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Florida v. Georgia

***FLORIDA V. GEORGIA*: THE LONG RIVER TO NOWHERE / US SUPREME COURT RULING**

by Don Blankenau, Blankenau, Wilmoth & Jarecke, LLP, Lincoln (NE)

Introduction

For over 100 years, disputes between states over the use of interstate waters has been a frequent subject before the United States Supreme Court (Supreme Court). The legal grappling over interstate waters usually concerned interstate streams west of the Missouri River, where water demand often exceeds supplies. Rivers like the Rio Grande, Colorado, Arkansas, and Republican have been frequent visitors to the Supreme Court since 1907. Yet one of the longest-running and most intensely contested cases comes from one of the wettest places in the United States — the states of Florida and Georgia. Unlike traditional western disputes, which generally concerned competing agricultural users, this case pitted municipal, recreational, and agricultural users in upstream Georgia against oystermen, fishermen, and ecologists in Florida. The dispute spanned some 31 years, and included the creation and expiration of a compact, extended negotiations, litigation in multiple federal courts, and ultimately a failed attempt to obtain an equitable apportionment from the Supreme Court. The river system that spawned this dispute is the Apalachicola-Chattahoochee-Flint River Basin, or "ACF."

The Geography, Hydrology, and Biology of the ACF Basin

The ACF Basin comprises some 19,800 square miles in the Southeastern states of Alabama, Georgia, and Florida. As described by Supreme Court, the Basin is shaped like the letter "Y." The top of that "Y" begins in Georgia at the headwaters of both the Chattahoochee and Flint Rivers. The Chattahoochee begins its flow in the Blue Mountains of northeastern Georgia and ambles southerly through metropolitan Atlanta, then southwesterly forming the border with Alabama and on to the Florida/Georgia state line, where it joins with the Flint River to form the Apalachicola River.

Flows of the Chattahoochee vary widely but average discharge to the Apalachicola frequently exceeds 10,000 **c**ubic **f**eet per **s**econd (cfs) during the summer months. Early developers recognized the value of this river and Atlanta has made use of its waters for municipal purposes since its founding in 1837. The United States Army Corps of Engineers (Corps) also envisioned the Chattahoochee as an important artery of interstate commerce and developed plans for a reservoir system. Although the potential for river commerce was never fully realized, Congress authorized the Corps to construct five major dams and reservoirs under the 1945 and 1946 River and Harbor Acts. These dams and reservoirs include: 1) Buford Dam and Lake Lanier; 2) West Point Dam and Lake; 3) Walter F. George Dam and Lake; 4) George W. Andrews and Lake Eufaula; and 5) Jim Woodruff Lock and Dam and Lake Seminole. These reservoirs have a combined conservation pool storage capacity of 1.6 million acre-feet. Relative to the flows of the Chattahoochee, this volume of storage is significantly undersized. Like most reservoir systems developed by the Corps, the Chattahoochee dams are operated together in an integrated manner according to protocols contained in its master manual. The operational goals required by Congress are to maximize: flood control; power generation; navigation; recreation; water supply; water quality; and fish and wildlife conservation benefits.

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Lake Lanier

Of the five Chattahoochee reservoirs, the most northern, Lake Lanier, serves as the primary source of domestic and municipal water to the metropolitan Atlanta area. Withdrawals by Atlanta vary seasonally but have historically averaged around 300 **m**illion **g**allons per **d**ay (mgd). The Lake also provides a wide-range of recreational opportunities and was the site of the 1996 Olympic sailing and rowing sports competitions. In addition to Atlanta, numerous other communities in Georgia and Alabama make use of the Chattahoochee for domestic and municipal purposes. Due to the steeper terrain and unproductive soils, there is little irrigated agriculture found in the Chattahoochee Basin. There are, however, an estimated 20,000 small reservoirs on the Georgia side of the Chattahoochee that are used for recreation, wildlife, and small farm use. Groundwater is generally limited to alluvial deposits near the river.

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Compact

The Flint River has its headwaters near the Atlanta airport and from there, flows southwesterly through some of Georgia's most productive farm ground. The Flint is the boyhood haunt of former President Jimmy Carter and the location of the fictional "Tara" from the novel and movie "Gone with the Wind." Unlike the Chattahoochee, the Flint River Basin holds substantial groundwater resources in the Florian Aquifer that runs through the lower portion of that basin. The Floridan Aquifer is in close, hydrologic connection to the Flint River and contributes substantially to its flows. This groundwater resource has allowed for the development of significant irrigation, with Georgia reporting that nearly 40% of the harvested crops in the Flint Basin come from irrigated lands. In total, some 160,000 acres of land are approved for irrigation from surface water sources, and another 400,000 acres are approved for groundwater. The primary crops grown in the Flint Basin include cotton, corn, pecans, and peanuts. The Flint River flows are impeded by only one dam — the Jim Woodruff — which also serves as the terminus of the Chattahoochee River at the Florida state line.

Created by the union of the Chattahoochee and Flint Rivers, the Apalachicola is an undammed river. It flows only 106 river miles to the Apalachicola Bay in the Gulf of Mexico and the last 30 miles or so are impacted by the Gulf tide. In terms of flow, the Apalachicola ranks fourth in the Southeast with flows averaging 25,000 cfs. Flood conditions can increase the flows to over 200,000 cfs, while drought conditions, coupled with limited releases from the Chattahoochee reservoirs, have resulted in flows during droughts of less than 5,000 cfs.

With little municipal or agricultural use, the Apalachicola's flows sustain unique ecosystems in the River and the Bay. The Apalachicola holds at least 122 species of fish, 29 mussel species, and 30 species of crayfish. It has the highest diversity of reptiles and amphibians in the United States and over 70 tree species. The Apalachicola also provides habitat for the federally-listed threatened and endangered species: Gulf sturgeon; fat threeridge mussel; purple bankclimber mussel; and Chipola slabshell mussel. The freshwater flows of the river create one of the most productive estuarine systems in the Gulf of Mexico by providing nutrients and moderating salinity in the Bay. The highly productive Bay historically produced over ten percent of the nation's Eastern Oysters and served as the economic base for the coastal community.

Warring Against the Corps and Setting the Stage

As Georgia's water uses began to grow in the 1970s, the Corps modified its reservoir operations to accommodate some of that growth. At that time, the Corps entered into limited "interim" contracts with Georgia water suppliers. While both Alabama and Florida raised concerns about their neighbor's growing water demands, the relatively modest amounts of water and limited duration of the contracts kept those concerns in check. Those concerns, however, were elevated in October of 1989 when the Corps unveiled a draft water supply report that became known as the Post Authorization Charge (PAC) Report. The PAC Report proposed a permanent change to the congressionally authorized uses of Lake Lanier — making municipal and industrial uses the primary purpose. The Corps also proposed permanent storage contracts with Georgia water suppliers. Additionally, the PAC Report identified water sources for Georgia users in the neighboring Alabama-Coosa-Tallapoosa Basin (ACT Basin). The ACT Basin provides water to a wide-range of users in Alabama and the PAC Report immediately drew the attention and ire of that state.

In 1990, Alabama filed the first of multiple federal suits against the Corps in the Northern District of Alabama, challenging the interim contracts and the proposed permanent water supply storage contracts as violating both the Water Supply Act of 1958 and the National Environmental Policy Act. Alabama further claimed that the Corps breached its congressionally mandated duty to operate Buford Dam and Lake Lanier as well as the other federal reservoirs for the benefit of all downstream users within the ACF and ACT Basins. Both Florida and Georgia filed motions to intervene in the litigation and the case appeared to be headed for a much bigger conflict.

By September of 1990, however, the litigation was stayed when the three states and the Corps agreed to pursue a negotiated solution to manage the resource for all users. After two years of negotiations, the states and the Corps executed a Memorandum of Agreement in 1992 that called for a comprehensive study of both the ACF and ACT Basins. The purpose of the study was to provide information on water availability, forecast water needs, examine options for meeting those needs, and find an appropriate coordination mechanism to implement the study's findings and recommendations. The comprehensive study helped the parties identify the water uses and needs of the basin and did identify the appropriate mechanism to apportion the water: a compact.

On January 3, 1997, following the adoption by each of the three states, Congress adopted the Apalachicola-Chattahoochee-Flint River Compact (ACF Compact), Pub. L. No. 105-104, 111 Stat. 2219. Congress also separately adopted the nearly identical Alabama-Coosa-Tallapoosa Rivers Compact, Pub. L. No. 105-105, 111 Stat. 2233. The ACF Compact however, was dramatically different than any other

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"Live & Let Live"

Consumption Ignored

Private Negotiations (Georgia)

Hydropower Dispute

Georgia Lawsuit

Reservoirs' Authorized Purposes

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interstate river compact that preceded it. Amazingly the ACF Compact didn't divide or apportion the waters of the ACF Basin among the parties. Instead, the ACF Compact merely created an obligation to negotiate an apportionment formula. If a formula could not be agreed to by December 31, 1998, the compact would terminate unless extended by the parties. *See* ACF Compact Art. VIII. The ACF Compact also contained the rather ill-advised provision referred to as "live and let live" that allowed all of the states to continue to increase their consumptive uses without restraint while the negotiations were ongoing.

From the beginning of those negotiations, the parties focused their attention on reservoir operations on the Chattahoochee and virtually ignored the effects of consumption and inflows in the Basin. Indeed, water uses in the Flint River portion of the Basin were almost entirely ignored. From a strategic water management perspective, this approach offered little in the way of lasting benefit since the combined storage capacity of the reservoirs was relatively small and could provide little in the way of lasting flow support during drought periods. Subsequently, as in most such disputes, it was the drought periods that caused the harm to the users and created the conflict.

Unable to arrive at an apportionment formula within the initial negotiation period, the parties extended the deadline and continued a fairly intense period of negotiations. Nevertheless, in 2000, while those negotiations were at their apex, Georgia initiated private communications with the Corps seeking to increase Georgia's municipal and industrial withdrawals and obtain long-term storage contracts that would allow for withdrawals of up to 705 mgd — all without going through the compact process. Those discussions eventually become public and when they did, new litigation immediately erupted.

Because Georgia's request would reduce the amount of hydropower produced from Buford Dam and available throughout that region, the Southeastern Federal Power Customers, Inc. (SeFPC), a group that buys electric power generated at Buford Dam, concluded it would be paying too much for that power because water supply providers in Georgia would be taking water without paying for the loss of power. SeFPC then sued the Corps in the Federal District Court for the District of Columbia. SeFPC focused its claims on the congressionally authorized purposes for Buford Dam, alleging that the Corps lacked authority to prioritize water supply over power production. Georgia moved to intervene but on March 31, 2001, before its motion could be ruled on, the case was stayed for mediation.

Although not a party to the SeFPC case, Georgia was quietly invited to participate in the mediation. Neither Alabama nor Florida were invited or had any knowledge of Georgia's participation. Interestingly, in February of 2001, Georgia filed its own suit against the Corps in the Northern District of Georgia — resulting in three concurrent cases in three jurisdictions against the Corps. In the Georgia suit, the State of Georgia sought an order compelling the Corps to approve its water supply request to meet future needs. When Florida became aware of Georgia's participation in the SeFPC mediation, it moved to intervene in the case before the Georgia court.

In its efforts to intervene, Florida argued that granting Georgia's water supply request would reduce the amount of water being released from the reservoirs for downstream uses in Florida, contrary to the congressionally authorized purposes of the reservoirs. Florida emphasized that allowing increased consumption in Georgia effectively constituted a partial de facto apportionment of the Chattahoochee, the very subject of the ongoing compact negotiations. Therefore, argued Florida, it had standing to intervene with respect to the authorities of the Army Corps. Remarkably the Georgia district court concluded that the use of Chattahoochee water was an *intrastate* Georgia matter that didn't concern Florida and denied the intervention. Florida appealed and the 11th Circuit Court of Appeals agreed with Florida's reasoning and reversed. *See Georgia v. United States Corps of Engineers*, 302 F.3d 1242 (11th Cir. 2002). This decision opened the door to not only additional litigation against the Corps in additional jurisdictions, but state interventions in those cases.

In addition to its intervention in the Georgia case, Florida and Alabama also moved to intervene in the SeFPC case, in which the parties had already developed a settlement agreement. Intervention was granted. Before the SeFPC court could approve the settlement, Florida and Alabama also filed motions with the Alabama District Court to enjoin the SeFPC settlement as a violation of the Alabama court's stay order issued years earlier. Those motions were granted on October 15, 2003 and both Georgia and the Corps appealed the granting of the motions to the Eleventh Circuit Court of Appeals. The D.C. court, however, approved the SeFPC settlement and Florida and Alabama appealed the D.C. court's order to the Court of Appeals for the District of Columbia Circuit.

Ultimately both appeals resulted in the parties going back to their respective corners for yet another future round of sparing. The Eleventh Circuit ruled that the Alabama court abused its discretion in issuing the injunction against the SeFPC settlement and remanded for further proceedings. The D.C. Circuit Court concluded that the district court's approval of the settlement was a non-final order and not subject to appeal. So all of the cases were effectively back in their starting positions. In 2007, all of these cases were consolidated by a multi-district litigation panel and assigned to a single judge, the Honorable Paul Magnuson, in the Middle District of Florida.

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Two Phases (Litigation)

Storage Reallocation

Phase 2: ESA in Florida

Water Supply Authority

Consumptive Use Increases

Equitable Apportionment

"Original Action" in Supreme Court

Judge Magnuson, who served as a federal judge in Minnesota, was a seasoned veteran of interstate river disputes, having served as a multi-district judge in the Missouri River litigation between the Corps and the states of North Dakota, South Dakota, Nebraska, and Missouri a decade earlier. Judge Magnuson divided the ACF cases into two phases: Phase 1 concerned the extent to which the Corps had authority to operate Buford Dam to serve the municipal needs of the Atlanta area; and Phase 2 was to determine whether the Corps' operations of the Chattahoochee reservoirs was in compliance with an array of federal environmental statutes.

