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Water Rights, Water Quality & Water Solutions in the West

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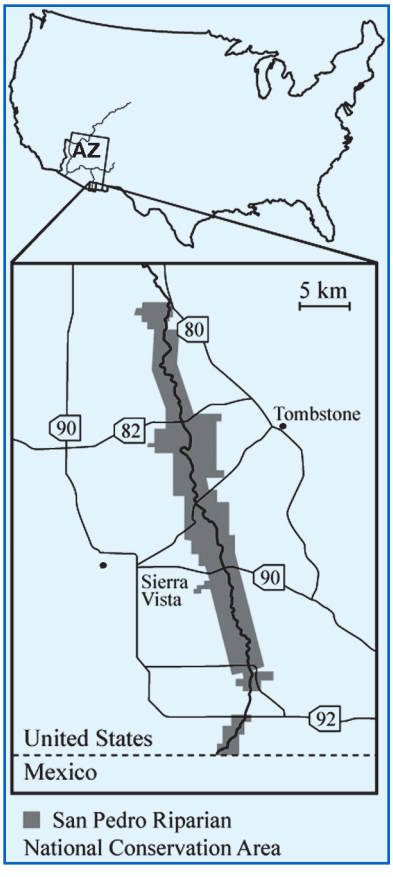
# ASSURED WATER SUPPLY COMPLIANCE

**IMPLICATIONS OF THE *SILVER V. PUEBLO DEL SOL* DECISION FOR ARIZONA WATER LAW**

by Rhett Larson and Jonathan Charlton, Sandra Day O'Connor College of Law (Phoenix, AZ)

### Introduction

The San Pedro National Riparian Conservation Area (SPRNCA) in southern Arizona represents a stretch of desert riparian habitat of unique ecological value, and was thus designated for special federal protection by Congress in 1988. The water necessary to maintain SPRNCA's ecology comes from the San Pedro River within the Gila River basin, which also provides water to large cities, small towns, farms, Native American tribes, and a military base. The surface water rights of state and federal parties in the Gila River basin, including to the San Pedro River, have been subject to a general stream adjudication for over 40 years. Arizona does not include groundwater rights in this adjudication, although groundwater in many parts of Arizona is carefully managed by the Assured Water Supply (AWS) program. The AWS management regime includes requiring a demonstration to the Arizona Department of Water Resources (ADWR) that a subdivision has 100 years of physically, legally, and continuously available water before any subdivided land can be sold.




On August 8, 2018, the Arizona Supreme Court held in *Silver v. Pueblo Del Sol Water Company,* 423 P.3d 348 (Ariz. 2018) (*Silver*) that ADWR is not required to consider unquantified federal water rights still subject to adjudication — like those likely held by SPRNCA — when determining compliance with AWS. *See* 423 P.3d 348, 360-61 (Ariz. 2018).

On the one hand, the Arizona Supreme Court's decision allows development to proceed without getting bogged down by the state's prolonged general stream adjudication process. On the other hand, developments will move forward with less certainty that their water supply is based on valid, quantified, and reliable water rights.

This article provides background on Arizona water law and summarizes the facts, procedural history, and holding of the *Silver* decision. The article then evaluates the implications of that decision, including proposing possible reforms to facilitate the resolution of Arizona's general stream adjudications.

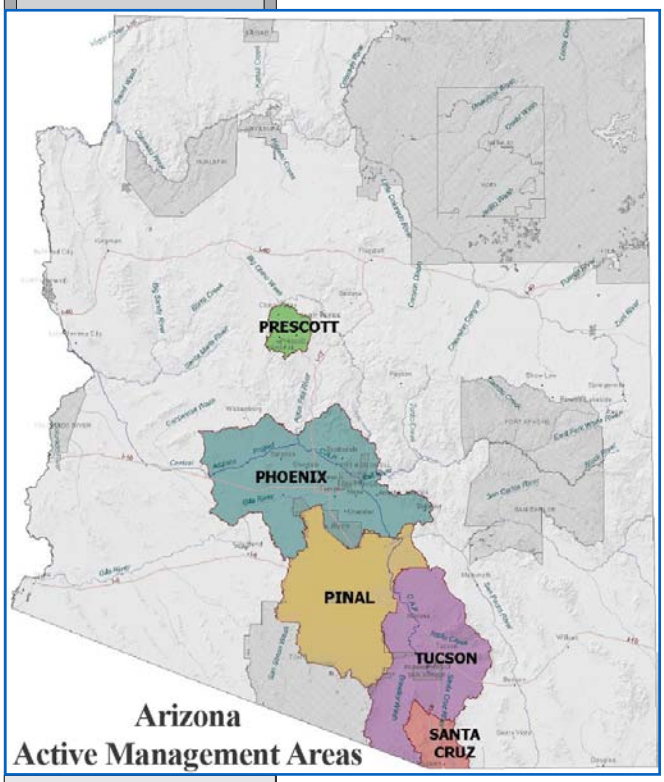
**Assured Water Supply**

**Arizona Water Law and Federal Reserved Water Rights**

**Arizona Water Law: Bifurcated Water Rights**

To understand the implication of the Arizona Supreme Court's decision in *Silver*, it is first essential to have a basic understanding of water law in Arizona and the doctrine of federal reserved water rights.

Arizona has a bifurcated water rights regime, meaning that Arizona treats groundwater and surface water as legally distinct and subject to different legal protections. Arizona allocates rights in surface water through the principles of prior appropriation — simply put, "first-in-time, first-in-right." Arizona Revised Statutes (ARS) § 45-151. Appropriable surface water includes water flowing in streams and other natural channels, definite underground channels, lakes, ponds, and springs. ARS § 45-101. Also within the category of surface water, the law includes a "subflow" class: water in the saturated floodplain Holocene alluvium that is more closely associated with instream flows than percolating groundwater. These surface water rights are subject to state general stream adjudications.




Rights to percolating groundwater, on the other hand, are subject to a complex set of groundwater laws and are not subject to general stream adjudications. *In re General Adjudication of All Rights to Use Water in Gila River System and Source*, 9 P.3d 1069, 1073 (Ariz. 2000). Much of the use and development of groundwater in Arizona is governed by the 1980 Arizona Groundwater Management Act (GMA), administered by ADWR. Groundwater Management Act, 1980 Ariz. Sess. Laws 4th Spec. Sess., ch. 1, § 86 (codified at ARS §§ 45-401 to -704). Most of the GMA focuses on management of groundwater within designated Active Management Areas (AMAs), which roughly correspond to the state's most densely-populated regions. ARS§ 45-402(2). Named for the prominent cities within their boundaries, the five current AMAs include Prescott, Phoenix, Pinal, Tucson, and Santa Cruz. § 45-411; § 45-411.03. Notably, the area surrounding SPRNCA is not located within an AMA.

Outside of AMAs, the pumping of groundwater is virtually unregulated as long as the quantity is reasonable and use is beneficial. § 45-453. However, the AWS program applies, to varying extents, both inside and outside of AMAs. The GMA provides that a real estate developer seeking to develop and sell subdivided land may not sell subdivided lots inside an AMA without first demonstrating to ADWR that the subdivision has 100 years of water physically, legally, and continuously available. § 45-576 (A), (J). The developer must either secure a Certificate of Assured Water Supply (CAWS) from ADWR or receive a commitment from a water utility provider that has received a Designation of Assured Water Supply (DAWS) from ADWR. § 45-576 (B). Outside AMAs, developers may generally still sell subdivided lots even without an AWS demonstration, but they must disclose the lack of an AWS to prospective buyers. *Id*. However, municipalities outside of AMAs may still require an AWS demonstration prior to recording any subdivision plat — effectively making the AWS program as much a requirement in those municipalities as it is inside of AMAs. ARS § 9-463.01. The relevant municipality near SPRNCA in the *Silver* decision elected to require the AWS demonstration, even though it is located outside of an AMA. 423 P.3d 361-65.

**Federal Reserved Water Rights**

When the federal government reserves land for a particular federal purpose, the government also implicitly reserves the minimum amount of unappropriated water necessary to accomplish the primary purpose of that reservation. *Cappaert v. United States*, 426 U.S. 128, 138 (1976); *Colorado River Water Cons. Dist. v. United States*, 424 U.S. 800, 805 (1976); *United States v. District Court for Eagle County*, 401 U.S. 520, 522-523 (1971); *Arizona v. California*, 373 U.S. 546, 601 (1963); *FPC v. Oregon*, 349 U.S. 435 (1955); *United States v. Powers*, 305 U.S. 527 (1939); *Winters v. United States*, 207 U.S. 564 (1908). In prior appropriation regimes, the day the reservation was created typically establishes the priority date for purposes of adjudication. *In re Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source*, 35 P.3d 68, 71 (Ariz. 2001). Courts view the amount of water a reservation needs to accomplish its purpose as a strict limit to federal water rights. *Cappaert v. United States*, 426 U.S. 128, 141 (1976); *Silver* at 353. To determine what a reservation's purpose is, federal courts carefully examine "both the asserted

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**Assured Water Supply**

**State Law Deference**

**McCarran Amendment**

**Groundwater Reserved Right**

**Bifurcation**

**Gila River Adjudication**

**Groundwater Not Adjudicated**

water right and the specific purposes for which the land was reserved." *United States v. New Mexico*, 438 U.S. 696, 700 (1978). The focus on a strict interpretation of a federal reservation's purpose helps mitigate conflict with state interests in water. *Id.* at 702.

Congress has historically shown deference to state law when it reserves water. *Id.* The McCarran Amendment, passed in 1952, demonstrates this deference by waiving the federal government's sovereign immunity in state water right adjudications. 43 U.S.C. § 666 (2012); Rhett Larson & Brian Payne, *Unclouding Arizona's Water Future*, 49 Ariz. St. L.J. 465, 477 (2017). Specifically, the statute grants consent for the United States to be served as a defendant in any "adjudication of rights to the use of water of a river system or other source" when the United States is a necessary party to the action. 43 U.S.C. § 666. This allows and even encourages state courts to quantify and adjudicate federal water rights. *See Arizona v. San Carlos Apache Tribe of Arizona*, 463 U.S. 545, 569 (1983).

Although Arizona handles its surface water and groundwater differently, Arizona and federal courts recognize that the federal reserved water rights apply to both surface water and groundwater. *Agua Caliente Band of Cahuilla Indians v. Coachella Valley Water Dist.*, 849 F.3d 1262, 1271 (9th Cir. 2017); *In re Gen. Adjudication of All Rights to Use Water In Gila River Sys. & Source*, 989 P.2d 739, 748 (Ariz. 1999). When adjudicating federal reserved water rights, Arizona courts interpret the purpose of federal reservations narrowly due to their "disruptive" influence in the prior appropriation system. *In re Gen. Adjudication of All Rights to Use Water In Gila River Sys. & Source*, 289 P.3d 936, 941 (Ariz. 2012). Furthermore, Arizona courts have held that "a reserved right to groundwater may only be found where other waters are inadequate to accomplish the purpose of a reservation." *Id.* That being said, Federal reserved rights to groundwater preempt and restrict Arizona groundwater law. *Silver* at 353. Also, in the event that a well infringes on a federal reserved water right, the federal government may obtain an injunction in federal court to prevent further pumping, provided that the injunction is narrowly tailored to meet the reservation's minimal need. *Cappaert v. United States*, 426 U.S. 128, 141(1976); *Silver at* 353.

**Arizona's General Stream Adjudications**

As already noted, while both surface water and groundwater are hydrologically connected, Arizona law still treats them as if they are distinct resources. *Davis v. Agua Sierra Res., L.L.C.*, 203 P.3d 506, 508 (Ariz. 2009). This bifurcation creates challenges for water management, but perhaps none more significant than determining the scope of general stream adjudications. Larson & Payne at 476.

The function of a general stream adjudication is to determine the quantity, diversion point, beneficial use, and relative priority of competing water rights. Lining up all of a river's users by order of when they started appropriating water and also determining how much water each may use is, by itself, a daunting task. *Id.* at 477. For example, Arizona's Gila River, which drains from an area covering nearly half the state, began a general stream adjudication in 1974 and not yet been fully adjudicated. *Id.* With over 38,000 parties and some 100,000 claims, the Gila River adjudication is among the most complex cases every litigated in the history of the United States. *Id.*; *see generally* Joseph M. Feller, *The Adjudication that Ate Arizona Water Law*, 49 Ariz. L. Rev. 405 (2007).

Aggravating this challenge of an adjudication — and perhaps the primary reason for the intractable state of Arizona's general stream adjudications — is that groundwater rights are not subject to the adjudication, while surface water rights must be included in the adjudication. Any line drawn between surface water and groundwater for purposes of determining which rights are subject to the adjudication and which are not will inevitably be hydrologically arbitrary. Arizona includes water in defined underground channels and "subflow" — water flowing in the saturated floodplain Holocene alluvium — as surface water and thus subject to adjudication, while other subterranean groundwater lies outside of the scope of the adjudication. But the cone of depression of wells taking groundwater may nevertheless extend into, and draw from, water treated legally as surface water. Much of the general stream adjudication resources are devoted to determining which wells lie within the court's jurisdiction. [Editor's Note: A "cone of depression" is a funnel-shaped depression produced in the water table by the pumping of water from a well. As a well pumps, groundwater elevation around the well drops, typically in the shape of an inverted cone.]

