. For details regarding the Decree court's rulings, *see Slip Op.* at 30-33.

Concerning the question of injury to the Farmers' water rights due to the changes proposed, the Decree court focused on the volume of water that would be used. "First, the court found that the stipulated program water quantity would injure New Land Stored Water Rights [Farmers' rights], because NFWF would not mimic the historical consumptive use watering patterns of prior users who had occasionally suspended calls for water on harvesting days." *Id*. at 30-31. In other words, while normally irrigation would have lapses in use, the Program's use of water would be continuous and result in larger volumes (quantity) of water being used. "The Decree court found that, although NFWF had properly limited program water to the consumptive use portion of its flow on a per second basis, NFWF would continuously call for its claims to be serviced, and thus would consume more water per season as compared to its predecessors-in-interest." *Id*. at 31. The Ninth Circuit also cited the Decree court's reasoning regarding the "no injury rule" for change applications. "A limit on the rate of consumption per second during days of use does not suffice to satisfy the no injury rule if the total amount of consumption per year is nevertheless increased." *Id*.



Walker Lake Ruling

Two Issues

"No Injury Rule"

Deference to State Agency

State Engineer Deference

Rationale

"Basin"

Purpose of Prohibition

Ninth Circuit Decision

The Ninth Circuit concentrated its review on two questions. "First, did the Decree court properly reject the state agency rulings — that NFWF's program would not cause any cognizable injury to the Farmer's water rights — based on its de novo review of the Walker River Decree? Second, does the export restriction of the Walker River Decree prohibit delivering water to Walker Lake because it is 'outside of' the Walker River Basin?" *Id*. at 18. The decision was rendered by a three-judge panel, with Judge Jay S. Bybee authoring the opinion.

"No Injury Rule" and Changes

The Ninth Circuit's analysis turned first to the "no injury rule." Notably, the Walker River Decree of 1936, Article X, contains a specific "no injury" provision, which "recognizes the duty of each appropriator to manage its water use so as to avoid injury to other appropriators, including junior appropriators." *Slip Op*. at 40. The Ninth Circuit's decision on this issue, however, turns on the standard of review that requires the Decree court to defer to the findings and conclusions of the state agencies (*see id*. at 37-39 for discussion of deference required).

> The Nevada State Engineer and the California Control Board both concluded that because NFWF agreed to limit program water to the consumptive use portion of the claims, there is no material change in its usage and no other rights holders will be injured. The Decree court rejected this conclusion. We conclude that the Decree court failed to defer to the findings and conclusions of the state agencies.

Id. at 40.

For a detailed discussion of the "no injury rule" and change applications under both Nevada and California water law, *see Slip Op*. at 40-54.

The Ninth Circuit also included a lengthy discussion of the record concerning the "no injury" finding by the Nevada State Engineer before concluding:

> Once we consider the record before the Nevada State Engineer, the Decree court's concerns are unfounded, and the Nevada State Engineer properly found that "a transfer [to NFWF] limited to the consumption portion...would avoid conflict and injury to other existing water rights." Because these findings are supported by substantial evidence and the State Engineer applied the correct legal rule, the Engineer's conclusions are entitled to deference. It was error for the Decree court to reject those conclusions.

Id. at 50.

Export Prohibition Outside the Basin

The second issue addressed by the Ninth Circuit dealt with the export restriction of the Walker River Decree (Decree), which states that "no water shall be delivered or sold outside of the basin of the Walker River." Decree, Article XIV. The Decree court held that delivering river water to Walker Lake would violate the export restriction.

The Decree court's holding rested on several grounds (*see Slip Op*. at 54):

- there are no rights decreed in the Decree to appropriate water from the Lake;
- the Decree does not mention the Lake, but does mention other lakes as tributaries to the River; and
- the Decree concerns appropriative rights only to the River and its tributaries, but not the Lake.

> On this basis the court held that "basin," as used in the export restriction, unambiguously refers only to those agricultural lands that beneficially use the River's waters and those waters that are mentioned by name in the Decree, but not the Lake itself.

Id.

The Ninth Circuit pointed out, however, that both the Nevada State Engineer and the SWRCB found that Walker Lake was within the Walker River Basin.

The Decree court's (district court's) view of the *purpose* of the export restriction was noted by the Ninth Circuit. "The district court correctly noted that the export restriction ensures that the basin's waters remain in the basin for beneficial use by appropriative rights holders. Such a protectionist measure appears elsewhere in water law as a mechanism to preserve water resources for local use." *Id*. at 55.