With respect to Phase 1, Judge Magnuson concluded that the Army Corps' operations of Burford Dam for water supply constituted a "de facto" reallocation of storage in the reservoir that was a "major operational change" under the Water Supply Act of 1958 and thus required congressional approval. *See In re Tri-State Water Rights Litig*., 639 F.Supp. 2nd 1308, 1347-1350 (M.D. Fla. 2009). The court also concluded that the Corps had correctly denied Georgia's larger request for future storage. While this decision was hailed in Florida and Alabama, it was a short-lived victory.

The Eleventh Circuit reversed Judge Magnuson, concluding that the district court lacked jurisdiction over the claims concerning Buford Dam operations because the parties did not challenge final agency action by the Corps to grant Georgia's water supply request, as required by the Administrative Procedure Act, 5 U.S.C. 704. See MDL-1824 *In re Tri-State Water Rights Litig.*, 644 F.3d 1160 (11th Cir. 2001), cert. denied, 133 S.Ct. 25 (2012). The Eleventh Circuit further held that Rivers and Harbors Act of 1946 provided authority to the Corps to operate Buford Dam for water municipal supply but concluded that it was unclear as to what extent and remanded that matter back to the Judge Magnuson for further consideration.

The Phase 2 issues revolved around the question of whether releases from the Chattahoochee reservoirs were sufficiently protective of the threatened and endangered species in the Apalachicola River in Florida. Over the years, the Corps had adopted a Revised Interim Operating Plan (RIOP) for the species in Florida. The RIOP specified flow releases be made from the reservoirs over a range of inflow and climatic variations to hit flow objectives in Florida. The US Fish and Wildlife Service (FWS) issued a Biological Opinion (BiOp) in 2008 that concluded the RIOP would not jeopardize the species or adversely modify their critical habitat. Florida had challenged the RIOP and the 2008 BiOp but Judge Magnuson rejected those claims. Florida appealed the decision, but later terminated the appeal because the FWS issued a new 2012 BiOp that reached a conclusion similar to the 2008 BiOp, thereby rendering the issue moot.

Upon remand of the Phase 1 issues, Judge Magnuson directed the Corps to prepare a "well-reasoned, definitive, and final judgment as to its authority" regarding reservoir operations for water supply. Unsurprisingly, the Corps determined that it did have authority to grant Georgia's water supply request in full. Thereafter, the Corps initiated renewed efforts to revise its Master Manual for the operation of all of the Chattahoochee Reservoirs. While additional legal skirmishes followed in other courts, they were limited in scope and the district court litigation over the Corps' authority was effectively concluded. During the course of those conflicts the ACF Compact was allowed to expire and any further negotiations to share the waters of the ACF Basin were clearly futile. The stage was now set for the final conflict.

State vs. State: The Original Action

In reality, the only protection for Florida's Apalachicola River and Bay for the future was to obtain restrictions on the increases to consumptive uses in Georgia during times of drought. To accomplish that goal, Florida would need to sue Georgia directly and seek an equitable apportionment that enjoined Georgia from growing its consumptive uses that caused reduced river inflows. Previously reluctant to take such a bold measure, flow conditions in 2012 resulted in massive mortality to the oysters in the Apalachicola Bay. That blow to the oyster industry had political reverberations in Tallahassee, spurring the state to take the final step in the legal process.

To obtain an equitable apportionment, a state must prove by clear and convincing evidence that it has suffered a real and substantial injury or will soon suffer such injury as a result of the depletions caused by the defendant state. (The burden of "clear and convincing" is notably higher than the normal burden of proof — by a "preponderance of the evidence" —imposed on plaintiffs in ordinary civil cases). Moreover, to impose restrictions on established uses or equities, the plaintiff state must show that the benefits to its users outweigh the harms to the users in the defendant state.

As a constitutional matter, only one court has jurisdiction to hear a state v. state action for an equitable apportionment: the United States Supreme Court. Because the Supreme Court is the originating court, all such actions are referred to as "original actions." Although the Supreme Court has exclusive jurisdiction over these disputes, it requires the plaintiff state to receive leave or permission to file its complaint. The Supreme Court requires leave to file to ensure that the allegations in the complaint rise to the seriousness and dignity of the Court's unique jurisdiction.

Florida v. Georgia

Harm to Florida

Environmental Component

Depletion Cap

Special Master Role

"Lancaster Report"

Oyster Harm

Water Use Restriction (Harm)

Florida's Proof Failure

Uncertain Benefit

Redressability of Harm

On October 1, 2013, Florida filed its Motion for Leave to File a Complaint, its Complaint, and Brief in Support of its Motion. In its Complaint, Florida alleged that the flows of the Apalachicola had been reduced by ever-increasing consumptive uses in Georgia. It further alleged that the reduced flows had caused harm to the ecology and economy of Florida and particularly emphasized the harm to its oyster fishery. While a seemingly novel apportionment, over eighty years earlier the Supreme Court had apportioned the waters of the Delaware River tributaries, in part, to protect oysters from municipal uses. *See New Jersey v. New York*, 283 U.S. 336, 51 S.Ct. 478 (1931). Interestingly *New Jersey v. New York* wasn't the first case to attempt an apportionment to include an environmental component. Just prior to the *New Jersey* case, the Supreme Court declined to apportion the waters of the Ware River in *Connecticut v. Massachusetts*, 282 U.S. 660, 51 S.Ct. 286 (1931) because Connecticut failed to meet its burden of proof.

Florida's Complaint asked the Court to apportion the waters of the ACF Basin between Georgia and Florida. Further, Florida asked the Court to cap Georgia's overall depletive water users at the level that existed on January 3, 1992 — the date the ACF Compact was approved by Congress. While Alabama would appear to be a necessary party, it chose to sit on the sideline and attempt to negotiate a solution to its real interests in the ACT Basin. Georgia opposed Florida's Motion. The United States, through the Solicitor General, urged the Supreme Court to take the matter up. On November 3, 2014, the Supreme Court concluded the matter was of significant importance and granted Florida's Motion for Leave to File a Complaint and the original action was officially underway. (*See Florida v. Georgia*, No142, Orig.)

On November 19, 2014, the Supreme Court issued an order appointing Mr. Ralph Lancaster of Portland, Maine to preside over the proceeding as the special master. Special masters effectively serve as the trial judge in these matters to schedule and conduct hearings, create a record, and make recommendations to the Court in their reports to the Court. Special masters, however, have no authority to make binding decisions on the parties. Only the Court can make findings and holdings that bind the state parties. The parties appear before the Court only when taking exceptions to the reports of the special masters.

A private practice attorney and seasoned special master, Mr. Lancaster moved the parties quickly through discovery and to trial. While the parties did attempt mediation, those efforts failed and trial began on October 31, 2016, and ran through the month of November, concluding on December 1, 2016. Over that period, the special master took testimony from 41 witnesses and received over 2,400 exhibits. On February 14, 2017, Special Master Lancaster issued a detailed, 70 page report ("Lancaster Report").

Florida's presentation of the case successfully convinced the special master that there had been significant harm to its oyster fishery. Special Master Lancaster observed: "There is little question that Florida has suffered harm from decreased flows in the River. Florida experienced an unprecedented collapse of its oyster fisheries in 2012... . In late 2012, oyster mortality reached devastating levels, leaving many previously-productive oyster reefs virtually empty." Lancaster Report at 31.

Yet despite demonstrating a level of harm that might result in an apportionment, Florida stumbled by failing to show that the harm could be redressed by restrictions on water uses in Georgia. Specifically, the special master reasoned: "Regardless of the harm suffered by Florida and the unreasonableness of Georgia's agricultural water use, it is necessary to determine whether the activities of the Corps render uncertain any relief to Florida stemming from a Court decree capping Georgia's consumptive water use." Lancaster Report at 34, internal citations omitted.

After reviewing the Corps' master manual and associated protocols for the ACF reservoir operations, the special master concluded:

> I find that Florida has not proven by clear and convincing evidence that any additional streamflow in the Flint River or in the Chattahoochee River would be released from Jim Woodruff Dam into the Apalachicola River at a time that would provide a material benefit to Florida (i.e., during dry periods), thereby alleviating Florida's injury. The evidence presented at trial does not "instantly tilt" the scale in favor of Florida. The evidence instead tends to show that the Corps' operation of federal reservoirs along the Chattahoochee River creates a "highly regulated system over much of the [B]asin", rendering any potential benefit to Florida from increased streamflow in the Flint River uncertain and speculative.

Lancaster Report at 47-48, internal citations omitted.

Following the issuance of the Lancaster Report, Florida filed its exceptions to the Supreme Court arguing that the special master applied too strict a standard with respect to redressability of harm. The exceptions were fully briefed and the matter argued to the Court on January 8, 2018. At argument, the Justices' questioning focused on the role of the Corps in reservoir operations and hinted strongly at a remand. Some six months later, on June 27, 2018, the Court issued its opinion agreeing with Florida — at least in part. At argument, the questioning from the Justices indicated a desire to more fully explore

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Remand to Special Master

flexible options in reservoir operations to fashion an apportionment in light of the harm observed by the special master. Those indications were realized in the Court's opinion, which remanded the case to the special master for further proceedings, specifically noting:

> In sum, in respect to the evidentiary questions at issue, the Master assumed that: (1) Florida has likely suffered harm as a result of decreased water flow into the Apalachicola River; (2) Florida has made some showing that Georgia, contrary to equitable principles, has taken too much water from the Flint River; and (3) Georgia's inequitable use of the water may have injured Florida, but more findings are needed. And in light of the Master's assumptions, we conclude that: (4) an equity-based cap on Georgia's use of the Flint River would likely lead to a material increase in streamflow from the Flint River into Florida's Apalachicola River; and (5) the amount of extra water that reaches the Apalachicola may significantly redress the economic and ecological harm that Florida has suffered. Further findings, however, are needed on all of these evidentiary issues on remand.

Florida v. Georgia, 585 U.S. ____, 138 S. Ct. 2502, (2018) - *Slip Opinion* at 34.

New Special Master

Unfortunately Special Master Lancaster became ill at this time and was discharged of his duties as special master; the Special Master subsequently died on January 22, 2019 at the age of 88. On August 9, 2018, the Court appointed a new special master; the Honorable Paul J. Kelly, Jr., of Santa Fe, New Mexico, a judge on the Tenth Circuit Court of Appeals. Special Master Kelly had some familiarity with water law and like his predecessor, wasted no time in moving the case to a decision point.

Additional Evidence Rejected

Almost immediately Special Master Kelly asked the parties whether the record should be opened to additional discovery and another hearing to receive new evidence. Florida responded in the affirmative and sought to add additional evidence on: 1) the effects of the Army Corps' new operational manual; 2) reasonable modifications that could be made to the manual; 3) increased agricultural irrigation since trial; and 4) the difficulties with recovery in the Apalachicola Bay since trial. Georgia naturally took the opposite position. Special Master Kelly agreed with Georgia and concluded no additional discovery or evidentiary proceedings were necessary and rejected Florida's request.

No Request to Supreme Court

At that point, Florida could have filed a request directly to the Supreme Court for leave to conduct the discovery and present additional evidence, effectively seeking to overrule the special master. Given the scope of the remand, the import of the new master manual, and the willingness of the Court to explore all options, such a request may well have been entertained. Nevertheless, Florida declined to so do and rested on the record created at the 2016 trial. Thereafter, the special master reviewed the 2016 record and issued a thorough, 81-page report to the Supreme Court on December 11, 2019. ("Kelly Report").

"Kelly Report" Differs

Although Special Master Kelly and Special Master Lancaster reviewed the same evidence, they interpreted the meaning of that evidence in striking contrast. Special Master Kelly was much less impressed with the evidence adduced by Florida then had been Special Master Lancaster. Indeed, where Special Master Lancaster found real harm had been caused by Georgia's river depletions, Special Master Kelly found a natural cause, unrelated to consumption. Special Master Kelly explained:

Low Flows Causation

Georgia's Consumption

> As Special Master Lancaster noted, Florida "points to real harm."...(finding that oyster mortality in late 2012 left "many previously-productive oyster reefs virtually empty")....
> Consequently, between September 2012 and February 2013, "commercial harvest revenues declined by 43% and commercially marketed pounds of oyster meat declined by 58%."
> Georgia does not contest that the oyster fishery suffered significant harm; rather, it argues that the collapse resulted from Florida's mismanagement, and insofar as low flows caused the collapse, those low flows were predominantly caused by drought, not Georgia's consumptive use. I agree and conclude that Florida has not shown by clear and convincing evidence that the harms in the Bay resulted from Georgia's consumption.

Kelly Report at 8-9, internal citations omitted.

While Florida had premised much of its case on the loss of oyster production, it also attempted to protect flows for the riverine ecosystem. Special Master Kelly largely brushed aside Florida's evidence and arguments, concluding there was insufficient evidence to show the Apalachicola River species and broader ecosystem has suffered measurable harm resulting from Georgia's consumption.

Excessive Use Issue

While the Bay and River harm analysis would have been enough to recommend denying Florida relief, the Special Master next examined the question of whether Georgia's use of ACF Basin water was excessive. Again, finding in favor of Georgia, the Special Master stated: "The Supreme Court has asked me to determine '[t]o what extent does Georgia take too much water from the Flint River.' I conclude that Georgia does not take too much water from its portion of the ACF Basin including from the Flint River." Kelly Report at 25.

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Reservoirs Operation

Harm Analysis

Supreme Court Opinion

Heavy Burden of Proof

Florida Mismanagement

Equitable Apportionment Rejected

Ecological Injury

Economic Values Comparison

1992 Cap

In a final blow to Florida, the Special Master examined how increased inflows to the Chattahoochee and Flint Rivers would translate to increased flows to the Apalachicola. Like Special Master Lancaster, Special Master Kelly concluded that, due to the Corps' reservoir operations expressed in the master manual, increasing inflows to the Basin in Georgia would not provide flow relief to Florida. Any increase in flows, reasoned the special master, would only end up being stored in reservoirs before it could get to Florida. Ultimately, Special Master Kelly summed up his analysis as follows:

> I do not recommend that the Supreme Court grant Florida's request for a decree equitably apportioning the waters of the ACF Basin because the evidence has not shown harm to Florida caused by Georgia; the evidence has shown that Georgia's water use is reasonable; and the evidence has not shown that the benefits of apportionment would substantially outweigh the potential harms.