***Silver v. Pueblo Del Sol Water Company***

**Synopsis of the Decision**

The San Pedro River, a central part of the *Silver* decision, flows north from Sonora, Mexico through Cochise County, Arizona into the Gila river. Larson & Payne at 488. It is one of the last free flowing rivers in the United States. *Id.* In 1988, Congress saw fit to place the river and its surrounding lands in a federal reservation — the San Pedro National Riparian Conservation Area (SPRNCA) — with the Arizona-Idaho Conservation Act of 1988, Pub. L. No. 100-696, § 101, 102 Stat. 4571, 4571.

 

## Assured Water Supply

**Reservation's Purpose**

**Development**

**Legally Available (Unquantified)**

**Quantified Rights**

**Requirement's Intent**

**Legislature's Policy**

**Supply Uncertainty**

**Developer's Obligation**

As stated in its founding Act, SPRNCA's primary purpose is to protect "to protect the riparian area and the aquatic, wildlife, archeological, paleontological, scientific, cultural, educational, and recreational resources of the public lands surrounding the San Pedro River in Cochise County, Arizona." 16 U.S.C. § 460xx. To accompany this purpose, Congress explicitly reserved water necessary to fulfill the reservation's purpose. 16 U.S.C. § 460xx-1(d). The Act directed the Secretary of the Interior to file a claim in the appropriate stream adjudication with a priority date of November 18, 1988. *Id.* SPRNCA's surface water claim is part of the Gila Rivera adjudication. *Silver* at 351. Note that this case will only settle SPRNCA's rights as it relates to surface water, not groundwater. The specific trial for the adjudication of SPRNCA's surface water rights is scheduled for January, 2019.

The Pueblo Del Sol Water Company (Pueblo) is a public utility company operating in Cochise County. *Silver* at 351. Pueblo is owned by a development company, County Castle & Cooke, Inc., which intends to build a mixed-use development of about 7000 commercial and residential units near Sierra Vista. *Id.* To support the development, Pueblo plans to pump about 1430 acre-feet to 4870 acre-feet per year from the groundwater approximately five miles away from the San Pedro River. *Id.* Thus, in 2013 Pueblo applied for an AWS determination from ADWR. *Id.*

Although the proposed well lies outside an AMA, Cochise County requires developers to obtain an adequate water supply determination before it will approve a plat subdivision. *Id.* at 353 n.1. Pueblo had few problems demonstrating that there would be sufficient groundwater physically available for one hundred years. *Id.* at 354. The real trouble came in demonstrating that the groundwater would be legally available for appropriation for a new water right. *Id.* At the time the case was decided, SPRNCA's federally reserved water rights had not yet been quantified. *Id.* at 351. If a water source's users don't know how much water they have a right to, how is one to determine how much, if any, water will be legally available in a century? The Arizona Supreme Court broadened that question and asked whether ADWR, is even required to consider any unquantified federal reserve water rights when determining if water is legally available. *Id* . The Court said no: ADWR isn't required to consider unquantified federal reserved water rights in its adequate water supply determinations. *Id.*

The key component of the Court's reasoning rested on its interpretation of the term "legally available" — which the Court described as a vague and ambiguous term. *Id.* at 355. Either (the majority argued) one could interpret "legally available" to mean that ADWR must consider "every conceivable" water right that might later influence a prospective developer's groundwater pumping operations or the term could only apply to existing, quantified water rights. *Id.* Ultimately, the Court chose the latter because it aligned with an ADWR regulation that existed prior to the statutory requirement. *Id.* The Court held that in adopting the legal availability requirement, the Legislature meant to adopt ADWR's regulation that private water companies have a legally available groundwater supply when they possess a Certificate of Convenience and Necessity from the Arizona Corporation Commission. *Id*. at 354. Interestingly, the Court did not say whether ADWR would need to consider *quantified* federal reserved claims in its assessment of legal availability, although ADWR did concede that it would have to acknowledge such rights. *Id*. at 360. This raises the question: was it really the Legislature's intent to ignore water rights that are existing, but not yet quantified, when it required a determination of legal availability?

The dissent argued that the legal availability requirement was intended to ensure that property buyers did not unknowingly buy land without adequate access to water. *Id*. at 361. As defined by the dissent, legally available water is water that can be used without violating the law. Id. "Water will not be available for the proposed subdivision's groundwater pumping if that use will withdraw water necessary to fulfill the purpose of the SPRNCA." Id., (citing *Cappaert v. United States*, 426 U.S. 127 (1976)). One of the chief purposes of the legal availability requirement was to protect consumers, and, the dissent argued, if a Certificate of Convenience and Necessity were the only necessary requirement to establish legal availability, the Legislature would certainly have said so in legislation. Id. at 362.

The majority acknowledged that their interpretation of "legally available" would put consumers at risk. *Id.*, at 360. But, the majority declined to "recast the statute's meaning under the guise of interpreting it" and reserved any policy changes for the Legislature. *Id.* at 361. It is worth noting that the Legislature had tried to pass legislation that would allow Pueblo to avoid Cochise County's adequate water requirement. Governor Ducey vetoed the — in his words — "bad bills."

***Silver's* Influence**

While Pueblo may have won the case, it seems that all of Arizona lost. If Arizona groundwater law is not as concerned with consumer protection as some would have previously claimed, then the Arizona Supreme Court's (Supreme Court's) decision in *Silver* made clear that there is significant uncertainty in Arizona's water supply. It is entirely possible that the Gila Adjudication may affirm and quantify federal water rights to the exclusion of future homeowners. Businesses seeking to buy land may look askance at a developer's promise of legally available water if it does not entail a promise that the water in question is legally available for use. The decision also presents a risk for Pueblo because it will still have an obligation to provide water to its customers as a condition of its Certificate of Convenience and Necessity, even in the event that its groundwater source becomes unavailable. *See Application of Trico Elec. Co-op., Inc*., 377

**Assured Water Supply**

P.2d 309, 315 (Ariz. 1962):

> By the issuance of a certificate of convenience and necessity to a public service corporation the State in effect contracts that if the certificate holder will make adequate investment and render competent and adequate service, he may have the privilege of a monopoly as against any other private utility.

**Reserves Risk**

In addition to the risk posed to Arizona citizens' water supply, the *Silver* decision also puts federal reserves at risk of losing water to which they are legally entitled. SPRNCA is certainly one of the most vulnerable reserves. A study by the United States Geological Survey found that even if all groundwater pumping across the Sierra Vista Subwatershed were to stop immediately, the cone of depression would still drain surface water from the San Pedro River for decades. Bruce Gungle et al., USGS, *Hydrological Conditions and Evaluation of Sustainable Groundwater Use in the Sierra Vista Subwatershed, Upper San Pedro Basin, Southeastern Arizona*, 78 (2017). Consider what a waste investing in nearby groundwater would be if such uses were deemed to infringe on a federal right, and there wasn't even any surface water left to flow in the river.

**Tribal Reserved Rights**

To be sure, the Supreme Court's decision has potential benefits. There is no end in sight for the Gila River Adjudication and insisting that assured water supply determinations cannot be made without full adjudication may delay or preclude development indefinitely. Of course, some federal reserved water rights are not as uncertain as those that SPRNCA claims. For example, some Native American tribes have federal reserved rights that have been fully declared by settlement and related Congressional legislation. In those cases, where there is no uncertainty regarding the quantity and priority of the asserted reserved right, ADWR could — and likely should — consider impacts of subdivision development and their asserted assured water supply on those reserved rights.

**Subordinate Rights**

On the other hand, the Supreme Court's decision has risks, as even the majority opinion concedes. While the quantity and priority of reserved rights like those held by SPRNCA are not fully adjudicated, the rights certainly exist. Subdivisions will receive approval from ADWR, declaring these subdivisions have a century of assured water, without any certainty that the water rights underlying that approval will not ultimately be determined to be subordinate to, or in conflict with, unadjudicated rights. This uncertainty is not simply a risk for state and local water managers and potential purchasers of subdivided property, but it presents real risks for developers seeking to market property when the underlying assured water supply is not on firm legal footing.

**Legislative Inaction**

The effects of the *Silver* decision are far-reaching and influence a variety of stakeholders. How will those whom the decision impacts the most respond? It is possible for federal entities to lobby and wait for the Arizona Legislature to amend the statute to convey a more consumer-protection-oriented statute, but that seems unlikely given that the Legislature attempted to pass two laws that would allow Pueblo to disregard the adequate water supply designation (*see* https://azcapitoltimes.com/news/2016/05/09/ducey-to-veto-bad-water-bills/). As noted above, those laws were only stopped by a gubernatorial veto. *Id.*

## Possible Reforms to Respond to the *Silver* Decision

**Adjudication Reform?**

The GMA could be amended by legislation to direct ADWR to use its discretion and consider unquantified federal reserve rights when issuing CAWS or DAWS. However, perhaps the most important reforms would be aimed, not at the GMA, but at the Gila River adjudication. While there are several such potential reforms, this part will address three, each of which has promise and would face some legal and political obstacles to implementation. For a more in-depth overview of these proposals, *see* Rhett Larson, *Overcoming Constitutional Obstacles to the Resolution of General Stream Adjudications*, 8 Ariz. J. Envtl. L. & Pol'y 52 (2018).

**Test Case, Contingent Legislation & Settlement**

**Exemptions?**

One possible approach to facilitating the resolution of the Gila River Adjudication and addressing the uncertainties and risks surrounding the *Silver* decision is to pass legislation granting exemptions to, or grandfather protections to, groundwater rights supporting AWS approvals by ADWR. As a nod to federal rights like SPRNCA that could be impacted by such protections or exemptions, legislation would also prioritize federal claims in the general stream adjudication and allocate more resources to settlement of federal claims. That legislation would be contingent on court approval. Potential legal challenges to the legislation could be faced directly through a test case to resolve potential constitutional objections based on eminent domain or separation of powers claims.

**Consensus Unlikely**

The proposal could face significant obstacles. Federal settlements, or even broad consensus for contingent legislation, would be difficult given the scope and diversity of interests in play. Additionally, such a proposal would face some political opposition. That political opposition is likely to be particularly acute if the legislation includes any cap on, or more stringent management of, groundwater outside of AMAs, as such a move would be considered anti-growth by many municipalities and businesses. Also, determining an appropriate test case and coordinating between a settlement, test case, and legislation would present enormous logistical challenges with unpredictable potential outcomes.

 

**Assured Water Supply**

**Water Escrow**

**Forfeiture Shield**

**Bank Protection**

**Market Limits**

**Mitigation Fee**

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**State Water Escrow: Forfeiture Shield**

Another possible reform to facilitate resolution of the general stream adjudication, and thus to mitigate the risks of the *Silver* decision, would be for Arizona to establish a state water escrow. Such a system would allow water right holders to temporarily or permanently place their water rights in escrow, where those rights would be shielded from forfeiture. This would allow farmers to take advantage of improved water efficiency without the risk of forfeiting their water rights. While in escrow, water rights would protect instream flows. The escrow would also provide a clearinghouse for water rights transactions, with such transactions benefiting from an expedited sever-and-transfer process. Protection from forfeiture and lowered transaction costs would hopefully attract buyers and sellers to the escrow.

In exchange for these benefits, a portion of all water rights moving through the escrow would be held back to build a bank of water rights held by the escrow. This bank would serve two purposes. First, it would create a permanent protection for instream flows. Second, it would build up a source of discounted water rights that would mitigate losses to those who may lose in the general stream adjudication — for example, those who assumed they were pumping groundwater, but instead were pumping subflow with a junior priority. If more parties see that there will be some protection and some opportunities at the end of the adjudication, they may be more willing to invest in its resolution.

Despite its promise, the water escrow concept has significant limitations. It may not function in its intended purpose in some river basins or segments, particularly in areas with large non-tribal federal reservations (like SPRNCA). This is because a functioning water escrow would require the presence of enough cities or farmers looking to benefit from improved efficiency efforts and enough new buyers to stoke a robust market for rights held in escrow. Furthermore, the expedited sever-and-transfer process in the escrow is a fine incentive in theory, but it may not provide sufficient process to water right holders whose vested rights would be impacted by sales through the escrow.

