The Water Report

Water Rights, Water Quality & Water Solutions in the West

In This Issue

Upcoming Stories

Arizona v. Navajo Nation

Sackett v. EPA

Streamflow Restoration Act

& More!

ARIZONA GROUNDWATER POLICY

ADDRESSING THE SUPPLY PARADOX

by Fred Breedlove with contributions from:
William Staudenmaier, John Burnside, and John Habib, Snell & Wilmer (Phoenix, AZ)

Introduction

The Arizona Department of Water Resources (ADWR) has published extensive studies of groundwater resources in Arizona. These studies confirm that Arizona has hundreds of millions of acre-feet of groundwater located in more than 40 different groundwater basins across the state. Groundwater in many of the basins extends thousands of feet below land surface, including in the aquifers beneath the Phoenix metropolitan area. Richard, S.M., Reynolds, S.J., Spencer, J.E., and Pearthree, P.A., 2000, *Geologic map of Arizona: Arizona Geological Survey,* Map 35, scale 1:1,000,000, https://ngmdb.usgs.gov/ngm-bin/pdp/zui_viewer.pl?id=7099 (last visited July 19, 2023).

However, while a huge resource, this groundwater is almost entirely a non-renewable water supply (i.e., very little water is added to most of the state's aquifers each year to offset ongoing withdrawals from basins). Because of this limited natural recharge, some of Arizona's more extensively developed groundwater basins experienced significant declines in water tables in the second half of the 20th Century. This prompted the Arizona Legislature to enact the 1980 Groundwater Management Act (Groundwater Code) which was intended to slow, and ultimately end, groundwater declines and related problems such as land subsidence and fissuring. Arizona Revised Statutes (A.R.S.) Sections 45-401, et seq. [Editor's Note: Earth fissures are fractures or cracks that form in alluvial basins due to substantial groundwater overdrafts that produce local subsidence (Holzer, 1976; Jachens and Holzer, 1979; Larson and Péwé, 1986).]

Arizona Groundwater in the News

While the local and national news outlets flood the media with articles about the dire nature of Arizona's water supplies, careful planning by Arizona's water leaders over decades has created resilient responses to these challenges that are unmatched in the Southwest and perhaps the nation. Arguably, Arizona is much better positioned to withstand the challenges of drought and climate change than any state that relies largely on groundwater supplies or any other single water source. However, complex issues are rarely conveyed accurately in news headlines. It's much easier and attention-grabbing for a headline writer to say, *"Arizona is Running Out of Water"* than it is to say, *"Arizona Has Plenty of Water but It's Being Proactive by Taking Important Steps to Ensure the State Develops using Renewable Water Supplies."*

Arizona is taking the heat from national media because it is following decades-old policies designed to shift reliance from non-renewable groundwater to renewable supplies through reasonable, incremental steps. It is these steps that led ADWR to announce in June 2023 that it would no longer allow subdivision development in the Phoenix area to grow by relying exclusively on groundwater. ADWR, *Phoenix AMA Groundwater Supply Updates,* https://azwater.gov/phoenix-ama-groundwater-supply-updates (last visited July

The Water Report
(ISSN 1946-116X)
is published monthly by
Sky Island Insights LLC

Editors
Shaina Shay,
David Light,
David Moon

Phone
602/ 456-2127

Email
Info@TheWaterReport.com

Website
www.TheWaterReport.com

Subscription Rates
$299 per year
Multiple & Electronic
Subscription Rates
Available

Postmaster
Please send address
corrections to:
The Water Report
3615 W. Hills of Gold Dr.
Tucson, AZ 85745

AZ Groundwater

AMAs & INAs

Management Goals

Safe Yield

19, 2023). At the same time, however, these policies have created a paradox that is not easily explained: central Arizona groundwater supplies are both insufficient to support future development on the fringes of the Phoenix suburbs AND there are still very large quantities of groundwater in much of the Phoenix area that are projected to last well over one hundred years. But how can both statements be true?

It should be noted at the outset that Arizona has a diverse portfolio of water resources, with groundwater only one component. In fact, Arizona's reliance on groundwater ranks eighth in the Nation at approximately 3.1 million acre-feet per year, compared to California being the number one groundwater user in the country at 19.6 million acre-feet per year. Dieter, C.A., Maupin, M.A., Caldwell, R.R., Harris, M.A., Ivahnenko, T.I., Lovelace, J.K., Barber, N.L., and Linsey, K.S., 2018, *Estimated use of water in the United States in 2015: U.S. Geological Survey Circular 1441, 65 p., https://doi.org/10.3133/cir1441* [Supersedes USGS Open-File Report 2017–1131] (last visited July 19, 2023). Moreover, Arizona collectively uses no more water today — with a population over seven million people — than it used in the 1950s when the population was less than one million. Nicla, Andrew, *Does Arizona really use less water now than it did in 1957?*, azcentral.com, Feb. 12, 2019, www.azcentral.com/story/news/local/arizona-environment/2019/02/12/arizona-water-usage-state-uses-less-nowthan-1957/2806899002/ (last visited July 19, 2023). This can be directly attributed to efforts to: conserve groundwater; use water more efficiently; and utilize diverse sources of water available to Arizonans, including groundwater, in-state surface water, Colorado River water, stored or banked water, and reclaimed water.

The Adequate Water Supply Program

Prior to the Groundwater Code, there was only limited protection in Arizona law related to water to groundwater, primarily through the Adequate Water Supply Program. A.R.S. § 45-108, et seq. Created in 1973, the program requires land developers to seek a determination from ADWR demonstrating that there is enough water available to supply a new subdivision's needs for 100 years. A.R.S. § 45-108. Under Arizona law, a subdivision is defined as "improved or unimproved land or lands divided for the purpose of sale or lease, whether immediate or future, into six or more lots, parcels, or fractional interests." A.R.S. § 32-2101(58). There is no requirement that the lots must be for residential use; they can be intended for any purpose. Any time six or more lots are developed, the seller must disclose to the first buyer whether there is, or is not, a 100-year water supply. A.R.S. § 32-2181(F)(2). While it has been supplanted by the Assured Water Supply program within Arizona's Active Management Areas (AMAs), the Adequate Water Supply Program still exists today, 50 years later, outside of the State's AMAs.

A significant change to the Adequate Water Supply Program was adopted by the Arizona Legislature in 2007 when it passed the Water Adequacy Amendments. SB 1575, amending A.R.S. § 45-108 et seq. These amendments allow counties, cities, and towns to adopt *mandatory* water adequacy requirements in jurisdictions outside of Active Management Areas, which are discussed later herein.

The Arizona Groundwater Code

At its most basic level, the Groundwater Code established certain areas of the state for enhanced groundwater protection, including AMAs and Irrigation Non-Expansion Areas (INAs). In these locations, the Groundwater Code imposes extensive regulatory requirements that limit access to groundwater in ways that greatly limit the "reasonable use" doctrine that applies elsewhere in the state. The common law doctrine of reasonable use is broadly interpreted, allowing a landowner to pump groundwater to whatever extent is needed to make reasonable use of the land. *See*, e.g., Bristor v. Cheatham, 75 Ariz. 227, 234 (1953); Brady v. Abbott Laboratories, 443 F.3d 679, 683 (9th Cir. 2005).

Four initial AMAs were created in the Groundwater Code: Phoenix, Pinal, Tucson, and Prescott. A.R.S. § 45-411. Later, the Arizona Legislature carved the Santa Cruz AMA out of the Tucson AMA, and the Douglas AMA was voted into existence in November 2022. A.R.S. § 45-411.03, ADWR, *Election to Designate AMA for the Douglas Basin,* https://new.azwater.gov/ama/faqs-douglas-ama (last visited July 19, 2023).

Each AMA has its own management goal and adopts conservation measures in a series of management plans to help achieve the management goal. In the Phoenix, Tucson, and Prescott AMAs, the management goal is to achieve "safe-yield" by 2025. A.R.S. § 45-562(A). Safe-yield is defined in the Groundwater Code as "a groundwater management goal which attempts to achieve and thereafter maintain a long-term balance between the annual amount of groundwater withdrawn in an active management area and the annual amount of natural and artificial recharge in the active management area." A.R.S. § 45-561(12).

The management goal for the Pinal AMA is to allow development of non-irrigation uses while preserving the agricultural economy as long as feasible. A.R.S. § 45-562(B). The Santa Cruz AMA management goal is to maintain safe-yield and prevent long-term declines of the local water tables. A.R.S. § 45-562(C).

AZ Groundwater

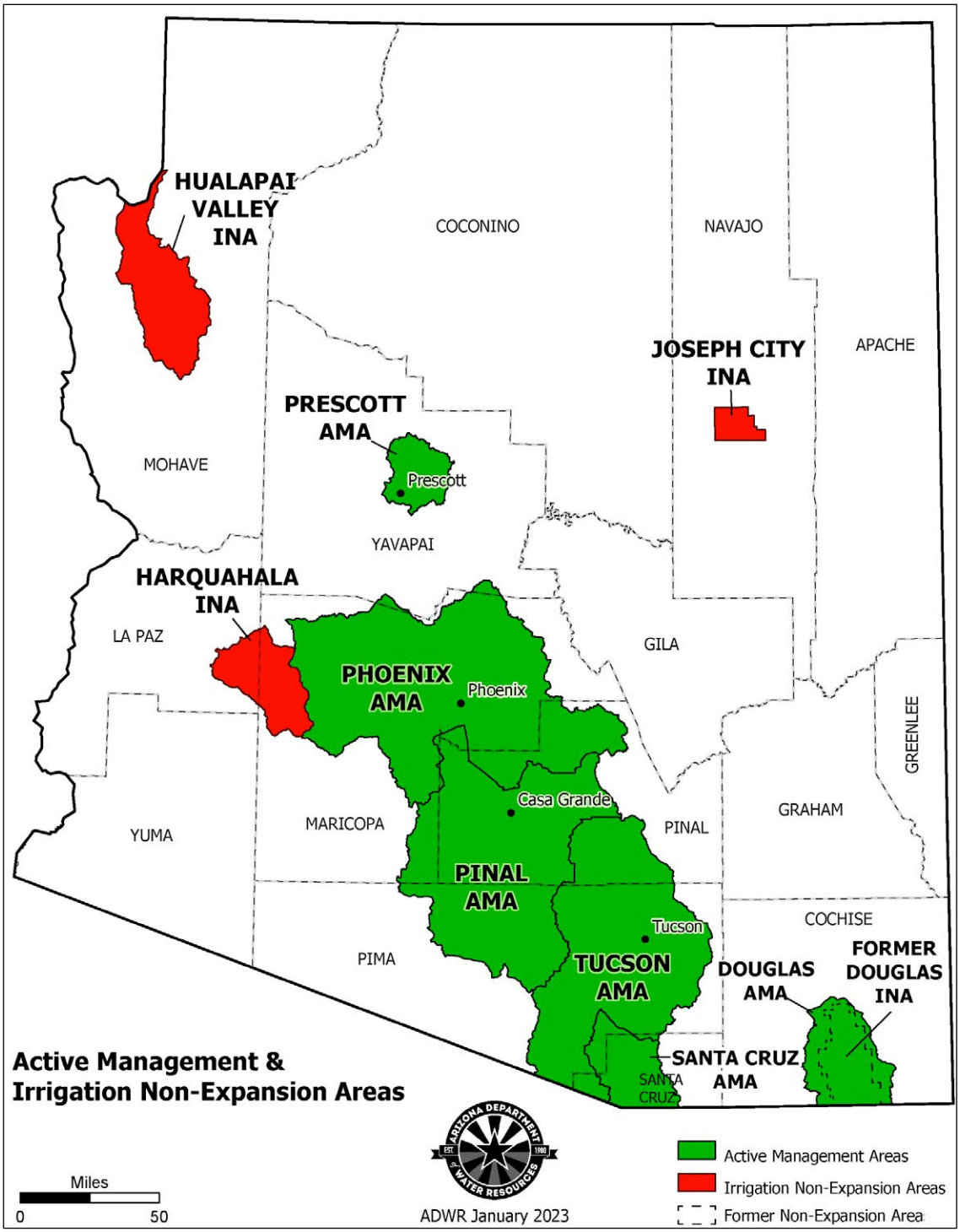

Figure 1.

ADWR works with stakeholders to develop management plans for each AMA that conserve groundwater in a manner intended to meet the AMA management goal. A.R.S. § 45-561, et seq. These conservation measures are intended to become more stringent over time to gradually ratchet down groundwater pumping. *Id*. In the INAs, groundwater use for irrigation purposes is limited to those lands that were in irrigation at the time the INAs were established. A.R.S. § 45-435.

Pumping Rights

Additionally, groundwater in the AMAs may only be withdrawn if a pumper has: (1) a grandfathered groundwater right based on historic groundwater use prior to creation of the AMA, A.R.S. § 45-461, et seq.; (2) a service area right issued to municipal water providers and irrigation districts, A.R.S. § 45-592; (3) a groundwater withdrawal permit, A.R.S. § 45-511, et seq.; or (4) an "exempt" well, i.e., a well equipped with a pump capable of pumping not more than 35 **g**allons **p**er **m**inute (gpm), A.R.S. § 45-454. [The cited statute defines exempt wells by quantity of pumping — anything at 35 gpm or below is exempt from most regulation].

AZ Groundwater

GRANDFATHERED GROUNDWATER RIGHTS

Grandfathered groundwater rights are rights to use groundwater within an AMA that were determined by historic use of groundwater during the five-year period before the AMA was created. These include Irrigation Grandfathered Rights, Type 1 Non-Irrigation Grandfathered Rights, and Type 2 Non-Irrigation Grandfathered Rights. A.R.S. § 45-461, et seq.

Appurtenant Rights

Irrigation Grandfathered Rights (IGFRs) are created for lands that were being irrigated at any time during the five years prior to creation of the AMA. A.R.S. § 45-465. IGFRs are appurtenant to the land and cannot be used on other lands. Type 1 rights are created by permanently retiring irrigation acres from agriculture. A.R.S. §§ 45-463 and 45-469. Type 2 rights were established based on historic non-irrigation use prior to creation of an AMA. A.R.S. § 45-464. Type 2 rights are not appurtenant to land and can generally be used anywhere within the AMA where they were created. A.R.S. § 45-464(G).

THE ASSURED WATER SUPPLY PROGRAM

Assured v. Adequate

The Groundwater Code also created the Assured Water Supply Program, largely modeled after the Adequate Water Supply Program, but with stricter requirements. While subdivision developers outside of the AMAs must only *notify* the first buyer of a lot if they have a 100-year water supply, subdivision developers — using the same definition for "subdivision" described earlier in the article — inside the AMAs must *prove* that they have a 100-year water supply before they can legally sell a single lot. A.R.S. § 45-576.