Kelly Report at 81.

To this Report, Florida filed its exception and the case was finally argued to the Supreme Court on February 22, 2021. Argument this time suggested approval of Special Master Kelly's recommendation, with questioning from all Justices seemingly in agreement. The Court issued its decision just six weeks later, on April 1, 2021. In a short, 10-page opinion, Justice Barrett wrote for a unanimous Court agreeing with Special Master Kelly's analysis and adopting his recommendation. *Florida v. Georgia*, 592 U.S. ____, 2021 U.S. LEXIS 1741. With regard to the oyster collapse in 2012, which was the triggering event for the suit, Justice Barrett wrote:

> Of course, the precise causes of the Bay's oyster collapse remain a subject of ongoing scientific debate. As judges, we lack the expertise to settle that debate and do not purport to do so here. Our more limited task is to evaluate the parties' arguments in light of the record evidence and Florida's heavy burden of proof. And on this record, we agree with the Special Master that Florida has failed to carry its burden. Florida's own documents and witnesses reveal that Florida allowed unprecedented levels of oyster harvesting in the years before the collapse. In 2011 and 2012, oyster harvests from the Bay were larger than in any other year on record. That was in part because Florida loosened various harvesting restrictions out of fear — ultimately unrealized — that the Deepwater Horizon oil spill would contaminate its oyster fisheries. A former Florida official, one of Florida's lead witnesses, acknowledged that these management practices "bent" Florida's fisheries "until [they] broke."

Slip Opinion at 11, internal citations omitted.

Justice Barrett concluded the opinion dismissing the case:

> In short, Florida has not met the exacting standard necessary to warrant the exercise of this Court's extraordinary authority to control the conduct of a coequal sovereign. We emphasize that Georgia has an obligation to make reasonable use of Basin waters in order to help conserve that increasingly scarce resource. But in light of the record before us, we must overrule Florida's exceptions to the Special Master's Report and dismiss the case.

Slip Opinion at 18.

The Aftermath

In a broader context, the case represents the difficulty of proving ecological injury on large river systems. Depletions and harms on smaller rivers is fairly traceable to consumptive uses but large riverine systems are generally much more complicated — both physically and biologically. Not only is consumption more difficult to quantify, but the ecological impacts are often subtle and difficult to document. Florida's case also suffered from its failure to embrace a more wholistic view of the economic value of its ecosystem. Reliance on simply the production value of harvested species will rarely outweigh the economic value of production agriculture or municipal and industrial growth. Had Florida pursued a course that looked at imminent future harm in light of Georgia's acknowledged future growth and tethered those impacts to the ecosystem services of the River and Bay, the outcome may have been more favorable.

Florida was also likely too aggressive in seeking to restrict existing uses to 1992 levels. While the "live and let live" provision of the ACF Compact did not waive any claims against subsequent development, any development that did occur accrued to the benefit of the developing state as an equity to be protected — and virtually all of the post-1992 development occurred in Georgia. Restricting that new development would have caused economic and human consequences so harmful to Georgia that it is unlikely the Court would have agreed to such relief even if the special master had so recommended.

Florida v. Georgia

Georgia's Future Consumption

While the Court noted that Georgia has a legal obligation to make reasonable use of its water resources, it is largely free to develop as it sees fit without any further interstate interference. To Georgia's credit, it has made notable efforts to use water more efficiently, on both the municipal and agricultural sides. Nevertheless, consumption is growing and may be exacerbated by a changing climate. Unless or until Florida is able to develop better evidence of actual injury to its ecosystems that can be traced directly to Georgia's consumption, it must adapt to this new paradigm. (Florida is not prohibited from filing another suit for an equitable apportionment in the future). In the meantime, Florida can and should work closely with the Corps to seek reservoir operational changes that are more favorable to its concerns and provide some relief.

The River will continue to flow into the Bay...but neither the River or the Bay will ever be the same.

The author advised the State of Florida on ACF issues from 2000 to 2016.

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Special Master's Reports at: www.ca10.uscourts.gov/special-master-142

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Natural Infrastructure

NATURAL INFRASTRUCTURE: FEDERAL ROLE

TESTIMONY BEFORE THE US SENATE ENERGY AND NATURAL RESOURCES SUBCOMMITTEE ON WATER AND POWER
MARCH 24, 2021

Editors' Introduction: On March 24th, the US Senate Energy and Natural Resources Subcommittee on Water and Power heard testimony from four experts regarding federal water management projects and interactions and the use of "natural infrastructure" — i.e., utilizing or mimicking natural processes to provide water management benefits. Holly Richter (The Nature Conservancy) discussed the need for, and benefits of, employing natural infrastructure and provided several case-study examples; Charles Stern (Congressional Research Service) discussed the incorporation of natural infrastructure into Bureau of Reclamation water management systems and the issues this raises in Congress; Bobby Cochran (Willamette Partnership) discussed successful applications of natural infrastructure in forests, streams, and urban parks and provided suggestions for congressional actions; and Troy Larson (Lewis & Clark Regional Water System) cautioned that support for natural infrastructure should not be allowed to detract from ongoing traditional water infrastructure projects and federal commitments.

Four Presentations

What follows are excerpts from their written testimony, which have been abridged and edited to better fit our format. Graphics not originally included with the testimony have also been added.

The full written testimony from the March 24th hearing is available from the US Senate Committee on Energy and Natural Resources Subcommittee on Water and Power website: www.energy.senate.gov/water-power

TESTIMONY OF DR. HOLLY RICHTER
Arizona Water Projects Director, The Nature Conservancy

I am Holly Richter, Arizona Water Projects Director for The Nature Conservancy (TNC). Founded in 1951, TNC is a global environmental nonprofit working to create a world where people and nature can thrive. Thanks to more than a million members and the dedicated efforts of our diverse staff and more than 400 scientists, we work in all 50 U.S. states and impact conservation in 72 countries across six continents.

Nature Utilized

Put simply, natural infrastructure involves a natural system that is intentionally managed to provide multiple benefits for the environment and human well-being. Natural infrastructure storage solutions more specifically increase water storage through: aquifer recharge; floodplain storage; or alteration to the timing of runoff. These solutions mimic natural riverine, wetland, ecosystem, or hydrologic processes. In many cases these approaches also provide added benefits to the environment and recreation. Methods for the economic evaluation of natural infrastructure for aquifer recharge have been developed to weigh costs and benefits, and return on investment (Morales, et al., 2019).

Storage Options

Water is the lifeblood of the arid West. Over the past 20 years we have endured widespread drought conditions, and climate change is producing higher temperatures and drier conditions throughout the Western states. According to the U.S. Drought Monitor, 55.4% of the country was experiencing severe, extreme, or even exceptional drought at the beginning of 2021. The news for the desert Southwest is even more alarming — more than half of Arizona and New Mexico are experiencing "exceptional drought" conditions (Pugh, 2021).

Ongoing Drought

How much water we have at any given time or location is a simple equation, and essentially depends on two factors: how much we extract and consume (demand) and how much water enters the system and is subsequently stored (supply). Historically, our western water storage portfolio has revolved primarily around surface water reservoirs, which until recent decades, were adequate to meet the combination of municipal, industrial and agricultural demands. Now, in the Colorado River Basin, demand exceeds supply and surface water storage levels have been going down (Reclamation, 2012).

Demand & Supply

We have all seen the photographs of Lake Powell and Lake Mead with telltale bathtub rings that reflect declining water levels under our ongoing and extended drought conditions. But what is harder to see is the similar decline in groundwater storage beneath our feet across the West. In the United States, groundwater is the source of drinking water for about half the total population and nearly all of the rural population, and over 40 percent of irrigation water is groundwater (USGS, Water Science School: Groundwater Use United States). Groundwater depletion in the United States from 1900-2008 is estimated to be 1,000 cubic kilometers of water, one quarter of which was extracted between 2000-2008 alone (Konikow, 2013).

Groundwater Decline

To bridge the gap between supply and demand we have increasingly relied on groundwater resources. However, groundwater pumping remains largely unregulated in most western states, and due to the cumulative losses of groundwater storage, our fall-back and safeguard for water supplies, has itself diminished over the past century. Groundwater overdraft has many negative consequences such as: land subsidence that is damaging public infrastructure (including bridges and canals); seawater intrusion; water quality deterioration; and depleted surface water (Matsumoto et al., 2019). Groundwater is also a critical resource not only for human communities but also for many riparian and aquatic ecosystems and species. Unfortunately, groundwater management priorities seldom address the water needs of natural systems, and as a result, many of them have been degraded or eliminated, especially in arid regions (Saito, et al., 2021).

Overdraft Impacts

Management Shortcomings

Natural Infrastructure

Innovation Drivers

Aquifer Replenishment

Forestry Nexus

Flood Flow Recharge

Groundwater Storage

Chronic water shortages and more frequent and intense droughts, combined with population growth and aging water infrastructure, are not only increasing the potential for conflict over water resources, but also reducing water security. These urgent drivers, informed by the development of new science and technical tools, now encourage innovation and new approaches to our water management practices, policies and projects as well as additional investments in western water infrastructure. These investments can be most effectively leveraged by the incorporation of natural infrastructure approaches either alone or in combination with traditional approaches. Natural systems can convey and store water at the right times, and in the right places, to meet our needs.

Natural Infrastructure Storage Solutions

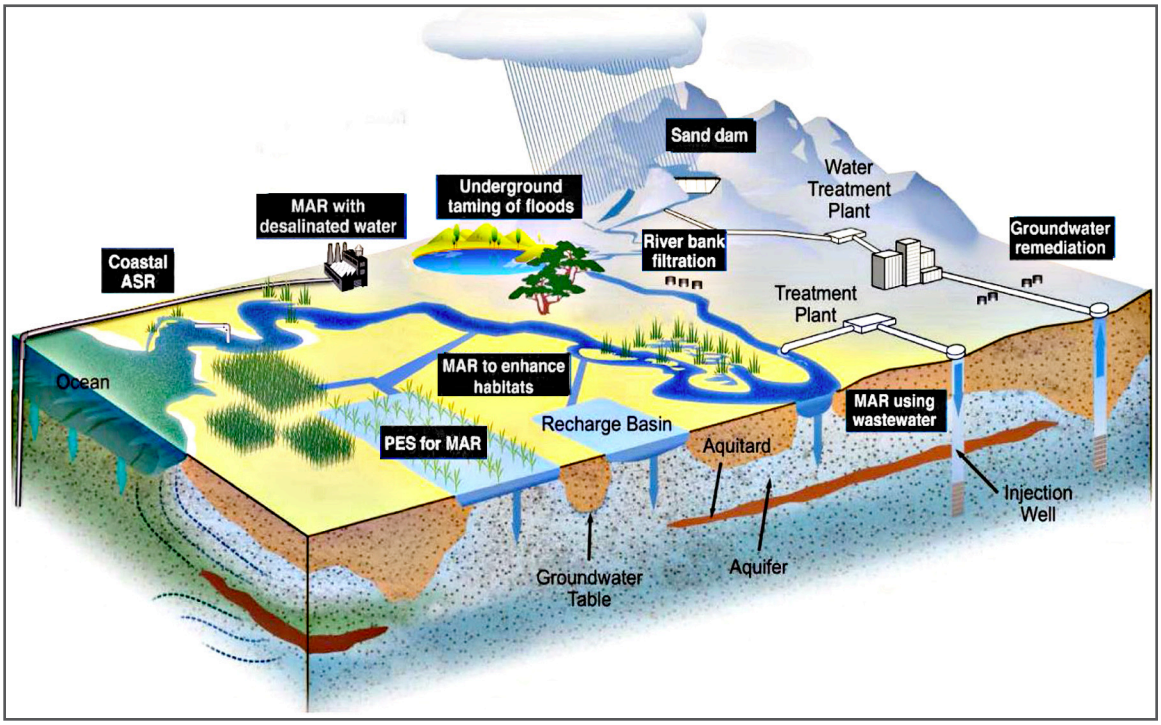
The use of natural infrastructure has increased in recent years in response to the growing need to protect people and property in a changing climate, and to increase resilience in the face of extreme weather. Different types of landscapes offer different opportunities for replenishing groundwater aquifers. How we manage our watersheds above ground — the conditions of woodlands, forests, grasslands and deserts — can affect how rainfall enters and moves through natural systems, ultimately determining how much natural runoff, and streamflow occur.

There are many forest thinning hydrologic studies, assessing the use of forest thinning as a management tool to reverse the adverse impacts of decades of fire suppression in the western United States. Research into the impacts of forest thinning on surface water, soil, and vegetation re-growth have occurred concurrently with the growing popularity of forest thinning. However, until recently forest thinning's potential impact on groundwater recharge has largely been ignored. There are few studies that focus on groundwater resources in this regard. Of 35 studies reviewed, there is little consensus among them, other than a general positive trend of increased groundwater recharge in response to forest thinning, as compared to clear cut forests (Shenk et al., 2020).

Groundwater recharge for a particular aquifer, soil type, or geologic setting can vary greatly. However, in general, the protection and restoration of rivers, streams, wetlands and natural floodplains enables flood flows to recharge alluvial aquifers, as well as aid natural sediment transport processes (Levick et al., 2008).

Groundwater storage is harder to measure, understand, and manage than surface water storage. Fortunately, advancements in predictive models and monitoring techniques are allowing water managers to make better decisions across the drought-stricken West. As a result, innovations in water management techniques are also starting to emerge. **M**anaged **a**quifer **r**echarge (MAR) projects that enhance supply are becoming more commonly implemented and are more cost-effective than many other supply enhancement projects, such as surface water storage and ocean desalinization (Perrone and Rohde 2016).