**Voluntary Regional Water Mitigation Authorities**

In addition to a state water escrow, Arizona could establish **r**egional **w**ater **m**itigation **a**uthorities (RWMAs) as a means of facilitating resolutions to its general stream adjudications. Under this approach, ADWR would use a mathematical model to determine any well's relationship to the subflow zone, which would conservatively estimate the well's impact on surface water. ADWR would use that estimate to determine a mitigation fee owed by well owners to senior appropriators, which would be voluntarily paid to the well owner's RWMA. Such an RWMA would be a quasi-municipal entity with jurisdiction based on sub-basins. So long as members pay their mitigation fee to the RWMA, those RWMA members would be shielded from a call on the river by senior water right holders.

Instead, those senior right holders would call on the RWMA, which would use member fee payments to compensate senior right holders. RWMAs could rely on the state water escrow as a source of water rights to make senior water right holders whole. Subflow pumpers who elect not to join an RWMA could still seek to adjudicate their rights as part of the general stream adjudication. This voluntary approach would allow for some protection of subflow pumper's water supply, while still protecting senior water right holders. Additionally, RWMAs would make it less costly and more straightforward for senior water right holders to identify parties in negotiating settlements of water disputes.

There are practical limits to the RWMA proposal. These include how best to develop the underlying model and connect it to an appropriate fee, as well as the extent to which RWMAs could invest in water augmentation projects, like desalination or cloud seeding, to compensate senior water right holders. Additionally, RWMAs would raise some political and legal complications, including the authority of the RWMAs to issue bonds, establish and enforce regulations on members, and exercise powers of eminent domain.

## Conclusion

The *Silver* decision adds to the uncertainty surrounding Arizona's future water security. It creates greater uncertainty for homebuyers, developers, and especially for unquantified federal water rights. While the Legislature could act to reform the narrow issue of whether and how ADWR evaluates unquantified federal rights, it could also take the *Silver* decision as an opportunity to address greater challenges to the quantification of water rights in Arizona's general stream adjudications.

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**Hydropower Ruling**

# HYDROPOWER RELICENSING

***AMERICAN RIVERS V. FERC***

**PAST ENVIRONMENTAL HARM — A NEW DAY FOR HYDROPOWER RELICENSING?**

by Walker Stanovsky, Craig Gannett, and Rick Glick (Davis Wright Tremaine LLP: Portland, OR)

## Introduction

In 2013, the Federal Energy Regulatory Commission (FERC) issued a hydroelectric license to the Alabama Power Company. *Alabama Power Company*, Order Issuing New License, 143 FERC ¶ 61,249 (2013) (the "License Order"). On July 6, 2018, the District of Columbia Circuit Court of Appeals (D.C. Circuit) torpedoed that hydroelectric license because FERC and the US Fish and Wildlife Service (USFWS) "declined to factor in the decades of environmental damage already wrought by exploitation of the waterway for power generation and that damage's continuing ecological effects." *American Rivers v. FERC*, Nos. 16-1195, 16-2336, ---- F.3d ----, 2018 WL 3320870 (D.C. Cir. July 6, 2018); *Slip Opinion* at 2. In doing so, the court rejected FERC's attempt to follow its longstanding practice of limiting environmental review of past impacts by using existing conditions and operations as the environmental baseline.

**Environmental Baseline**

The decision — *American Rivers v. FERC* — uses unusually sharp language to chastise FERC and USFWS for: sloppy analysis; failing to follow USFWS' own guidance; relying on weak or non-existent data; and failing to properly explain their reasoning.

**Relicensing Shift?**

However, it remains to be seen how far this case will shift the law regarding the use of environmental baselines under the Federal Power Act (FPA), the National Environmental Policy Act (NEPA), and the federal Endangered Species Act (ESA). Are the shortcomings in FERC's analysis easily fixable on remand, or does this represent a fundamental shift in how the courts will view the relicensing of dams constructed long before enactment of the environmental safeguards of the 1970s and 80s? (*American Rivers v. FERC* quotes will be cited as *Slip Op.* or referred to as the "July 6th opinion" hereafter).

## D.C. Circuit's Environmental Baseline Analysis

**Past Impacts**

During the relicensing proceeding, FERC relied on existing environmental conditions — continued project operation under the existing license — as the baseline to evaluate potential environmental impacts. Environmental groups opposed using existing conditions as the environmental baseline and instead pushed for NEPA and the ESA analysis that took account of past environmental impacts from project construction and operation. License Order at P. 229 and n.236 (citing Conservation Groups July 8, 2010 Comments at 64-67).

**FERC Past Practice**

FERC defended its practice, citing opinions of the Ninth Circuit in 1999 and the D.C. Circuit in 2000:

> In relicensing proceedings, the Commission uses existing environmental conditions (i.e., continued project operation under the existing license) as a baseline against which to evaluate the environmental impacts of an applicant's proposal and other reasonable alternatives. This longstanding practice has been upheld by the courts, and Conservation Groups provide no persuasive arguments for changing this practice.

License Order at P. 231 (citing *American Rivers v. FERC*, 201 F.3d 1186, 1195-96 (9th Cir. 2000); *Conservation Law Foundation v. FERC*, 216 F.3d 41, 46-47 (D.C. Cir. 2000)).

**BiOp Rejected**

In the July 6th decision, however, the D.C. Circuit would have none of it. First, the court rejected the USFWS' **bi**ological **op**inion (BiOp, a requirement under the ESA) because the agency's analysis excluded historic impacts and thereby departed irrationally from the agency's own ESA handbook and regulations. *Slip Op.* at 22. The court criticized USFWS for not addressing an incidental take of 100% of multiple species resulting from continued project operations:

**100% Take**

> In its briefing before this Court, the Department of Interior argues that the one hundred percent take only refers to individual members of the species in a specific location. Given its absence from the Opinion [BiOp], this argument appears to be a post-hoc litigation position. The Opinion never suggests as a basis for its finding of no jeopardy that the local populations are insignificant to the larger populations. [citation]
> ***

 

## Hydropower Ruling

**Reinitiation Notice**

**Previous Damage**

**Fish Passage Analysis Flaws**

**No Nice Zoo Defense**

**Water Quality Certification**

**NEPA & ESA Compliance**

> The Department argued that if there ended up being a higher percentage of harm than predicted, however, reinitiation of consultation would be required. [citation]. But the Department admitted that it would not be able to detect take for certain species. [citation]. As a result, the Department acknowledged that the reinitiation notice in the [BiOp] was only included to meet Fish and Wildlife Service's regulatory obligations. [citation]. The requirement to include a trigger for reinitiation of consultation necessitates more than lip service. The lack of a clear trigger point to reinitiate consultation renders the Opinion [BiOp] unlawful.

*Slip Op.* at 25-26 (citations omitted).

Next the court rejected FERC's NEPA analysis, which relied heavily on the BiOp and was "fatally infected" by the failure to consider "the damage already wrought by the construction of dams into the cumulative impacts analysis... ." *Slip Op.* at 39. The court was singularly unimpressed with FERC's analysis impacts to fish passage:

> That analysis is rife with flaws. First, the Commission's only cited evidence for the amount of fish deaths was a more-than-decade-old-survey of fish entrainment studies and estimates provided by the license applicant itself, Alabama Power. No updated information was collected; no field studies were conducted. Nor was any independent verification of Alabama Power's estimates undertaken. Assuming Alabama Power's good faith, its estimates were entirely unmoored from any empirical, scientific, or otherwise verifiable study or source. The Commission also failed to take even the preliminary step of attempting to acquire recent or site-specific data against which Alabama Power's estimates could have been compared. The Commission's acceptance, hook, line, and sinker, of Alabama Power's outdated estimates, without any interrogation or verification of those numbers is, in a word, fishy. And it is certainly unreasoned.
>
> * * *
>
> An old review of even older and geographically remote projects is far too thin a reed on which to rest a conclusion that annually killing 11% of a fish population is of no environmental significance.

*Slip Op.* at 29-30.

The court thoroughly rejected FERC's pointing to the recreational fishery established by the project as a substitute for thorough-going analysis:

> [The] Commission's cheery assurance that "excellent" human-operated sport and commercial fisheries remain downstream is just whistling past the graveyard. [citation]. The Commission, for its part, made no effort to explain how downstream, human-operated sport and commercial fisheries are relevant bellwethers for environmental impacts in the upstream Coosa River. After all, the nearby presence of a nice zoo has never been a relevant answer under NEPA to high species mortality in nature.

*Slip Op.* at 31 (citation omitted).

Although the project received certification under Clean Water Act section 401 by the state of Alabama, the court chastised FERC for disregarding water quality standards, particularly for dissolved oxygen. Alabama Power had proposed an aeration system, but offered little technical support, which FERC should have insisted upon, according to the court:

> These aeration systems are generally designed to pump additional oxygen into the water during generation periods. That sounds like a promising approach. At least, if the aspiration were matched with substance. But it is not on this administrative record. The licensing record is devoid of information about what aeration system will be implemented, or when, or how it will perform.

*Slip Op.* at 35.

Finally, the court held that the analytical failures under NEPA and the ESA also violated FERC's obligations under the Federal Power Act itself.

> Finally, we note that in this case, the question of whether the Commission complied with its statutory obligations under the Federal Power Act's licensing provisions is subsumed by questions concerning its compliance with countervailing statutory restrictions imposed by NEPA and ESA. The propriety of the Commission's decision under the Federal Power Act, on these facts, thus stands or falls on the merits of the NEPA and ESA inquiries. In light of the foregoing, it must fall.

*Slip Op.* at 39-40.

**Hydropower Ruling**

**Baseline Analysis**

**NEPA & ESA Flaw**

**Split Authorities**

**Forum Shopping**

**Existing Conditions Appropriate**

**Failure to Analyze**

**Possible Outcomes**

Surprisingly, the D.C. Circuit's scathing analysis did not discuss either of the two circuit court opinions (*American Rivers*, 9th Cir. 1999, and *Conservation Law Foundation*, D.C. Cir. 2000) that FERC relied on in justifying its exclusion of past impacts from the baseline. Nor had FERC, in the License Order, discussed the primary circuit court opinion (*National Wildlife Federation*, 9th Cir. 2008) on which the D.C. Circuit relied in its analysis of the *Alabama Power* baseline. *See Slip Op.* at 9 (citing *National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917 (9th Cir. 2008)). As a result, determining how the new *American Rivers* decision changes the legal landscape created by the three preceding cases will require analysis by future courts. For now, here are four ways that courts might view the case's effect on the environmental baseline issue in FERC relicensing.

**Overruling D.C. Circuit Court Precedent**

In the License Order, FERC justified using existing conditions as the baseline in part by citation to the D.C. Circuit's 2000 opinion in *Conservation Law Foundation*, in which the D.C. Circuit upheld FERC's use of existing conditions as the baseline in a licensing proceeding. As quoted earlier in this article, FERC defended its practice by noting that it was a longstanding practice upheld by the courts and no persuasive arguments for changing the practice was provided. Though the *Conservation Law Foundation* baseline analysis dealt only with the FPA — not NEPA or the ESA — a later court might read the new holding that the faulty baseline under NEPA and the ESA "fatally infected" the FPA analysis, and conclude that Friday's decision overrules *Conservation Law Foundation* on the baseline issue. On the other hand, a later court could also attempt to reconcile the two, perhaps by reasoning that existing conditions may suffice as a baseline for analysis under the FPA, but not NEPA or ESA.

**Circuit "Split" Between D.C. Circuit and Ninth Circuit**

Both the License Order and *Conservation Law Foundation* relied on the Ninth Circuit's 1999 opinion in another *American Rivers* case. *See* License Order at P. 231 n.238; *Conservation Law Foundation*, 216 F.3d at 46. Like *Conservation Law Foundation*, the 1999 *American Rivers* opinion analyzed the acceptability of FERC's baseline mainly in reference to the requirements of the FPA, not NEPA or the ESA. *See American Rivers*, 201 F.3d at 1195-99. If the July 6th opinion overruled *Conservation Law Foundation* on the baseline issue, a later court might also view it as inconsistent with the Ninth Circuit's older *American Rivers* opinion, resulting in a direct split of authority between the Ninth and D.C. Circuits on the proper baseline in FERC licensing. Specifically, FERC's approach to the environmental baseline would survive in the Ninth Circuit but be deeply suspect in the D.C. Circuit, until the US Supreme Court had occasion to resolve the discrepancy. The Federal Power Act allows direct review of FERC orders in either the D.C. Circuit or the circuit where the licensee is located (16 U.S.C. § 825l(b)), so the split would make a tempting target for forum-shopping, especially regarding projects located in the Ninth Circuit.

**Filling a Gap in Ninth Circuit Precedent**

The Ninth Circuit in *American Rivers* only dealt with the baseline issue as a matter of Federal Power Act compliance; its NEPA analysis focused on whether FERC considered a reasonable range of alternatives, and the opinion did not analyze the ESA at all. *See American Rivers*, 201 F.3d at 1195-99. The Ninth Circuit then moved on to NEPA, but analyzed only whether FERC considered a reasonable range of alternatives — the Ninth Circuit said nothing about whether existing conditions could constitute an appropriate environmental baseline for NEPA purposes. *See id.* at 1199-1201. The Ninth Circuit's later decision in *National Wildlife Federation*, by contrast, faulted the ESA BiOp at issue in the case for excluding past impacts from its environmental baseline, but also did not address NEPA. *National Wildlife Federation*, 524 F.3d at 929-31. Thus, a later court might view the July 6th opinion as simply filling a gap left by the Ninth Circuit decisional law by answering the environmental baseline question with respect to NEPA.