The Ninth Circuit then turned to its view of the clear meaning of the word "basin:"

> We do not think there is any ambiguity in the phrase "basin of the Walker River." Consider the plain hydrological, geomorphic, geographic, and everyday meaning of the word "basin." A "basin," as we commonly use that word, is simply the geographic area that is coextensive with a river system's hydrological drainage. The Decree court itself used the term "basin" according to this plain hydrological and geographic meaning, when it opened its Order by observing that the Walker River Basin is approximately 4,050 square miles "from its origins in the southwestern elevations of the Sierra Nevada Mountains to its terminus, Walker Lake."

Id.

Walker Lake Ruling
History & Logic

Lake in Basin

The Ninth Circuit finally reverts to Latin to make the point that the "…interpretation flies in the face of history and logic and that ancient and simple maxim *aqua currit et debet currere ut currere solebat ex jure naturae*: water runs and ought to run as it is accustomed to run, according to the law of nature." (citations omitted), *Id*. at 57.

The Ninth Circuit then brings its decision to a simple end, ruling on the effect of the export prohibition. "We conclude that Walker Lake is part of the Walker River Basin. As a consequence, dedicating water from the Walker River to Walker Lake does not violate the Decree's prohibition on delivering water 'outside of the basin of the Walker River.'" *Id*.

Conclusion

The Ninth Circuit's decision is a clear victory for Walker Lake itself and the Walker Basin Restoration Program. A voluntary program — dependent on willing sellers of water rights — that works to "restore a natural balance between the competing demands of agriculture and conservation" should be lauded. Protecting existing water rights through the "no injury rule" is also important whenever changes in water rights are proposed. According to the Nevada State Engineer, the Program's approach of limiting in-stream water use to the historic consumptive use portion of its decreed water rights and dedicating the non-consumptive portion to mitigate hydrological system loss will adequately protect those existing rights.

For Additional Information:
Ninth Circuit Decision available at: www.ca9.uscourts.gov/opinions/

WATER BRIEFS

WALKER RIVER DECREE AMENDMENTS NV/CA

PUBLIC TRUST DOCTRINE AND ADJUDICATION AMENDMENTS: CERTIFICATION TO THE NEVADA SUPREME COURT

The Ninth Circuit Court of Appeals (Ninth Circuit) issued a trio of related rulings on May 22nd on issues crucial for the Walker River Basin (Basin) and Walker Lake. The Ninth Circuit's rulings overturned three decisions of US District Judge Robert Jones. The above article by David Moon discusses the case involving change applications filed to implement the Walker Basin Restoration Program to restore Walker Lake and the objections by farmers opposed to the Program.

The second case addressed another issue brewing in the Basin. In *Mono County et al. v. Walker River Irrigation District*, Case No. 15-16342 (May 22, 2018), the Ninth Circuit issued an order certifying the following question to the Supreme Court of Nevada for determination: "Does the public trust doctrine apply to rights already adjudicated and settled under the doctrine of prior appropriation and, if so, to what extent?" *Slip Op*. at 17-18.

The Walker River Basin covers approximately 4000 square miles, running northeast from its origins in the Sierra Nevada Mountains in California, then turning south and finally terminating in Walker Lake in Nevada. The first quarter of the Basin lies in California, with the majority of the precipitation and surface water flowing into the basin in California. The vast majority of the water is diverted and consumed, however, in Nevada. Litigation over water rights in the Walker River Basin began in 1902. The federal district court has continuing and exclusive jurisdiction over the Walker River Basin litigation. "The Walker River Decree adjudicated the water rights of hundreds of claimants under the doctrine of prior appropriation (including water rights to the Tribe." *Id.* at 6. "Next, in 1991, the Paiute Tribe and the United States sought recognition of the Tribe's right to a certain additional amount of water from the Walker River, under a principle that Native American tribes have superior water rights based on their relationship to the federal government." *Id.* at 7.

The Ninth Circuit's decision concerning the Public Trust Doctrine was based on its recognition that each State has authority to interpret their water laws — rather than the federal courts — even when the case is pending in federal court:

> The remaining issue — whether the Walker River Decree can be amended to allow for certain minimum flows of water to reach Walker Lake — depends on whether the public trust doctrine applies to rights previously adjudicated and settled under the doctrine of prior appropriation and permits alteration of prior allocations. This is an important question of Nevada water law we believe should be decided by the Nevada Supreme Court.

Id. at 9. *See also* II. Discussion, *Id.* at 9-17.