Requirements

The developer must demonstrate to ADWR that:

1. The water supply required to serve all water uses within the subdivision is legally, physically, and continuously available for one hundred years;
2. The water is of adequate quality;
3. The water provider has the financial means to deliver water to the lots;
4. The proposed water use is consistent with the AMA management plan; and
5. The proposed water use is consistent with the AMA management goal.

A.R.S. § 45-576(L).

100 Year Availability

The Assured Water Supply Program provides assurance to both homeowners and commercial subdivision lot owners that there will be water available for at least 100 years from the date that the seller received a Certificate of Assured Water Supply or the date that the development received a commitment to serve from a municipal water provider with a Designation of Assured Water Supply from ADWR.

CERTIFICATES VS. DESIGNATIONS OF ASSURED WATER SUPPLY

Developer Supply

A Certificate of Assured Water Supply (CAWS or Certificate) is issued by ADWR to the developer of a subdivision who has met the requirements of obtaining an Assured Water Supply and has received a "will serve" letter from a water provider who will deliver the water described in the Assured Water Supply application to the subdivision lots. A.R.S. § 45-576(A). When a CAWS is issued, any groundwater included in the CAWS is essentially reserved in the aquifer for that subdivision. *See generally,* A.R.S. § 45-576(L). CAWS are often issued to developers located on the fringes of suburban development outside of the service area of a municipal water provider that has a Designation of Assured Water Supply (DAWS or Designation).

Provider Supply

A DAWS is issued by ADWR to a municipal water provider that has demonstrated it meets the requirements of the Assured Water Supply program. A.R.S. § 45-576(D)&(E). When a municipal water provider obtains a DAWS, it can then provide water to any new development within its service area if the current and committed demands — including the demands of the new development — do not exceed the quantity of physically, legally, and continuously available water specified in the DAWS. If water demand for a future development within the municipal service area would exceed the quantity approved in the DAWS, the DAWS would need to be modified to address the increased demand before service to the development can begin.

ANALYSES OF WATER SUPPLY

Physical Availability

An important tool authorized in the Groundwater Code that is commonly used by developers is the Analysis of Assured or Adequate Water Supply (Analysis). Arizona Administrative Code (A.A.C.) § R12-15-704 & -713. When a landowner is in the early stages of planning a subdivision development, they often obtain an Analysis to essentially get pre-approval for an aspect of the CAWS, usually to satisfy the physical availability requirement. An Analysis requires substantial investment by a developer, including hiring consultants and sometimes attorneys to assist in proving that there is sufficient water available to meet the demands of their subdivision. If ADWR approves an Analysis, this effectively sets aside the proven quantity of water for a proposed development until issuance of a CAWS.

AZ Groundwater

Depth Restriction

Loop Holes

Over-Allocated

Unmet Demands

Groundwater Reliance

To prove "physical availability," an applicant must demonstrate through computer modeling that any groundwater used for the development will not cause the water table to decline below specific elevations established in ADWR's Assured Water Supply regulations. A.A.C. § R12-15-716. In the Phoenix, Tucson, and Prescott AMAs, that depth is 1,000 feet below ground surface. *Id*. In the Pinal AMA, the maximum depth is 1,100 feet, and for Adequate Water Supply purposes outside of AMAs, the depth is 1,200 feet. *Id*. This maximum depth restriction is a unique feature of Arizona water law, as it does not appear to have an equivalent anywhere else in the United States. The 100-year planning horizon is also among the most stringent in the nation. Monica Green & Anne Castle, *Assured Water Supply Laws in the Western States: The Current State of Play*, 28 Colo. Nat. Resources, Energy & Envtl. L. Rev. 67 (2017).

Emerging Challenges

As you might expect, after forty years of groundwater management under the Groundwater Code, some cracks in the regulatory framework are beginning to appear. One of the ways to avoid the Assured Water Supply requirements is for a landowner to develop property in a way that does not meet the definition of a subdivision, which is what happened with the Rio Verde Foothills community on the northeastern fringe of the Phoenix metropolitan area. By selling lots that were not subject to the Assured Water Supply program, developers in the area left homeowners to secure water for themselves. With long-term drought affecting availability of renewable CAP water supplies, and with limited access to groundwater in the Rio Verde Foothills area, many homeowners have been unable to secure sufficient water at affordable prices. A temporary solution was enacted by the Arizona Legislature, requiring the City of Scottsdale, Arizona, to provide water through a standpipe for a period of three years while a more permanent solution is developed. Gomez, Gloria Rebecca, *Rio Verde Foothills Water to Finally Be Restored*, AZMirror, June 19, 2023, www.azmirror.com/blog/rio-verde-foothills-water-to-finally-be-restored/, (last visited July 19, 2023).

Different, but equally significant, challenges appear to be on the horizon for landowners and water providers in the Lower Hassayampa Sub-basin of the Phoenix AMA. Around the same time that the Rio Verde issue became national news, ADWR released the results of a detailed groundwater modeling analysis which concluded that the Lower Hassayampa Sub-basin is over-allocated and that previous Analyses of Assured Water Supply likely reserved too much groundwater for proposed developments in the sub-basin. Because this sub-basin is largely undeveloped at this time, the impact of ADWR's conclusion will be felt more by developers than by current homeowners. This announcement was similar to one made by ADWR in 2021 pertaining to the Pinal AMA. And as has been significantly covered in the media more recently, ADWR and Governor Hobbs announced on June 1, 2023 that ADWR would no longer process assured water supply applications for new subdivisions anywhere in the Phoenix AMA that propose to rely on groundwater for their 100-year assured water supply.

The New Phoenix AMA Groundwater Model

The decision to stop processing new groundwater-reliant assured water supply applications in the Phoenix AMA is based on the results of a new groundwater model that covers most of the Phoenix AMA. ADWR used historical information to build and calibrate a model representing changes in the aquifer underlying the AMA over the period from pre-1900 to 2021. ADWR then extended the historical simulation until 2121 by estimating future pumping demands from groundwater uses previously approved under the Assured Water Supply Program and other uses expected to occur during the next 100 years.

According to ADWR, its 100-year projection indicates that by 2121 the demand for groundwater in the Phoenix AMA will exceed the "physically available" supply by four percent — resulting in "unmet demand" in several areas of the Phoenix Valley (Valley), particularly in the outer fringes of urban development. ADWR is taking the position that this "unmet demand" means that a 100-year supply of groundwater is not "physically available" for new development *anywhere* in the Phoenix AMA, except for developments for which ADWR has already issued a CAWS or that will be supplied by a municipal provider with a DAWS.

Because "physical availability" of groundwater for 100 years is one of the legal requirements for approving a CAWS, ADWR announced it will no longer grant CAWS to new subdivisions in the Phoenix AMA that propose to rely on groundwater. Moreover, at a public meeting on June 2, ADWR staff clarified that they will not honor any Analyses of Assured Water Supply that have been previously issued on the basis of physically available groundwater. Similarly, a DAWS modification to account for additional demands is unlikely to be approved where groundwater is proposed to supply any part of the additional demand.

AZ Groundwater

Model Variability

However, the lack of "physically available" groundwater is a legal concept that does not mean the aquifer is going dry. As noted above, Arizona law provides that groundwater at depths greater than 1,000 feet below ground surface is generally not considered physically available for the purpose of showing a 100-year assured water supply in the Phoenix AMA. *See* A.A.C. § R12-15-716. This is true even though, in some areas of the Phoenix AMA, the depth to bedrock is greater than 10,000 feet below ground surface, indicating that there may still be substantial volumes of groundwater available below 1,000 feet. Moreover, according to ADWR's presentation at the June 2 meeting, groundwater will remain available through the year 2121 in large areas of the AMA at depths of 101 to 250 feet, and between 250 and 1,000 feet in most of the rest of the AMA. ADWR, *Phoenix AMA Groundwater Model,* June 2, 2023, https://new.azwater.gov/sites/default/files/media/2023_06PhxAMA_Model_PublicMeeting_0.pdf

The areas where ADWR's model predicts that water will not be available at depths less than 1,000 feet are limited to a few locations on the outskirts of the Valley, where the depth to bedrock gets shallow as it approaches the surrounding mountains. *Id*. The possibility that groundwater may not be available in these locations 100 years from now does not mean that abundant groundwater will not be available elsewhere.

Potential Solutions to Groundwater Challenges

GROUNDWATER USE

Transportation Basins

It may be antithetical to try to solve a groundwater shortage with increased use of groundwater. Even so, there are at least some opportunities to mitigate the projected Phoenix AMA shortfall through the use of groundwater. First, Arizona has a number of groundwater transportation basins authorized in statute for the purpose of pumping groundwater and transporting it either through the Central Arizona Project canal, by pipeline, or other means, to one of the initial AMAs established by the 1980 Groundwater Code. One such transportation basin is the Harquahala INA, roughly 40 miles west of Phoenix, where landowners are currently working together and with the Arizona State Land Department and the Town of Queen Creek to get approval from ADWR for a unique project to help augment water supplies in Central Arizona.

Land Use Change

Another potential solution to mitigate groundwater overdraft is the conversion of irrigation grandfathered rights in AMAs to non-irrigation grandfathered rights, which happens as urban areas expand into agricultural areas. This is occurring rapidly in central Arizona, where industries are locating and using substantially less groundwater than was used to irrigate the acres now devoted to industrial production.

COLORADO RIVER/CAP WATER

CO River Shortage

Arizona water users are entitled to 2.8 **m**illion **a**cre-**f**eet (MAF) of water from the Colorado River. Boulder Canyon Project Act of 1928, as amended (43 U.S.C. § 617, et seq.); *Arizona v. California,* 373 U.S. 546, 575 (1963). Approximately 1.5 MAF of that water, in a normal year, is transported through the Central Arizona Project (CAP) canal for use in the three-county area that comprises the Central Arizona Water Conservation District: Maricopa, Pinal, and Pima Counties. CAP, 2020/2021 *Biennial Budget Executive Summary & Overview,* pg. 1-13, https://library.cap-az.com/documents/departments/finance/2020-21-Biennial-Budget-Executive-Summary.pdf (last visited July 19, 2023). At the present time, a shortage exists on the Colorado River that prevents Arizona from receiving its full allocation, and the full amount is unlikely to be available to mitigate groundwater supplies in central Arizona anytime in the near future. *See generally,* CAP, *Shortage Impacts,* www.cap-az.com/water/cap-system/planning-and-processes/shortage-impacts/ (last visited July 19, 2023).

LONG-TERM STORAGE CREDITS

Storage & Recovery

In some cases, water users can recover Colorado River water and treated wastewater that has been stored in the ground pursuant to permits authorizing the creation of Long-Term Storage Credits (LTSCs). This permit system was created by the Arizona Legislature in the 1990s to allow underground storage of then-underutilized water supplies to ensure the water would be available during future shortages. *See* A.R.S. § 45-801.01 *et seq.* In the past 30 years, Arizona has stored nearly three trillion gallons of water pursuant to this program. Three trillion gallons is equivalent to thirty years of the City of Phoenix's water demands. ADWR, *Water Your Facts: Arizona's Water Supplies,* www.arizonawaterfacts.com/water-your-facts (last visited July 16, 2023). These credits serve as a vital component of Arizona's diverse water supply, and they help ensure that Arizona will not run out of water.

AZ Groundwater

Recycling Water

Seasonality

Storage

RECLAIMED WATER

Arizona law defines reclaimed water as water that has been treated or processed by a wastewater treatment plant. *See* A.R.S. § 49-201(41). In practical terms, reclaimed water — sometimes referred to as "treated wastewater" or "effluent" — is water that has been used, treated, and used again. According to ADWR, reclaimed water makes up 5% of Arizona's water supply. *Id*. While this percentage is small relative to other sources, it is nevertheless important, and this importance will grow because reclaimed water is the one source of water that expands with increases in population.

SURFACE WATER

In-state surface water includes water from lakes, rivers, and streams that flow within the state's boundaries. This resource is considered renewable because it regenerates with the rain and snow that fall seasonally within the watersheds of Arizona's rivers and streams. As is typical in a semiarid climate, natural flow of this system is seasonal, with greatest flows expected during the late summer monsoon and spring runoff season and the lowest flows in mid-summer. Moreover, lengthy drought cycles interspersed with periods of relatively abundant precipitation are common in Arizona. To manage the highly variable flow of surface water, storage reservoirs and delivery systems have been constructed throughout the state. Most notable are the major reservoir storage systems on the Salt, Verde, Gila, and Agua Fria Rivers.

According to ADWR, in-state surface water makes up 18% of Arizona's water supply. *Id*. Availability of in-state surface water is highly dependent on location. For example, the City of Flagstaff relies on the flow of Walnut Creek, impounded in Upper Lake Mary, for a substantial portion of its municipal water supply. At the other end of the spectrum, agricultural operations in the upper Gila River valley utilize flow diverted from the Gila River. The Salt River Project (SRP) — which impounds and transports water from the Salt and Verde River watersheds to the Phoenix metro area — supports a very significant use of in-state surface water, but its availability is generally limited to those portions of the region that are within SRP's project boundaries. However, unlike the Phoenix metro area, Tucson has no appreciable source of in-state surface water and must rely entirely on other sources for its municipal supply.

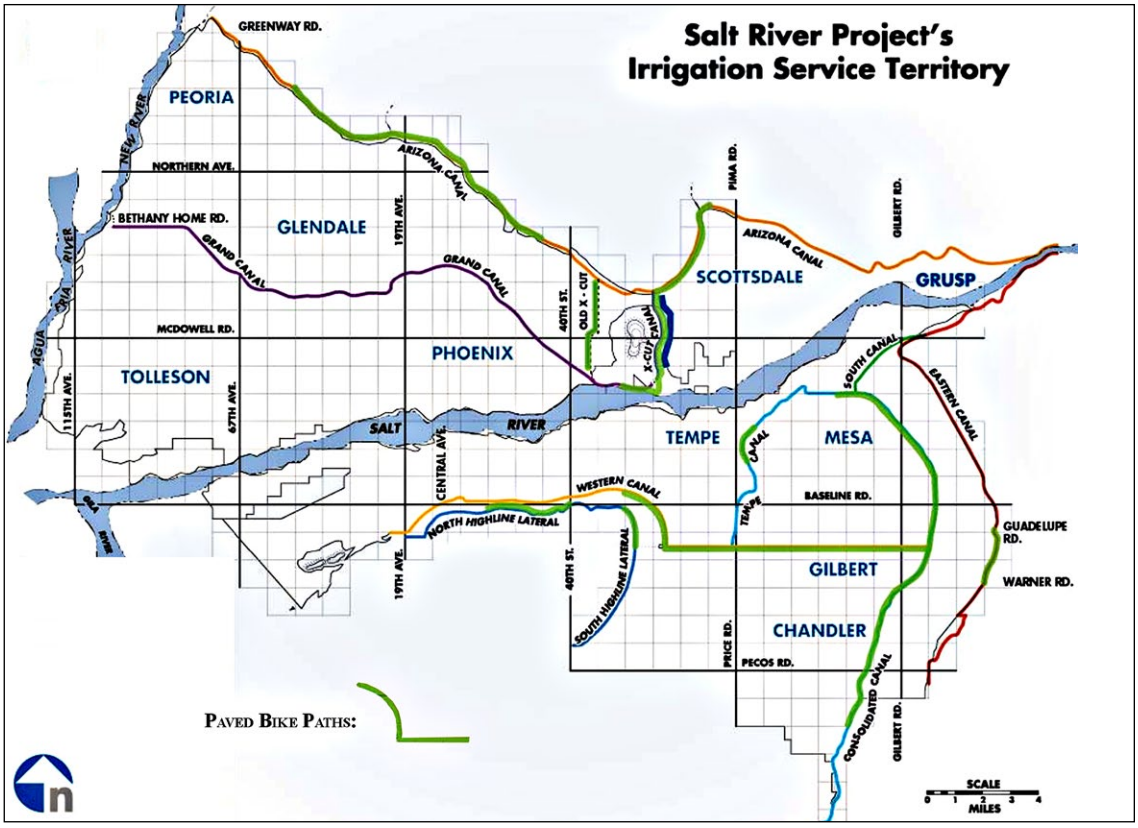

Figure 2.