**Baseline as "Red Herring"**

Finally, as the D.C. Circuit on July 6th recognized at the outset, the environmental impacts of hydropower implicate "three intersecting statutory schemes" — the FPA, NEPA, and ESA — "all…are designed to force federal agencies to carefully assess and address the environmental impacts of large-scale development projects." *Slip Op. at 3*. One way to reconcile these leading cases may be simply that the courts will reject any license order that fails to seriously analyze past environmental conditions and impacts, and will therefore reject any attempt to rely on existing conditions as an environmental baseline *if* the effect is to paper over such a failure.

 

## Hydropower Ruling

### Full Options Examination

In *Conservation Law Foundation*, after upholding FERC's use of an existing conditions baseline, the D.C. Circuit noted that "the baseline business has the whiff of a red herring." *Conservation Law Foundation*, 216 F.3d at 46. In weighing FERC's licensing decision against the standards of both the FPA and NEPA, the court reasoned that "[b]aseline or no baseline, the question is whether the Commission has fully examined options calling for greater or lesser environmental protection." *Id.* at 45-46 (citing, inter alia, 16 U.S.C. §§ 797(e), 803(j) (FPA); 42 U.S.C. § 4321 et seq. (NEPA)).

Thus, perhaps the most important aspect for the *Conservation Law Foundation* court was not the choice of baseline, but the rationality and completeness of the analysis. "So long as the Commission examines options that include recommended environmental enhancements, its choice of baseline will not prevent it from giving 'equal consideration' to nonpower values." *Id.* at 46.

### Exclusion from Analysis

One can read the 1999 *American Rivers* and *National Wildlife Federation* similarly. *See American Rivers*, 201 F.3d at 1197-98 (citations omitted): "We agree with the Commission that the adoption of an existing project baseline does not preclude consideration and inclusion of conditions in a license that enhance fish and wildlife resources and reduce negative impacts attributable to a project since its construction." In *National Wildlife Federation*, 524 F.3d at 929, the Ninth Circuit found that the National Marine Fisheries Service "may not avoid determining the limits of the action agencies' discretion by using a reference option to sweep so-called 'nondiscretionary' operations into the environmental baseline, thereby excluding them from the requisite ESA jeopardy analysis." Of course, this reading also suggests that FERC and resource agencies cannot shield themselves from analyzing a project's past impacts — perhaps even long-past — by selecting current conditions as the environmental baseline in implementing the FPA, ESA, and NEPA in hydropower licensing proceedings.

### Lessons

**Conclusion**

All eyes now shift to FERC and USFWS on remand and re-consultation. What lessons will they take from the D.C. Circuit? Does this case mark a sea change in how the agencies analyze environmental impacts? Could that spill over into their selection of mitigation measures? Or must the agencies merely do a better job of explaining how past impacts fit into their analyses under these key statutes?

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Slip Opinion available at: www.ferc.gov/legal/court-cases/opinions/2018/16-1195.pdf

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Water & Climate

# WATER & CLIMATE CHANGE

EXCERPTS FROM THE FOURTH NATIONAL CLIMATE ASSESSMENT

VOLUME II: IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES

**Editors' Introduction:** The Fourth National Climate Assessment was released by the White House in November. What follows are excerpts from the Assessment pertaining to the possible impacts of climate change on water in the United States. Numerous citations and footnote references have been omitted and some editing has been done to better match our format.

The Fourth National Climate Assessment is available online at: https://nca2018.globalchange.gov

## OVERVIEW

FROM SUMMARY FINDINGS

Risks & Costs

*The quality and quantity of water available for use by people and ecosystems across the country are being affected by climate change, increasing risks and costs to agriculture, energy production, industry, recreation, and the environment.*

Varying Impacts

Rising air and water temperatures and changes in precipitation are intensifying droughts, increasing heavy downpours, reducing snowpack, and causing declines in surface water quality, with varying impacts across regions. Future warming will add to the stress on water supplies and adversely impact the availability of water in parts of the United States. Changes in the relative amounts and timing of snow and rainfall are leading to mismatches between water availability and needs in some regions, posing threats to, for example, the future reliability of hydropower production in the Southwest and the Northwest. Groundwater depletion is exacerbating drought risk in many parts of the United States, particularly in the Southwest and Southern Great Plains. Dependable and safe water supplies for US Caribbean, Hawai'i, and US-Affiliated Pacific Island communities are threatened by drought, flooding, and saltwater contamination due to sea level rise. Most U.S. power plants rely on a steady supply of water for cooling, and operations are expected to be affected by changes in water availability and temperature increases. Aging and deteriorating water infrastructure, typically designed for past environmental conditions, compounds the climate risk faced by society. Water management strategies that account for changing climate conditions can help reduce present and future risks to water security, but implementation of such practices remains limited.

Management Strategies

## US WATER & CLIMATE CHANGE IMPACTS

FROM VOLUME II, CHAPTER 3: WATER

**Water Security**

Reliable Supplies

Water security in the United States is increasingly in jeopardy. Ensuring a reliable supply of clean freshwater to communities, agriculture, and ecosystems, together with effective management of floods and droughts, is the foundation of human and ecological health. The water sector is also central to the economy, contributing significantly to the resilience of many other sectors, including agriculture, energy, urban environments, and industry. The health and productivity of natural aquatic and wetland ecosystems are also closely linked to the water sector.

Water Infrastructure

Changes in the frequency and intensity of climate extremes relative to the 20th century and deteriorating water infrastructure are contributing to declining community and ecosystem resilience. Climate change is a major driver of changes in the frequency, duration, and geographic distribution of severe storms, floods, and droughts. In addition, paleoclimate information (reconstructions of past climate derived from ice cores or tree rings) shows that over the last 500 years, North America has experienced pronounced wet/dry regime shifts that sometimes persisted for decades. These shifts led to protracted exposures to extreme floods or droughts in different parts of the country that are extraordinary compared to events experienced in the 20th century. Operational principles for engineering, design, insurance programs, water quality regulations, and water allocation generally have not factored in these longer-term perspectives on historical climate variability or projections of future climate change. While there has been much discussion on the need for climate adaptation, the design and implementation of processes that consider near- and long-term information on a changing climate are still nascent.

Operational Principles

**Water & Climate**

**Water Storage Limits**

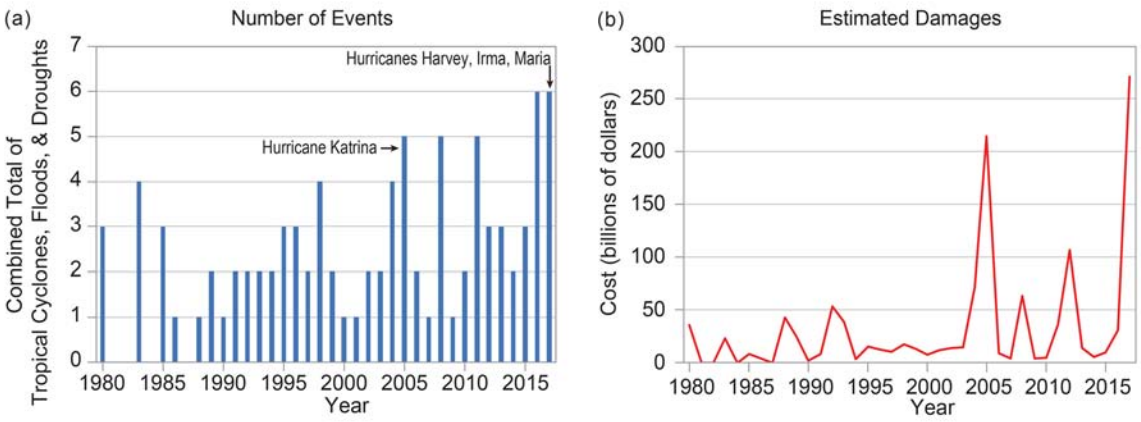
Water systems face considerable risk even without anticipated future climate changes. Gains in water-use efficiency over the last 30 years have resulted in total US water consumption staying relatively constant. Gains in efficiency are most evident in urban centers. However, limited surface water storage and a limited ability to make use of long-term drought forecasts and to trade water across uses and basins have led to the significant depletion of aquifers in many regions of the United States. Aging and deteriorating dams and levees also represent an increasing hazard when exposed to extreme or, in some cases, even moderate rainfall. Several recent heavy rainfall events have led to dam, levee, or critical infrastructure failures, including the Oroville emergency spillway in California in 2017, Missouri River levees in 2017, 50 dams in South Carolina in October 2015 and 25 more dams in the state in October 2016, and New Orleans levees in 2005 and 2015. The national exposure to this risk has not yet been fully assessed.

**Regional Summaries**

Every region of the United States is affected by water sector sensitivities to weather- and climate-related events (see Figure 3.1).

**Disasters**

**Figure 3.1 Billion-Dollar Weather & Climate Disaster Events in the US**




The figure shows (a) the total number of water-related billion-dollar disaster events (tropical cyclones, flooding, and droughts combined) each year in the United States and (b) the associated costs (in 2017 dollars, adjusted for inflation).
Source: adapted from NOAA NCEI 2018.19

**Regional Summaries**

Recent examples are summarized below:

*Northern and Southern Great Plains:* Future changes in precipitation and the potential for more extreme rainfall events will exacerbate water-related challenges in the Northern Great Plains. Extreme precipitation and rising sea levels associated with climate change make the built environment in the Southern Great Plains increasingly vulnerable to disruption, particularly as infrastructure ages and deteriorates. Flooding on the Mississippi and Missouri Rivers in May 2011 caused an estimated $5.7 billion in damages (in 2018 dollars). One year later, drought conditions in 2012 led to record low flows on the Mississippi, disrupting river navigation and agriculture and resulting in widespread harvest failures for corn, sorghum, soybean, and other crops. The nationwide total damage from the 2012 drought is estimated at $33 billion (in 2018 dollars).

**Extreme Droughts**

*Northeast and Southeast:* Much of the water infrastructure in the Northeast is nearing the end of its planned life expectancy. Disruptions to infrastructure are already occurring and will likely become more common with a changing climate. Hurricane Irene (2011) and Superstorm Sandy (2012) highlighted the inadequacy of deteriorating urban infrastructure, including combined sewers, for managing current and future storm events. In the Southeast, the combined effects of extreme rainfall events and rising sea level are increasing flood frequencies, making coastal and low-lying regions highly vulnerable to climate change impacts. In South Carolina in 2015, locally extreme rainfall exceeding 20 inches over 3 days caused widespread damage, including the failure of 49 state-regulated dams, one federally regulated dam, two sections of the levee adjacent to the Columbia Canal, and many unregulated dams. In Louisiana in 2016, a severe large-scale storm with record atmospheric moisture dropped nearly 20 inches of rain in 72 hours, triggering widespread flooding that damaged at least 60,000 homes and led to 13 deaths.

**Hurricane Rainfall**

**Water & Climate**

**Algal Blooms**

*Midwest:* Storm water management systems and other critical infrastructure in the Midwest are already experiencing impacts from changing precipitation patterns and elevated flood. In addition, **h**armful **a**lgal **b**looms (HABs) in western Lake Erie have been steadily increasing over the past decade. Warmer temperatures and heavy precipitation associated with climate change contribute to the development of HABs. Harmful algal blooms can introduce cyanobacteria into recreational and drinking water sources, resulting in restrictions on access and use. In 2014 in Toledo, Ohio, half a million people were warned to avoid drinking the water due to toxins overwhelming a water treatment plant in Lake Erie's western basin as a result of a harmful bloom. Conditions that encourage cyanobacteria growth, such as higher water temperatures, increased runoff, and nutrient-rich habitats, are projected to increase in the Midwest.

**Salmon Risks**

*Northwest and Alaska:* Pacific salmon populations in the Northwest are being affected by climate stressors, including low snowpack (such as in 2015), decreasing summer streamflow, habitat loss through increasing storm intensity and flooding, physiological and behavioral sensitivity, and increasing mortality due to warmer stream and ocean temperatures. Salmon are a cultural and ecological keystone species in this region. Salmon loss is a particular threat to the cultural identities and economies of Indigenous communities. In Alaska, residents, communities, and their infrastructure also continue to be affected by flooding and erosion of coastal and river areas, resulting from changes in sea ice.