Following the Ninth Circuit's "Discussion" of the public trust doctrine under Nevada law and how it might apply in the current case, the court concluded that "…whether, and to what extent, the public trust doctrine applies to appropriative rights settled under the Walker River Decree is an open question. Because this question has significant implications for Nevada's water laws and because we cannot be certain how the Nevada Supreme Court would resolve this matter, certification on this question of law is appropriate." *Slip Op*. at 17.

For info: Ninth Circuit Opinion available at: www.ca9.uscourts.gov/opinions/

WATER BRIEFS

WALKER RIVER DECREE & TRIBES NV/CA

TRIBAL CLAIMS FOR UNRECOGNIZED WATER RIGHTS: DISMISSAL OF CLAIMS OVERTURNED

In the third case bearing on the Walker River Basin, the Ninth Circuit reversed US District Judge Robert Jones' dismissal of the Walker River Paiute Tribe's claims for previously unrecognized water rights. The Ninth Circuit held that the federal district court erred by dismissing the claims on the basis of *res judicata* without first giving the Tribe and the United States an opportunity to be heard on the issue. *United States v. Walker River Irrigation District*, Case No.15-16478 (May 22, 2018). *Res judicata*, also referred to as "claim preclusion," is the principle that a cause of action may not be relitigated once it has been judged on the merits.

In 1940, after remand from the Ninth Circuit, the federal district court amended the original Walker River Decree of 1936 and retained jurisdiction to modify it. In 1991, the Walker River Irrigation District filed a petition invoking the court's continuing jurisdiction over the waters of the Walker River. The current appeals arise from the counterclaims in the 1991 action filed by the Tribe in 1992 (and later by the United States) asserting new water rights for the Tribe.

In May 2015, without briefing or argument on the issue, Judge Jones *sua sponte* (acting without formal prompting from any parties) dismissed all of the Tribe's and the United States' counterclaims on *res judicata* or jurisdictional grounds. The Ninth Circuit reversed the district court's dismissal of claims:

> This circuit has never "upheld a dismissal for claim or issue preclusion where the parties were not given any opportunity to be heard on the issue," *Headwaters v. U.S. Forest Serv*., 399 F.3d 1047, 1055 (9th Cir. 2005), and we decline to do so here. Our decision is further bolstered by the fact that the district court explicitly told the parties not to brief *res judicata* issues, before dismissing on that ground.

Slip Op. at 27-28.

The Ninth Circuit also held that the counterclaims filed by the Tribe and the US are not a "new action."

> Furthermore, because we have concluded that the counterclaims are not a new action, traditional claim preclusion and issue preclusion do not apply. *See Arizona v. California*, 460 U.S. 605, 619(`1983) ("*[R]es judicata* and collateral estoppel do not apply...[where] a party moves the rendering court in the same proceeding to correct or modify its judgment."). Instead, the counterclaims are "subject to the general principles of finality and repose, absent changed circumstances or unforeseen issues not previously litigated." *Id*.

Slip Op. at 28.

The United States requested that the case be reassigned to a different district judge on remand. The three-judge Ninth Circuit panel set out its reasoning about the problems with Judge Jones.

> We reluctantly conclude that reassignment is appropriate here because we believe (1) that Judge Jones would have substantial difficulty putting out of his mind previously expressed views about the federal government and its attorneys, and (2) that reassignment will preserve the appearance of justice. *See United States v. Estate of Hage*, 810 F.3d 712, 722 (9th Cir. 2017) (holding that Judge Jones "harbored animus toward the federal agencies" and that "the judge's bias and prejudgment are a matter of public record"); *Nat'l Council of La Raza*, 800 F.3d at 1046; *In re United States*, 791 F.3d at 958 (concluding that Judge Jones' exclusion of federal government attorneys appeared to be based on his personal hostility to federal government policies and officials).

Id. at 29-30. The Ninth Circuit continued that "[B]ecause Judge Jones' statements are coupled with his unprecedented *sua sponte* dismissal of the United States' counterclaims, we conclude that reassignment is necessary." *Id*. at 30.

The decision ended with the following Conclusion: "While the district court was correct that it retained jurisdiction to modify the Decree, the district court erred in characterizing the counterclaims as part of a new action and then *sua sponte* dismissing them on *res judicata* grounds. We therefore reverse the order of the district court and remand for further proceedings consistent with this opinion. On remand, the case shall be randomly reassigned to a different district judge." *Id*. at 31.