GROUNDWATER STORAGE & WATER QUALITY ENHANCEMENTS



Adapted from: (Groundwater Solutions Initiative for Policy and Practice website https://gripp.iwmi.org/natural-infrastructure/overview-on-groundwater-based-natural-infrastructure/)

Natural Infrastructure Varied Approaches

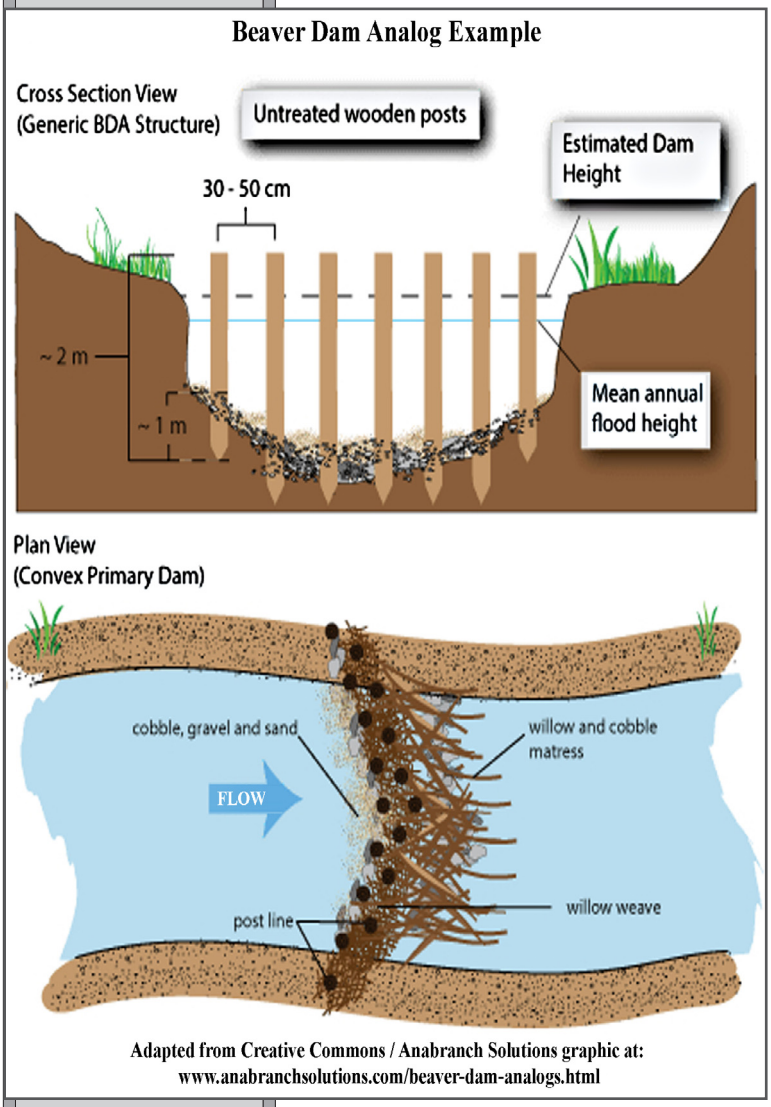
Headwaters Restoration

Case Studies

The following examples provide a sense of the variety of approaches that have been undertaken to advance innovation in natural storage solutions so far, from the Colorado River headwaters to the Central Valley in California. Some of the best solutions come from the local level where customized solutions are developed according to context and need. What is most frequently missing to develop, advance, and take full advantage of these sorts of innovations is adequate funding.

Case Study: Restoration of Headwater Systems

In the headwaters of the Colorado River Basin, in high elevation meadows where tributary streams cross meadows and irrigated pastures, even seemingly small structures like beaver dams can help to slow flows and increase the amount of water recharged back into the streambanks and floodplains of upper watersheds. The reintroduction of beaver and/or the replication of the types of structures they historically built can increase groundwater storage in these locations.



Within the Upper Green River Basin, the New Fork River flows out of the Wind River Range, and the installation of 35 beaver dam analogs and 125 low-profile, hand-built structures of rock or wood is underway to accelerate recovery of incised streams and riparian and wet meadow habitats by: reducing water velocities; increasing sediment deposition and aggradation; enhancing floodplain connectivity; raising groundwater tables; and increasing habitat complexity. Over the long term, the desired outcome is to restore the natural processes that self-sustain riparian and wet meadow habitats, as well as water supplies. TNC's role is to develop and implement a measurement and monitoring program, and assist with project installation. The project is a cost share between TNC, a private landowner, federal partners (US Fish & Wildlife, National Fish and Wildlife Federation, and the Natural Resource Conservation Service), one State agency (Wyoming Game and Fish Department), and a local agency, the Sublette County Conservation District.

These projects have the potential to build adaptive capacity in ecosystems and ranching operations to deal with ongoing climate shifts. Such projects: improve watershed resilience; support floodplain functions; regulate stream hydrographs; provide habitat; minimize erosion and sedimentation; and support recovery from extreme events (e.g., droughts, floods, and fires) (Fairfax, 2020). In addition, while streams restored through beaver dams and beaver dam analogs will likely flow longer during drought over the long term, additional groundwater can also be stored for irrigation purposes. The implementation of various analogs to beaver-related restoration tactics have shown promise as a means by which to re-establish naturally distributed storage at the watershed scale which has been previously lost.

Groundwater Collaboration

Case Study: Municipal Recharge of Regional Aquifers

In the arid valleys of the Lower Colorado River Basin in Arizona, where I live and work, groundwater is the only source of water for people and nature. Fort Huachuca, the US Army's premier intelligence and communications testing facility, depends on the same limited groundwater resources as does the US Bureau of Land Management's San Pedro Riparian National Conservation Area, located several miles from it, and ranches, rural landowners, and small towns and cities located in the same area.

Over twenty years ago, legal battles and litigation related to the limited groundwater supplies in the region started to emerge. In response, a collaborative group of 21 local, state and federal entities formed to build consensus and serve as an honest broker for developing hydrologic science that could help to inform decision-making, the Upper San Pedro Partnership (Partnership). *See*: uppersanpedropartnership.org. This group worked closely with the US Geological Survey to develop a predictive groundwater model

Natural Infrastructure

Planning Process

Treated Effluent & Stormwater

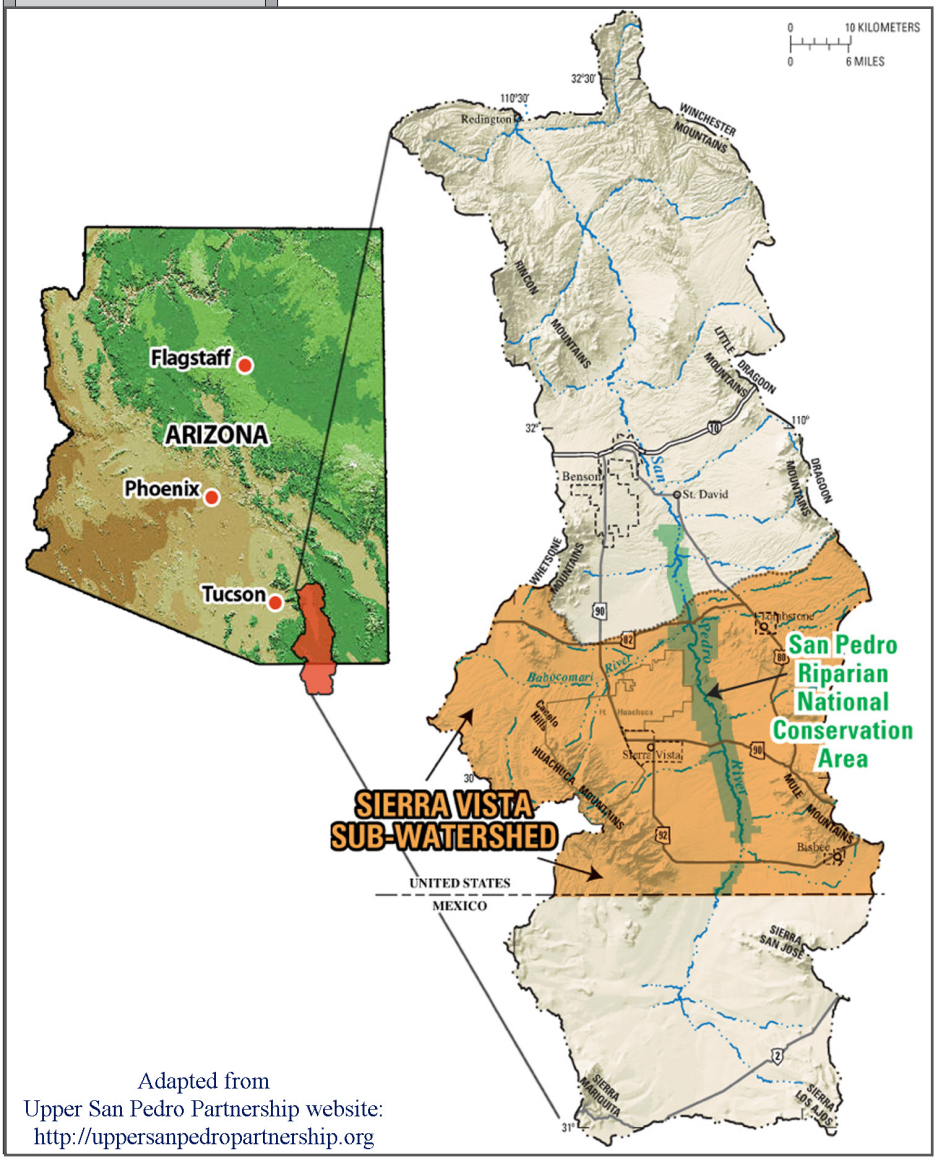
Recharge Projects

to compare and evaluate a wide range of options and alternatives (Pool, et al., 2007). What we learned, together, was that there was a way to optimize groundwater for the various water needs of humans and nature — including for flows in the San Pedro River itself.

The Partnership also joined forces with the US Bureau of Reclamation (Reclamation) to conduct an Appraisal Level Study of regional water management alternatives (Reclamation, 2007). Of the 15 alternatives assessed in the study, four were recommended for further study. This planning process also helped to inform the regional water management vision. Today, we have much more clarity about how to replenish groundwater to ensure: a vibrant economy; the operability of missions at Fort Huachuca; the health of the San Pedro River; and water security for local communities.

The vision for regional management included replenishment of the groundwater aquifer at just the right places and amounts, using treated wastewater effluent and stormwater. We identified where too much stormwater was problematic — for example, where there was increased runoff from urbanized areas — and flipped that problem into a water source asset. We looked at the demand side of the equation as well, and either retired high volume pumping, and/or precluded it in the future, at the very specific locations where our science told us it had the worst impacts to water supplies.

Today, eight groundwater protection and recharge projects are underway in the region, by a relatively small consortium of five project implementation partners called the Cochise Conservation and Recharge Network (*see*: ccrnsanpedro.org). The Conservancy partnered with the cities of Sierra Vista and Bisbee, Cochise County, and the Hereford Natural Resource Conservation District to form the Network, under a voluntary Memorandum of Understanding "to implement regional water management projects to meet the long-term water needs of the Sierra Vista Subwatershed by preserving the baseflows of the San Pedro River and ensuring the long-term economic viability of local communities by promoting and implementing recharge and conservation efforts." TNC's main role has been to provide facilitation, science and technical support for the group, and assistance with land acquisition. The water benefits of the groundwater projects between 2015-2019 were over 26,400 acre-feet, over half of which was a result of aquifer recharge, and the remainder from the retirement of historic pumping or areas where future pumping had been precluded (*see*: https://ccrnsanpedro.org/about/). Only three projects remain to be constructed. We're not done yet and funding for infrastructure construction remains challenging. However, we could have never come this far without the engagement and support of many players at all levels of government.



Adapted from
Upper San Pedro Partnership website:
http://uppersanpedropartnership.org

One of these three remaining projects was originally intended to be a managed aquifer recharge project, whose conceptualization came out of Reclamation's 2007 Appraisal Study. It has since been adapted to a natural infrastructure solution approach. Storm runoff from the largest urban area in the watershed, that currently enters a natural tributary to the San Pedro, will be diverted into an adjacent basin, to detain accelerated flood peaks in a way that slowly releases them back into the natural channel at a rate that will increase channel infiltration and groundwater recharge. The project is anticipated to: restore a more natural flood regime; reduce sedimentation; increase water quality; and result in enhanced groundwater storage.

Natural Infrastructure

Hydrologic Data Portal

Flexible Funding

Military Bases' Supply Projects

Overdraft Impacts

Managed Aquifer Recharge

Seasonal Recharge

Congressional Funding

Today the members of the Partnership are also working together on a WaterSMART Applied Science Grant, to create a state-of-the-art web portal that will make the extensive hydrologic data sets for the region available to the public in a manner that is useful and accessible.

The US Army has also been a critical partner for all of these projects. It facilitated essential land acquisition in key locations along 25 miles of river that were necessary to make the regional water vision a reality. The Army's Compatible Use Buffer Program — part of the Department of Defense (DoD) Readiness and Environmental Protection Integration (REPI) Program — was established to combat encroachment on military training, testing and operations. For these projects, the flexibility of the REPI funding program to not only accomplish its own specific programmatic objectives, but to also leverage the efforts of its conservation partners and address water security for all water users in the region, has made a big difference for our area. REPI enabled partnerships between DoD, state and local governments, and conservation **n**on-**g**overnmental **o**rganizations (NGO's) to develop and co-fund projects to: combat encroachment on military training, testing, and operations; enhance military installation resilience; and increase water security for the region.