**Water Supply Reliability**

*Southwest:* Water supplies for people and nature in the Southwest are decreasing during droughts due in part to human-caused climate change. Intensifying droughts, increasing heavy downpours, and reduced snowpack are combining with increasing water demands from a growing population, deteriorating infrastructure, and groundwater depletion to reduce the future reliability of water supplies. The 2011–2016 California drought was characterized by low precipitation combined with record high temperatures, leading to significant socioeconomic and environmental impacts. Drought risk is being exacerbated by increasing human water use and the depletion of groundwater that serves as a buffer against water scarcity. Rising air temperatures may increase the chance of droughts in the western United States. Compounding the impacts of drought in February 2017, heavy, persistent rainfall across northern and central California led to substantial property and infrastructure damage from record flooding, landslides, and erosion.

**Groundwater Depletion**

**Island Impacts (Saltwater Intrusion)**

*U.S. Caribbean, Hawai'i and U.S.-Affiliated Pacific Islands*: Dependable and safe water supplies for the communities and ecosystems of the U.S. Caribbean, Hawai'i, and the U.S.-Affiliated Pacific Islands are threatened by rising temperatures, sea level rise, saltwater intrusion, and increased risk of extreme drought and flooding. The U.S. Caribbean is experiencing an increasing frequency of extreme events that threaten life, property, and the economy. On September 20, 2017, Hurricane Maria struck the U.S. Virgin Islands as a Category 5 storm and then Puerto Rico as a Category 4 storm — just two weeks after Hurricane Irma had struck the Caribbean islands. The storms left devastation in their wake, with the power distribution severely damaged and drinking water and wastewater treatment plants rendered inoperable. Maria's extreme rainfall, up to 37 inches in 48 hours in some places, also caused widespread flooding and mudslides across the islands.

## CHANGES IN WATER QUANTITY AND QUALITY

**Timing: Supply & Demand**

**Mobilized Pollutants**

Significant changes in water quantity and quality are evident across the country. These changes, which are expected to persist, present an ongoing risk to coupled human and natural systems and related ecosystem services. Variable precipitation and rising temperature are intensifying droughts, increasing heavy downpours, and reducing snowpack. Reduced snow-to-rain ratios are leading to significant differences between the timing of water supply and demand. Groundwater depletion is exacerbating drought risk. Surface water quality is declining as water temperature increases and more frequent high-intensity rainfall events mobilize pollutants such as sediments and nutrients.

**Snowmelt Shift**

Increasing air temperatures have substantially reduced the fraction of winter precipitation falling as snow, particularly over the western United States. Warming has resulted in a shift in the timing of snowmelt runoff to earlier in the year. Glaciers continue to melt in Alaska and the western United States. Shifts in the hydrological regime due to glacier melting will alter stream water volume, water temperature, runoff timing, and aquatic ecosystems in these regions. As temperatures continue to rise, there is a risk of decreased and highly variable water supplies for human use and ecosystem maintenance.

**Regional Differences**

Additionally, heavy precipitation events in most parts of the United States have increased in both intensity and frequency since 1901 and are projected to continue to increase over this century under both a lower and higher scenario. There are, however, important regional and seasonal differences in projected changes in total precipitation.

**Water & Climate**

**Efficiency**

**Groundwater Withdrawal**

**Conjunctive Management**

**Water Quality Effects**

**Warm Water**

**Nutrient Loading**

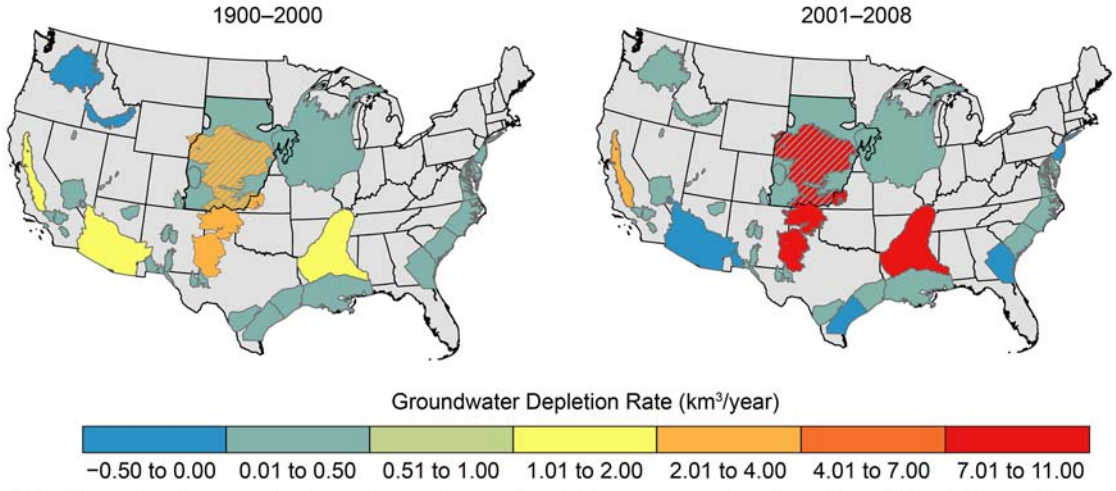
**Aquifer Changes**

Higher temperatures also result in increased human use of water, particularly through increased water demand for agriculture arising from increased evapotranspiration. In some regions of the United States, water supplies are already stressed by increasing consumption. Continued warming will add to the stress on water supplies and adversely impact water supply reliability in parts of the United States. Over the last 30 years, improvements in water-use efficiency have offset the increasing water needs from population growth, and national water use has remained constant. However, without efforts to increase water-use efficiency in rural and urban areas, increased future demand due to warming could exceed future supply in some locations.

In the United States, groundwater provides more than 40% of the water used for agriculture (irrigation and livestock) and domestic water supplies. Groundwater use for irrigation has increased substantially since about 1900 and in some areas has exceeded natural aquifer recharge rates. For example, in the High Plains Aquifer, the largest freshwater aquifer in the contiguous United States that supports an important agricultural region, the rate of groundwater withdrawal for irrigation is nearly 10 times the rate of natural recharge, resulting in large groundwater depletions (see Figure 3.2). Groundwater pumping for irrigation is a substantial driver of long-term trends in groundwater levels in the central United States. In many parts of the United States, groundwater is being depleted due to increased pumping during droughts and concentrated demands in urban areas. Increasing air temperatures, insufficient precipitation, and associated increases in irrigation requirements will likely result in greater groundwater depletion in the coming decades. The lack of coordinated management of surface water and groundwater storage limits the Nation's ability to address climate variability. Management of surface water and groundwater storage and water quality are not coordinated across different agencies, leading to inefficient response to changing climate.

Changes in climate and hydrology have direct and cascading effects on water quality. Anticipated effects include warming water temperatures in all U.S. regions, which affect ecosystem health, and locally variable changes in precipitation and runoff, which affect pollutant transport into and within water bodies. These changes pose challenges related to the cost and implications of water treatment, and they present a risk to water supplies, public health, and aquatic ecosystems. Increases in high flow events can increase the delivery of sediment, nutrients, and microbial pathogens to streams, lakes, and estuaries; decreases in low flow volume (such as in the summer) and during periods of drought can impact aquatic life through exposure to high water temperatures and reduced dissolved oxygen. The risk of harmful algal blooms could increase due to an expanded seasonal window of warm water temperatures and the potential for episodic increases in nutrient loading. In coastal areas, saltwater intrusion into coastal rivers and aquifers can be exacerbated by sea level rise (or relative sea level rise related to vertical land movement),

**Figure 3.2 Depletion of Groundwater in Major US Regional Aquifers**




**LEFT:** Groundwater supplies have been decreasing in the major regional aquifers of the US over the last century (1900–2000). **RIGHT:** This decline has accelerated recently (2001–2008) due to persistent droughts in many regions and the lack of adequate surface water storage to meet demands. This decline in groundwater compromises the ability to meet water needs during future droughts and impacts the functioning of groundwater dependent ecosystems. The values shown are net volumetric rates of groundwater depletion ($km^3$ per year) averaged over each aquifer. Subareas of an aquifer may deplete at faster rates or may be actually recovering. Cross-hatching in the figure represents where the High Plains Aquifer overlies the deep, confined Dakota Aquifer. Source: adapted from Konikow 2015.

**Water & Climate**

storm surges, and altered freshwater runoff. Saltwater intrusion could threaten drinking water supplies, infrastructure, and coastal and estuarine ecosystems. Indirect impacts on water quality are also possible in response to an increased frequency of forest pest/disease outbreaks, wildfire, and other terrestrial ecosystem changes; land-use changes (for example, agricultural and urban) and water management infrastructure also interact with climate change to impact water quality.

## DETERIORATING WATER INFRASTRUCTURE AT RISK

Deteriorating water infrastructure compounds the climate risk faced by society. Extreme precipitation events are projected to increase in a warming climate and may lead to more severe floods and greater risk of infrastructure failure in some regions. Infrastructure design, operation, financing principles, and regulatory standards typically do not account for a changing climate. Current risk management does not typically consider the impact of compound extremes (co-occurrence of multiple events) and the risk of cascading infrastructure failure.

**Aging Infrastructure**

Across the Nation, much of the critical water infrastructure is aging and, in some cases, deteriorating or nearing the end of its design life, presenting an increased risk of failure. Estimated reconstruction and maintenance costs aggregated across dams, levees, aqueducts, sewers, and water and wastewater treatment systems total in the trillions of dollars based on a variety of different sources. Capital improvement needs for public water systems (which provide safe drinking water) have been estimated at $384 billion for projects necessary from 2011 through 2030. Similarly, capital investment needs for publicly owned wastewater conveyance and treatment facilities, combined sewer overflow correction, and storm water management to address water quality or water quality-related public health problems have been estimated at $271 billion over a 20-year period. More than 15,000 dams in the United States are listed as high risk due to the potential losses that may result if they failed.

**Needed Improvements**

Extreme precipitation events are projected to increase in a warming climate and may lead to more severe floods and greater risk of infrastructure failure in some regions. Long-lasting droughts and warm spells can also compromise earth dams and levees as a result of the ground cracking due to drying, a reduction of soil strength, erosion, and subsidence (sinking of land). To date, however, there is no comprehensive assessment of the climate-related vulnerability of U.S. water infrastructure, and climate risks to existing infrastructure systems remain unquantified. Tools, case studies, and other information are available that can be adopted into design standards and operational guidelines to account for future climate and/or integrate climate projections into infrastructure design. However, there are no common design standards or operational guidelines that address how infrastructure should be designed and operated in the face of changing climate risk or that even target the range of climate variability seen over the last 500 years.

**Extreme Precipitation**

Procedures for the design, estimation of probability of failure, and risk assessment of infrastructure rely on 10–100 years of past data about flood and rainfall intensity, frequency, and duration. This approach assumes that the frequency and severity of extremes do not change significantly over time. However, numerous studies suggest that the severity and frequency of climatic extremes, such as precipitation and heat waves, have, in fact, been changing. These changes present a regionally variable risk of increased frequency and severity of floods and drought. In addition, tree ring reconstructions of climate over the past 500 years for the United States illustrate a much wider range of climate variability than does the instrumental record (which begins around 1900). This historical variability includes wet and dry periods with statistics very different from those of the 20th century. Infrastructure design that uses recent historical data may thus underrepresent the risk seen from the paleo record, even without considering future climate change. Statistical methods have been developed for climate risk and frequency analysis that incorporate observed and/or projected changes in extremes. However, these procedures have not yet been incorporated in infrastructure design codes and operational guidelines.

**Design Standards Lacking**

Compound extreme events — the combination of two or more hazard events or climate variables over space and/or time that leads to an extreme impact — have a multiplying effect on the risk to society, the environment, and built infrastructure. Recent examples include the 2016 Louisiana flood, which resulted in simultaneous flooding across a large area. Superstorm Sandy in 2012, when extreme rainfall coincided with near high tides; and other events combining storm surge and extreme precipitation, such as Hurricane Isaac in 2012 and Hurricane Matthew in 2016. Traditional infrastructure design approaches and risk assessment frameworks often consider these drivers in isolation. For example, current coastal flood risk assessment methods consider changes in terrestrial flooding and ocean flooding separately, leading to an underestimation or overestimation of risk in coastal areas. Compound extremes can also increase the risk of cascading infrastructure failure since some infrastructure systems rely on others, and the failure of one system can lead to the failure of interconnected systems, such as water–energy infrastructure.