For info: Ninth Circuit Opinions: www.ca9.uscourts.gov/opinions/

FLOOD MITIGATION FUNDS TX

FEMA GRANTS

The Texas Water Development Board (TWDB) has authorized $27,743,911 in flood mitigation assistance grants. The grants provided through this assistance are funded through the Federal Emergency Management Agency (FEMA) and will be used to mitigate flood damages and prevent future losses. Thirteen applications were approved by FEMA for this assistance. The TWDB administers FEMA's Flood Mitigation Assistance grant program for Texas. FEMA annually accepts applications for these grants. In addition to the FEMA grants, communities are contributing approximately $2,767,000 of local match funds. The Flood Mitigation Assistance grant program assists communities by providing federal funds for cost-effective measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

For info: TWDB website: www.twdb.texas.gov/flood/grant/fma.asp

WATER BRIEFS

TEXAS V. NEW MEXICO TX/NM ANSWERS & COUNTERCLAIMS

On May 23, New Mexico Attorney General (AG) Hector Balderas announced that he has filed counterclaims and answers to Texas and the United States in the *Texas v. New Mexico* water lawsuit. In his press release, Balderas highlighted that "New Mexico's traditionally underrepresented populations have been taken advantage of for decades by the parties…" and "this case is about protecting working New Mexicans and small businesses to ensure the water they own is not unjustly taken away." Balderas has assembled a team of water experts "using the latest science, best evidence, and new joint strategy to protect New Mexico's working families, cultural way of life, and overall economy." Now that the last action initiated by former Attorney General Gary King has been adjudicated by the US Supreme Court, Balderas is able to execute his new legal strategy.

"Our legal strategy will hold Texas and the federal government accountable for the significant amount of precious water being misappropriated that rightfully belongs to New Mexico's working families and small businesses, and for the federal government not using proper accounting and failing to ensure reasonable water delivery improvements," said Attorney General Balderas.

After five years of preliminary motions initiated by former Attorney General Gary King, this is New Mexico's first chance to assert defenses, utilize the best science, and demand a better planning process to ensure there are adequate water resources for all citizens, according to Balderas. The pleadings filed by New Mexico on May 22nd emphasize the fact that Texas is not entitled to relief, because it has not been damaged by New Mexico's conduct. "In many years, even years of less than a full Project allocation, Project beneficiaries in Texas have not used a significant portion of the Project water allotted to them. Nor have Texas Project beneficiaries ever been denied any Project water which they ordered." *State of New Mexico's Answer to the State of Texas' Complaint* at 9, First Affirmative Defense (Case No. 141, Original; U.S. Supreme Court).

New Mexico's *Answer* asserts as its Third Affirmative Defense that "[T]exas's claims are barred by the doctrine of unclean hands." New Mexico maintains that Texas's "inequitable conduct" includes:

- allowing water users in Texas to develop groundwater within the Project area in Texas, lowering groundwater levels, reducing Project efficiency, and reducing return flows, requiring additional releases from Project Storage to meet irrigation demand in EPCWID;
- failing to correctly account for historic Project return flows;
- transferring Project water uses from irrigation to other purposes, including municipal use, in violation of federal requirements and without approval of the Compacting States; and
- otherwise interfering with the Compact's apportionment.

Id. at 10.

Additionally, New Mexico asserted that Texas has failed to take steps to mitigate the harm and injury alleged in its Complaint. The pleadings further detail Texas' failure to properly regulate or manage surface or groundwater located within Texas, failure to prevent groundwater development in Texas, and failure to properly plan for known and expected drought or water shortages. Other affirmative defenses and additional details can be found in New Mexico's pleadings (see below).

"I remain open to resolving this case amicably and look forward to working towards securing a more sustainable water future for all parties involved, but New Mexicans will not pay an unjust price," Balderas added.

For info: New Mexico' *Answer to the State of Texas' Complaint* and the *State of New Mexico's Answer to the United States' Complaint in Invervention* are available at the end of AG Balderas Press Release of May 23, 2018 at: www.nmag.gov/press-releases.aspx

THE PRICE OF WATER US MAJOR US CITIES

Circle of Blue on June 4th released its annual survey of water rates in the United States. The report found the slowest rate of increase since the survey began in 2010. Reporter Brett Walton discusses financial trends that affect water bills for tens of millions of US households and includes water rates data from 2010-2018 for 30 major U.S. cities. Listen to Circle of Blue's June 4th "What's Up With Water" Podcast for more details.