Meanwhile, the military is grappling with water supply challenges across our nation. In January 2019, DoD sent Congress a list of 79 bases vulnerable to one or more impacts of climate change (DoD, 2019). In 45 of those 79 installations, drought was listed as a concern or vulnerability. In FY 2021 two military installations in the West asked for REPI funding for drought-related projects: 1) Fort Huachuca asked for $4.37 million in REPI funding for groundwater recharge work; and 2) Cannon Air Force Base in New Mexico requested REPI funding to address drought, erosion, soil quality/quantity, and water quality/quantity. Earlier this year, Fort Bliss and El Paso secured a $4.5 million grant from the Texas Military Preparedness Commission to invest in aquifer storage and recharge supporting both the city's and installation's water supplies there (El Paso Herald-Post, 2021). At the Mountain Home Air Force Base in Idaho, the groundwater aquifer which supplies the base is nearly depleted, and a large pipeline project from the Snake River has been proposed with a new water treatment facility to pipe surface water and keep the base in place and operational (SPF Water Engineering, 2016).

Case Study: Agricultural Recharge of Regional Aquifers

In the San Joaquin Valley of California, the overdraft of groundwater there is estimated at 1.8 million **a**cre-**f**eet (AF) per year. It's important to remember that the impacts of pumping an aquifer are cumulative over time. Every year that cumulative deficit increases, lowering the water table year-after-year. The combination of population growth and climate change in California has resulted in reduced snowpack, increased frequency of droughts, and altered surface water availability (Diffenbaugh et al. 2015; Swain et al. 2018; Grantham et al. 2018). Groundwater supplies have never been more important there than then they are now, given that groundwater withdrawals for irrigation in California increased 60% from 2010 to 2015, a period of protracted drought; surface water withdrawals for irrigation decreased 64% during the same period (Dieter et al. 2018).

In the fall of 2019, TNC began a managed aquifer recharge effort developed in partnership with the Colusa Groundwater Authority (CGA) and the California Department of Water Resources (DWR). CGA and TNC identified areas where overdraft issues were of most concern, and through an innovative partnership between farmers, water managers and conservation interests, an on-farm, multi-benefit demonstration project began recharging groundwater while also providing wetland habitat for migratory birds. Through these and other practices that create habitat on farms, TNC estimates that we've recharged 0.66 AF/acre on low end, and measured recharge up to 1.8 AF/acre, for a total estimate of 41,000-51,000 AF (acre-feet) of recharge since 2014.

The Colusa County grower agreed to prepare and flood agricultural fields to provide temporary or "pop-up" wetland habitat for shorebirds in early fall, during the peak of migration along the Pacific Flyway. These practices created habitat appropriate for shorebirds, as well as shallow flooding, and maintained water depths of no higher than four inches throughout the four-week enrollment. These seasonal recharge projects are very inexpensive, leveraging existing land and irrigation conveyance infrastructure, while benefiting migratory birds.

Recommendations to Enhance Natural Storage Solutions

I want to thank you for Congress's attention to water resources legislation. The consolidated appropriations bill passed by Congress in December 2020 contained provisions to respond to many needs of tribal communities, western states' water supply, and the environment. The bill will promote a more balanced approach to providing 21st century western water infrastructure, water supply security, and ecological resiliency in the face of shifts in water availability and the changing climate.

Natural Infrastructure

WaterSMART Program

Reclamation Solutions

However, much more needs to be done. I hope that as Congress debates investments in infrastructure that you will make western water supply infrastructure a priority. To increase water security in the West, we will need additional resources and funding for projects capable of leveraging natural systems to convey and store water supplies.

The Bureau of Reclamation has supported natural infrastructure solutions primarily through grants issued through the WaterSMART Program. Congress made changes to these grants last year that should make them more amenable to the types of multi-benefit natural infrastructure projects described in my testimony. Those grants can be funded and further targeted to promote water conservation and reduced consumptive use while restoring ecosystems and boosting the resilience of western communities to drought and water shortages.

The Bureau of Reclamation needs to support natural solutions outside of the WaterSMART Program as well. We recognize the need for additional water storage and support an expanded portfolio of infrastructure projects as the Bureau of Reclamation takes full advantage of groundwater recharge benefits as well as natural storage solutions that improve watershed conditions overall. The examples described in my testimony show how these types of projects are already providing water supply benefits to local communities and nature. As the primary federal water manager for the West, the Bureau of Reclamation should look to these solutions more often and implement them where appropriate to build a resilient and multi-benefit western water infrastructure for the future.

I appreciate the committee's attention to western water issues, and I thank you again for the opportunity to testify today.

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Natural Infrastructure

TESTIMONY OF CHARLES STERN

NATURAL RESOURCES POLICY SPECIALIST, CONGRESSIONAL RESEARCH SERVICE

This CRS statement focuses on the authorities of the US Bureau of Reclamation (Reclamation) and provides relevant general context on natural and nature-based infrastructure. I will start by providing context for federal efforts on natural infrastructure. I will then discuss Reclamation's authorities and potential opportunities for the incorporation of natural infrastructure in its activities, including questions for policy makers.

Natural Infrastructure

Natural Features & Combinations

Historically, researchers, practitioners, and decision-makers have used a variety of terms to describe natural features and combinations of traditional hard or gray features with natural components that are used to restore or mimic natural processes. These features may be implemented to achieve certain objectives for humans and wildlife. Some of the most common terms used to describe these features include: natural infrastructure; nature-based infrastructure; green infrastructure natural features; and nature-based features — among others.

"Green" & "Grey" Benefits

Natural infrastructure sits on a continuum from natural areas, such as forested lands, to combinations of natural "green" components and engineered or "gray" (e.g., rock, steel, and concrete) components. The benefits of using natural infrastructure include a range of functions ("ecosystem services") such as: evaporation; infiltration into the ground; water storage (i.e., within soils, groundwater, and wetlands); erosion and sediment regulation; flood protection; drought protection; natural resource provisioning (e.g., fisheries, agricultural products, and hydropower); carbon sequestration; and aesthetic and recreation value — among others.

Selected Federal Agency Definitions & Applications

Economic Benefits

Some federal agencies have supported natural infrastructure under existing statutory authorities. For example, the National Oceanic and Atmospheric Administration (NOAA) has supported the use of natural infrastructure features to fulfill the agency's mandate to research, restore, and conserve natural resources. However, Congress has not defined natural infrastructure in statutes related to NOAA activities. Where Congress has been involved, interest in natural infrastructure has evolved over time. While interest may have been initially in the environmental and social benefits of natural infrastructure, especially as part of restoration efforts, interest in the economic benefits of these features has grown. For example, NOAA highlights several studies regarding the economic benefits of certain coastal natural infrastructure at NOAA Office of Coastal Management (*see* "*Fast Facts: Natural Infrastructure*" at https://coast.noaa.gov/states/fast-facts/natural-infrastructure.html).

Congressional Definitions

In recent years, Congress has begun to explicitly define natural infrastructure, as well as nature-based and green infrastructure, in statute for some federal agencies. Congress has directed selected agencies to consider and use natural infrastructure in specific ways. For example, as part of the Water Infrastructure Improvements for the Nation Act of 2016 (P.L. 114-322), Congress defined a natural feature as a feature "created through the action of physical, geological, biological, and chemical processes overtime" and a nature-based feature as "a feature that is created by human design, engineering, and construction to provide risk reduction by acting in concert with natural processes." Congress enacted these definitions in the context of the water resource authorities of the US Army Corps of Engineers (Army Corps). The Army Corps refers to these features collectively as **n**atural and **n**ature-**b**ased **f**eatures (NNBFs). In the same legislation, Congress directed the Army Corps to consider NNBFs in its planning of flood risk management, hurricane and storm damage reduction, and ecosystem restoration projects. As discussed below, Congress also provided similar definitions in amendments to the Reclamation WaterSMART program authorized in the Western Water and Indian Affairs title of P.L. 116-260.

"NNBFs"

Green Infrastructure Definition

Congress has also defined green infrastructure, a similar but not always synonymous term, in the context of the US Environmental Protection Agency's (EPA's) authorities under the Clean Water Act (CWA). Under the 2019 Water Infrastructure Improvement Act (P.L. 115-436), green infrastructure is defined as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters." The act also directed EPA to promote the use of green infrastructure in: CWA permitting and enforcement; planning efforts; research; technical assistance; and funding guidance.

Agency Definitions

Other agencies may have their own working definitions that were developed administratively. For example, NOAA defines natural infrastructure as "healthy ecosystems, including forests, wetlands, floodplains, dune systems, and reefs, which provide multiple benefits to communities, including storm protection through wave attenuation or flood storage capacity and enhanced water services and security." NOAA describes nature-based infrastructure as "engineered systems where natural features are combined with more hard or structural engineering approaches to create a hybrid system."

Natural Infrastructure
Water Supply

"MAR"

Agencies' Support

"Reclamation Projects"

Focus Shift

Water Supply Support

Improving Natural Storage

Aquifer Recharge

Natural Infrastructure & Water Availability

In the water availability context, natural infrastructure primarily addresses water supply, rather than demand, through managing water storage, infiltration, and conveyance. These efforts may include: conserving and restoring forests; reconnecting rivers to floodplains; creating spaces for bioretention and infiltration; and combining one or more of these features with **m**anaged **a**quifer **r**echarge (MAR). MAR generally refers to purposeful recharge of water to aquifers for subsequent recovery or for environmental benefit. It may involve purposefully injecting water into an aquifer through an aquifer storage and recovery well, or allowing water to recharge from a space dedicated to bioretention or infiltration (e.g., a spreading basin).

Some of the benefits of these actions may include: reducing flash flooding; increasing groundwater storage; and improving late season runoff. There are a variety of options to support the implementation of these features, including: direct financial support; technical assistance; grants; loans; tax incentives; and payments for ecosystem services — among other things.

Multiple federal agencies provide support for natural infrastructure that improves water availability; this support is typically provided to meet various objectives and mission areas. For example, the US Department of the Interior (DOI (including Reclamation)), EPA, and the US Department of Agriculture (USDA) all have broad authorities to provide financial assistance for aquifer recharge. At the same time, the Army Corps, NOAA, USDA, and multiple bureaus within DOI, among others, all have authorities that support the use of natural infrastructure to restore portions of ecosystems at various scales. For example, §306 of the Water Resources Development Act of 1990 (P.L.101-640; 33U.S.C.§2316) directed the Secretary of the Army to include environmental protection (now commonly referred to as ecosystem restoration or environmental restoration) as one of the primary missions of the Army Corps in planning, designing, constructing, operating, and maintaining water resources projects.

Natural Infrastructure & Reclamation Authorities

Congress created the Reclamation Service (the precursor to the Bureau of Reclamation) in 1902. Since that time, Reclamation has constructed more than 180 congressionally-authorized projects throughout the 17 arid and semiarid Reclamation states. Most of these "reclamation projects" consist of some combination of dams, surface storage reservoirs, and water conveyance infrastructure. Many of these projects continue to be operated by Reclamation to provide water supplies for agricultural irrigation and municipal and industrial uses, to generate hydropower, and to benefit the environment, among other purposes.

Over the last 50 years, Reclamation has shifted its focus, first from project construction to operations and maintenance of existing projects. Then, in the early 1990's Congress began directing Reclamation to expand its support for non-federally led projects, including those for: water reuse and recycling; water and energy efficiency modernization efforts; and desalination. Congress added further to these efforts in 2009 under P.L. 111-11. As a result, Reclamation's current activities can be broadly characterized as a split between: (1) operation and oversight of "traditional" reclamation projects (i.e., federally-owned water supply projects that provide low-cost water to agricultural and municipal contractors); and (2) financial and technical support for nonfederal efforts to conserve or create water supplies in the West, including grants for water efficiency and authorized projects for water recycling, desalination, and rural water supply, among other efforts. While the first category continues to account for the majority of congressionally appropriated funding for Reclamation, the latter category has grown in recent years.

Current Authorities: Support for Groundwater Storage and Restoration Projects

Based on Reclamation's mission and activities, the primary opportunities for Reclamation to incorporate natural infrastructure solutions into its activities may involve efforts to improve natural water storage, in particular storage available in groundwater aquifers. These efforts can involve MAR as well as restoration of riverine ecosystems and floodplains to a more natural state that allow for surface waters to replenish groundwater supplies.

Groundwater Storage

Historically, Reclamation has not managed or administered significant aquifer recharge programs or facilities, but has had experience with aquifer recharge activities in some locations. In the Lower Colorado River Basin, Reclamation is authorized to enter into agreements to store Colorado River water off-stream (including in groundwater storage) for future use. Some projects, such as the Central Arizona Project (which conveys Colorado River waters), convey water that is used in extensive groundwater banking operations that store excess or recycled supplies. Part of another Reclamation project — the Friant Division of Reclamation's Central Valley Project in California — was designed and is operated as a conjunctive use project, with groundwater and surface water facilities managed jointly.