**Extremes Intensifying**

**Compound Events**

**Cascading Failures**

**Water & Climate**

**Implementation Gap**

**Design Variables**

**Wide Ranging Conditions**

**Managing Variability**

## WATER MANAGEMENT IN A CHANGING FUTURE

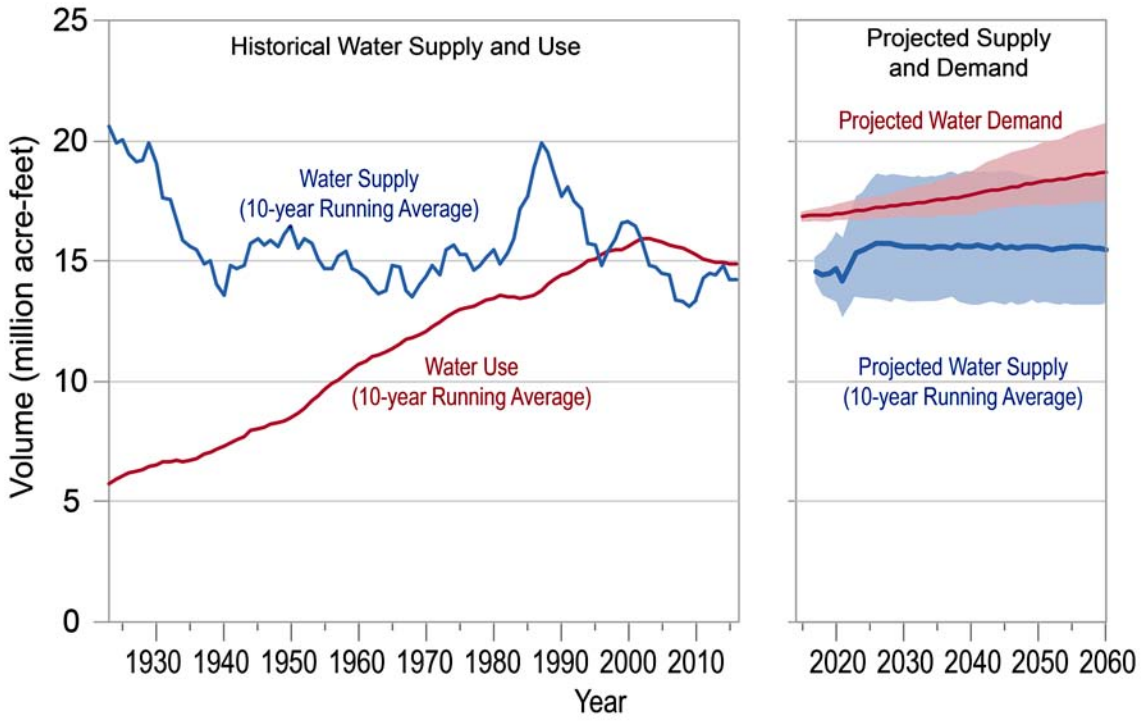
Water management strategies designed in view of an evolving future we can only partially anticipate will help prepare the Nation for water- and climate-related risks of the future. Current water management and planning principles typically do not address risk that changes over time, leaving society exposed to more risk than anticipated. While there are examples of promising approaches to manage climate risk, the gap between research and implementation, especially in view of regulatory and institutional constraints, remains a challenge.

The susceptibility of society to the harmful effects of hydrologic variability and the implications of climate variability and change necessitate a reassessment of the water planning and management principles developed in the 20th century. Significant changes in many key hydrologic design variables (including the quantity and quality of water) and hydrologic extremes are being experienced around the Nation. Paleoclimate analyses and climate projections suggest persistent droughts and wet periods over the continental United States that are longer, cover more area, and are more intense than what was experienced in the 20th century. An evolving future, which can only be partially anticipated, adds to this risk. Furthermore, while hydroclimatic extremes are projected to increase in frequency, accurate predictions of changes in extremes at a particular location are not yet possible. Instead, climate projections provide a glimpse of possible future conditions and help to scope the plausible range of changes.

A central challenge to water planning and management is learning to plan for plausible future climate conditions that are wider in range than those experienced in the past (see Figure 3.3). Doing so requires approaches that evaluate plans over many possible futures instead of just one, incorporate real-time monitoring and forecast products to better manage extremes when they occur, and update policies and engineering principles with the best available geoscience-based understanding of global change. The challenge is both scientific, in terms of developing and evaluating these approaches, and institutional–political, in terms of updating the regulatory–legal and institutional structures that constrain innovation in water management, planning, and infrastructure design.

One approach is to focus on better managing variability, which is likely the dominant source of operational uncertainty for many water systems. An example of this approach is incorporating monitoring of current conditions and forecasts of near-term future conditions (days to weeks to seasons) in lieu of stationary operating rules based on historical expectations. Forecasts of near-term hydrologic conditions

**Figure 3.3 Colorado River Basin Water Supply & Use**




The figure shows the Colorado River Basin historical water supply and use, along with projected water supply and demand. The figure illustrates a challenge faced by water managers in many US locations — a potential imbalance between future supply and demand but with considerable long-term variability that is not well understood for the future. For the projections, the dark lines are the median values and the shading represents the 10th to 90th percentile range.
Source: adapted from US Bureau of Reclamation 2012.

## KEY MESSAGES

### Changes in Water Quantity and Quality

Significant changes in water quantity and quality are evident across the country. These changes, which are expected to persist, present an ongoing risk to coupled human and natural systems and related ecosystem services. Variable precipitation and rising temperature are intensifying droughts, increasing heavy downpours, and reducing snowpack. Reduced snow-to-rain ratios are leading to significant differences between the timing of water supply and demand. Groundwater depletion is exacerbating drought risk. Surface water quality is declining as water temperature increases and more frequent high-intensity rainfall events mobilize pollutants such as sediments and nutrients.

### Deteriorating Water Infrastructure at Risk

Deteriorating water infrastructure compounds the climate risk faced by society. Extreme precipitation events are projected to increase in a warming climate and may lead to more severe floods and greater risk of infrastructure failure in some regions. Infrastructure design, operation, financing principles, and regulatory standards typically do not account for a changing climate. Current risk management does not typically consider the impact of compound extremes (co-occurrence of multiple events) and the risk of cascading infrastructure failure.

### Water Management in a Changing Future

Water management strategies designed in view of an evolving future we can only partially anticipate will help prepare the Nation for water- and climate-related risks of the future. Current water management and planning principles typically do not address risk that changes over time, leaving society exposed to more risk than anticipated. While there are examples of promising approaches to manage climate risk, the gap between research and implementation, especially in view of regulatory and institutional constraints, remains a challenge.

can provide the basis for adaptive reservoir operations, but they require flexible operating rules. New York City, for example, altered existing operational guidelines to implement adaptive reservoir operations based on current hydrologic conditions to better meet new concerns for ecological flow requirements in addition to water supply goals. In another example, the International Joint Commission adopted a new operating plan for Upper Great Lakes water levels; the plan is based on the ability to provide acceptable performance, as defined by stakeholders, over thousands of possible future climates. The plan includes forecast-based operations and a funded adaptive management process linking observatories and information systems to water-release decisions to address unanticipated change. In addition, updating operations and optimizing for changing conditions as they occur provide additional operating flexibility for water supply, flood risk reduction, and hydropower reservoirs. Finally, financial instruments and water trading provide avenues for managing the effects of variability on water competition, especially between urban water supply and agricultural water use.

Better management of variability does not eliminate the need for long-term planning that responds to plausible climate changes (see Figure 3.3). Major water utilities provide examples of planning that focus on identifying and managing vulnerabilities to a wide range of uncertain future conditions, rather than evaluating performance for a single future. For example, Tampa Bay Water employed 1,000 realizations of future demand and future supply to evaluate their preparedness for future conditions. Alternatively, Denver Water used a small set of carefully selected future climate and socioeconomic development scenarios to explore possible future vulnerabilities. The World Bank published a set of specific guidelines for implementing such robustness-based approaches in water investment evaluation.

**Planning Examples**

...[T]he nature of hydrologic extremes and their rarity complicate the detection of meaningful trends in flood risk, while traditional trend detection methods may lead to missed trends and underpreparation. In response to these challenges, the U.S. Army Corps of Engineers is exploring robustness to a wide range of trends and expected regret as metrics for evaluating flood management strategies, including the increased incorporation of natural infrastructure.

## CONCLUSION

Actions taken by communities and the managers of water systems of all sizes can help prepare the Nation for the water-related risks of climate variability and change. The risks associated with a changing climate are compounded by inadequate attention to the state of water infrastructure and insufficient maintenance. Developing new water management and planning approaches may require updating the regulatory, legal, and institutional structures that constrain innovation in water management, community planning, and infrastructure design. Furthermore, adequate maintenance and sufficient funding to monitor, maintain, and adapt water policy and infrastructure would help overcome many of these challenges. Continued collaboration on transboundary watershed coordination and agreements on both surface water and groundwater with Canada and Mexico are among the actions that could facilitate more sustainable binational water management practices.

**Innovation Encouragement**

**New Approaches**

Developing and implementing new approaches pose special challenges for smaller, rural, and other communities with limited financial and technical resources. The development and adoption of new approaches can be facilitated by assessments that compare the effectiveness of new management and planning approaches across regions; greater exchange of emerging expertise among water managers; and better conveyance of the underlying climate and water science to communities, managers, and other decision-makers.

**For Additional Information:**
The Fourth National Climate Assessment is available online at: https://nca2018.globalchange.gov

# CRITICAL HABITAT & ECONOMIC IMPACT

ENDANGERED SPECIES ACT DESIGNATION & REVIEW

by David Moon, Editor

**Critical Habitat**

**Unanimous Ruling**

**"Critical Habitat" Eligibility**

**ESA Definition**

**Exclusion Considerations**

**Frog Listed**

**"Unit 1" Conditions**

**Extinction Risk**

**Designation Factors**

**Introduction**

On November 27, the US Supreme Court (Court) issued a unanimous decision concerning the federal Endangered Species Act (ESA) and the designation of "critical habit" made in conjunction with the listing of a species as endangered. The Court voted 8-0, with Judge Kavanaugh taking no part in the decision, to vacate a Fifth Circuit Court of Appeals' decision and remand the case back to that court for consideration of two issues in accordance with the Court's opinion.

The Fifth Circuit had affirmed the federal district court's decision, rejecting the suggestion that the "critical habitat" definition contains any habitability requirement and concluding that the Service's decision not to exclude Unit 1 was committed to agency discretion by law and was therefore unreviewable. The Fifth Circuit's decision was appealed to the Court.

The Court held first, that an area is eligible for designation as "critical habitat" under the ESA *only if* it is habitat for the species. Secondly, the Court held that the Secretary of the Interior's (agency's) decision *not to exclude* an area from critical habitat, based on the consideration of economic impact and relative benefits, is subject to judicial review. *Weyerhaeuser Co. v. USFWS, et al*., 586 U.S. ___ (2018) (*Slip Op*.). The ESA defines "critical habitat" as:

> "(i) the specific areas within the geographical area occupied by the species...on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
> (ii) specific areas outside the geographical area occupied by the species...upon a determination by the Secretary that such areas are essential for the conservation of the species."

*See* U.S.C. §1532(5)(A).

The Court set out the part of the statutory law concerning any potential exclusion of an area from "critical habitat:"

> Before the Secretary may designate an area as critical habitat, the ESA requires him to "tak[e] into consideration the economic impact" and other relevant impacts of the designation. §1533(b)(2). The statute goes on to authorize him to "exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of [designation]," unless exclusion would result in extinction of the species. *Ibid*.

*Slip Op*. at 3.

**Background**

In 2001, the US Fish & Wildlife Service (USFWS or Service) listed the dusky gopher frog as an endangered species. *See* 16 U.S.C. §1533(a)(1). Upon listing a species as endangered under the ESA, the Secretary of the Interior is directed to also designate the "critical habitat" of the species. As part of that critical habitat designation, the USFWS proposed including a site in Louisiana, dubbed "Unit 1." The frog had previously lived in the area of Unit 1 in the longleaf pine forests, but that land had been used for many years as a commercial timber plantation — which was detrimental the frogs' habitat. "The timber plantations consist of fast-growing loblolly pines planted as close together as possible, resulting in a closed-canopy forest inhospitable to the frog." *Slip Op*. at 2.

Though Unit 1 had its drawbacks, it was in a unique position. "Because the existing dusky gopher frog populations were all located in two adjacent counties on the Gulf Coast of Mississippi, local events such as extreme weather or an outbreak of an infectious disease could jeopardize the entire species. (citation omitted) To protect against that risk, the Service proposed to designate as *unoccupied* critical habitat a 1,544-acre site in St. Tammany Parish, Louisiana. The site, dubbed 'Unit 1' by the Service, had been home to the last known population of dusky gopher frogs outside of Mississippi. The frog had not been seen in Unit 1 since 1965, and a closed-canopy timber plantation occupied much of the site. But the Service found that the site retained five ephemeral ponds 'of remarkable quality,' and determined that an open-canopy forest could be restored on the surrounding uplands 'with reasonable effort.' Although the uplands in Unit 1 lacked the open-canopy forests (and, of course, the frogs) necessary for designation as occupied critical habitat, the Service concluded that the site met the statutory definition of unoccupied critical habitat because its rare, high-quality breeding ponds and its distance from existing frog populations made it essential for the conservation of the species. Designation, at 35118, 35124, 35133, 35135." *Slip Op*. at 5 (emphasis in original).