For info: Report available at: www.circleofblue.org/waterpricing/

WATER EFFICIENCY GOALS CA LEGISLATION SIGNED

On May 31, California Governor Edmund G. Brown, Jr. signed SB 606 by Senator Robert Hertzberg (D-Van Nuys) and AB 1668 by Assemblymember Laura Friedman (D-Glendale) to help the state better prepare for droughts and climate change by establishing statewide water efficiency standards. SB 606 and AB 1668 establish guidelines for efficient water use and a framework for the implementation and oversight of the new standards, which must be in place by 2022. The two bills strengthen the state's water resiliency in the face of future droughts with provisions that include:

- Establishing an indoor, per person water use goal of 55 gallons per day until 2025, 52.5 gallons from 2025 to 2030 and 50 gallons beginning in 2030.
- Creating incentives for water suppliers to recycle water.
- Requiring both urban and agricultural water suppliers to set annual water budgets and prepare for drought.

The legislative action builds on Governor Brown's ongoing efforts to make water conservation a way of life in California. The state responded to the most recent drought with emergency actions and investments and the advancement of the California Water Action Plan, the Administration's five-year blueprint for more reliable, resilient water systems to prepare for climate change and population growth (available at: http://resources.ca.gov/california_water_action_plan/).

For info: Full Text of SB 606 & AB 1668 at: http://leginfo.legislature.ca.gov

WATER BRIEFS

INNOVATIVE SAVINGS WEST
WATER TECHNOLOGY FUNDING

On May 31, this year's Innovative Conservation Program (ICP) grant recipients were announced. A dozen water-saving technologies received a financial boost from the federal government and water agencies across the Southwest. From a drone that uses thermal imagery to detect leaks in water distribution pipelines to a tool that estimates how much water a home can save by switching to native plants, the grant recipients all offer new ways to potentially permanently reduce water use. Recipients will receive grants of up to $50,000 to evaluate water-savings potential. The grants come from a partnership between the US Bureau of Reclamation, the Metropolitan Water District of Southern California, Western Resource Advocates, Southern Nevada Water Authority, Central Arizona Project and Southern California Gas Company.

A total of $570,000 was awarded to private businesses, public agencies, and universities during this two-year ICP cycle. Awardees were chosen from among 55 proposals evaluated through a competitive review process based on project innovation, research plan, market impact potential, and project preparedness. Since ICP was launched in 2001, the program has awarded 67 grants totaling $2.4 million during six two-year funding cycles.

This year's ICP grants also fund research into technology to reuse brewery wastewater for irrigation; a device to monitor real-time household water use and automatically shut-off leaks and water waste; a water-efficient commercial dishwasher; a financial mechanism to drive greater adoption of graywater systems; a system to save water by monitoring water-use by fixture; multiple technologies to improve the water-saving potential of using compost and hydrogel on grass; smart irrigation technologies; and soil moisture-based control technologies.

The complete list of the 2018 Innovative Conservation Program awardees and their projects is available on the ICP website shown below.

For info: Innovative Conservation Program website at: http://mwdh2o.com/ICP

WASTEWATER PERMIT WA
WINERY GENERAL PERMIT

On May 17, The Washington Department of Ecology (Ecology) announced that Washington's wineries and Ecology have collaborated to develop the first statewide water quality permit that will help the industry protect water quality. The new Winery General Permit establishes practices that help wineries manage their wastewater. The general permit will benefit both the state and permittees by providing broad, efficient, and consistent coverage for wineries across the state. The permit is scheduled to take effect July 1, 2019. The delayed start gives winemakers time to assess their facilities and develop a compliance strategy that best suits their business. This permit can be appealed to the Washington Pollution Control Hearings Board within 30 days of becoming effective.

Washington is the second largest wine-producing state in the nation. The byproduct of making wine is a corrosive wastewater that, if not properly managed, can damage soil and crops, kill aquatic life, degrade the infrastructure in wastewater treatment plants, and pull metals from the soil into groundwater that can harm people. Ecology has worked closely with the winemaking community, stakeholders, and public since 2014 to develop this permit. The permit incorporates the best practices from wineries that already successfully manage wastewater, and time-tested practices from California's regulations. A guiding principle was to provide flexibility for wineries covered under the permit, and provide options for winemakers to comply. This will allow wineries to manage wastewater in the way that best suits their business.

Wineries may need coverage under the permit if they discharge more than 53,505 gallons of wastewater in a calendar year. Specifically, these wineries will need coverage if they discharge winery process wastewater:

- As irrigation to managed vegetation
- To a lagoon or other liquid storage structure
- As road dust abatement
- To a subsurface infiltration system
- To an infiltration basin
- To a wastewater treatment plant

In the coming year, Ecology will hold workshops to provide guidance to winery representatives about how to apply for coverage, inspect their facilities, document their progress, implement best management practices, and report their monitoring data to the agency.