EFFICIENCY & CONSERVATION

Using Arizona's available water supply more efficiently is a critical part of meeting our future needs. As noted previously, Arizona uses less water today than it did in the 1950s despite enormous population growth over the past six decades. The straightforward explanation for this counterintuitive fact is that we collectively use our available water supply much more efficiently than we once did.

AZ Groundwater

Efficient Irrigation

Native Vegetation

Per-Capita Use

Supply & Demand

Augmentation

Policy Change

Alternative Sources

A significant portion of this increased efficiency has resulted from urbanization of former agricultural lands in the Phoenix AMA. On average, urban water consumption is significantly less than agricultural water consumption on a per-acre basis. However, even lands that continue to be irrigated now use water much more efficiently. Water use technology in agriculture has evolved from flood irrigation of sloped fields, to laser-leveled fields, to sophisticated drip irrigation systems with soil moisture sensors and meteorological monitoring. As a result, while agriculture still uses approximately 70% of Arizona's water supply (down from 90%+ 50 years ago), it uses water much more efficiently than it once did.

Similarly, urban uses of water have become significantly more efficient over time. This is partly driven by conservation requirements imposed through the management plans adopted by ADWR to govern groundwater uses in AMAs. Visible manifestations of these requirements include significantly reduced use of grass lawns and other non-native landscaping in newer developments and in public rights-of-way. This and other conservation efforts have resulted in significant reductions in per-capita water use for most of the major cities in the Phoenix AMA over the past 30 years. In the City of Phoenix alone, per capita water use dropped approximately 29 percent between 1990 and 2019. *See* City of Phoenix, *Historical Populations & Water Use,* www.phoenix.gov/waterservices/resourcesconservation/yourwater/historicaluse (last visited July 19, 2023).

Another factor driving water use efficiency and conservation, across all water use sectors, is the increased cost of securing new, renewable, water supplies. The law of supply and demand indicates that as demand for water increases and supplies stay level or shrink, prices will go up. This is reflected in price increases for long-term storage credits, Type 2 non-irrigation grandfathered groundwater rights, and assured water supply extinguishment credits in the AMAs. A natural effect of increasing prices is a strong incentive to use water as efficiently as possible. Developers who must secure a CAWS, industries that require water for new facilities, and municipal providers looking to expand their future water supplies will ensure that the water they acquire will be used as efficiently as possible.

DESALINATED WATER

Arizona is also preparing to face the future by augmenting its supplies. In the 2022 legislative session, Arizona dedicated $1 billion to the Water Infrastructure Finance Authority over three years with the specific instruction to use these funds to augment Arizona's water supplies (although the legislature later diverted a portion of those funds for other water projects). One frequently discussed potential opportunity is to work with other states and Mexico on ocean desalination facilities to provide additional supplies to water users in Arizona and potentially throughout the Colorado River Basin. Locally, numerous parties are collaborating to evaluate the possibility of raising the height of Horseshoe Dam to enable greater impoundment and use of floodwaters from the Verde River. This water can augment supplies in parts of the Phoenix metropolitan area. These and other projects will contribute to Arizona's ability to meet the challenges ahead.

NEW POLICY DEVELOPMENT STRATEGIES

More controversially, policy changes could also mitigate perceived shortfalls in groundwater availability. As noted above, Arizona's aquifers collectively contain hundreds of millions of acre-feet of groundwater. With appropriate safeguards, more of this groundwater could be made available to meet short term, and even long term, needs. For example, the Assured Water Supply requirement that limits groundwater withdrawals to specified elevations in each AMA creates essentially arbitrary limits on use of groundwater in these basins, which policy makers could change to allow withdrawals to greater depths. This idea, however, has historically been very controversial and would be a tough sell to water regulators and managers who are successfully operating within current limitations. Perhaps more appealing might be new laws that could take new approaches to groundwater management, such as cap and trade markets that place a limit on total groundwater withdrawals and provide water users with shares that can be bought, sold, and traded.

Addressing the Paradox

The requirement that subdivision developers prove continuous, physical availability of water for one-hundred years in Arizona's AMAs forces development to occur within a box. Subdivisions can use water from a variety of sources in that box, but if one of the sources is not available, the developer must find another source. This has been the case since the Groundwater Code was adopted in 1980 and it is likely to continue being the case long into the future.

Arizona's outright ban on reliance on groundwater for new subdivision development in the Phoenix AMA may be a bit ham-fisted. There may be better ways to accomplish the same task without summarily denying the right of developers to try to prove up their CAWS with groundwater. However, ADWR certainly cannot approve an assured water supply based on groundwater if the developer cannot prove the groundwater will be continuously available for one-hundred years.

AZ Groundwater

Situation

Herein lie the answers to the paradox:

- The box was created by policy makers to impose limitations on the use of groundwater for subdivision developments.
- The new Phoenix AMA groundwater model shows that over the next 100 years there will be a modest shortfall (4%) in the amount of groundwater within the box to support new subdivision developments on groundwater alone.
- Groundwater supply levels within the box are variable — some areas will have a lot of groundwater in 100 years, some areas around the edges will have no groundwater in 100 years. There may even be a lot of groundwater available outside of the box, but on balance groundwater supplies in the box will be slightly over-drafted in 100 years unless additional measures are taken to conserve or augment groundwater supplies.

Solutions

- New subdivision development that has not already been approved can still occur using other sources from the box (renewable supplies).
- New industrial development can still occur within the service areas of Designated Water Providers (groundwater available within the box).
- New industrial development can still occur in areas of the Phoenix AMA where there are no Designated Water Providers if the development is located on former agricultural lands where Irrigation Grandfathered Rights are converted to Type 1 Non-Irrigation Grandfathered Rights, or if they use Type 2 Non-Irrigation Grandfathered Rights, or if they use renewable supplies.

Conclusion

Addressing Challenges

The Groundwater Code was passed in 1980 to address a serious problem caused by excessive groundwater pumping, but it was also intended as a critical tool for addressing future challenges as water demands increase over time for all sectors: agriculture, industrial, and residential. In effect, it was a solution to a potential future problem.

Today, we find that the Groundwater Code continues to meet the needs for Arizona's future even as new tools are developed and added to the box. As we face a future of current and potential water supply challenges, it will be critical to continue evaluating and adapting these tools to help us meet those challenges in ways that ensure the long-term prosperity of Arizona and its citizens.

For Additional Information:

Fred Breedlove, Snell & Wilmer, 480/ 452-4358 or fbreedlove@swlaw.com

Fred Breedlove is an attorney in Phoenix at Snell and Wilmer, LLP. Fred focuses his practice on water, public lands, and natural resources. His experience includes negotiation of groundwater, surface water, and Colorado River water rights contract and leases; obtaining permits from a variety of state and federal agencies relating to water, minerals, grazing, agriculture, and solar projects; governmental relations, and legislation. Fred has previously worked at the Arizona Senate, the Arizona Department of Water Resources, and the Arizona State Land Department.

William Staudenmaier has been practicing water and natural resources law in Arizona for more than 30 years. Bill specializes in acquiring and protecting water rights for industrial, agricultural, and municipal water users. He represents clients in general stream adjudications, tribal water right negotiations, transactions involving water rights, and securing water permits and authorizations from state and federal agencies.

John Burnside is a member of the Environmental & Natural Resources law group at Snell & Wilmer. Water is a key focus of John's broad-based environmental law practice, in which he covers both water rights and water quality. John regularly counsels and represents significant water interests in the State of Arizona. He has extensive experience litigating contested water rights claims in Arizona. John has in-depth experience litigating complex legal and technical issues addressing the relationship between groundwater and surface water in connection with water rights.

John Habib is an associate with Snell & Wilmer and 2021 graduate of Arizona State University Law School. Prior to law school, John received an undergraduate degree in Agricultural and Environmental Plant Science from California Polytechnic University.

Smart Irrigation

"CLIMATE SMART" IRRIGATION

ADDING IRRIGATION MODERNIZATION AS A "CLIMATE SMART" PRACTICE A CASE STUDY IN BUILDING A COORDINATED, WATERSHED-SCALE FUNDING SOLUTION

by Tim Wigington, Stephanie Tatge, Xia Vivian Zhou, Nick Osman & Danielle Dumont
The Freshwater Trust (Portland, OR)

Introduction

Improving Waterways

The United States has made significant progress towards restoring and improving water resources on some fronts since the passage of the Clean Water Act in 1972. However, despite the trillions of dollars invested over recent decades, more than half of America's waterways still do not meet water quality standards. On top of this, growing climate pressures are exacerbating flood, drought, and fire risks in almost every watershed. In short, we haven't achieved our goals, and it's getting harder to do so with each passing year.

Current Funding System — Not Delivering Results at Scale

Funding

Technology is now available to identify, target, and implement conservation actions at the scale necessary to secure resilient watersheds. The challenge has become how to quickly organize and deploy the trillions of new dollars available to produce the best environmental outcomes. In 2022, President Biden signed the Inflation Reduction Act (IRA) into law, just months after also enacting the Bipartisan Infrastructure Law (BIL). The tens of billions in new funding from both laws provide a significant opportunity to build critical natural-resource-related infrastructure and implement climate-smart agriculture initiatives on a national scale. However, adding new money is just the first half to getting better results.

Challenges

Currently, most funding from government programs is disbursed through process-heavy, technical, and lengthy project-by-project grant or loan programs. Many of these programs have "match" funding requirements that make it difficult for partners to leverage together multiple programs, even if they have similar objectives. The potential to use multiple programs to reinforce funding is also splintered, with each program focused on a sliver of the problem. On the project side, the long, uncertain, and costly application cycles associated with these programs often deter landowners with key lands and projects from participating. Because each program is structured differently and focuses on a different part of the problem, it is difficult to determine what environmental outcomes have been produced and how the outcomes add up compared to watershed needs.

Watershed-Scale Investment Solution — Proposed USDA Action

Quantifying Outcomes

The Freshwater Trust (TFT) proposes a solution that helps to reassemble these currently disparate efforts into a collective watershed-wide investment approach. With watershed analytics, agencies and practitioners can effectively quantify the "outcomes" of projects using measurements such as: gallons of water saved; tons of carbon sequestered; or pounds of excess nutrients avoided. These measurements make it possible to coordinate investment of otherwise splintered public funds toward priority projects in the watershed that produce outcomes most cost-effectively. *See* https://www.thefreshwatertrust.org/combining-technology-and-financial-tools-in-new-ways-to-solve-tough-water-problems/.

Multiple Benefits

For example, if one government funding program needs greenhouse gas emission reductions, another needs nutrient reductions, another needs water quantity savings, and a final program wants to support underserved rural community resilience, funding from all programs can be combined to support an irrigation modernization project because this type of project produces all those desired outcomes.

USDA Funding

Making it possible for multiple agencies to participate in this type of coordinated watershed funding approach will require some targeted policy changes. One of those specific changes — which is the focus of this article — relates to the IRA funding added to US Department of Agriculture (USDA) conservation programs. The IRA instructed USDA to prioritize $19 billion in new funding to "climate-smart" projects that directly improve soil carbon, reduce nitrogen losses, or sequester carbon dioxide (CO_2), methane (CH_4), or nitrous oxide (N_2O) emissions (collectively greenhouse gases, or GHGs). To be eligible for this priority IRA funding, projects must use one or more climate-smart conservation practices from the USDA Natural Resources Conservation Service's (NRCS) Climate-Smart Agriculture and Forestry Mitigation Activities List (CSAF List) (NRCS, 2023). *See* https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/climate/climate-smart-mitigation-activities.

Smart Irrigation

Solution

Definition

Emission Reductions

While the CSAF List includes many important practices, it does not currently include any related to irrigation modernization except for a small carveout limited to rice fields. Adding this practice class to the CSAF List has the potential to mobilize IRA funding to include a set of practices that *simultaneously* reduce GHG emissions, improve water quality, and support Western farmers' and water managers' initiatives to sustain their operations through long-term drought. This addition alone will not solve watershed-scale funding and implementation challenges, but it will be a big step forward in terms of broadening the potential for IRA funds to deliver impact in the Western United States. This article summarizes the technical case for adding this group of irrigation modernization practices to the CSAF List, and potentially offers a template for making similar cases to NRCS to add additional multi-benefit practices to the CSAF List.

The Case for Adding Irrigation Modernization to the Climate-Smart List

TFT defines "irrigation modernization" as the *improvement of water use efficiency via pressurization of irrigation systems on currently irrigated agricultural lands,* through the adoption of NRCS practices for irrigation pipeline (430), microirrigation systems (441), sprinkler systems (442), and irrigation water management (449) (NRCS, 2020a, 2020b, 2020c, 2021). This definition does not include irrigating previously non-irrigated lands, changing water management practices while maintaining unpressurized (flood) irrigation systems, or installing an unpressurized subirrigation system. Irrigation modernization does include converting unpressurized irrigation to pressurized sprinkler or microirrigation, as well as upgrading already pressurized systems from sprinklers to microirrigation.

This article lays out the strong evidence showing how irrigation modernization practices can reduce N_2O and CH_4 emissions similar to practices already on the CSAF List. As seen in Figure 1, just under half (49%) of agriculture's GHG emissions in 2018 were N_2O and CH_4 emissions from cropland soils and grazing lands (United States Department of Agriculture et al., 2022). Analysis by TFT details the scientifically robust, existing methods available to quantify the GHG emission reduction benefits generated by these irrigation modernization practices, utilizing some of the same methods that support practices already on the CSAF List. The analysis also demonstrates how irrigation modernization facilitates other climate-smart practices.