**Critical Habitat**

**Opposition Position**

**Exclusion & Economics**

**"Habitat" Requirement**

***Weyerhaeuser Co. v. USFWS***

Weyerhaeuser, and a group of family landowners who own land in Unit 1 and lease it to Weyerhaeuser, sought to overturn the critical habitat designation in federal district court. "They contended that Unit 1 could not be critical habitat for the dusky gopher frog because the frog could not survive there: Survival would require replacing the closed-canopy timber plantation encircling the ponds with an open-canopy longleaf pine forest." *Id*. at 6. Weyerhaeuser also maintained that USFWS "should have excluded it [Unit 1] from designation under Section 4(b)(2) of the ESA. That provision requires the Secretary to 'tak[e] into consideration the economic impact...of specifying any particular area as critical habitat' and authorizes him to 'exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat.' 16 U. S. C. §1533(b)(2)." *Slip Op*. at 10-11.

Despite the risks to the frog's survival noted in the Designation, the Court rejected the Fifth Circuit's decision concerning "critical habitat," finding instead:

> Only the "habitat" of the endangered species is eligible for designation as critical habitat. Even if an area otherwise meets the statutory definition of unoccupied critical habitat because the Secretary finds the area essential for the conservation of the species, Section 4(a)(3)(A)(i) does not authorize the Secretary to designate the area as critical habitat unless it is also habitat for the species.

*Slip Op*. at 9.

The Supreme Court thus held that an area is eligible for designation as critical habitat under U.S.C. §1533(a)(3)(A)(i) only if it is habitat for the species. That provision — the sole source of authority for critical-habit designations — states that when the Secretary of the Interior lists a species as endangered he must also "designate any habitat of such species which is then considered to be critical habitat." It does not authorize the Secretary to designate the area as critical habitat unless it is also habitat for the species. The definition allows the Secretary to identify a subset of habitat that is critical, but leaves the larger category of habitat undefined. USFWS does not now dispute that critical habitat must be habitat, but argues that habitat can include areas that, like Unit 1, would require some degree of modification to support a sustainable population of a given species. Weyerhaeuser maintains that habitat can't include areas where the species could not currently survive. USFWS disputes the premise that the administrative record shows that the frog could not survive in Unit 1. The Fifth Circuit, which had no occasion to interpret the term "habitat" in §1533(a)(3)(A)(i) or to assess the USFWS administrative findings regarding Unit 1, will address those issues on remand (*see* Court's Syllabus).

The Court also held that the agency determination concerning exclusion of a particular area as critical habitat — based on the review of economic impact — was the type of assessment that courts should be able to review to insure that the decision was not "arbitrary, capricious or an abuse of discretion." See *Slip Op*. at 14-15. Since the Fifth Circuit had ruled that such a determination was unreviewable, the Supreme Court (Court) remanded the issue back to the Fifth Circuit for a proper review.

**Conclusion**

The Court held that land is eligible for designation as "critical habitat" under the ESA *only if* it is habitat for the species. The precise definition of "habitat" and thus what limitations exist remains for the Fifth Circuit to rule on, with a Supreme Court review possible thereafter. The Court further clarified that landowners who disagree with the Secretary of Interior's economic analysis and exclusion determination have a right to judicial review to insure that such a determination is not arbitrary, capricious or an abuse of discretion. Whether the exclusion should occur in this particular case awaits the Fifth Circuit's review.

**For Additional Information:**

*Slip Opinion* available at: www.supremecourt.gov/opinions/18pdf/17-71_omjp.pdf

## WATER BRIEFS

### WATERSMART PROJECTS US
**SMALL-SCALE EFFICIENCY**

On November 8, Bureau of Reclamation (Reclamation) Commissioner Brenda Burman announced that Reclamation has selected 58 projects to receive $3.7 million for small-scale water efficiency projects in 16 western states. The funding from Reclamation is being leveraged to support more than $8.2 million in improvements throughout the West. The projects funded with these grants include installation of flow measurement devices and automation technology, canal lining or piping to address seepage, municipal meter upgrades, and other projects to conserve water. Funding of up to $75,000 is provided to projects on a 50% cost-share. A complete list of the projects selected is available at: www.usbr.gov/watersmart/swep/.

Small-Scale Water Efficiency Projects are part of Reclamation's WaterSMART Program. The program aims to improve water conservation and reliability, helping water resource managers make sound decisions about water use. Among the projects funded are the following. The City of Avondale in Arizona is receiving $75,000 to update two water treatment/booster station wells within their system. They will connect them to their current supervisory control and data acquisition system which will help them better manage their water supplies. The North Kern Water Storage District in Bakersfield, California, is receiving $75,000 to install SCADA software to interface with previously installed SCADA equipment and two evapotranspiration measurement stations in the service area. The City of Gallup in northwest New Mexico is receiving $60,000 to upgrade old mechanical meters with modern solid-state meters for industrial, commercial and institutional users. This project will allow for allow for more accurate measurement of water consumption and is supported by its 2013 water conservation plan.

**For info:** WaterSMART Program: www.usbr.gov/watersmart

### WASTEWATER DISCHARGE MT
**CWA CRIMINAL CHARGES**

On November 16, US Attorney Kurt Alme announced that two operators of USA Brass, Inc. were sentenced in US District Court after admitting to illegal discharges of lead contaminated water into a public sewer system. USA Brass was a company formerly operating in Bozeman, Montana, that cleaned and recycled spent ammunition casings. Chief US District Judge Dana Christensen on November 15 sentenced Zachary Flanagan, 27, of Bozeman, to five years of probation and imposed a $50,000 fine; on November 16, the judge sentenced co-defendant Nolan Schimpf, 27, of Bozeman, to five years of probation and imposed a $50,000 fine. On August 9, Flanagan, the chief executive officer, pleaded guilty to making a false statement, a felony, while Schimpf, the company's chief production officer, pleaded guilty to negligent discharge of pollutants, a misdemeanor.

An investigation found illegal discharges into the City of Bozeman's public wastewater treatment system occurred in the fall of 2013. USA Brass took spent ammunition casings from military bases, shooting ranges, and recycling centers, cleaned and polished the brass casings and sold them for reuse. After cleaning the casings in a water and vinegar solution in cement mixers, the wastewater was drained and collected in blue totes, which held about 300 gallons each. During the cleaning process, the wastewater became contaminated with lead, a toxic metal. The lead in the wastewater was high enough to be considered a pollutant under the federal Clean Water Act.

In November 2013, Flanagan contacted Dustin Johnson, the pretreatment coordinator of the Bozeman wastewater facility by email, asking for permission for USA Brass to discharge lead wastewater into the city sewer system. Johnson told Flanagan he would have to get the wastewater analyzed and submit test results. Flanagan submitted lab test results and a signed wastewater survey in which he maintained the information about the cleaning process was true and accurate. Flanagan asked to dispose of the wastewater through the sewer saying it met all city standards.

Flanagan followed up the request in December with another email to Johnson seeking approval to dispose of the wastewater through the sewer and told him that an environmental analyst who reviewed the lab results said it would be fine to send the wastewater down the sewer. However, Flanagan's statements to Johnson were false — i.e., he knew that an environmental consultant had not reviewed the lab results and concluded the wastewater would be fine for discharge to the public system. On the same day in December, Johnson responded to Flanagan's email and, based on Flanagan's false statements, authorized the discharge of the lead wastewater into the sewer system. When Johnson learned that Flanagan had provided him false information, he told investigators he would never have granted the company permission to discharge the wastewater had he known the truth.

The investigation found that in September 2013, USA Brass installed a sink in the facility to dispose of the lead wastewater into the city sewer system. Employees reported that the blue totes containing the wastewater were pumped into the sink until the totes were empty. A filtration system was abandoned after a few days because it got clogged. Flanagan and Schimpf were present on more than one occasion as the wastewater was being pumped down the sink but neither stopped the discharge or sought permission for the discharge. By being present and doing nothing to stop the unauthorized discharges, Schimpf negligently causing the wastewater to be discharged.

**For info:** Clair Johnson, USDOJ, 406/247-4623

### LAND SUBSIDENCE AZ
**"STORY MAP" TOOL**

Copernicus struggled to bring around 16th century skeptics to his evidence of a heliocentric solar system. Illustrating complex science to a general audience remained challenging. A century or so after Copernicus, Galileo

## WATER BRIEFS

and his famous telescope would help illustrate the Polish astronomer's claim that the earth revolved around the sun, as opposed to the other way around. Following in Galileo's footsteps, researchers in the Arizona Department of Water Resources' (ADWR's) Hydrology Division have developed one of the Department's most visually appealing presentations ever: A "story map" depicting land subsidence in the Willcox Groundwater Basin, where ADWR recently completed work on a comprehensive groundwater-flow model. *See* https://new.azwater.gov/hydrology/groundwater-modeling/willcox-model.

Focusing on the prevalence of land subsidence in the Willcox Basin, the story map uses interactive imagery as a compliment to textual descriptions of the area's subsidence issues. Together, they provide a clear picture of the dramatic subsidence issues facing the region. Produced for ADWR by GIS Application Developer Karen Fisher and Brian Conway, supervisor of the Geophysics/Surveying Unit, the "story map" brings together in a single, user-friendly package a wide assortment of the tools that hydrologists employ to analyze groundwater conditions. "This story map is the first of hopefully other story maps that combine (geographic information system, or "GIS") maps, data analysis, images/multimedia content, and a summary of various Water Resources topics in an easy to read format to tell a story," said Conway.

Fisher said they selected the Willcox Basin as the subject of the story map due to the area "having the highest annual magnitude of land subsidence in Arizona," as well as "a number of active earth fissures." Fisher designed the story map using ArcGIS mapping and analytics software, a product of Esri. As described by Esri, story maps "are a simple yet powerful way to inform, engage, and inspire people with any story you want to tell that involves maps, places, locations, or geography." **For info:** Story map available at the ADWR Hydrology eLibrary: https://new.azwater.gov/hydrology/e-library

### SUBSIDENCE STUDY AZ

**USGS GROUNDWATER & SUBSIDENCE STUDY**

The US Geological Survey released "*Groundwater-Storage Change and Land-Surface Elevation Change in Tucson Basin and Avra Valley, South-Central Arizona—2003–2016*" (USGS Report 2018-5154) on November 29th.

USGS monitors groundwater-storage change and land-surface elevation change caused by groundwater withdrawal in Arizona's Tucson Basin and Avra Valley — the two most populated alluvial basins within the Tucson Active Management Area. The Tucson Active Management Area is one of five active management areas in Arizona established by the 1980 Groundwater Management Act. Gravity and land-surface elevation change were monitored every 1-to-3 years at wells and benchmarks in Tucson Basin and Avra Valley from 2003 to 2016. Monitoring resulted in estimates of land-surface elevation change and groundwater-storage change. Interferometric synthetic aperture radar (InSAR) interferograms showing land-surface elevation change were constructed for the Tucson metropolitan area from: 1) May 2003 to July 2006; 2) July 2006 to June 2008; 3) June 2008 to April 2011; 4) April 2011 to November 2014; and 5) November 2014 to March 2016. For the Tucson metropolitan area, maximum subsidence of about two inches occurred during May 2003 to July 2006. From July 2006 to June 2008, maximum subsidence of approximately 0.8 inches occurred in two regions in the Tucson metropolitan area. From June 2008 to April 2011, about 0.8 inches of subsidence also occurred in two regions. Additionally, for the period April 2011 to November 2014, a maximum of about 0.9 inches of subsidence occurred in the same two regions of Tucson Basin. For the entire monitoring period from May 2003 to March 2016, maximum subsidence of as much as 5.3 inches occurred in the Tucson metropolitan area south of Irvington Road and as much as 4 inches in central Tucson south of Broadway. The InSAR data indicated that there was no significant land-surface deformation from 2003 to 2016 in Avra Valley, and no change in either basin from 2014 to 2016.

The volume of stored groundwater in the monitored part of Tucson Basin showed net zero change from spring 2003 to summer 2006. From summer 2006 to summer 2008 the volume of stored groundwater in the monitored part of Tucson Basin increased approximately 50,000 acre-feet; however, overdraft conditions resumed from summer 2008 to spring 2011, resulting in decreased storage of approximately 178,000 acre-feet. From spring 2011 to fall 2014, the volume of stored groundwater in Tucson Basin decreased about 200,000 acre-feet, following a period of lower than average rainfall in 2012 and 2013. The volume of stored groundwater in the monitored part of Tucson Basin increased approximately 167,000 acre-feet from fall 2014 to spring 2016.