For info: Ecology website at: www.ecology.wa.gov/winerypermit

STORMWATER PIPES US
CURED-IN-PLACE REPAIR CONTAMINATION

On May 15, Purdue University released a review of a common construction practice, which revealed environmental contamination, and a need for improved oversight and monitoring. An in-depth review of environmental protections for a common stormwater culvert repair practice — cured-in-place pipe repair, or CIPP — has revealed differing installation practices across the states, water contamination incidents in ten states and Canada, and lack of safety data for existing installation practices.

Funded by six states, Purdue researchers examined past water contamination incidents, environmental studies, industry practices, and construction specifications from 32 states. Creek, river, pond, and sometimes drinking water contamination incidents were found in ten states: Alabama, California, Colorado, Connecticut, Florida, Georgia, Minnesota, Oregon, Vermont, and Washington.

Of the 32 states that responded to the researchers' request for information, only four states required water testing after the construction procedure, and the test methods used were often not the same. Nine states had no formal requirements to oversee or monitor the procedure's environmental impacts.

Andrew Whelton, associate professor at Purdue, says many states and municipalities are beginning to re-examine how CIPP is used and lessen the potential harm to nearby water and air. A popular method of repairing culverts, CIPP utilizes resin-impregnated fabric that is hardened inside a damaged pipe using pressurized steam, hot water, or UV light, creating a new plastic pipe inside the old,

WATER BRIEFS

damaged pipe. The process, if not well controlled, can release a worrisome mix of hazardous chemicals into the air and water, although what exactly is discharged, and how that varies site to site, is just beginning to be understood.

"In 2014, waste produced at an Alabama culvert repair site was found to be acutely contaminated and dissolved a freshwater organism," Whelton says. "While the technology has been around for 30 years, there are very few laboratory and field studies on possible environmental effects." Previous research found that the chemical plume created during the steam-based CIPP installation process released chemical vapors, not just steam. It also contained known air pollutants, suspected endocrine-disrupting chemicals, and known and suspected carcinogens. The California Department of Public Health issued a statewide notice about potential hazards after its own investigation and the prior study.

For info: Report available at: https://awwa.onlinelibrary.wiley.com/doi/epdf/10.1002/awwa.1042

SGMA INTERACTIONS CA

GROUNDWATER/SURFACE WATER

A new report, *Navigating Groundwater-Surface Water Interactions under SGMA*, provides guidance to Groundwater Sustainability Agencies (GSAs) and stakeholders as they develop plans to sustainably manage their groundwater basins. The report was released May 9th by the Center for Law, Energy & the Environment at the University of California at Berkeley.

Groundwater and surface water are intimately connected. Until 2014 California law ignored this reality. The Sustainable Groundwater Management Act (SGMA) is California's first statewide law to explicitly reflect the fact that surface water and groundwater are frequently interconnected and that groundwater management can impact groundwater-dependent ecosystems, surface water flows, and the beneficial uses of those flows. As such, SGMA partially remedies the historically problematic practice of treating groundwater and surface water as legally distinct resources.

SGMA requires groundwater sustainability agencies (GSAs) to manage groundwater to avoid six undesirable results, including significant and unreasonable adverse impacts on beneficial uses of surface water. While this aspect of SGMA is clearly important, significant uncertainties exist regarding how GSAs will actually define and achieve this goal.

Addressing SGMA's requirements for groundwater-surface water interactions will be difficult. No clear, pre-defined line exists to guide GSAs in determining what significant and unreasonable depletions of interconnected surface water will be, or whether their planned actions will sufficiently avoid them. Many GSAs will face pressure to aggressively address impacts on surface water in their basin. Many will face equal or greater pressure to draw the line more loosely. Nevertheless, it will fall to the GSAs to make a determination, and to defend it in their groundwater sustainability plans.

The process of addressing groundwater-surface water interactions also offers GSAs an opportunity to help communities and other stakeholders resolve, or avoid, difficult conflicts. While California law has only recently begun to seriously address conflicts between surface and groundwater uses, those conflicts have been occurring for decades, and in some places for over a century. SGMA did not create conflict between groundwater pumping and beneficial uses of surface water; it just created an opportunity — as well as an obligation — to respond to those challenges.

The research presented here examines some of the legal and institutional questions that will inevitably arise as GSAs seek to address groundwater-surface water interactions under SGMA. The core goal of this report is to help parties identify and address these questions, and ultimately to let GSAs and stakeholders manage groundwater-surface water interactions proactively and effectively.