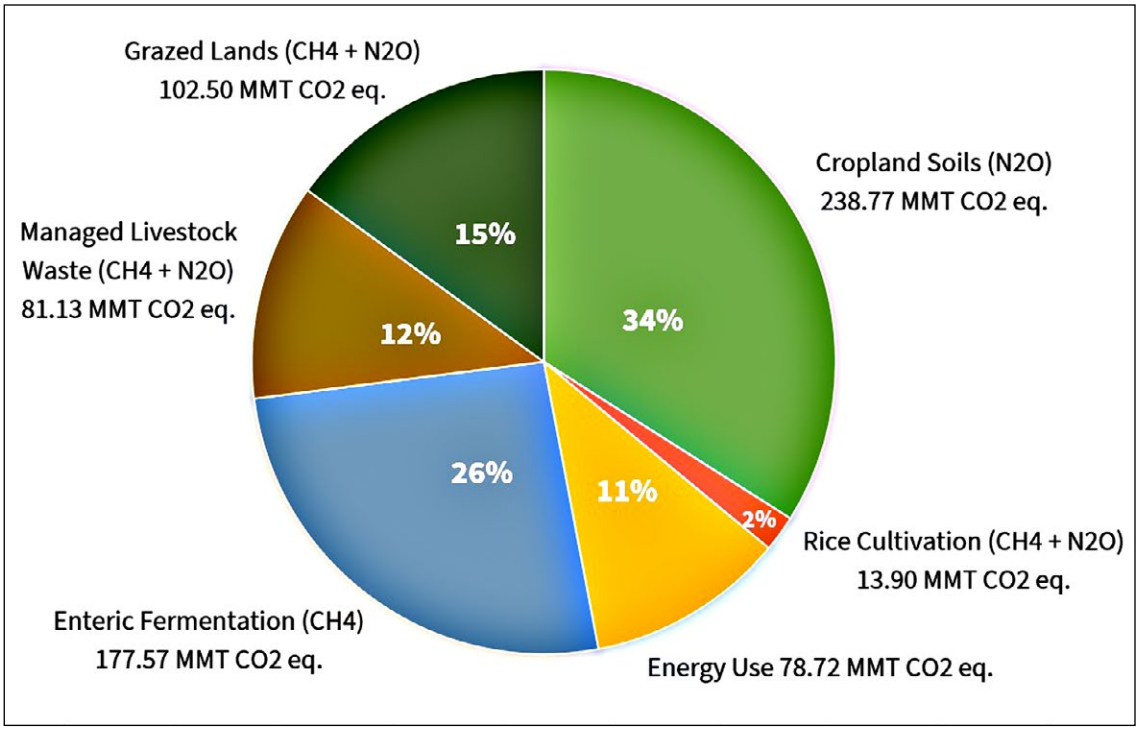

Figure 1. Agricultural sources of greenhouse gas in 2018. MMT CO2 eq. means million metric tons of carbon dioxide equivalent. Adapted from US Agriculture and Forestry Greenhouse Gas Inventory 1990-2018: Technical Bulletin 1957 (USDA et al., 2022).

Smart Irrigation

Adding irrigation modernization practices will provide NRCS, communities, and partners with another pathway to secure meaningful GHG emission reductions while also supporting producers as they navigate unprecedented water scarcity challenges driven by climate change. This opportunity is greatest in the Western states, where 71% of our nation's irrigated agricultural lands are located. Nationwide, at least one-third of irrigated agricultural lands still use unpressurized irrigation methods (McGee, 2016), so adding this practice could be utilized by a lot of producers.

Flood Irrigation

Flood irrigators can benefit from practices already on the CSAF List. Practices that could reduce GHG emissions or sequester carbon in flood irrigated acres include: Field Borders (386); Nutrient Management (590); Pasture and Hay Planting (512); and Range Planting (550). Adding irrigation modernization to the CSAF List is not intended to imply that flood irrigators should choose irrigation modernization over the other practices on the CSAF List. Rather, this analysis is meant to illustrate that converting gravity systems to pressurized pipe systems can also quantifiably decrease GHG emissions.

Multiple Factors

TFT recognizes that GHG reduction benefits are just one of many factors that need to be considered when making water management decisions. Other factors that need to be considered in addition to GHG benefits include crop yield, affordability, practicality, other benefits to the environment, and the economic bottom line. Accordingly, irrigation modernization practices should be included as options in the CSAF toolkit in addition to those already available.

Modelling Conservation Practice Impacts

Practices

The USDA report *Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory (Methods for Entity-Scale Inventory)* provides the scientific foundation for the NRCS conservation practices included on the CSAF List (Eve et al., 2014). The CSAF List states that "listed practices have quantifiable carbon sequestration and/or GHG reduction methodologies described in COMET-Planner." NRCS Conservation Practices and GHG quantification methods used in the COMET-Planner modeling tool are closely aligned with those identified in the USDA's *Methods for Entity-Scale Inventory.* In the 2014 report, USDA: (a) designates irrigation as one of ten "management practices impacting GHG emissions from croplands and grazing lands;" (b) outlines evidence in the literature for reductions in soil emissions resulting from irrigation modernization (described below); and (c) provides scientifically defensible methods for the quantification of changes in N_2O and CH_4 with implementation of irrigation and water management practices.

Quantifying Benefits

Unfortunately, the 2014 USDA report did not explicitly include any GHG quantification methods for irrigation modernization practices on croplands or grazing lands. In recent years, quantification methods have been developed for irrigation modernization to fill this gap, particularly the Daily Century (DayCent) and Denitrification-Decomposition (DNDC) models. These methods provide scientifically defensible options for quantifying changes in emissions from irrigation modernization and have been used in multiple studies to evaluate changes in N_2O and CH_4 emissions (described below). With these advances, it's now possible to close the loop, and fully quantify the GHG-related benefits from irrigation modernization.

The CSAF List also states that "conservation practices that facilitate the management or the function of a CSAF mitigation activity but may not achieve the desired effects on their own (and may not have a quantifiable benefit) may be planned as applicable." These practices can be supported by NRCS through Climate-Smart programs when they are implemented in conjunction with CSAF mitigation activities. While Conservation Practices 430, 441, 442, and 449 have their own GHG reduction benefits to support inclusion on the CSAF List as stand-alone practices, they also qualify as significant "facilitating practices" for multiple, currently listed CSAF mitigation activities, including nitrogen management and reduced tillage (described below).

Evidence of Lower GHG Emissions from Irrigation Modernization

Flood Irrigation

Unpressurized irrigation methods use a significant volume of water that is applied to an entire field every few days. This practice results in greater losses to seepage below the root zone compared to pressurized sprinkler and microirrigation systems (Ross et al., 1997). Pressurized, more frequent, and targeted irrigation systems reduce GHG emissions through more consistent and direct watering of crop roots. This approach moderates the two major processes that drive GHG emissions in unpressurized systems: (1) soil wetting and drying cycles that increase N_2O emissions; and (2) soil anoxic conditions that increase CH_4 emissions. Pressurized and managed irrigation systems also improve uptake of nitrogen by plants (further reducing N_2O) and decrease nitrogen runoff and leaching that cause indirect N_2O emissions.

Smart Irrigation

Irrigation Impacts

USDA's 2014 *Methods for Entity-Scale Inventory* summarizes research and science that drive GHG emissions under various forms of irrigation. USDA provides reasoning and evidence for higher N_2O (and in some cases CH_4) emissions in unpressurized systems compared to pressurized systems. Pressurized systems are used to apply lower volumes of water more consistently to root zones.

Key statements from *Methods for Entity-Scale Inventory* (beginning on p. 3-19) include:

Unpressurized flood: "Flood irrigation involves flooding the entire field with water. Under continuously flooded conditions, soils are highly anoxic, thus facilitating high methanogenesis and denitrification rates (Mosier et al., 2006)."

Unpressurized furrow: "The impact of furrow irrigation on GHG emissions depends on how often and the extent to which furrows are filled with water. Wetting and drying cycles are likely to emit large pulses of NO and N_2O (Davidson, 1992)."

Pressurized sprinkler: "During and shortly after [sprinkler] irrigation events, soil may become saturated and emit pulses of N_2O, but because the soil is not continuously saturated, N_2O emissions are expected to be lower compared with surface [furrow] irrigation (Nelson & Terry, 1996)."

Pressurized surface drip: "The impacts of surface drip irrigation on GHG fluxes are expected to be similar to those of sprinkler systems, ...there is early evidence that both surface and subsurface drip irrigation leads to less emissions of CH_4 and N_2O (Kallenbach et al., 2010; Kennedy et al., 2013)."

Pressurized subsurface drip: "Soil water content has less temporal variation with subsurface drip irrigation compared with sprinkler and surface systems, so pulses of N_2O...emissions are also expected to be of smaller magnitude (Kallenbach et al., 2010). Similarly, subsurface drip irrigation/fertigation [i.e., the application of fertilizer solutions via irrigation] of high-value crops, such as tomatoes, has been shown to reduce N_2O emissions compared with furrow irrigation (Kennedy et al., 2013)."

NITROUS OXIDE IRRIGATION EMISSIONS & RESEARCH

Evidence

In addition to the USDA report, TFT gathered independent evidence on N_2O emissions and irrigation practices. For example, Sapkota et al. (2020) reviewed empirical field studies related to irrigation modernization and GHG emissions in a meta-analysis. They concluded that: (1) in arid regions, high-intensity irrigation methods (defined as high volume and more intermittent applications) showed the greatest N_2O production; and (2) the maximum N_2O flux from unpressurized irrigated fields was higher than the maximum on pressurized irrigated fields.

Studies

One caveat to this meta-analysis is that it was difficult to isolate the impacts of irrigation modernization from changes to fertilizer application, cover cropping, and tillage practices — which often varied between the studies' treatments. Therefore, TFT isolated the studies reviewed by USDA and Sapkota that align with the irrigation modernization practices that were excluded from the CSAF List. These studies and their results are summarized in Table 1 (see below) along with additional relevant studies not included in their review.

Results

The field study results summarized in Table 1 consistently show reduced N_2O emissions from high-efficiency pressurized irrigation systems when compared to unpressurized systems. The most relevant studies show where irrigation was varied on non-rice crops grown in arid or semi-arid regions of the US, including hay and alfalfa in southern California (Andrews et al., 2022); cotton in Arizona (Bronson et al., 2018), and tomatoes grown in northern California (Kennedy et al., 2013) and California's Central Valley (Kallenbach et al., 2010). In each case, N_2O emissions were 25% to 75% lower in the pressurized systems when compared to unpressurized systems. Similar results were found in studies of cropping systems in arid and semi-arid regions outside the US, including in Spain and northern China.

Irrigation Types

Most studies compared unpressurized systems to high-efficiency systems. TFT found only three studies that compared N_2O emissions between unpressurized and sprinkler systems. Of these three, Fangueiro et al. (2017) saw 40% lower N_2O emissions on sprinkler irrigation fields relative to flooding. The other two studies saw no significant difference in N_2O from sprinklers relative to unpressurized methods (Bronson et al., 2018; Wang et al., 2016). While sprinkler irrigation conversions were less conclusive with respect to N_2O reductions, this practice does provide other GHG reduction benefits as outlined in the CH_4 subsection below.

Smart Irrigation

Reference	Location	Crops	Irrigation Scenario	N2O reduction or flux
Bronson et al., 2018	Arizona	Cotton	Furrow	Efficiency factor* (EF) < 0.5%
			Sprinkler	EF < 1.1%
			Subsurface drip	EF < 0.1%
Andrews et al., 2022	Southern California	Alfalfa	Furrow	Baseline
			Drip	Reduction by 38%
		Sudangrass	Furrow	Baseline
			Subsurface drip	Reduction by 59%
Kennedy et al., 2013	Northern California	Tomato	Furrow	2.01±0.19 kg N2O-N/ha
			Drip	0.58±0.06 kg N2O-N/ha
Kallenbach et al., 2010	California Central Valley	Tomato	Furrow	0.02 kg N2O-N/ha/d
			Subsurface drip	0.005 kg N2O-N/ha/d
Wu et al., 2014	Xinjiang, China	Cotton	Furrow	1.71 kg/ha
			Drip	1.09 kg/ha
Sanchez-Martin et al., 2010	Spain	Melon	Furrow	Baseline
			Drip	Reduction by 75% and 28%
Maris et al., 2015	Spain	Olive	Drip	0.07 kg/ha
			Subsurface drip	0.02 kg/ha
Fangueiro et al., 2017	Southwest Spain	Rice	Flood	Baseline
			Sprinkler	Reduction by 40%
Wang et al., 2016	North China	Winter wheat	Flood	Baseline
			Sprinkler	Insignificant change
			Drip	Reduction by 14.6%
Ye et al., 2020	Shenyang, China	Tomato	Flood	25.33 ± 3.94 kg N/ha
			Mulched drip	23.87 ± 2.23 kg N/ha
			Drip filtration	10.04 ± 1.05 kg N/ha

Table 1 Literature review of N2O flux from irrigation modernization. All references were field experiments. Units are as follows: kg N2O-N/ha = kilograms of Nitrous oxide per hectare; kg N2O-N/ha/d = kilograms of Nitrous oxide per hectare per day; kg/ha = kilograms per hectare; kg N/ha = kilograms of Nitrogen per hectare.

* Efficiency factor (EF) is the percentage of applied nitrogen fertilizer emitted as N_2O and can therefore be used to standardize application rates. Since the application rates varied under the treatments, it's likely that the modernized irrigation systems produced lower absolute N_2O emissions than the furrow baseline, but these values were not provided in the study.

Saturation Variations

METHANE IRRIGATION EMISSIONS & RESEARCH

Irrigation management systems affect oxygen availability in soil, and methanogenic microbes are most competitive in anoxic conditions; therefore, irrigation efficiency is well correlated to methane emission reductions (Nguyen et al., 2015). Flood irrigation systems saturate soils deeply and lower soil oxygen levels, causing anaerobic conditions that favor methanogens (Eagle & Olander, 2012) and ultimately produce CH_4 emissions (Eve et al., 2014; Nelson & Terry, 1996). Pressurized systems irrigate more precisely and uniformly distribute water to root zones, which can interrupt anerobic microbial processes such as methanogenesis. High-efficiency systems lead to even fewer emissions of CH_4 than sprinkler and surface irrigations because drip irrigation reduces evaporative loss and avoids full saturation of soil pores (Del Grosso et al., 2000; Kallenbach et al., 2010; Kennedy et al., 2013).

Results

Table 2 summarizes multiple published studies that showed methane reductions from irrigation modernization on agricultural fields without negative yield effects (Nie et al., 2023; Sapkota et al., 2020; Zschornack et al., 2016). A three-year rice study in southwest Spain found that sprinkler irrigation decreased CH_4 emission by 99% relative to flood irrigation (Fangueiro et al., 2017). A winter wheat study in a semi-arid region of northern China showed that CH_4 uptake in high-efficiency irrigation systems increased more than 20% compared to flood irrigation fields due to the lower frequency wetting/drying cycles, lower soil moisture, improved oxygen diffusion, and increased CH_4 oxidation (Wang et al., 2016). It is hypothesized in the literature that under the aerobic soil conditions common in modernized irrigation methods, a high redox potential prevents the formation of CH_4, or permits its oxidation by methanotrophic bacteria (Aulakh et al., 2001).