Groundwater storage in Avra Valley increased during the entire monitoring period from spring 2003 to spring 2016, largely as a result of managed recharge of Central Arizona Project water in the monitored region. From 2003 to 2016, artificial recharge in Avra Valley totaled approximately 1,788,000 acre-feet, and in Tucson Basin artificial recharge for the entire period was about 636,790 acre-feet. Artificial recharge exceeded pumping in Avra Valley for each time interval. Pumping in Tucson Basin exceeded artificial recharge for every period except 2014 to 2016. Overall, long-term water-level declines have stabilized or reversed since 2000 at most areas in Tucson Basin and Avra Valley. **For info:** USGS Report 2018-5154 available at: https://pubs.er.usgs.gov/publication/sir20185154

### BIODIESEL SPILL WA

**COLUMBIA RIVER IMPACTS**

The Washington State Department of Ecology (Ecology) has fined Lewiston-based fuel retailer Coleman Oil $189,000 for spilling 3,840 gallons of biodiesel from a corroded underground pipe at its bulk oil plant in Wenatchee. The fuel contaminated nearby soil and groundwater, and seeped into the Columbia River, creating a

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visible sheen that appeared off and on for more than a year. The property is now a toxic cleanup site.

Ecology cited Coleman Oil for negligence and not monitoring levels in the 20,000-gallon above-ground storage tank connected to the corroded pipe. Although Coleman Oil believed the underground pipe had been in place since 1935, the company did not follow its own inventory control procedures or industry guidance for buried piping.

"This spill happened over a long period of time and impacted the health of the river system," said Dale Jensen, who manages Ecology's Spills Program. "It could easily have been prevented if the company had been properly monitoring the fuel level in that tank."

Ecology first responded to the site when the sheen was reported March 17, 2017. Its source remained a mystery until lab results came back identifying the pollution as biodiesel. Responders then traced the product to the Coleman Oil facility near the river.

The company was cooperative throughout the spill response process and has worked with Ecology on cleanup under the provisions of the Model Toxics Control Act since October 2017. Groundwater monitoring wells are in place and are being sampled regularly to determine how much, if any, contamination remains in the groundwater. If fuel is found in the wells, it is being pumped out so it doesn't reach the river. The next phase of the investigation is to find out if river sediments have been contaminated.

In addition to the fine, the company must reimburse the state $213,400 for its costs to respond to the spill. It is also faces a resource damage assessment, which may be an environmental restoration or enhancement project, or a payment into a fund that pays for such projects. The combined total of the state's penalty, cost reimbursement and damage assessment are expected to total more than $1 million.

Funds collected from the penalty will go into the state's Coastal Protection Fund. Coleman Oil also faces a potential resource damage assessment from tribes.

**For info:** Sandy Howard, Ecology, 360/407-6990 or sandy.howard@ecy.wa.gov

### PURIFIED WATER — TX

**EL PASO ADVANCED TREATMENT**

El Paso's water utility — El Paso Water — is designing an Advanced Water Purification Facility (AWPF) which will treat wastewater to produce up to 10 million gallons per day of drinking water, to supplement the city's drinking water supplies. The AWPF will use a direct-to-distribution approach, with the purified water flowing directly into the drinking water distribution system.

In 2016, El Paso Water completed a pilot test that could lead to a full-scale facility. The pilot facility was designed to purify cleaned wastewater through a rigorous four-step process, which included:

- Membrane technology
- Reverse osmosis
- Ultraviolet disinfection with advanced oxidation
- Granular activated carbon filtration

Results of the pilot test were submitted to the Texas Commission on Environmental Quality. The Commission has reviewed the pilot facility data and other information on the Advanced Purified Facility and gave El Paso Water approval to proceed with design of the full-scale facility. The Commission will review and comment on the plans and specifications before construction begins, and their final approval is needed before the plant goes on line.

Upon completion, El Paso's AWPF will become the second true direct potable reuse facility worldwide. Singapore supplies forty percent of its tap water from treated sewage water.

**For info:** El Paso Water website: www.epwater.org/our_water/water_planning

### PLATTE RECOVERY — WEST

**ESA FINDINGS RELEASED**

The US Bureau of Reclamation (Reclamation) has released the Final Environmental and Biological Assessment (EA) and signed the Finding of No Significant Impact (FONSI) for the Platte River Recovery Implementation Program (Program), Proposed First Increment Extension. Reclamation, working with the states of Wyoming, Colorado, and Nebraska, water users, and environmental and conservation organizations, proposes to extend the First Increment of the basin-wide, cooperative Recovery Implementation Program by 13 years. Reclamation participates in the Program to meet its obligations under the Endangered Species Act.

The purpose of this action is to continue implementing Program projects in order to accomplish the following:

- Reduce flow shortages in the Platte River aimed at conforming with US Fish and Wildlife Service target flows
- Continue land management activities necessary to provide habitat for target threatened and endangered species
- Continue integrated monitoring, research, and adaptive management, in order to assess the progress of the Program and inform future management decisions

The final EA and FONSI evaluates and discloses the potential impacts of the proposed 13 year extension of the Program's First Increment. The final EA and FONSI does not represent the final decision of the Secretary of the Interior, in cooperation with the Governors of the states of Colorado, Nebraska, and Wyoming, to extend the Program. The final EA and FONSI informs the Secretary that the potential impacts of the proposed extension do not warrant the preparation of an Environmental Impact Statement. The formal decision by the Secretary regarding whether or not to extend the Program in cooperation with the Governors will occur at a later date.

The final EA and FONSI are available for viewing at www.usbr.gov/gp/nepa/platte_river/index.html.

**For info:** Brock Merrill, Reclamation, 307-532-1093 or bemerrill@usbr.gov

## CALENDAR

**December 18 WEB**
**WIFIA Application Process - Water Infrastructure Finance & Innovation Act Webinar, WEB.** Presented by EPA. For info: www.epa.gov/wifia/wifia-resources#information

**December 18 WEB**
**EPA Enforcement & Compliance History Online (ECHO) Webinar, WEB.** Presented by EPA to Answer Environmental Enforcement & Compliance Questions. For info: https://echo.epa.gov/help/training#upcoming

**January 7-10 NE**
**Managing Floopdplain Development Through the National Flood Insurance Program (NFIP), Management Training, Lincoln.** Union College, Shawnee-Porter Care Conference Room. Free Registration. Presented by the Nebraska Department of Natural Resources, FEMA Region VII, and NeFSMA. For info: https://dnr.nebraska.gov/calendar/event/

**January 8 WY**
**Wyoming Water Forum: Microbial Source Tracking on Listed Streams in the Upper Laramie Basin, Cheyenne.** WWDO Conference Room, 6920 Yellowtail Road. Presented by Tony Hoch, Laramie Rivers Conservation District. For info: http://seo.wyo.gov/interstate-streams/water-forum

**January 10-11 TX**
**Texas Water: Past, Present & Future - Water Law Seminar, Austin.** Omni Southpark Austin. Presented by Texas Water Conservation Assoc. & Texas Rural Water Assoc. For info: www.twca.org/Public/Public/Water_Law_Seminar.aspx

**January 10-11 India**
**4th Annual National Summit on Sustainable Water and Sanitation Conference, Bangalore.** Presented by Nispana Innovative Platforms. For info: https://nswss.com/

**January 11 WA**
**SEPA & NEPA Seminar, Seattle.** 1111 3rd Avenue, Ste. 3400. For info: Law Seminars International, 206/ 567-4490 or www.lawseminars.com/

**January 15 GA**
**WIFIA Information Session - Water Infrastructure Finance & Innovation Act, Atlanta.** EPA Region 4 Office, 61 Forsyth Street, SW. Presented by EPA. For info: www.epa.gov/wifia/wifia-resources#information

**January 17 OR**
**2019 Oregon Legislative Session: Preview of Environmental & Natural Resource Bills, Salem.** Willamette University, 1140 State Street, Room 102, Noon - 1:15 p.m. Presented by Oregon State Bar - Environmental & Natural Resources Section; RSVP by Jan. 14 at www.eventbrite.com/e/2019-oregon-legislative-preview-environmental-natural-resource-bills-tickets-52846564497. For info: Maura Fahey, maura@crag.org

**January 23-24 CO**
**The Law of Fracking Conference, Westminster.** The Westin Westminster. Presented by the Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org

**January 23-25 TX**
**Water for Texas 2019 Conference: The Story of Texas Water, Austin.** AT&T Executive Education & Conference Center. Hosted by the Texas Water Development Board. For info: http://waterfortexas.twdb.texas.gov/2019/

**January 24 CO**
**11th Annual Schultz Lecture in Energy by Prof. Jody Freeman, Boulder.** Wolf Law Bldg.-Wittemyer Courtroom, Univ. of Colorado. Presented by the Getches Wilkinson Center for Natural Resources, Energy, and the Environment. For info: www.getches-wilkinsoncenter.cu.law/events/

**January 24-25 WA**
**Endangered Species Act Conference - 26th Annual, Seattle.** Washngton Athletic Club, 1325 6th Avenue. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

**January 28-29 CA**
**Groundwater Resources Association "Bridging the Gap" Conference, San Diego.** Dana Hotel. Hosted in collaboration with CDWR & the Center for Western Weather and Weather Extremes. For info: www.grac.org/events/

**January 28-29 CA**
**Tribal Water in California Seminar, Funner.** Harrah's Resort Southern California. For info: Law Seminars International, 206/ 567-4490 or www.lawseminars.com/

**January 30 OR**
**24th Annual Oregon Superfund Conference, Portland.** World Trade Center Two. CERCLA & Oregon Cleanup Law, Policy & Practices. For info: www.elecenter.com

**January 30-31 TX**
**Endangered Species Act, Wetlands, Stormwater & Floodplain Regulatory Compliance for Energy and Utilities Symposium, Houston.** The Westin Houston. For info: www.euci.com

**January 31 TX**
**Integrated Water: Keeping Conservation at the Forefront - 2019 Central Texas Water Conservation Symposium, Austin.** Canyon View Event Center. Presented by Texas Living Waters Project. For info: https://texaslivingwaters.org/events/2019-ctwcs/

**February 4 AZ**
**WIFIA Information Session - Water Infrastructure Finance & Innovation Act, Phoenix.** Arizona DEQ Office, 1110 W. Washington Street. Presented by EPA. For info: www.epa.gov/wifia/wifia-resources#information

**February 4-8 WA**
**18th Annual River Restoration Northwest Symposium, Stevenson.** Skamania Lodge. Presented by River Restoration Northwest. For info: www.rrnw.org/program/

**February 7-8 DC & WEB**
**Environmental Law 2019 Conference, Washington.** Washington Plaza Hotel. Presented by the American Law Institute CLE and cosponsored by the Environmental Law Institute. For info: www.ali-cle.org/course/ca012

**February 12 WY**
**Wyoming Water Forum: Water Law and Wyoming, Cheyenne.** WWDO Conference Room, 6920 Yellowtail Road. Presented by Abby Boudwyns / Kelly Shaw, WY Attorney General's Office. For info: http://seo.wyo.gov/interstate-streams/water-forum

**February 21-22 NV**
**2019 Family Farm Alliance Annual Conference, Reno.** Eldorado Resort Casino. For info: http://familyfarmallianceconference.com/

**February 25-26 FL**
**Deep Well Injection Conference, Miami.** Miami-Dade Water & Sewer Dept., 3071 SW 38th Avenue. Presented by American Ground Water Trust. For info: https://agwt.org/events

**February 26-28 DC**
**ACWA DC2019 - Annual D.C. Conference, Washington.** St. Regis Hotel, 923 16th Street NW. Presented by the Association of Clean Water Agencies. For info: www.acwa.com/events/dc2019/

**Feb 28-March 1 CO**
**2019 Martz Winter Symposium: The Changing Landscape of Public Lands, Boulder.** Wolf Law Bldg.-Wittemyer Courtroom, Univ. of Colorado. Presented by the Getches Wilkinson Center for Natural Resources, Energy, and the Environment. For info: www.getches-wilkinsoncenter.cu.law/events/

 

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## CALENDAR

(continued from previous page)

**Feb 28-March 1 CO**
**Administrative Law & Natural Resources Development Conference, Denver.** Presented by the Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org

**February 28-March 1 TX**
**North American Shale Water Management 2019: Reducing the Cost of Water Recycling & Reuse Exhibition & Conference, Houston.** JW Marriott Houston by the Galleria. For info: www.shale-water-management.com

**March 5-8 TN**
**The Utility Management Conference, Nashville.** Renaissance Nashville Hotel. Presented by the American Water Works Assoc.. For info: www.awwa.org/conferences-education/conferences/water-quality-technology.aspx

**March 6 WA**
**Managing Stormwater in Washington Conference, Tacoma.** Greater Tacoma Convention Center. Northwest Environmental Business Council (NEBC) Event. For info: www.nebc.org

**March 7-8 AZ**
**Tribal Water in the Southwest Seminar, Laveen.** Vee Quiva Hotel & Casino. For info: Law Seminars International, 206/ 567-4490 or www.lawseminars.com/

**March 12 WY**
**Wyoming Water Forum: Harmful Algal Blooms, Cheyenne.** WWDO Conference Room, Presented by WY DEQ. For info: http://seo.wyo.gov/interstate-streams/water-forum