For info: Report available at: www.law.berkeley.edu/research/clee/research/wheeler/gw-sw/

AQUIFER RECHARGE ID

NEW ESPA RECHARGE RECORD

At a May meeting, Idaho Water Resource Board (IWRB) officials estimated they will reach a new record of 524,000 acre-feet of water flowing into the Eastern Snake Plain Aquifer (ESPA) by the end of the winter 2017-18 recharge season — more than double the annual recharge goal of 250,000 acre-feet.

The IWRB set a record with 317,000 acre-feet of recharge flows into the ESPA last year. The average recharge flow throughout the season this winter was 1,021 **c**ubic **f**eet per **s**econd (cfs), compared to 641 cfs last year — a 59 percent increase.

Because of the record recharge season, the IWRB voted to increase the budget to pay recharge partners up to a total of $4.7 million for the winter of 2017-18. The IWRB had budgeted $2.5 million based on the previous recharge season. Each canal company and irrigation district gets paid on an acre-foot basis for assisting the IWRB with recharging the ESPA. The recharge program is aimed at restoring the ESPA to sustainable levels after many years of over-drafting the aquifer by about 200,000 acre-feet per year.

In other action, the Board approved the FY 2019 Secondary Aquifer Planning, Management and Implementation Fund budget of $17.8 million, including $4.3 million for ESPA recharge operations; $6.9 million for ESPA recharge infrastructure projects; $1.8 million for Treasure Valley water projects; $75,000 for water projects in the Camas Prairie; $380,000 for water projects in the Big Lost River Basin; $100,000 for the Palouse Basin; $250,000 for the Bear River Basin, and $2 million for other statewide water projects including aquifer monitoring and cloud-seeding.

For info: Brian Patton, Chief, Planning Bureau, Idaho Water Resource Board, 208/ 287-4800 or Brian.Patton@idwr.idaho.gov

CALENDAR

June 20-21 NM
Environmental Conditions of the Animas & San Juan Watersheds 3rd Annual Conference, Farmington. San Juan College. Presented by the New Mexico Environment Department. For info: https://animas.nmwrri.nmsu.edu/2018/

June 20-21 CA
2018 California Water Boards Science Symposium: Adapting in the Face of Disruptive Landscape Change, Sacramento. Cal EPA, 1001 I Street, 9am-3:00 pm. Presented by the State Water Resources Control Board; Free - Registration Required. For info: www.waterboards.ca.gov/resources/data_databases/wq_science_symposium.shtml

June 21 OR
Managing Stormwater in Oregon Conference, Salem. Salem Convention Center. Presented by Northwest Environmental Business Council. For info: www.oregonstormwater.com

June 25-26 Argentina
Argentina Shale Water Management & Frac Sand Logistics Exhibition & Conference, Buenos Aires. Emperador Hotel. For info: www.argentina.shale-water-sand.com/?join=VR

June 28 OR
Oregon Groundwater Regulation Hot Topics - OSB Environmental & Natural Resources Section CLE, Portland. Tonkon Torp, 1600 Pioneer Tower, 888 SW Fifth Avenue, Noon-1:15 pm. For info: RSVP by 6/26: Maura Fahey at maura@crag.org

July 9-11 TX
Managing Transboundary Groundwater Conference, Fort Worth. Worthington Renaissance Fort Worth Hotel. Presented by American Water Resources Association. For info: www.awra.org

July 10-12 MN
One Water Summit - National Conference on Sustainable, Integrated, and Inclusive Approaches to Managing Water, Minneapolis. Hyatt Regency Minneapolis. For info: http://uswateralliance.org/summit/one-water-summit-2018

July 12-13 CO
Endangered Species Act, Wetlands, Stormwater & Floodplain Regulatory Compliance for Energy & Utilities, Denver. Sheraton Denver Tech Center. Presented by EUCI. For info: www.euci.com

July 13 OR
Bull Run Watershed Tour - Portland Water Bureau, Portland. Field Trip. Hosted by OSB Environmental & Natural Resources Section, 8:30 am - 4:30 pm. For info: Limited to ENR Section Members - Closes June 22, www.brownpapertickets.com/event/3468287

July 16-20 MT
Water Law in Indian Country - Summer Program, Missoula. University of Montana School of Law; 9 am - 12 pm each day. Blewett School of Law 11th Annual Summer American Indian & Indigenous Law Program. For info: umt.edu/indianlaw

July 19-20 WA
Tribal Water in the Pacific Northwest Conference, Seattle. Crowne Plaza Hotel. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