Smart Irrigation

Reference	Location	Crops	Irrigation Scenario	CH4 Flux
Wang et al., 2016	North China	Winter wheat	Flood	40.19±2.61 (ug m 2 h 1)
			Sprinkler	37.63±2.30 (ug m 2 h 1)
			Surface drip	49.41±1.46 (ug m 2 h 1)
Maris et al., 2015	Spain	Olive	Surface drip	-48 kg/ha
			Subsurface drip	-63 kg/ha
Wu et al., 2014	Xinjiang, China	Cotton	Furrow	-3 kg/ha
			Surface drip	-9 kg/ha
Ye et al., 2020	Shenyang, China	Tomato	Flood	0.71 ± 0.11 kg C/ha
			Mulched drip	0.93 ± 0.20 kg C/ha
			Drip filtration	1.98 ± 0.34 kg C/ha
Fangueiro et al., 2017	Spain	Rice	Flood	Baseline
			Sprinkler	Reduction by 99%

Table 2 Literature review of CH4 flux from irrigation modernization. All references were field experiments. Units: ug m 2 h 1= micrograms per square meter per hour

GHG Quantification Methods for Irrigation Modernization

Models

Two biogeochemical models — **Den**itrification-**Dec**omposition (DNDC) and Daily Century (DayCent) — are the most widely used models to quantify GHG emissions from agricultural soils (Institute for Study of Earth, Oceans and Space, 2012; Li et al., 2005; Parton et al., 2001; Wang et al., 2021). Both DNDC and DayCent are simulation tools to predict soil fluxes of N_2O, CH_4, and CO_2 with various farm management practices, such as irrigation, cropping, tillage, fertilization, and grazing (Del Grosso et al., 2000; Deng et al., 2018, 2020; Institute for Study of Earth, Oceans and Space, 2012; Necpálová et al., 2015; Parton et al., 2001).

Results

Previous studies have used the DNDC model to evaluate the impacts of conversion from unpressurized to pressurized irrigation on N_2O and CH_4 emissions, which are summarized in Table 3. A study using the DNDC model simulated cropping systems in California from 2001 to 2010 found that drip irrigation is predicted to reduce N_2O emissions by 55-67% relative to unpressurized irrigation (Deng et al., 2018). In another study, the DNDC model was used to simulate soil fluxes for cropland in California's San Joaquin Valley from 2011 to 2013, and the results indicate that sprinkler, surface drip, and subsurface drip irrigation systems are predicted to decrease N_2O emission by 29%, 58%, and 78%, respectively, relative to unpressurized irrigation (Guo et al., 2020).

Outside the US, the DNDC model has been used to assess effects of irrigation modernization on soil fluxes in China, including a study for vineyards in Ningxia that indicated drip irrigation is predicted to reduce N_2O emission by 72.5% in 2012 and by 52.4% in 2013, relative to unpressurized irrigation (Zhang et al., 2016). DNDC model simulations for cucumber and tomato production in Beijing, China during 2017 and 2018 indicate that drip irrigation is predicted to reduce N_2O emissions by 31.7%, relative to unpressurized irrigation (Huadong et al., 2022).

Reference	Location	Crops	Irrigation Scenario	N2O Flux
Deng et al., 2018	California	Varying cropping systems	Unpressurized	Baseline
			Sprinkler	Reduction by 37%
			Drip	Reduction by 55%
			Subsurface drip	Reduction by 67%
Guo et al., 2020	San Joaquin Valley, California	Cropland, grassland, urban turf, and forest	Flood	9,688 t
			Sprinkler	6,837 t
			Surface drip	4,030 t
			Subsurface drip	2,093 t
Zhang et al., 2016	Ningxia, China	Vineyards	Furrow	Baseline
			Drip	Reduction by 72.5% and 52.4%
Huadong et al., 2022	Beijing, China	Cucumber, tomato	Flood	Baseline
			Drip	Reduction by 31.7%

Table 3 Summary of studies using the DNDC model to evaluate the impacts of conversion from unpressurized to pressurized irrigation on N2O and CH4 emissions.

Inputs

DayCent does not use specific irrigation types as inputs, such as flood, sprinkler, and drip, but it does allow other relevant inputs that approximate irrigation modernization, such as irrigation intensity (low, medium, or high), volume, frequency, and timing (Olander et al., 2011). DayCent has been used widely for simulating N_2O emissions from agricultural soils from various irrigation, cropping systems, and fertilization (Del Grosso et al., 2005; Eve et al., 2014).

Smart Irrigation

Accuracy

Recent research calibrated and validated both DayCent and DNDC models using measured data from a turfgrass field experiment with medium and low irrigation in Kansas (Hong et al., 2023). The study concluded that DayCent model results were accurate ranging from -54% to 14% and therefore *adequately* estimated N_2O emission reductions from soils with low and medium irrigation and N-fertilization treatments, while DNDC model results ranged from -24% to -85% and therefore *underestimated* N_2O emission reductions from the tested practices (Hong et al., 2023). This underestimation by DNDC could be addressed by incorporating empirical data into quantification methods for irrigation modernization.

Empirical Data

The DayCent or DNDC methods can be used at the farm or regional scale throughout the US to simulate irrigation modernization practices. Irrigation method, application, and frequency are key inputs to both models, which account for changes in soil microbial activity and plant growth rates that impact net GHG flux. These process-based models facilitate scaling and account for spatial heterogeneity at the farm scale, while available empirical data can be used to quantify and address model uncertainty. Where field-based measurement validation is lacking for the N_2O and CH_4 estimates from process-based models, empirical data are available (or can be gathered) to produce "emissions factors" for simpler or more accurate quantification methods.

Quantification Methods

The 2014 USDA *Methods for Entity-Scale Inventory* already describe DNDC and DayCent as quantification methods for multiple practices included on the CSAF List (including forms of irrigation and water management). These existing quantification frameworks used in COMET-Planner can also be applied to irrigation modernization practices. Table 4 describes how quantification methods used for other CSAF Listed management practices — particularly those that involve irrigation or water management — can be easily adapted or applied to irrigation modernization.

GHG & source	CSAF Listed practice(s)	Quantification methods overview (from USDA *Methods for Entity-Scale Inventory* Table ES-2)	Application of methods to quantifying GHG emissions associated with irrigation modernization practices (not currently CSAF Listed)
Direct N2O emissions from mineral soils	Tillage and nitrogen application	DayCent and DNDC are used to derive expected base emission rates which are scaled with practice based scaling factors to estimate the influence of management changes. Scaling factors are derived from experimental data.	This method is directly applicable for quantifying changes in N2O and CH4 resulting from irrigation modernization on crop/grazing lands. DayCent and DNDC use irrigation methods, application rate, and frequency as inputs. DNDC allows the user to specific irrigation equipment, while DayCent does not.
Soil organic carbon stocks for mineral soils	Irrigation effects on decomposition in cropland and grazing land	DayCent model is used to estimate soil organic carbon at the beginning and end of the year for mineral soils. The stocks are entered into IPCC equations to estimate carbon stock changes.	DayCent uses irrigation method, application rate, and timing as inputs and can be used for evaluation of N2O flux, as it is for CO2 flux here.
Soil organic carbon stocks, N2O and CH4 emissions in wetlands	Water management	DNDC process based biogeochemical model is used for estimating N2O and CH4 emissions from wetlands; hence, no emissions factors are used in this method.	Although applied for wetland practices here, this method is directly applicable for quantifying changes in N2O and CH4 resulting from irrigation modernization on crop/grazing lands. DNDC uses irrigation methods, application rate, and frequency as inputs; therefore, changes to irrigation practices associated with modernization can be simulated.
CH4 & N2O emissions from rice cultivation	Cultivation period flooding regime; time since last flooding	A basic estimation equation (cf., IPCC Tier 1) is used to estimate CH4, and an inference (cf., IPCC Tier 2) method is used for N2O emissions from flooded rice production	USDA states the DayCent or DNDC model was not used because it has been evaluated for rice cultivation in Asia but not in the US where rice cultivation differs significantly. They also state that these models will likely be adopted for this quantification method in the future when additional testing has occurred. Differences in cultivation between US and Asia is not as much of a factor for non-rice crops.

Table 4 Demonstration of how the USDA GHG quantification methods developed for other practices can be applied to irrigation modernization practices, as defined in this document. The first three columns summarize information on currently listed CSAF activities and GHG quantification methods in Table ES-2 in the USDA's *Methods for Entity-Scale Inventory Quantification*; the fourth column describes how these methods can be applied or adapted for quantifying changes in GHG emissions associated with irrigation modernization.

How Irrigation Modernization Facilitates Climate-Smart Activities

The CSAF List includes the following direction: "In addition to the designated CSAF mitigation activities listed, conservation practices that facilitate the management or the function of a CSAF mitigation activity but may not achieve the desired effects on their own (and may not have a quantifiable

Smart Irrigation

Fertilizer Management

Efficient Irrigation

Soil Health

Flood Irrigation Benefits

Impact

benefit) may be planned as applicable." The sections above demonstrate that irrigation modernization does "achieve the desired effects" on its own, and clearly has substantial quantifiable benefits. In addition, irrigation modernization has also been shown to facilitate other CSAF mitigation activities.

For example, in the *Methods for Entity-Scale Inventory,* USDA states that "optimizing other practices — including tillage and the management of soil pH, pests, irrigation, drainage, and other factors — will tend to increase nitrogen fertilizer uptake by the crop and therefore reduce N_2O emissions." (Chapter 3.2.1.2; page 3-16). Indeed, fertilizer management is a suite of agricultural practices that strongly control soil mineral nitrogen availability for the nitrification and denitrification process in which N_2O emissions are produced in soils (Abbasi & Adams, 2000). N_2O emission is positively correlated with nitrogen fertilizer application rates, which in turn are affected by irrigation efficiency and the potential for fertigation (Akiyama et al., 2004).

A recent paper analyzed the extent to which the adoption of efficient irrigation practices mediated the adoption of climate-smart soil health practices in diverse cropping systems in California. The analysis demonstrated that pressurized irrigation systems are an especially important farm operation characteristic for the adoption of many nitrogen management and soil health practices (Rudnick et al., 2021). This is particularly relevant to the CSAF List because almost half of the eligible practices (14 out of 32 non-provisional practices) fall under the categories of soil health or nitrogen management.

This relationship is further exemplified by a University of Colorado Boulder report that claims irrigation modernization provides Colorado farmers with the ability to adopt zero tillage and reduced tillage practices. They state that sprinkler and microirrigation systems do not compact the soil like many flood irrigation systems and, therefore, "expand options for zero-tillage and safeguard soil health" (UC Boulder, 2020). This means that adding irrigation modernization to the CSAF List of eligible practices is likely to facilitate the adoption of additional CSAF-eligible practices by the same producer, multiplying GHG-emission reduction benefits while investing in a producer's operation and creating other co-benefits including water quality improvement and soil health.

While flood irrigation may lead to GHG emissions, it may provide other benefits in some cases, such as wildlife habitat, ecosystem function, hydrologic benefits such as aquifer recharge or stream baseflow, and other societal benefits. Alternative CSAF practices can be adopted to maintain those benefits while investing in the enhancement of an operation. Ranchers and farmers will be the experts on their own operations and will need to carefully consider all these elements when making specific implementation choices.

Conclusion

The upcoming strategic investment of Farm Bill funds through the IRA represents an unprecedented opportunity to increase the pace and scale of conservation investment and to enable multiple funders to leverage their investments together more easily at the watershed scale. Adding irrigation modernization practices to the CSAF List will help secure GHG reduction benefits, while also positioning many rural communities for long-term water resilience from the impacts of climate change, enhancing domestic food supply, and supporting a healthy environment for the future. These practices not only help address the causes of climate change but can also be implemented in a way that helps mitigate the severe water-related impacts being experienced in the Western United States.

For Additional Information:

Tim Wigington, Vice President of Finance & Policy at The Freshwater Trust, 503/ 222-9091 or tim@thefreshwatertrust.org

The Freshwater Trust, protects and restores freshwater ecosystems using science, technology, and incentive-based solutions. The 40-year-old nonprofit is the largest restoration-focused organization in the Pacific Northwest and the second largest conservation group based in Oregon. The Freshwater Trust has pioneered a "Quantified Conservation" approach using data and technology to ensure every restoration action taken translates to a positive outcome.

Tim Wigington is the Vice President of Finance & Policy at The Freshwater Trust.
Stephanie Tatge is an Agroecologist at The Freshwater Trust.
Xia Vivian Zhou is an Agricultural Economics Analyst at The Freshwater Trust.
Nick Osman is the Conservation & Innovation Director at The Freshwater Trust.
Danielle Dumont is the Program Communications Manager at The Freshwater Trust.

WA Adjudications

ADJUDICATIONS IN WASHINGTON STATE

LEGAL FRAMEWORK – PAST ACTIONS – CURRENT EFFORTS - FUTURE PLANS

by Jessica Kuchan, Confluence Law (Seattle, WA); Jenna Mandell-Rice, Van Ness Feldman LLP (Seattle, WA); & Hayley Ventoza, Tupper Mack Wells, PLLC (Seattle, WA)

Introduction

In several areas of Washington State water has been "over appropriated" — meaning the water rights issued for a given stream exceed the quantity of water actually available. In addition to increased demand for water from an expanding population, climate change is affecting both the amount of water available for use and the times during the year water is available. As water demand increases and water availability decreases, the potential for conflict over water resources rises. Under the current law, one method for resolving conflicts comes in the form of a water rights adjudication.

Resolving Conflicts

In anticipation of the themes to be explored in this year's upcoming Washington Chapter of the American Water Resources Association (WA-AWRA) Annual Conference (September 28, Seattle), this article provides an overview of adjudications in Washington State and efforts to find collaborative solutions to address complex water resource management issues.

Background

In Washington State, water is a public resource that is held for the common good and subject to regulatory control. Water is not subject to private ownership. Instead, the State issues permits for water and regulates its use.

Washington State water law is historically based on the doctrine of prior appropriation ("first in time, first in right") which means that a "senior" water right holder has the right to divert or withdraw the maximum amount allowed under their water right, even if their withdrawal leaves no water available to a "junior" water right holder — i.e., the holder of a right established later in time.

Legal Framework

Prior to 1917, water rights were established according to common law and legislation. In 1917, Washington enacted the State's Water Code, adopting a formal permitting system for surface water rights (RCW 90.03.). Since 1917, the use of surface water has required a permit from the State. In 1945, Washington enacted the groundwater code, requiring permitting for the withdrawal of groundwater (RCW 90.44.). Since 1945, the use of groundwater has required a permit from the State, except for limited permit-exempt uses, including domestic withdrawals of up to 5,000 gallons per day (RCW 90.44.050.). The Washington Legislature has also required all holders of pre-existing groundwater (1945) and surface water (1917) rights to file claims, which the Washington State Department of Ecology (Ecology) maintains in a pre-code claim registry.