Natural Infrastructure

Settlement & Restoration

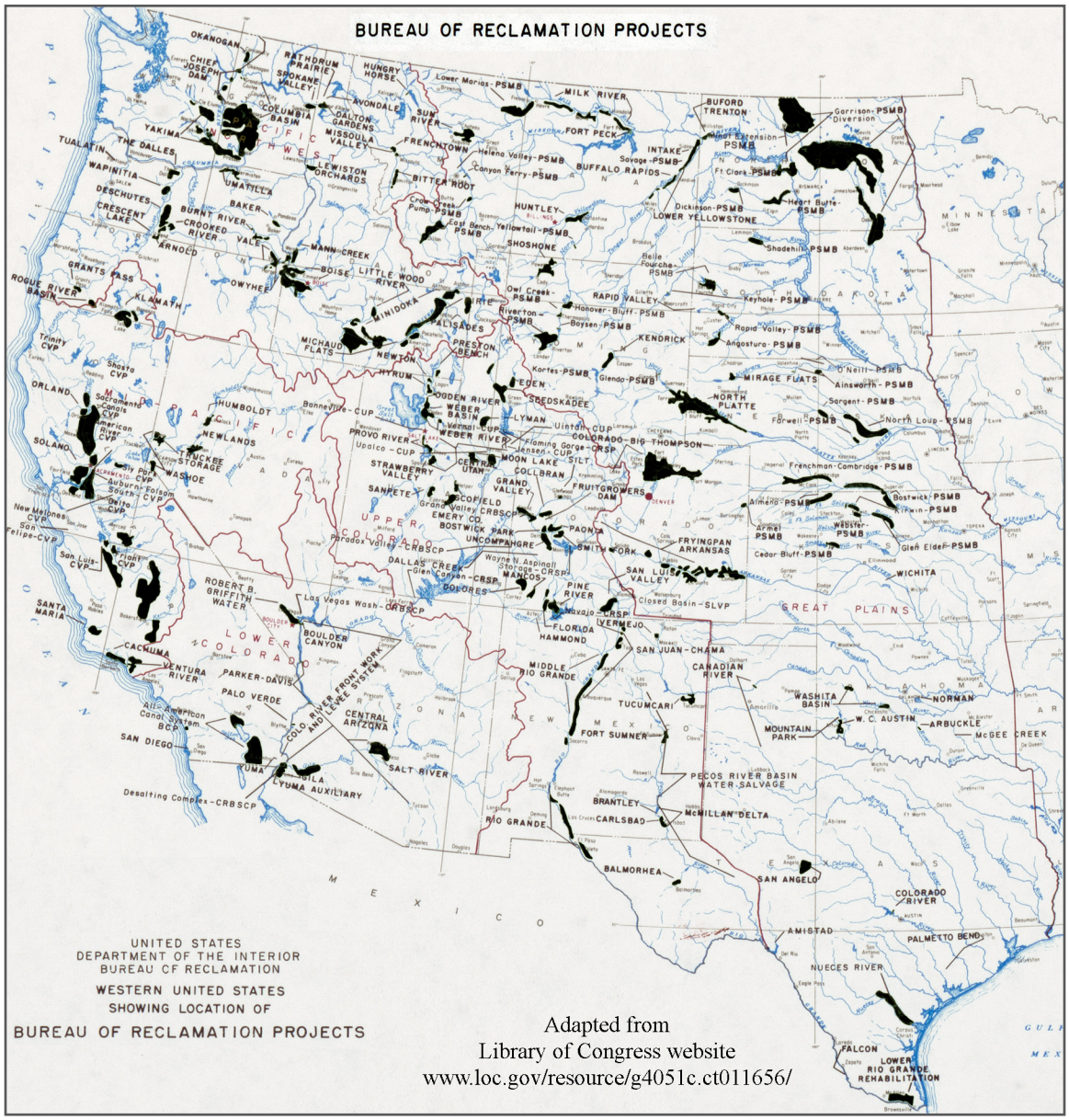
Authorities

Congress has also authorized financial support for several specific groundwater storage projects as part of a broader legal settlement and restoration effort. As part of the San Joaquin River Restoration Settlement Act authorized in P.L. 111-11, Congress approved financial assistance to local agencies within the Central Valley Project for the purposes of designing and constructing groundwater recharge/banking facilities that offset water supply impacts to water contractors. The act provided a total of $50 million of cost-shared funding to assist agencies in constructing these groundwater recharge facilities. To date, two of the four facilities have been completed.

Congress has also approved broader programmatic authorities that Reclamation may use to support groundwater storage projects, among other things.

These broader programmatic authorities include:

- Title IX, Subtitle F (Secure Water), Section 9504 of the Omnibus Public Land Management Act of 2009 (P.L. 111-11) authorizes Reclamation to provide financial assistance (i.e., grants) through the WaterSMART program for groundwater projects.
- Reclamation's Title XVI program (Title XVI of the Reclamation Projects Authorization and Adjustment Act of 1992, P.L. 102-575, as amended) provides Reclamation with the authority to implement water recycling and reuse projects, which may include projects that recycle and reuse impaired groundwater.
- Title III, Section 4007(c) of the Water Infrastructure Improvements for the Nation Act (WIIN Act; P.L. 114-322) authorizes Reclamation to participate in state-led water storage projects, which are defined to include groundwater storage facilities, among other facility types.



Natural Infrastructure

WaterSMART

Title XVI

Reclamation and local water users have utilized some of these programmatic authorities for natural infrastructure more than others. For example, from 2012-2019, the WaterSMART Water and Energy Efficiency Grant program authorized in P.L. 111-11 funded at least 19 nonfederal projects with groundwater storage or recharge components. Eleven of these projects were in California, with other projects in Idaho, Colorado, Washington, Oregon, and Arizona. Similarly, Reclamation recently reported that since 2017, it has funded 15 Title XVI projects with major groundwater storage or aquifer replenishment aims. For example, Reclamation approved and provided funding for the Aquifer Storage and Recovery Using Reclaimed Water Project in El Paso, Texas. This project will treat impaired surface water for groundwater infiltration at the Hueco Bolson Aquifer (more project descriptions are available at: www.usbr.gov/watersmart/title/index.html).

Among WIIN Act Section 4007 storage projects, as of early 2021 Reclamation had allocated funding for 12 water storage projects costing $306 million, but only one of these projects (the Sacramento Regional Water Bank) is for groundwater storage. The project has received less than $1 million to date.

Expanded Benefits

Ecosystem Restoration

In regard to ecosystem restoration, in the past, Reclamation has typically aligned its ecosystem restoration and fish and wildlife "enhancement" activities with project purposes, as well as with other relevant laws such as the Endangered Species Act. Congress has included or added fish and wildlife benefits to the authorized purposes for some Reclamation projects. In other cases, Congress has authorized standalone Reclamation restoration programs and activities, or has authorized Reclamation to conduct efforts to respond to endangered species concerns. Projects undertaken with these authorities often support activities, such as river and stream-bank protection and enhancement, which may benefit natural watershed services and functions.

Recent Changes

Recharge Support

The 116th Congress considered and enacted several changes related to natural infrastructure in the Western Water and Indian Affairs title of P.L. 116-260 (Title XI of Division FF) in December 2020. In Section 1105 of the title, Congress directed that Reclamation project infrastructure could be used to convey non-project water for the purposes of aquifer recharge (subject to the applicable rates and requirements), and that Reclamation project water contractors could use and/or contract for recharge activities involving project water. While recharge activities were reportedly occurring to some extent in prior years, this was the first formal, Reclamation-wide guidance from Congress on this subject.

WaterSMART Definitions

In Section 1106 of the title, Congress added specific definitions for "natural feature" and "nature-based feature" in the context of WaterSMART grants and research agreements as authorized in P.L. 111-11, and formally recognized these as eligible project types for grants. The same section also provided for additional federal cost-share coverage (i.e., raising the cost-share ceiling from 50 percent to 75 percent) for certain projects developed by watershed groups or multiple users; this could apply to projects with natural and nature-based features that meet this criteria.

Section 1109 of the title authorized $15 million for Reclamation to provide assistance to states, state-based entities, tribes, and non-profits, among others, for the design, study, and construction of aquatic ecosystem restoration and protection projects for the benefit of fish and wildlife. These projects, which have yet to be funded, may in some cases provide Reclamation the opportunity to support additional ecosystem services.

Potential Issues for the 117th Congress

Aging Infrastructure

In the 117th Congress, some stakeholders may propose further prioritizing natural infrastructure in Reclamation activities; some of this attention may be enhanced by regional drought concerns and flood events. Other stakeholders may raise concerns that efforts to have increased Reclamation participation in natural infrastructure activities may hamper or compete with the agency's efforts to operate and maintain existing, aging infrastructure.

Priorities

Congress may debate the extent to which "natural water storage projects" might merit a set-aside or other priority in certain Reclamation programs, such as for WaterSMART grants or in any proposed extensions of the WIIN Act's Section 4007 storage authority (which expires in December 2021). Congress could also consider agency-specific guidance for how Reclamation should incorporate natural infrastructure into other projects and programs, as it has done for the Army Corps. Some support congressional approval of new Reclamation financing authorities that could leverage funding for natural infrastructure projects, among other things. Most prominently, this includes the "Reclamation Water Infrastructure Financing and Innovation Act (RIFIA)" — a proposed loan authority which would operate similarly to existing water financing authorities of EPA and the Army Corps.

Natural Infrastructure

Congressional Issues

When considering whether and how to make available additional authorities and funding to Reclamation for natural water infrastructure, Congress may wish to consider several questions:

- What is known and what research is underway to understand the efficiency and efficacy of natural infrastructure for enhancing water availability?
- How do natural infrastructure options compare to other alternatives in terms of life-cycle costs, reliability, and environmental and social impacts?
- What are the primary impediments to incorporating more natural infrastructure into Reclamation's water management activities?
- What is the demand for the natural water storage projects, and how would increased federal funding support for these projects be likely to affect this demand?
- Which states stand to benefit the most from support for natural infrastructure by Reclamation? How accommodating are various state water rights systems to natural infrastructure?
- What is the preferred federal role in supporting natural infrastructure? Is Reclamation the agency best suited to support these projects? What other federal agencies (if any) support the type of nature-based projects that Reclamation is most likely to target?

TESTIMONY OF BOBBY COCHRAN

PARTNER FOR COMMUNITY RESILIENCE & INNOVATION, WILLAMETTE PARTNERSHIP

The Willamette Partnership is based in Oregon, and supports communities across the West in finding solutions that improve the environment, improve health, and create more inclusive economies (*see*: https://willamettepartnership.org/).

Examples of Natural Infrastructure

Forests as Reservoirs: North Platte River & Sierra Nevadas

Snowpack Decline

Forest Restoration

Water Yield Benefits

Attention to natural infrastructure can increase groundwater recharge and increase water availability in the West's dry summers and fall. The Colorado River Basin is seeing snowpack declines across 90% of its monitoring sites. That snowpack accounts for two-thirds of the inflow into major storage reservoirs in the Basin. In Colorado's North Platte River, research is showing how restored forests that have the right mix of stand densities and canopy cover ensure rain gets into groundwater and snowpack stays shaded. It is estimated that water yields from National Forests in the North Platte have decreased 11-13% and improved forest management could increase yields by 55,000 acre-feet. Similar research in California's Sierra Nevada forests estimate that improved forest management could increase water yields by 16% and delay snowmelt by days or weeks on the Tahoe National Forest. Further, restoring forests can reduce fire upstream of existing reservoirs and irrigation/municipal diversions. Denver and Santa Fe have both invested in restoration of upstream federal forest lands to prevent fire from exposing masses of sediment to erosion and filling their reservoirs up.

Streams as Filters: Medford and Ashland in Oregon

Temperature Issue

Streamside Shade

The cities of Medford and Ashland in Southern Oregon (at the center of Reclamation's Rogue River Project) each had a challenge. Warm water flowing through and out of their wastewater treatment plants was too warm to support salmon. The cities could have spent $16 million each building mechanical chillers. Those chillers would have cooled the water, but they also would have used a ton of energy. Instead, the cities engaged with Willamette Partnership, The Freshwater Trust, the State of Oregon, and others to restore several miles of local streams. The natural infrastructure, shade-providing streamside forests in this case, were planted at half the cost and twice the cooling benefit of those chillers. Reclamation also invested in adjacent stream restoration as a cost-effective way to meet its Endangered Species Act mitigation obligations.

Fire Benefits

Last September, the Almeda Fire ripped through the Bear Creek Valley. The restored streamside forests acted as fire breaks, preventing the fire from destroying homes and saving millions in local and federal disaster relief costs.

Jobs & New Businesses

The replanting has also created new businesses: nurseries to grow plants and good-paying jobs for off-season fire and forestry crews. Investment in natural infrastructure is especially good for the rural economy. Every $1 million invested in natural infrastructure creates 15-24 jobs, and $0.90 of every dollar actually stays in the local economy.

Cities all over the West are using similar natural treatment. Boise, Idaho is paying a farmer for a sediment basin that removes these last nutrients from its wastewater. Prineville, Oregon is using a treatment wetland that doubles as a city park that helped them significantly reduce the treatment fees they charge businesses.

Natural Infrastructure

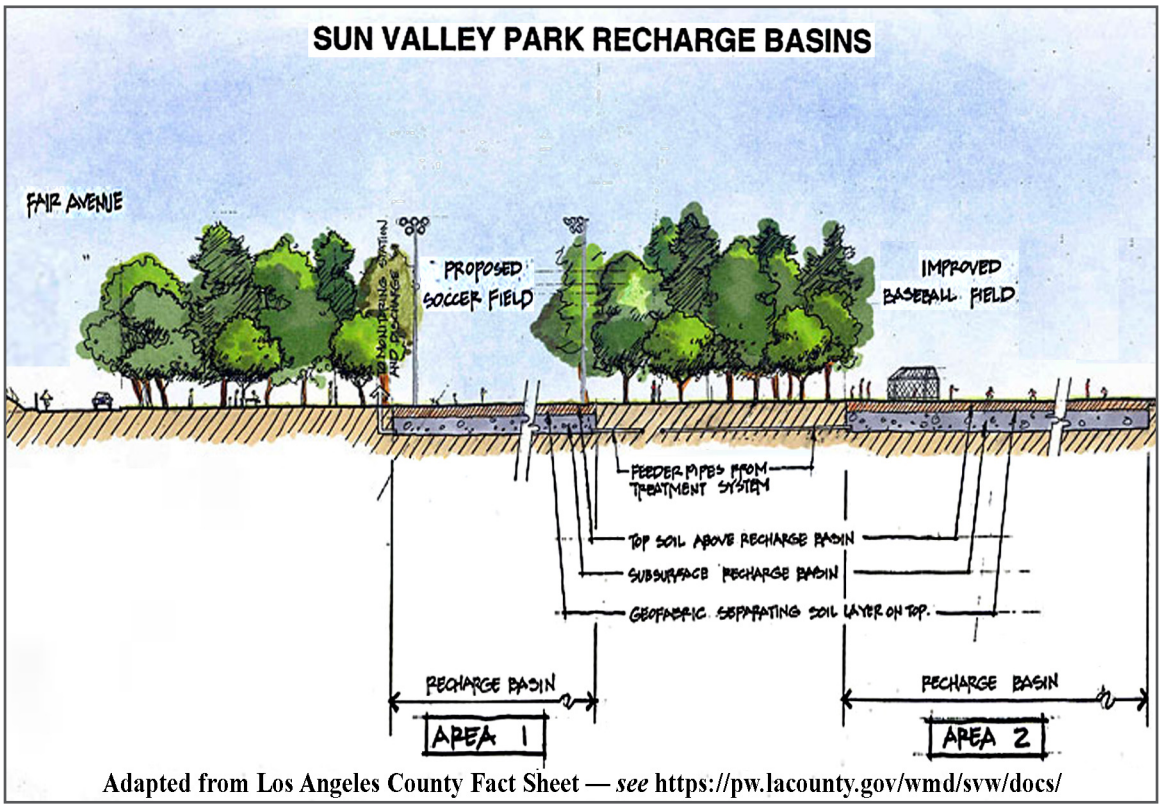
Health Benefits

Stormwater Infiltration

Parks as Flood Control: Los Angeles, Denver, & Oklahoma City

Natural infrastructure can improve health while protecting us from floods. We know that time in nature can measurably improve mental and physical health. Just two hours outside a week or simply greening a vacant lot in town produces measurable health improvements.