July 19-21 BC
64th Annual Rocky Mountain Mineral Law Institute, Victoria. Victoria Conference Centre. For info: www.rmmlf.org/

July 20 OR
Agriculture Law Seminar, Bend. The Oxford Hotel, 10 NW Minnesota Avenue. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

July 22-24 AZ
Arizona WateReuse Symposium, Flagstaff. Little America Hotel. Presented by WateReuse. For info: https://watereuse.org/event/az-water-reuse-symposium/?instance_id=323

July 26-27 CA
Sustainable Groundwater Planning in California: Important Practical Legal, Technical, Business & Regulatory Information for Preparing GSPs, Sacramento. Holiday Inn Downtown Sacramento. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

July 31-August 3 OR
2018 Western States Water Council Summer (187th) Meeting, Newport. Best Western Agate Beach Inn. For info: www.westernstateswater.org/upcoming-meetings

August 1-3 UT
Western Water Seminar, Park City. Park City Resort. Presented by National Water Resources Assoc. For info: NWRA, www.nwra.org/upcoming-conferences-workshops.html

August 2-3 AZ
Arizona Water Law 26th Annual Conference: Reforms, Initiatives & In-Depth Legal Analysis, Scottsdale. Hilton Scottsdale Resort. For info: CLE Int'l, 800/ 873-7130, live@cle.com or www.cle.com

August 6-7 DC
Transformative Issues Symposium on Infrastructure Affordability, Washington. Washington Court Hotel. Presented by American Water Works Assoc.. For info: www.awwa.org/conferences-education/conferences.aspx

August 8 NM & WEB
New Directions in Hydrology & Water Law Seminar: Intensive Look at Broadening Areas Where Scientific Proof is Required in Water Disputes, Santa Fe. Hilton of Santa Fe Historic Plaza Hotel. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

August 9 OR
Portland Harbor Superfund Site Cruise (Field Trip), Portland. Crystal Dolphin, 2:45 pm - 5 pm. Presented by OSB Environmental & Natural Resources Section: Sales end July 25th. For info: Caylin Barter, caylin.barter@jordanramis.com

August 9-10 NM & WEB
Natural Resource Damages Seminar, Santa Fe. Hilton of Santa Fe Historic Plaza Hotel. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

August 12-15 CO
StormCon Denver (2018): The Surface Water Quality Conference & Expo, Denver. Hyatt Regency Denver at Colorado Convention Center. For info: https://www.stormcon.com/

August 12-15 TN
International Low Impact Development Conference, Nashville. JW Marriott Hotel. Presented by American Society of Civil Engineers. For info: www.lidconference.org

August 16-17 WA & WEB
Water Law in Central Washington Seminar & Live Webcast, Ellensburg. Red Lion Hotel & Conference Center. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

August 16-17 WA & WEB
Clean Water & Stormwater Seminar, Seattle. Courtyard by Marriott Seattle Downtown/ Pioneer Square. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

The Water Report
Water Rights, Water Quality & Water Solutions in the West
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CALENDAR

(continued from previous page)

August 28-29 DC
Water Finance Conference, Washington. The Washington Court Hotel. Presented by the National Association of Clean Water Agencies. For info: http://waterfinanceconference.com/

September 9-12 TX
33rd Annual WateReuse Symposium, Austin. JW Marriott Hotel. Presented by WateReuse. For info: https://watereuse.org/news-events/conferences/

September 12-13 IL
US Power Plant Water Treatment Conference, Chicago. For info: www.lmnpower.com/power-water-treatment-conference

September 17-19 TX
WaterPro Conference, Fort Worth. Fort Worth Convention Center. Annual Conference of the National Rural Water Assoc. on Water & Wastewater Utility Systems. For info: www.waterproconference.org

September 20-21 NM
New Mexico Water Law 26th Annual Conference, Santa Fe. Eldorado Hotel & Spa. For info: CLE Int'l, 800/ 873-7130, live@cle.com or www.cle.com

September 20-21 CA
Climate Change in California Seminar, San Francisco. TBD. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

September 24 WA
CERCLA + MTCA: Advanced Sediments Conference, Seattle. TBA. For info: Holly Duncan, Environmental Law Education Center, 503/ 282-5220, info@elecenter.com or www.elecenter.com

September 25-27 CA
First Annual Western Groundwater Congress - Technical Conference on Western Groundwater Quality & Groundwater Resources, Sacramento. DoubleTree by Hilton. Presented by Groundwater Resources Assoc. of California. For info: www.grac.org/events/151/