Instream Flows

Under the Washington Water Code, Ecology may establish, through an administrative rule, an instream flow to protect streams for fish and wildlife, recreation, navigation, and aesthetics. An instream flow is a specific volume of water that is needed to support instream uses. Instream flows are treated as water rights with a priority date as of the effective date of the regulation and thus act as a limitation on future water rights (RCW 90.03.345.). A future (more junior) water right may not impair the instream flow water right.

Adjudication Statutory Authorization and Requirements

Ownership

Under Washington law, a general water right adjudication is a form of "quiet title action" (i.e. an action to clarify ownership and "quiet" any objections). A general water right adjudication is authorized by statute to determine all rights to the use of water from a specific body of water (*In re Marshall Lake,* 121 Wn.2d 459 467, 852 P.2d 1044, 1048 (1993); *In re Yakima River Drainage Basin,* 121 Wn.2d 257, 850 P.2d 1306 (1993)). In the 1917 Water Code, the Legislature included standards for the issuance and adjudication of water rights. The Legislature provided the Washington Superior Courts with jurisdiction to adjudicate the validity and priority date of water rights, including those established before the statute was adopted. The statute has been periodically updated, most substantially in 2009.

Ecology may initiate an adjudication if it determines: the "public interest will be served by a determination of the rights thereto;" or in response to a petition by one or more persons claiming the right to use water; or by the filing of a petition by a planning unit for the watershed with Ecology (RCW 90.03.110(1)).

WA Adjudications

Water Right Claims

To initiate a water rights adjudication, Ecology must prepare and file a statement of facts — including a plan or map — in the Superior Court in the county in which the water is situated, or if there are multiple counties, in the county most convenient to the parties interested therein (RCW 90.03.110(1)). Following the filing of the statement and map, a Superior Court judge must direct a summons to be issued according to state law to all claimants to water rights in the subject area (RCW 90.03.120.). The summons must state the object and purpose of the proceeding and state when defendants (i.e., water users) are required to make and file an adjudication claim to water rights. A water user will have to submit its water right claims to the Superior Court by the filing deadline. All claims to the right to use water from a specific water source are joined in one Superior Court proceeding.

Federal Participation

Under the federal McCarran Amendment (43 U.S.C. § 666), the United States waives its federal sovereign immunity for its joinder (i.e., participation in the case) as a defendant in general stream adjudications. The waiver of sovereign immunity only applies if the adjudication is a comprehensive general stream adjudication in which the rights of all competing claimants are joined (*United States v. Dist. Ct. for Eagle County,* 401 U.S. 520, 523 (1971)). This joinder includes the United States as a trustee for tribes and other federally reserved water rights.

A water right user must file a claim that includes extensive information about the use of water, including but not limited to: contact information; purpose of water use; annual quantities put to beneficial use; period of use; point of withdrawal or diversion; place of use; type of use; and legal basis and conformity with state law (see RCW 90.03.140.). The Water Code requires Ecology to provide the adjudication claim form.

Deadline

With limited exceptions, the deadline for filing a claim is "not less than one hundred nor more than one hundred thirty days" after a judge's order directing a summons to be issued. After the expiration of the filing period, Ecology must file a motion for default against defendants that have been served but did not file an adjudication claim. Under the Water Code, "[a] party in default may file a late claim under the same circumstances the party could respond or defend under court rule on default judgments" (RCW 90.03.625.).

Evidence & Contests

Within a date set by the court, claimants must file evidence to support their water right adjudication claims (RCW 90.03.635.). Following the receipt of evidence, Ecology must conduct a preliminary investigation of the water right (RCW 90.03.640.). Ecology will then file a report of its findings with the court. Claimants will next have an opportunity to contest claims before the court. The court can then determine the claims through a partial or final decree. During the proceeding, the court with jurisdiction over the adjudication has interim authority to regulate water rights.

Filing Changes

Notably, House Bill 1792 (passed in 2023) alters several of the important filing dates for a proposed adjudication in the Water Resource Inventory Area 1 (WRIA 1) — the Nooksack River Watershed. For example, a water right holder will have at least one year to return its claim form to the court after it is served with the form (RCW 90.03.120(2); HB 1792.). In addition, a claimant will then have three years after filing the claims form to submit evidence to Ecology to support the claims (RCW 90.03.63(2); HB 1792.). Moreover, Ecology is required to provide a draft version of the claim form and allow up to 60 days for public comment (RCW 90.03.140(3); HB 1792.). Ecology is anticipating the draft claims form will be out for public comment in the fall of 2023 (Ecology, Water Resources Advisory Committee Meeting (July 10, 2023) www.youtube.com/watch?v=v1A8815SthI).

Prior Washington Adjudication

Yakima Basin

In 1977, Ecology began a general adjudication of the surface water rights in the Yakima River Basin, in a case known as *Acquavella v. Department of Ecology (Acquavella)*. The matter went on for over forty years and included several interlocutory appeals and Washington State Supreme Court decisions. *See* Kray, *TWR* #115.

Special Master

Only one Superior Court judge presided over *Acquavella* at a time, but due to the length of the proceeding, two judges presided over the case. In order to manage the massive undertaking, the court created a set of rules that governed the matter. The court set a recurring monthly hearing in which it would make decisions on motions filed by the parties. The court also required the State to establish and maintain a notification procedure to provide notice to each attorney and party of record desiring notice, including notice of significant documents filed with the court and trial dates, times, and locations. The court split the cases into four categories — or pathways — that were dealt with separately, and appointed a special master who assisted the assigned judge. Even with careful management and diligence, this process continued for over forty years. The result was a final decree identifying the confirmed surface water rights to the Yakima River and its tributaries. It did not include groundwater uses, including those exempt from permitting.

WA Adjudications

WRIA 1 Adjudication

Ecology has announced it is preparing to file the next major adjudication in Washington — adjudication of WRIA 1. There are several reasons Ecology has indicated that it selected WRIA 1 for the next adjudication. One of the primary reasons is that the Lummi Nation and the Nooksack Tribe's water rights are unquantified; in addition, both Tribes petitioned Ecology for an adjudication (Ecology, Water Resources Adjudication Assessment Legislative Report at 6 (September 2020), https://apps.ecology.wa.gov/publications/documents/2011084.pdf.

Tribes' Uncertainty

Until the Tribes' rights are quantified, there is uncertainty regarding how much water they are using or are permitted to use and during what seasons.

Delays

Although Ecology has suggested that the process for the Nooksack adjudication will be shorter than the four-decades long process to adjudicate the Yakima Basin, the Nooksack process is already experiencing delays even before the adjudication is filed. Initially, Ecology indicated it would file the adjudication in 2023, indicating claims would be submitted to the court and Ecology sometime in late 2023, evidence of claims would be submitted in 2024, and Ecology would prepare a report of findings in "[a]bout 2025" (Ecology, WRIA 1 Water Right Adjudications, (January 30, 2023), https://appswr.ecology.wa.gov/docs/WaterRights/wrwebpdf/adjudication/WRIA1-Webinar2023.pdf.

Ecology has now suggested filing will occur in the second quarter of 2024. Intervening legislative amendments to the adjudication statutes ensure a longer process by providing claimants one year to file claims and at least three years thereafter to file evidence supporting the claims (RCW 90.03.635.).

Complex Claims

Furthermore, the claims anticipated to be involved in the Nooksack adjudication are voluminous, and the issues are likely to be more complex than those in the Yakima Basin. Ecology has indicated there are nearly 5,000 surface and groundwater rights documents on file for WRIA 1, some dating back more than 100 years (Ecology, Adjudication of WRIA 1 (Nooksack), https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Adjudications/Nooksack.

Groundwater

Unlike in the Yakima Basin — in which only surface water rights were adjudicated — Ecology plans to include groundwater in addition to surface water. There are also a large number of permit - exempt groundwater withdrawals, but it is not yet clear how Ecology intends to handle permit exempt uses. In an oral presentation in early 2023, Ecology indicated it would propose that small residential permit-exempt uses would be subject to a simplified claims process that would only require claimants to provide date of first use and place of use as evidence of their claims. *Id.*

Whatcom Court

The Nooksack adjudication is likely to be filed in Whatcom County Superior Court. The Whatcom County Superior Court is a relatively small Superior Court that will need staff, resources, and updated procedures to effectively manage a matter as large as the adjudication is expected to be. For example, the court currently does not accept filings electronically or by facsimile (Whatcom County Superior Court, Superior Court Clerk Home Page Filing Info, www.whatcomcounty.us/1944/Superior-Court-Clerk (last visited July 18, 2023)). Instead, it requires that filings with the court be conducted by either personal service or by mail to the court. *Id.* Moreover, Whatcom County Superior Court currently has only four seated judges and four commissioners, all with full dockets comprised of civil and probate matters, juvenile cases, family law cases, and criminal cases (Whatcom County Superior Court, Home Page, www.whatcomcounty.us/413/Superior-Court (last visited July 18, 2023)).

Referees

To lessen the burden of an adjudication on the currently seated judges and commissioners, there is a proposed amendment to the Whatcom County Superior Court Rules — proposed effective in September 2023 — that would allow the Superior Court to appoint referees to assist the assigned judge in a general water rights adjudication (Whatcom County Superior Court Proposed Local Court Rules Effective September 1, 2023, www.whatcomcounty.us/DocumentCenter/View/75571/2023-Proposed-Local-Rules at pp. 23-24).

The referees would have the authority to hear and rule on administrative procedures, sign agreed orders, conduct a trial involving questions of fact and/or law, and issue a written report to the assigned judge (*Id*. at p. 23). Ecology has also represented that it is working with the Whatcom County Superior Court to set up electronic filing and to ensure the court has the appropriate number of staff to ensure an efficient adjudication (Ecology, Water Resources Advisory Committee Meeting (July 10, 2023), www.youtube.com/watch?v=v1A8815SthI).

Ecology is also in the process of hiring staff to ensure it has the resources for the adjudication, including outreach and mapping positions. In order to provide notice of the adjudication to those potentially affected by the adjudication, Ecology has to identify all owners of land in WRIA 1, which is a time-intensive task. *Id*.

Whatcom County Superior Court has begun preparations for the adjudication, which will unquestionably be an expensive and extensive undertaking.

WA Adjudications

Priority

Resource Intensive

Rights Complexity

Adjudication Limitations

Alternative Tools

Success

Other Potential Adjudications

In addition to the Nooksack adjudication, other adjudications are anticipated in Washington in years to come. Ecology has taken initial steps toward adjudication of water rights to Lake Roosevelt on the Upper Columbia (WRIA 58) and has previously indicated its intent to file that adjudication in 2023 (Ecology, *Focus on Potential Adjudication in Lake Roosevelt and Middle Tributaries,* (January 2021), https://apps.ecology.wa.gov/publications/documents/2011097.pdf). That adjudication would include all water diversions, wells, and instream rights on Lake Roosevelt and WRIA 58 tributaries. Ecology does not expect to include water diversions or instream rights downstream of the Grand Coulee Dam because water flow to those areas is controlled by federal dam operations. *Id.*

Ecology has stated it is considering other future adjudications in the Spokane River basins (WRIAs 54, 55, 56, and 57) and Walla Walla (WRIA 32). Ecology is gathering additional information regarding whether the Skagit River system (WRIAs 3 and 4), Chehalis River (WRIAs 22 and 23), Methow basin (WRIA 48), and groundwater rights in the Yakima River basin (WRIAs 37, 38, and 39) would benefit from adjudication (Ecology, *Water Resources Adjudication Assessment Legislative Report,* (September 20202), https://apps.ecology.wa.gov/publications/documents/2011084.pdf).

Adjudication Outcomes

Although Ecology has expressed optimism for shortening the length of upcoming and future adjudications and continues to consider areas to be adjudicated in the future, the Yakima Basin adjudication demonstrates that adjudication is a complex time and resource intensive tool for addressing conflicts over water resources.

The basins most in need of adjudication do not necessarily have Superior Courts with the time, infrastructure, and resources to administer adjudications. Adjudications are resource intensive for Ecology as well as for each water right claimant. Water right claimants may lack financial resources and/or access to counsel necessary to successfully prosecute their claims, raising questions of fairness in the adjudication process. Ecology has recognized that there is a shortage of local attorneys in Whatcom County who routinely practice water law and as a result has stated its intention to conduct a series of webinars to educate local attorneys on water law (Ecology, Water Resources Advisory Committee Meeting (July 10, 2023), www.youtube.com/watch?v=v1A8815SthI).

Conclusion

Adjudications are unlikely to completely resolve all potential conflicts and complex questions involving the allocation and availability of water in Washington State. For example, the Yakima adjudication excluded all groundwater rights. The uncertainty over groundwater rights undermines the intended purposes of the adjudication process because groundwater is in hydrologic continuity with surface water and affects the amount of water available in rivers and streams, and vice versa. In watersheds bordering Canada (like the Nooksack) state-based adjudications will not resolve disputes between Canadian water users and Washington water users — the amount of water entering the Nooksack watershed will continue to depend on Canadian water use.

Perhaps more importantly, adjudications alone do not present practical solutions to potential shortages of water to serve all intended uses in the future. Critically, adjudications determine the right to use water based on the date of first beneficial use — consistent with Washington's prior appropriation water right laws. They do not prioritize water use based on importance of use or incentivize reduced water use by users that can most easily limit their water consumption. Nor will an adjudication require water right holders to implement water storage or other water management tools.

Successful navigation of water shortages, therefore, will require other water resource management tools. For example, where water is in limited supply, water markets can be an effective tool that allows water to be transferred to new uses. While an adjudication of water rights may facilitate water markets by creating more certainty regarding water rights to be bought and sold, this tool will not in and of itself address other water management issues.

On the other hand, adjudication may bring parties together to identify more holistic solutions to water management, as was the case in the Yakima Basin. To address long-term water needs in the Yakima River Basin, the large water users — including the US Bureau of Reclamation, Yakama Nation, cities, and irrigation districts — developed the Yakima Basin Integrated Plan (YBIP). The YBIP is a model of collaboration to help solve water resource management issues. The YBIP has facilitated projects to provide fish passage, habitat enhancement, floodplain restoration, and water storage. *See* Malloch & Garrity, *TWRs* #106, #108, #135; Malloch, *TWR* #186; Empel, *TWR* #198; Rigdon & Revell, *TWR* #200.

WA Adjudications

Management

It is unclear whether a similar holistic solution to water management will be achieved in the Nooksack Basin. At its conclusion, an adjudication will establish a list of the priority dates and attributes of water rights within its jurisdiction. However, in order to address complex water resource issues, water right holders and Ecology need to address the complex nature of water resource management, including, but not limited to, issues of water availability, aquatic habitat, flood impacts, and climate change. As exhibited in the Yakima River Basin, water user collaboration is necessary to develop projects and undertake actions to address the complex needs of a watershed and all its users.