In Los Angeles, Sun Valley Park got new baseball and soccer fields and trees in 2006. Most days it is a place to relax or run around. But, when heavy rains come, the park gathers, treats, and infiltrates stormwater from 21 acres of homes and businesses — reducing flooding and adding 30 acre-feet of water back in the aquifer for later use. The project cost $7 million to build.



Adapted from Los Angeles County Fact Sheet — *see* https://pw.lacounty.gov/wmd/svw/docs/

Green Stormwater Management

The National Recreation and Park Association is supporting "Environmental Learning for Kids" to improve aging gray stormwater infrastructure through the Montbello Open Space project, located in the far northeast section of the city and county of Denver, Colorado (*see*: www.elkkids.org). The project involves the restoration of five acres in Montbello — one of the city's largest neighborhoods. A new park has been designed specifically to: mimic the native Colorado prairie ecosystem; employ green infrastructure techniques to improve stormwater flow; accommodate frequent storms; withstand a 100-year flood event; improve water and environmental quality; and improve wildlife habitat in this arid landscape. To allow for additional infiltration, water will collect on the park site prior to releasing the flows into a detention pond on the health clinic site, thereby capturing and filtering all water that flows into the public storm sewer. This project will collectively manage over two million gallons of stormwater per year and will be complete in 2021.

Oklahoma City is re-orienting roads to include more natural infrastructure in ways that helped manage stormwater. This effort also has the effect of slowing traffic and has increased downtown business because more people stop and shop.

Policy Needs

PUT NATURAL INFRASTRUCTURE ON A LEVEL PLAYING FIELD

Authorization Needs

Natural infrastructure solutions are compatible with community needs and can serve a vital role in solving community infrastructure challenges. The federal government uses 240 separate programs to fund water infrastructure, research, data, and conservation. However, most of those programs don't explicitly authorize and encourage natural infrastructure. We need to put natural infrastructure on an even playing field. The small- and low-income communities I work with most would love a natural infrastructure option to consider if it saves money, increases water security, and builds a foundation for a strong economy. Natural infrastructure can cost less, create better more local jobs, and improve health.

Natural Infrastructure

Funding Eligibility

Capitol Asset

Multiple Benefits

Rural Needs

Regional Project

Funding Barrier

Programmatic Eligibility

Natural infrastructure was explicitly authorized, even prioritized, in the 2020 Water Resources Development Act (WRDA) that passed as part of the omnibus bill at the end of the 116th Congress. We can do that with every program (e.g., Bureau of Reclamation, USDA Rural Development, Clean Water and State Drinking Water Revolving Funds, and how we manage our nation's forests and streams). Federal funding can also clarify that the community engagement, planning, and stewardship of natural infrastructure are eligible costs.

Congress can also state its interpretation that natural infrastructure is a capital asset — just like a road or pump station. That designation allows local governments to capitalize the costs of restoring and caring for the streams, wetlands, and forests that serve their towns. It also lets them issue the bonds, and partner with the private sector, to finance that work.

Prioritize Infrastructure with Multiple Benefits

No investment should solve for one problem anymore. For example, in Central Oregon, irrigation districts are upgrading leaky canals on several Reclamation projects into pressurized pipe. They're laying down broadband for rural towns and micro-hydropower in those same conduits. That rural broadband is then connected to real-time water gauging which allows for better water budgeting and moving water between farm, municipal, and habitat uses as needed during the year.

Reclamation's WaterSMART and Cooperative Watershed Management programs can push these kinds of innovations further. USDA programs, like the Regional Conservation Partnership Program (RCPP), provide the space for farms and cities to come up with collaborative, good solutions that incorporate both built and natural infrastructure solutions.

Think Beyond "Shovel Ready"

The 2009 American Recovery and Reinvestment Act (ARRA) worked for some places, and left others behind. In Oregon, higher capacity towns could quickly put together project designs, permits, and applications. Rural Oregon didn't have that same capacity. Rural unemployment remained high. We need to move beyond "shovel ready" in some key ways:

- Invest in the technical assistance and capacity building for rural and low income areas to access federal aid (e.g., rural circuit riders and environmental finance centers) — making sure there is also technical assistance for natural infrastructure solutions
- Invest in the foundational information, such as groundwater basin studies, needed to do more accurate water budgeting and demand management
- Plan and solve regionally — we need to look across city and state boundaries with coordinated approaches
- Give communities up to three years from the date of project application to spend their allocation
- Coordinate permitting so that restoring streams and protecting forests doesn't take so much time or cost so much
- Make sure it's clear that infrastructure needs to create resilient, inclusive economies and opportunities for all people to thrive in all places — no exceptions. Infrastructure tied just to increases in job numbers and export-led production won't create the kinds of economic liberty that rural and urban places across the West are asking for.

TESTIMONY OF TROY LARSON (LEWIS & CLARK REGIONAL WATER SYSTEM)

I am Troy Larson, Executive Director of the Lewis & Clark Regional Water System (Lewis & Clark). Lewis & Clark is a tristate drinking water project that when completed will benefit over 350,000 individuals in southeast South Dakota, northwest Iowa, and southwest Minnesota. This water project involves the partnership of the federal government, three states, 15 cities, and five rural water systems.

The Bureau of Reclamation (Reclamation) provides construction oversight for our project and has been an important partner since the project was incorporated in 1990 and later authorized by Congress in 2000. Construction began in 2004, and we are approximately 86% complete. In today's dollars, the estimated cost of the project is $618 million. At current funding levels, we unfortunately still have about 10 years to go.

Our project and four other projects are funded by Reclamation's Rural Water Program, and at this point the primary barrier to project completion for us is federal funding. The states and municipalities have fulfilled their financial obligations to the projects. With construction roughly 86% complete, the goal of connecting all awaiting communities and rural water systems is within reach; however, this assumes that the construction requirements for our project from Reclamation do not significantly change in ways that would require spending financial resources to satisfy those new requirements.

Natural Infrastructure

Scarce Funds & Delay?

I appreciate the goals that the Chairman has in exploring the viability of incorporating natural infrastructure in water management and policy. I have three concerns about this proposal to discuss today. However, I caveat my concerns with the statement that I am not aware of the full scope of the policy changes under consideration, so I raise concerns in an effort to bring issues to the attention of the Committee for your consideration as you continue to contemplate changes to how Reclamation operates.

First, I am concerned about the financial effects these new requirements could have and that they will delay completion of projects and require additional scarce funds to satisfy these goals. Second, I am concerned about one-size-fits all changes because not every Reclamation funded project is alike; and third, I am concerned that funding new natural infrastructure will take precedent over completing the Reclamation projects that are currently in process.

In the course of my 18 years and our close partnership with the Reclamation, there have been countless times when we have had to ensure compliance with various environmental parameters. One example from 2008 is particularly important to consider as you weigh the impact of changes the Committee is discussing today.

Bank Stabilization Expense

Our source of water is a series of wells adjacent to the Missouri River. To protect the wells from erosion we need to construct bank stabilization. Our original plan was to bury large rocks a short distance inland, and when natural erosion affected the shore and reach the buried rocks, the rocks would eventually tumble down the river bank. This would stabilize the riverbank from further erosion. At the request of the National Park Service and the Army Corps of Engineers, we instead used a "modified stone toe revetment with root wads." I would be happy to further provide an explanation of what this entailed, but to keep this short I will just say that it was deemed a more environmentally friendly and natural looking approach to bank stabilization even though the other approach would have also accomplished the exact same goal. We were forewarned it has been used on smaller streams, but not on one as large as the Missouri River. The bank stabilization project was completed in August 2008, and the total cost was $5.25 million. Our engineers conservatively estimate this approach added at least $1 million to the contract of the project; roughly a 20% increase. That is $1 million we could have used to put more pipeline in the ground and closer to completing the entire water system.

Federal Funding Cap

This additional cost for natural shoreline infrastructure did not necessarily come out of the pocket of the federal government, and it is possible that future requirements for natural infrastructure will not come out of the pocket of the federal government. That is because of the hard cap of our federal funding ceiling. Reclamation knows that there is a maximum amount the federal government will pay for our project, so new additional costs, even if they are a result of policy directives coming from the federal level, will likely be borne by the municipalities and rural water systems in our project.

For projects like ours, the sooner our project is complete, the less of a burden we are to the federal government because once complete, Lewis & Clark is fully self-sustaining with water rates covering all operation and management expenses. We are grateful for what Congress appropriates every year, and we hold fast to our goal of being self-sufficient, but that cannot occur until we have received the funds necessary to complete construction. Adding new requirements that might make our project more expensive only further delays our ability to become self-sufficient, which was the vision Congress laid out for our project when we were authorized over 20 years ago.

Additional Requirements?

Funding Bias?

I am concerned that if Congress adds a new scope to Reclamation's mission, it will mean that long-standing projects like ours will take a back seat to funding for new natural infrastructure projects. For us, we originally thought it would take about 10 years to complete the water project. But here we are, 20 years after we were authorized, and we still are not complete, and at current funding levels, we anticipate another decade of work before we are complete. If Reclamation is suddenly trying to satisfy Congress' desire to have the agency focus on the new idea of natural infrastructure, what does that mean for projects like ours in terms of the commitment of the scare resources that Reclamation is appropriated every year?

I close by reiterating that changes in the mission or scope of Reclamation and their expectations for how we complete our infrastructure project have the potential to significantly affect timelines for completion by reducing the amount of federal funds required for Reclamation-funded projects; one-size-fits-all natural infrastructure mandates won't work for all Reclamation projects; and an expansion of Reclamation's mission could mean existing projects are no longer prioritized for completion.

For Additional Information:
US Senate Committee on Energy and Natural Resources Subcommittee on Water and Power website: www.energy.senate.gov/water-power

WATER BRIEFS

UNLAWFUL DIVERSIONS CA NESTLE VIOLATIONS

Following numerous complaints and a multi-year investigation into unauthorized spring water diversions in the San Bernardino National Forest (SBNF) by Nestle Waters North America, the State Water Resources Control Board (SWRCB) on April 23 issued a revised Report of Investigation and a draft Cease and Desist Order directing the company to stop its unlawful activities. Nestle has 20 days to respond to the draft order and request a hearing or SWRCB may issue a final order.

During California's historic drought, SWRCB's Division of Water Rights received multiple complaints alleging that Nestle's continual water diversions depleted Strawberry Creek, resulting in reduced downstream drinking water supply and impacts on sensitive environmental resources. The Division conducted a field investigation and issued an initial report in 2017 with recommendations that Nestle only take amounts within its established water rights. Afterward, the State Water Board received an additional 4,000 comments and thousands of pages of information from the public alleging continued excessive water diversions, which significantly expanded the investigation that culminated with the proposed enforcement action.

Division staff's extensive water rights complaint investigation included an evaluation of the spring water sources in the SBNF, Nestlé's historical water rights claims, and a visit to the spring sites, which are located in remote rugged mountain terrain. Division staff issued the 2017 Report of Investigation (ROI) on December 17, 2017 and solicited comments on the 2017 ROI from the public until February 9, 2018.

"It is concerning that these diversions are continuing despite recommendations from the initial report, and while the state is heading into a second dry year," said Jule Rizzardo, Assistant Deputy Director for the Division of Water Rights.

Besides prohibiting the unauthorized diversions, the order, if adopted, would instruct the company to limit diversions from surface streams to its pre-1914 water right of 7.26 acre-feet per year; submit annual monitoring reports that contain diversion amounts for the previous year, and include information regarding the nature of diversions that could be subject to the Board's permitting authority; establish a basis of right for diversions found within the board's permitting authority; and submit a compliance plan within 180 days after a final order is adopted.

Nestle operates facilities in the Strawberry Creek watershed, a tributary of the Santa Ana River that provides municipal water to an estimated 750,000 customers. The operation involves 13 sites where spring water is taken and redirected for bottling at numerous plants, including one in downtown Los Angeles.

The board acknowledged the extraordinary public input it received in this matter and its powerful impact on the investigation. "This investigation provides a clear example of the vital role Californians play in protecting our water resources," added Victor Vasquez, senior engineer with the Division of Water Rights. Any member of the public can submit a complaint regarding water rights issues through the online CalEPA Environmental Complaint System.

For info: Ailene Voisin, SWRCB, Ailene.Voisin@waterboards.ca.gov or https://www.waterboards.ca.gov/

DRINKING WATER REPORT CA IN-DEPTH REVIEW

The State Water Resources Control Board (SWRCB) announced on April 9 the completion of its first-ever comprehensive look at California water systems that are struggling to provide safe drinking water to communities and how to help them. With criteria for the state's Human Right to Water list recently expanded, the assessment identifies both failing water systems and those at risk of failing, offering the most in-depth view of long-term drinking water safety the state has ever had.

The 330-page needs assessment follows California's leadership in adopting the first Human Right to Water policy in the nation. The study is part of the state's Safe and Affordable Funding for Equity and Resilience (SAFER) Program, a comprehensive approach to implementing Governor Gavin Newsom's commitment to ensuring the estimated one million Californians being served contaminated water have solutions for safe, affordable drinking water. The Safe and Affordable Drinking Water Fund earmarks $130 million annually through 2030. Additional funds to address SAFER solutions come from various State and Federal funding sources.