For Additional Information:

Jessica Kuchan, Confluence Law, 206/ 755-4364 or kuchan@confluencelaw.com

Jessica Kuchan is a partner with Confluence Law, PLLC where she helps clients with issues relating to water resources, land use, and natural resources. Jessica works with local governments, non-profits, and private water users to find innovate solutions to complex water resource issues. Prior to law school, Jessica was an environmental scientist with the King County Department of Natural Resources researching the impact of water quality changes on freshwater mussels, macroinvertebrates, and salmon. Jessica received a BS in biology from Gonzaga University and juris doctorate from Lewis and Clark Law School with a certificate in Environmental and Natural Resource Law.

Jenna Mandell-Rice is a partner in Van Ness Feldman's Seattle office. Jenna practices in the areas of natural resources, environmental, and water law. She helps clients navigate complex regulatory, permitting, enforcement, and litigation matters under a range of environmental statutes, including the Federal Power Act, the Washington State Environmental Policy Act (SEPA), National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Clean Water Act (CWA), and Safe Drinking Water Act (SDWA). Jenna advises municipal water utilities and suppliers to address water rights, water supply, and water quality challenges.

Hayley Ventoza is an associate at Tupper Mack Wells, where she helps clients resolve issues related to water and natural resources. Hayley focuses her practice on environmental law, with an emphasis on water rights, water quality, and environmental cleanups. She has successfully represented public and private sector clients in matters including acquisition and transfer of water rights, CERCLA and MTCA cleanups, and NPDES Permit appeals.

2023 AWRA-WA State Conference

AMERICAN WATER RESOURCES ASSOCIATION – WASHINGTON SECTION EVENT
SEPTEMBER 28, 2023 – AT THE MOUNTAINEERS SEATTLE PROGRAM CENTER

On September 28, 2023 the Washington Section of the American Water Resources Association will host an in-person conference on: "The Four Corners of Washington – Water Resource Changes and Adaptations." This year's Keynote address will be presented by Derek Sandison, the director of the Washington State Department of Agriculture. Following Derek Sandison's address there will be four separate panels, one dedicated to each corner of Washington. The last session will focus on more overarching, or non-region-specific changes and adaptations.

For more information: www.waawra.org/event-5296122

WATER BRIEFS

FLOODING US

NOAA MODELLING

First Street Foundation released on June 26 their peer-reviewed precipitation model that captures climate-driven changes in heavy rainfall events for the United States and describes the implications for flood risk across the Nation in their report, *The 8th National Risk Assessment: The Precipitation Problem.*

The US government's current gold standard for precipitation expectations was created by the National Oceanic and Atmospheric Administration (NOAA), known as Atlas 14. The report compares it to the First Street Foundation Precipitation Model (hereafter FSF-PM) to understand the previously unaccounted influence of climate change. It finds that, in the worst cases, what is currently estimated to be an infrequent and severe 1-in-100-year flood event, is a much more frequent 1-in-8-year event.

While NOAA has recently received nearly $32 million in funding from Congress to update their precipitation standards, the expected release date of that updated product, to be known as Atlas 15, is not expected until 2027. The new FSF-PM addresses the well-known issues in Atlas 14 and immediately allows for insights and informed actions today that otherwise would have to wait until NOAA's completion of Atlas 15.

The results of First Street's study show that over half the population — some 51% of Americans — live in areas that are now twice as likely to experience a severe "1-in-100 year flood" event as expected from Atlas 14. Roughly 21% of the country can now expect their "1-in-100-year flood" to happen every 25 years. And in the most extreme cases, over 20 counties in the US — home to over 1.3 million people — are expected to experience the current "1-in-100-year flood" severe event at least once every 8-10 years. The greatest corrections in these expectations and increases in severe rainfall events exist in some of the most populated areas of the country — throughout the Northeast, along the Ohio River Valley, and the Texas and Louisiana Gulf Coast — which are the areas that have historically invested the most on engineered solutions for flood protection. The design standards for those projects are based on outdated Atlas 14 data and are likely to fail.

"This work highlights the degree to which the changing climate has affected our understanding of the likelihood of extreme precipitation events," said Dr. Jeremy Porter, Head of Climate Implications Research at the First Street Foundation. "Over the last few years, we have seen a remarkable uptick in flooding from heavy rainfall, which, unfortunately, is becoming our new normal for most of the US population."

Dr. Jungho Kim, First Street's senior hydrologist and lead author of the peer-reviewed study added, "The magnitude of the changes in expected rainfall intensity are startling for many areas in the United States, and it is important that Americans are fully aware of this consequence of climate change that can impact their lives and homes."

The report also highlights the impact of continued warming into the future. Looking at highly populated cities such as Houston, Texas, the initial Atlas 14 correction is pronounced, increasing the likelihood of Houston's 1-in-100-year flood event by 335% to a 1-in-23-year event. As the climate continues to warm, that same event will become a 1-in-11-year event by 2053, an 809% increase in likelihood.

One particular concern discussed in the report is that $1.2 trillion has been recently appropriated through the Infrastructure Investment and Jobs Act (IIJA) to fund capital investment and infrastructure spending through 2027. The vast majority of those projects will require significant engineering expertise, including the development of design standards to withstand climate-related risk exposure today and into the future. NOAA's Atlas 14 is the current authoritative source for local area extreme precipitation risk and is mandated by many states in infrastructure design. When taken together with the delay in the production of the new Atlas 15 precipitation estimates, this means that billions of dollars from the IIJA funding will be spent on projects that will not be built to the proper flood design standard.

The FSF-PM estimates will be integrated into the forthcoming version 3.0 of the First Street Foundation Flood Model and integrated onto the Risk Factor platform on July 31st and available for bulk access by contacting support@firststreet.org.
FOR INFO https://report.firststreet.org/8th-National-Risk-Assessment-The-Precipitation-Problem.pdf

DESERT LAKES NV

RESTORATION GRANTS

On June 19, the National Fish and Wildlife Foundation (NFWF) announced $33 million in grants to restore, protect, and enhance riparian and watershed resources in the greater Desert Terminal Lakes geography in Nevada. The grants will support voluntary water acquisitions in the Pyramid, Summit, and Walker Lake basins to help recover these unique ecosystems to benefit endemic fish and wildlife species, communities, and Tribes.

The grants were awarded under a Desert Terminal Lakes (DTL) funding agreement between NFWF and the US Bureau of Reclamation.

The grants will improve flows and ecosystem health in at-risk natural desert terminal lakes. Priority strategies under this funding partnership include voluntary water transactions and water management initiatives, community-based conservation and stewardship, and applied research and demonstration projects.

"We are excited to work with the Pyramid and Summit Lake Paiute Tribes and support their efforts to accomplish conservation priorities, including the recovery of endangered cui-ui and threatened Lahontan cutthroat trout," said Jeff Trandahl, executive director and CEO of NFWF. "This funding will also support ongoing restoration of Walker Lake and provide significant and long-lasting benefits to important freshwater ecosystems in Northwest Nevada."

"The Summit Lake Paiute Tribe is excited and grateful for the award and to work directly with NFWF, which maximizes the agility of the partnership and the funding to our Tribe," said James Simmons, natural resources director for the Tribe. "The award supports a multi-pronged strategic project that will make significant inroads toward securing the ecological and cultural heritage of the Tribe via increasing the resiliency of the Lahontan cutthroat trout populations, the overall lake ecosystem, and the Tribe's operational capacity."

A terminal lake is formed at the endpoint of an enclosed watershed basin. These lakes have no outlets and, therefore, are greatly affected by variations in water flows caused by upstream activities, such as diversions of surface water, groundwater pumping, and changes in the hydrologic cycle.

DTL funding was originally established by Public Law 101-171 in 2002 to provide water to a unique collection of at-risk natural desert terminal lakes in the northwestern Great Basin.
FOR INFO https://www.nfwf.org/sites/default/files/2023-07/NFWF-WBP-20230710-GS.pdf

TEXAS v. NM *WEST*

RIO GRANDE

On Monday, July 3, 2023, a United States federal circuit court judge serving as Special Master in the *Texas v. New Mexico* water case issued an opinion recommending the United States Supreme Court approve the settlement reached between New Mexico, Texas, and Colorado in November over the division of Rio Grande water south of Elephant Butte dam.

The Special Master's decision, if accepted, means that New Mexico farmers will receive roughly 57 percent of Rio Grande Project (Project) water from New Mexico's Elephant Butte Reservoir, which could result in tens of thousands of additional acre-feet of Project deliveries staying in New Mexico each year. The US Supreme Court will ultimately decide whether to accept or reject the Special Master's recommendation.

The Compacting States agreed to jointly file the Proposed Consent Decree after several months of trial and nearly a year of settlement negotiations involving engineers, lawyers, and environmental experts. The Consent Decree was formally filed with the Special Master in November 2022.

On July 3, the Special Master agreed with the Compacting States and found the Proposed Consent Decree to be fair, reasonable, and consistent with the Compact. The Special Master also determined that the Consent Decree did not impair the federal government's rights to water use in southern New Mexico but could protect those rights in other courts. The Special Master has recommended that the Court resolve the Compacting States' claims by entering the Compacting States' proposed Consent Decree and to dismiss the United States' claims without prejudice. The next and potentially final step in this long running water dispute will be a decision from the United States Supreme Court to accept or reject the Special Master's recommendation.
FOR INFO https://www.ca8.uscourts.gov/texas-v-new-mexico-and-colorado-no-141-original

HAZARDOUS WASTE ID

PENALTY

The US Environmental Protection Agency (EPA) and the US Department of Justice (DOJ) announced on July 11 a settlement with J.R. Simplot Company involving Simplot's Don Plant manufacturing facility located near Pocatello, Idaho.

The settlement resolves allegations primarily under the Resource Conservation and Recovery Act (RCRA) at the facility, including that Simplot failed to properly identify and manage certain waste streams as hazardous wastes. The settlement requires Simplot to implement process modifications designed to enable greater recovery and reuse of phosphate, a valuable resource. The settlement also requires Simplot to ensure that financial resources will be available when the time comes for environmentally sound closure of the facility. Simplot will also pay a civil penalty of $1.5 million.

"This is an important settlement which reduces the environmental impacts from one of the leading fertilizer manufacturers," said Acting Assistant Administrator Larry Starfield of the EPA Office of Enforcement and Compliance Assurance. "This settlement advances EPA's goals by creating environmentally beneficial waste management practices and ensures that the US taxpayer will not be responsible for future costs associated with closure of this facility. Additionally, this settlement ensures that any future expansion of Simplot's operations will be conducted according to strict requirements to minimize impacts to surrounding communities, including the Fort Hall Indian Reservation."

Simplot's Don Plant facility manufactures phosphate products for agriculture and industry, including phosphoric acid and phosphate fertilizer, through processes that generate large quantities of acidic wastewater and a solid material called phosphogypsum.

The phosphogypsum is deposited in a large pile known as a gypstack, and acidic wastewater is discharged to the gypstack. The gypstack, which has a capacity to hold several billion gallons of acidic wastewater, was fully lined in 2017 in accordance with a previous consent order Simplot entered into with the State of Idaho and the United States.

The settlement also resolves alleged violations of the Clean Air Act (CAA) that relate to fluoride emissions from the facility, and of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Emergency Planning and Community Right-to-Know Act (EPCRA) that relate to reporting and notification requirements for hazardous substances and toxic chemicals.

Under the settlement, Simplot agrees to implement specific waste management measures it has valued at nearly $150 million. Significantly, these measures include extensive new efforts to recover and reuse the phosphate content within these wastes and avoid their disposal in the gypstack. Simplot will implement requirements that ensure gypstack stability and containment that will protect the environment even should climate change result in more severe weather events. The settlement also includes a detailed plan setting the terms for the future closure and long-term care of the gypstack. The settlement requires Simplot to immediately secure and maintain approximately $108 million in dedicated financing to ensure that funding will be available when the facility is eventually closed.

Simplot also agrees to cease operation of the facility's cooling towers no later than June 27, 2026, and replace them with one or more newly constructed cooling ponds, which will significantly reduce fluoride emissions to the air. Additionally, Simplot agrees to submit revised Toxic Release Inventory forms for the years 2004-2013 that include estimates of certain metal compounds manufactured, processed or otherwise used at the facility.

In addition to paying the $1.5 million civil penalty, Simplot is providing $200,000 in funding for environmental mitigation work that will be administered by the Idaho Department of Environmental Quality in conjunction with the City of Pocatello

and the Shoshone-Bannock Tribes. The mitigation work will address habitat degradation on the Portneuf River that has resulted in part from excess phosphorus releases, especially from the facility's formerly unlined gypstack.

EPA previously required through judicial and administrative settlements at 14 phosphate fertilizer facilities across the US extensive injunctive relief, requiring the companies to establish financial assurance and bring their operations into compliance with RCRA.

A consent decree formalizing the settlement was lodged July 11 in the US District Court for Idaho and is subject to a 30-day public comment period and approval by the federal court.
FOR INFO https://www.justice.gov/enrd/consent-decrees

RECYLCED WATER CA

DPR REGULATIONS

Achieving a major milestone in the state's efforts to maximize the potential of recycled water, the California State Water Resources Control Board on July 11 proposed regulations that would allow for water systems to add wastewater that has been treated to levels meeting or exceeding all drinking water standards to their potable supplies. The process, known as **d**irect **p**otable **r**euse (DPR), will enable systems to generate a climate-resilient water source while reducing the amount of wastewater they release to rivers and the ocean.

This development advances Gov. Newsom's all-of-the-above Water Supply Strategy, which includes the goal of recycling and reusing at least 800,000 acre-feet of water per year by 2030.

This turning point in California's history with recycled water, which began in the mid-20th century with the use of recycled water for crops, comes after an expert panel of 12 scientists and engineers evaluated work by the State Water Board's Division of Drinking Water and determined that the proposed regulations are protective of public health. The regulations are the most advanced in the nation and reinforce California's position as a leader of innovative solutions to climate challenges. They are now open for public comment and subject to revision based on that input.

Direct potable reuse relies entirely on immediate, multi-barrier treatment that can recycle wastewater to drinking water standards in a matter of hours. This contrasts to the method currently being deployed in major projects launched throughout the state, called indirect potable reuse, which further improves treated wastewater over time through groundwater recharge or dilution with surface water.

While no formal direct potable reuse projects can be initiated in California until the regulations are adopted, water agencies in Santa Clara, San Diego and the city of Los Angeles have launched pilot projects in recent years. The board will consider adoption of the regulations before the end of the year.
FOR INFO https://watereuse.org/sections/watereuse-california/

SACKETT v. EPA US

LETTER TO EPA

A group of concerned legislators and environmental advocates is calling on the US Environmental Protection Agency (EPA) and the US Army Corps of Engineers (Corps) to meticulously document the repercussions of the US Supreme Court's recent ruling in *Sackett v. Environmental Protection Agency* (598 U.S. ___ (2023)). The decision in question has significantly curtailed federal protections under the Clean Water Act (CWA), raising concerns about the nation's water quality, economy, public health, and environmental sustainability.

The Court's decision in *Sackett* effectively narrowed the scope of the Clean Water Act's protections over waters and wetlands and redefined the Act's coverage, creating new criteria with no precedent in the statute or established agency interpretation.

The ramifications of this ruling may impact water quality, public safety, and ecosystems across the nation, leading to environmental degradation or destruction. Preliminary assessments suggest that the decision may expose up to 70 percent of the nation's river and stream miles to loss of Clean Water Act protections.

The group urging action from the EPA and the Corps argues that the potential consequences of the *Sackett* decision demand a systematic documentation of its individual and cumulative impacts. They are requesting the tracking of several data points, including the number and location of waters and wetlands affected by jurisdictional determinations initiated but not completed prior to the ruling, the ecological and hydrologic functions lost due to permits being abandoned, and the pollutants discharged into waters and wetlands that are no longer protected.

Additionally, the impact on federal geographic programs such as the Great Lakes, the Chesapeake Bay, the Florida Everglades, and other water bodies should be assessed. The potential economic impacts, including reduced ecological value, lost recreational opportunities, increased flooding risks, and agricultural water costs, must also be quantified.
FOR INFO https://democrats-transportation.house.gov/imo/media/doc/2023-07-10_letter_to_epa_and_usace_re_impacts_of_sackett_decision.pdf

$10 MILL GRANT WEST

ENVIRONMENTAL JUSTICE

The US Environmental Protection Agency's (EPA's) Region 8 Office is announcing a grant competition for an "Environmental Justice Thriving Communities Technical Assistance Center" (EJ TCTAC). The agency is offering this funding opportunity of up to $10 million to help communities and other environmental justice stakeholders in the Rocky Mountains and Great Plains states access federal assistance and resources to address environmental and energy justice concerns. EPA Region 8 includes the states of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming and 28 Tribes.

"This grant opportunity will create a technical assistance center to help communities tackle environmental justice concerns in the Rocky Mountains and Great Plains states," said EPA Regional Administrator KC Becker. "While many of our urban, rural and tribal communities have identified solutions to the environmental challenges they face, there is a significant need for resources to achieve results. This center will help build capacity and deliver federal funds for environmental justice projects across our region."

In April, EPA announced $177 million in investments for the creation of EJ TCTACs across the country to help underserved and overburdened communities access funds from President Biden's Investing in America agenda. Under this new Region 8 grant opportunity, EPA will partner with the US Department of Energy to select a qualified applicant to deliver much-needed assistance to these communities

within Region 8.

The agency will host two informational webinars for prospective applicants, one on July 27 and another on August 10, which will also include a partnership facilitation session.

Until an EJ TCTAC grant is awarded through this upcoming grant competition, EPA Region 8 communities will be able to access assistance through one of the designated national EJ TCTACs.

Once awarded, the EPA Region 8 EJ TCTAC will be part of the network of the other EJ TCTACs providing technical assistance on a comprehensive nationwide basis. With these critical investments, the EJ TCTACs will provide training and other technical assistance to community groups, nonprofits, local governments, and others to build capacity for navigating federal, state and private grant application systems, writing strong grant proposals, and effectively managing grant funding.

In addition, these EJ TCTACs will provide guidance on engagement in governmental processes, community outreach, meeting facilitation, and translation and interpretation services for limited English-speaking participants, removing barriers and improving accessibility for communities with environmental justice concerns. Each of the EJ TCTACs will also create and manage communication channels to ensure the communities they serve have direct access to resources and information.

EPA Region 8 will evaluate applications that are received through September 11 and expects to make the award by the end of the calendar year. The award amount will be approximately $10 million for a five-year project period, up to $2 million for each year.

Eligible applicants who can compete under the NOFO will generally include:

- Public and private universities and colleges and other nonprofit institutions of higher education such as community colleges
- Public and private nonprofit institutions/ organizations (including philanthropic organizations)
- Intertribal Consortia – a coalition between two or more Indian tribal governments authorized by the governing bodies of those tribes to apply for and receive assistance and participate in self-governance.

Entities which received an award for EJ TCTAC funding under the national competition are not eligible to apply for this opportunity.

FOR INFO: https://www.epa.gov/environmentaljustice/region-8-environmental-justice-thriving-communities-technical-assistance

QUEEN CREEK AZ

COLORADO RIVER WATER

After a five-year process, the Town of Queen Creek (Town) has begun receiving 4th priority Colorado River Water from Cibola, Arizona — reducing the reliance on groundwater.

In 2018, the Town approved a purchase agreement with a landowner in Cibola Valley for a portion of their water rights. The Town followed the established process for transferring Colorado River Water, which included reviews by the Arizona Department of Water Resources (ADWR) and the Bureau of Reclamation (USBOR).

The Town is receiving 2,033 acre feet of water per year in perpetuity. The Town made a one-time payment of $24 million for the water rights. The water is being delivered through the Central Arizona Project (CAP) canal, which runs along the Town's eastern border.

"This transfer may seem like a small amount — but over 100 years and with its reuse, it is nearly 365,000 acre feet — and a direct reduction to groundwater pumping," shared Queen Creek's Director of Water Resources Paul Gardner. "The Town is continuing to evaluate additional renewable supplies, including Harquahala water and participating in the study to raise Bartlett Dam. Water is a finite resource, and we will continue to do our part to diversify our supply."

Other efforts include using all of the Town's treated effluent and establishing three additional recharge sites. The Town is working with new developments on creative ways to reduce water use, including onsite lakes that store their treated effluent. The Town also offers a robust water conservation program for residents including free water workshops and classroom education for youth regarding water conservation strategies.

While the statutory 100-year water supply for all current Queen Creek customers is maintained, the Town is working toward becoming a designated provider by 2030 with a continued focus on renewable supplies and limiting the need for groundwater.

FOR INFO: Constance Halonen-Wilson, Communications & Marketing Manager, 480/ 358-3195 or QCPIO@QueenCreekAZ.gov

CYBERSECURITY US

RULE PAUSED

On July 13, the US Court of Appeals for the Eighth Circuit (Court) granted a request from the American Water Works Association (AWWA) and the National Rural Water Association (NRWA) to stop the US Environmental Protection Agency's Cybersecurity Rule from going into effect until the current case challenging the rule has been decided.

The Court's decision applies to all AWWA and NRWA members nationwide. AWWA and NRWA requested that the court stay (pause) the rule during a legal challenge from three states so that their members would not have to undertake costly changes to their operations until the court decides if the rule is legally valid. The stay applies until further notice from the court.

AWWA and NRWA joined the States of Missouri, Arkansas, and Iowa in a legal challenge to the Cybersecurity Rule because of concerns about the legal process and legality of the rule, concerns that the rule may create additional cybersecurity vulnerabilities for members, as well as concerns that states do not have appropriate resources, laws, rules or procedures in place to adhere to the rule requirements. Specifically, in the absence of a viable primacy agency implementation framework, water systems were at risk of violations for which they are unable to prepare. There is also the risk that the cybersecurity vulnerabilities of these systems would be publicly available because they are being done through sanitary surveys, which could be accessed by malicious actors.

The public wasn't given the opportunity to comment about EPA's proposed approach before the rule was issued. By granting a stay, the Court has prevented these risks to members while it reviews the legality of EPA's rulemaking process.

FOR INFO: Greg Kail, AWWA, 303/ 734-3410 or gkail@awwa.org

CALENDAR

August 15-17 CA

2023 Improving Sub-seasonal to Seasonal Precipitation Forecasting to Support Water Management Workshop, San Diego, DoubleTree by Hilton San Diego Downtown. The Western States Water Council (WSWC) and the California Department of Water Resources (CDWR) Cosponsoring Workshop to Continue Dialogue Among Western States, the National Oceanic and Atmospheric Administration (NOAA) & the Research Community. For info: https://westernstateswater.org/events/2023-workshop-on-improving-sub-seasonal-to-seasonal-precipitation-forecasting-to-support-water-management/

August 22-23 WEB

Data Collection Techniques and Analytics for Water Resource Systems and Natural Water Systems. Virtual Event. Presented by EUCI. For info: https://www.euci.com/event_post/0823-water-data-collection/

August 22-24 CO

Colorado Water Congress - Summer Conference, Steamboat Springs. The Steamboat Grand. For info: https://www.cowatercongress.org/sc23-registration.html

August 29-31 TX

Texas Groundwater Summit, San Antonio. Hyatt Regency Hill Country Resort. For info: https://texasgroundwater.org/news-events/events/texas-groundwater-summit/

September 6-7 CO

NWSA Annual Meeting - Water Supply in the Rocky Mountains, Denver. Grand Hyatt Denver. Presented by the National Water Supply Alliance. For info: https://www.nationalwatersupply.org/annual-meeting-2023

September 10-12 AZ

Smart Water Summit 2023: Proactive Water Technologies, Scottsdale. Talking Stick Resort & Casino. For info: https://www.smartwatersummit.com/

September 10-13 PA

Water Infrastructure Conference & Exposition, Philadelphia. Sheraton Philadelphia Downtown. For info: https://www.awwa.org/Events-Education/Water-Infrastructure

September 11-13 CA

CASQA 2023 Annual Conference, San Diego. Paradise Point. For info: California Stormwater Quality Association, www.casqa.org

September 12-14 CA

6th Annual Western Groundwater Congress, Burbank. Los Angeles Marriott Burbank Hotel. Presented by Groundwater Resources Association of California. For info: https://www.grac.org/events/514/

September 12-14 AK

Western States Water Council 2023 Fall Field Trip & Meetings, Anchorage. Aloft Anchorage Hotel. Field Trip 9/12; Meetings 9/13-9/14. For info: https://westernstateswater.org/events/wswc-2023-fall-meetings/

September 12-15 NV

Eastern Sierra Water Tour: Water Education Foundation Event, Reno, Grand Sierra Resort & Casino. Tour From Truckee River to Mono Lake. Presented by Water Education Foundation. For info: https://www.watereducation.org/tour/eastern-sierra-tour-2023

September 13-14 WI

Water Leaders Summit, Milwaukee, Harley Davidson Museum. Presented by The Water Council. For info: https://thewatercouncil.com/water-leaders-summit-2/

September 13-17 AZ

35th Annual Arizona Hydrological Society Symposium, Flagstaff, High Country Conference Center. For info: https://ahssymposium.org/2023/

September 14 WEB

Clean Water, Complicated Laws: Infrastructure & Federal Partnerships - 2023 Water Quality Webinar Series, Free Webinar on Water Quality Issues, Laws & Regulations; 10:00-10:30am Pacific Time. Presented by Best, Best & Krieger. For info: https://bbklaw.com/resources

September 14-15 NM & WEB

Natural Resources Damages: 16th Annual "Santa Fe" Advanced Conference, Santa Fe. La Fonda Santa Fe Hotel; Interactive Online Broadcast. Legal & Policy Developments, Evolving Roles for States & Tribes, Emerging New Issues & Litigation Strategies. For info: Law Seminars Int'l, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

September 18-19 NM

New Mexico Water Law Conference (30th Annual): Latest Updates on Water Law & Water Quality, Santa Fe. La Fonda on the Plaza. For info: CLE International: 800/ 873-7130 or www.cle.com

September 19 CO

RiverBank Celebration, Denver. Denver Botanic Gardens. Presented by Colorado Water Trust. For info: https://coloradowatertrust.org/riverbank/

September 19 TX

2023 Texas Rainmaker Award Dinner, Austin. Bullock Texas State History Museum. Presented by the Texas Water Foundation. For info: www.texaswater.org

September 20 TX

Pollution Prevention Waste Management Workshop, Austin. J.J. Pickle Research Campus. Presented by Texas Commission on Environmental Quality. For info: https://www.tceq.texas.gov/p2/events/pollution-prevention-waste-management-workshop

September 20-21 CA

Smart Water Utilities Canada 2023: Reducing Water Leakage Across the Network, Toronto. Delta by Marriott Toronto. Presented by WateReuse. For info: https://canada.smart-water-utilities.com

September 20-22 TX

2023 WateReuse Texas Conference, Frisco. Hyatt Regency Frisco. Presented by WateReuse. For info: www.watereuse.org

September 21 VA

One River's Perspective on a Changing Climate: Potomac River Conference, Lorton. Fairfax Water's Griffith Treatment Plant. Hosted by The Interstate Commission on the Potomac River Basin; 9am-2:30pm Eastern Time. For info: www.potomacriver.org

September 21 WA

Celebrate Waters - Center for Environment & Policy Annual Event, Seattle. Ivar's Salmon House. Celebrating Water Hero Award. For info: www.celp.org

September 21-22 WA

Water Law in Central Washington Seminar, Ellensburg. Central Washington University. For info: The Seminar Group: 206/ 463-4400, info@theseminargroup.net or theseminargroup.net

September 21-22 CA

P3 Electrified: Strategies to Modernize Energy, Water, and Other Utilities, San Diego. Grand Hyatt. For info: https://www.p3electrified.com/

September 23 OR

2023 Celebration of Oregon Rivers, Portland. The World Forestry Center. Hosted by WaterWatch of Oregon. For info: www.waterwatch.org

September 25-27 CO

WaterPro Conference, Aurora. Gaylord Rockies Resort & Convention Center. Industry Event for Networking, Technology & Education. For info: www.WaterProConference.org

September 25-28 CA

WTW 2023 Annual Conference & Exhibition, Saskatoon. TCU Place, Hilton Garden Inn. Presented by Working Together for Water. For info: www.wcwwa.ca

The Water Report
Water Rights, Water Quality & Water Solutions in the West
3615 W. Hills of Gold Dr. Tucson, AZ 85745

CALENDAR

September 26-27 **CO**

Interstate Council on Water Policy's 2023 Annual Meeting, Denver. SpringHill Suites Denver Downtown. Optional Field Tour Sept. 25th. Presented by Working Together for Water. For info: www.icwp.org

September 27-28 **CA**

Future Water World Congress, Anaheim. Anaheim Convention Center. For info: https://www.futurewatercongress.com/

September 27-28 **NM**

Southwest Drought Learning Network 2023 Annual Meeting, Albuquerque. Southwestern Indian Polytechnic Institute. For info: https://docs.google.com/forms/d/e/1FAIpQLSfO-V1zrw2ooyAg7duN6XMuR4fnpbuytl0GERBArSh6eDuGQ/viewform

September 28 **WA**

AWRA Washington Chapter State Conference, Seattle. Mountaineers Program Center. Presented by American Water Resources Association - Washington Chapter. For info: Jessica Kuchan, 206) 755-4364 or kuchan@confluencelaw.com