The needs assessment:

1) identifies California small water systems and domestic wells that are failing or at risk of failing to provide access to safe drinking water;
2) estimates the cost of interim and long-term solutions for these systems; and
3) determines the statewide funding gap and affordability challenges that may be barriers to implementing these solutions.

While the SWRCB estimates another $4.6 billion in drinking water grants and loans will be needed to help water systems implement sustainable, long-term solutions, the Biden Administration's recently announced $2 trillion infrastructure initiative devotes significant resources to new or upgraded water projects and could help close many financing gaps in the years ahead. Members of the all-volunteer SAFER Advisory Group were asked to provide input to help establish funding priorities for this year.

The criteria for systems on the Human Right to Water (HR2W) list were expanded in April 2021. This change was necessary to ensure that broader issues, such as treatment and critical monitoring violations, were being addressed in addition to chemical violations. The risk assessment was developed in partnership with UCLA and refined through stakeholder input.

Each year, approximately 45 new water systems are added to the HR2W list, but the overall number of HR2W systems is fairly constant because, as some come into compliance, others begin to fail. This demonstrates that to truly make statewide progress, it is critical to identify and support at-risk systems before they fail.

Of the 7,800 public water systems in California, there are about 345 systems on the HR2W List, meaning they don't meet safe drinking water

standards. Currently, 92% of those systems are actively working toward long-term solutions and 40% are looking at the feasibility of consolidating with another nearby water system.
For info: Edward Ortiz, SWRCB, Edward.Ortiz@Waterboards.ca.gov or www.waterboards.ca.gov/

TREATMENT AS A STATE OR TRIBAL CWA AUTHORITY

On May 3, the US Environmental Protection Agency (EPA) announced that it has approved the request by the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) to assume responsibilities of the Clean Water Act's water quality standards and certification programs on reservation and trust lands. With this approval, the CTCLUSI will assume authority over all surface waters within the Reservation and trust Lands. Trust lands include lands located outside of the reservation that are held in trust by the United States for the CTCLUSI. The CTCLUSI reservation and trust lands collectively cover almost 15,000 acres of southwest Oregon.

The CTCLUSI applied to EPA for "Treatment in a Similar Manner to a State" (TAS) for the Clean Water Act (CWA) section 303(c) water quality standards and the section 401 water quality certification programs on December 17, 2019, and supplemented the application on June 12, 2020. (*See* www.epa.gov/tribal/tribal-assumption-federal-laws-treatment-state-tas). This approval will enable the CTCLUSI to set water quality goals and standards for all water bodies within the CTCLUSI reservation and trust Lands. EPA's approval does not alter or modify water quality standards outside of the CTCLUSI reservation and trust Lands.

The approval authorizes the CTCLUSI to develop water quality standards for all surface waters within the CTCLUSI reservation and trust Lands and to ensure that CWA-permitted discharges will meet all applicable water quality standards for reservation waters after those standards are reviewed and approved by EPA. The CTCLUSI have previously been granted TAS status for other Clean Water Act sections: section 106 - Water Pollution Protection and section 319 - Nonpoint Source programs, in 2002 and 2003, respectively.

Several federal environmental laws, including the CWA, authorize EPA to treat eligible federally recognized Indian tribes in a similar manner as a state for implementing and managing certain environmental programs. The basic requirements for applying for TAS are that the tribe must be federally recognized; have a governing body to carry out substantial governmental duties and powers; have the appropriate authority; and be capable of administering the functions of the program.
For info: Mark MacIntyre, EPA, 206/553-7302 or macintyre.mark@epa.gov

PUBLIC WATER SYSTEM KS TAMPERING CHARGE

Wyatt A. Travnichek was indicted on a federal charge accusing him of tampering with a public water system, Acting U.S. Attorney Duston Slinkard announced on March 31st. Travnichek, 22, of Ellsworth County, Kansas is charged with one count of tampering with a public water system and one count of reckless damage to a protected computer during unauthorized access. "Our office is committed to maintaining and improving its partnership with the state of Kansas in the administration and implementation of the Safe Drinking Water Act of 1974," said Acting U.S. Attorney Duston Slinkard.

The indictment alleges that on or about March 27, 2019, in the District of Kansas, Travnichek knowingly accessed the Ellsworth County Rural Water District's protected computer system without authorization. During this unauthorized access, it is alleged Travnichek performed activities that shut down the processes at the facility, which affect the facilities' cleaning and disinfecting procedures with the intention of harming the Ellsworth Rural Water District No. 1 (also known as Post Rock Rural Water District).

"By illegally tampering with a public drinking water system, the defendant threatened the safety and health of an entire community," said Lance Ehrig, Special Agent in Charge of EPA's Criminal Investigation Division in Kansas. "EPA and its law enforcement partners are committed to upholding the laws designed to protect our drinking water systems from harm or threat of harm. Today's indictment sends a clear message that individuals who intentionally violate these laws will be vigorously prosecuted."
These alleged crimes carry the following penalties:

- Tampering with a Public Water System: Up to 20 years in federal prison and a fine up to $250,000
- Reckless Damage to a Protected Computer During Unauthorized Access: Up to five years in federal prison and a fine up to $250,000

EPA's Criminal Investigation Division, The Kansas Bureau of Investigation and Federal Bureau of Investigation conducted the investigation. Assistant United States Attorney Christine E. Kenney is prosecuting the case.
For info: www.epa.gov/enforcement/environmental-crimes-case-bulletin

WATERSMART PROJECTS WEST WATER SUPPLY & QUALITY

On March 25, the US Bureau of Reclamation (Reclamation) announced it will provide $2.1 million for 11 collaborative watershed management projects through the WaterSMART program. These projects have been developed by groups of stakeholders working together to address critical water supply needs and water quality concerns. The WaterSMART Cooperative Watershed Management Program projects selected will leverage the funding from Reclamation to complete more than $7.5 million toward watershed management. The selected projects are in Arizona, California, Colorado, Idaho, Oklahoma, Oregon and Washington.

The Colorado Rio Grande Restoration Foundation, in partnership with the Rio Grande Headwaters Restoration Project, will receive $285,000 to upgrade two diversion structures and restore adjacent riparian habitat on the Conejos River in southern Colorado's San Luis Valley. Streambank stabilization structures will also be installed upstream of the diversion structures, and the streambank

will be reshaped to reconnect the river with the floodplain and revegetated. It will improve water management and water quality and create new riparian and aquatic habitats.

In partnership with the Icicle Work Group, Washington's Chelan County Natural Resource Department will receive $229,901 to restore a section of Icicle Creek in the Wenatchee sub-basin of the Upper Columbia River Basin. An 850 linear foot section of streambank will be stabilized using bioengineered wood structures, grading, placement of fabric encapsulated soil lifts, and revegetating 1.1 acres of riparian area. The project will improve water quality and salmonid habitat conditions and protect the water supply.

To learn more about the Cooperative Watershed Management Program and see all the projects selected, please visit www.usbr.gov/watersmart/cwmp. Through WaterSMART, Reclamation works cooperatively with states, tribes, and local entities to plan for and implement actions to increase water supply reliability through investments to modernize existing infrastructure and attention to local water conflicts.
For info: Peter Soeth, Reclamation, 303/ 445-3615 or psoeth@usbr.gov or www.usbr.gov/watersmart

MIGRATORY BIRD RULE US

TRUMP RULE REVOCATION

On May 6, the US Fish and Wildlife Service (USFWS) announced a proposed rule to revoke the January 7, 2021, final regulation that limited the scope of the Migratory Bird Treaty Act (MBTA). Significant concerns about the interpretation of the MBTA have been raised by the public, legal challenges in court, and from international treaty partners. This proposed rule provides the public with notice of USFWS' intent to revoke the January 7 rule's interpretation of the MBTA (issued by the Trump Administration) and return to implementing the MBTA as prohibiting incidental take and applying enforcement discretion, consistent with judicial precedent.

On January 7, USFWS published a final rule defining the scope of the MBTA as it applies to conduct resulting in the injury or death of migratory birds protected by the MBTA. This rule made significant changes to the scope of the MBTA to exclude incidental take of migratory birds, with an effective date of February 8. USFWS extended the effective date until March 8 and opened a public comment period. Rather than extending the effective date again, the agency believes the most transparent and efficient path forward is instead to immediately propose to revoke the rule.

USFWS requests public comments on issues of fact, law, and policy raised by the MBTA rule published on January 7. Public comments must be received or postmarked on or before June 7, 2021. The notice will be available at www.regulations.gov, Docket Number: FWS-HQ-MB-2018-0090, and will include details on how to submit comments. The agency will not accept email or faxes. If you provided comments to the February 9, 2021, notice to extend the effective date, you do not need to resubmit those comments.

On March 8, 2021, Interior rescinded the 2017 Solicitor's Opinion M-37050 on the MBTA that had overturned decades of bipartisan and international consensus. The reasoning and basis behind that M-Opinion were soundly rejected in federal court. The Endangered Species Act and the Bald and Golden Eagle Protection Act, as well as state laws and regulations, are not affected by the Solicitor's Opinion M-37050 or the January 7 final regulation.
For info: Documents related to the rulemaking process are available at the USFWS' regulations page: www.fws.gov/regulations/mbta/

PFAS US

EPA PFAS COUNCIL

On April 27TH, EPA Administrator Regan has asked Radhika Fox, Principal Deputy Assistant Administrator in the Office of Water, and Deb Szaro, Acting Regional Administrator in Region 1, to convene and lead an "EPA Council on PFAS" — which will be comprised of senior EPA career officials from across the agency.

The agency's ongoing work on PFAS is based on the 2019 EPA PFAS Action Plan. Developed by EPA career staff, the plan identifies an agenda and actions that have yet to be realized. Over the past few years, science has progressed rapidly, and the agency is moving forward with actions that are based on this new science.
The Council is directed to:

- Develop "PFAS 2021-2025 - Safeguarding America's Waters, Air and Land," a multi-year strategy to deliver critical public health protections to the American public. To develop the strategy, the ECP will review all ongoing actions, propose any necessary modifications, and identify new strategies and priorities. The ECP shall make initial recommendations within 100 days of its establishment.
- Continue close interagency coordination on regional specific and cross-media issues to assist states, Tribes, and local communities faced with significant and complex PFAS challenges.
- Work with all national program offices and regions to maximize the impact of EPA's funding and financing programs and leverage federal and state funds to support cleanup of PFAS pollution, particularly in underserved communities.
- Expand engagement opportunities with federal, state, and tribal partners to ensure consistent communications, exchange information, and identify collaborative solutions.

The Coucil's's work will build on steps the Biden-Harris Administration has already taken to address these chemicals, including pulling down and updating a PFBS toxicity assessment that had been politically compromised and issuing a new assessment backed by career scientists. EPA has also taken action to begin to develop a national primary drinking water regulation, to collect new data critically needed to improve EPA's understanding of 29 PFAS, and to solicit data on the presence and treatment of PFAS in wastewater discharges. The agency also strongly supports President Biden's American Jobs Plan, which calls for investing billions of dollars to monitor and treat PFAS in drinking water.
For info: EPA PFAS website: www.epa.gov/pfas

CALENDAR

May 18 WEB
IFA Notice of Funding Availability Webinar, 2:00 pm - 3:30 pm Eastern Time. RE: How to Subit a WIFIA Letter of Interest & How EPA Selects Projects; EPA Will Walk Through Key Components of the Notice of Funding Availability, Explain Submittal & Selection Process, and Provide Tips for Completing Letter of Interest. For info: www.epa.gov/wifia/wifia-webinars

May 18-21 TN
National Pretreatment Workshop & Training, Nashville. Nashville Marriott at Vanderbilt University. Presented by National Assoc. of Clean Water Agencies. For info: www.nacwa.org/conferences-events/event-at-a-glance/2021/05/18/nacwa-events/national-pretreatment-workshop-training

May 19 WEB
Water and Almonds: Market Insights on California's Agricultural Power Duo Webinar, Noon to 1:00 pm Pacific Time. Presented by WestWater Research, LLC. For info: https://my.demio.com/ref/BMlNSLXpEzmHTWda or www.waterexchange.com

May 19-20 WEB
Water & Wastewater Investor Forum, RE: New Investments; Growth Strategies; Financing Sources; & Creative Deal Structures. For info: www.euci.com/events/ or 303/ 770-8800

May 20 WEB
Upper Columbia Salmon Reintroduction Webinar, Registration is Required for Web Link. 8:30 am to Noon Pacific Time. For info: www.lrf.org

May 20 WEB
Seeking Funding for Your Infrastructure Project - CFCC 2021 Virtual Funding Fair, Presentations: 9:00 am - 12:30 pm; Virtual Booths 12:30 pm - 3:00 pm Pacific Time. Presented by the California Financing Coordinating Committee; Learn About Available Grant, Loan & Bond Financing Options for Infrastructure Projects from Federal, State & Local Agencies. For info: www.cfcc.ca.gov

May 20-21 WEB
Tribal Water in the Southwest - Virtual Conference, Interactive Online Broadcast. For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

May 24-26 WEB
11th Annual Choose Clean Water Conference: A Changing Chesapeake, Richmond, VA. Webinar**.** For info: Drew Robinson, 443/927-8049, RobinsonAQ@nwf.org or www.choosecleanwater.org/choose-clean-water-conference/2021

May 26 WEB
Time to Get Creative: Muncipal Water Challenges Q&A Webinar, 1:00 - 2:00 pm Mountain Time. How Greeley, CO is Addressing Water Management Challenges: Conversation Between Adam Jokerst & Brett Bovee. For info: www.watereducationcolorado.org/programs-events/webinars/

May 26-27 CA
Smart Water Utilities USA 2021: Reducing Water Leakage Across the Network - Exhibition & Conference, Long Beach. Presented by the Choose Clean Water Coalition. For info: www.usa.smart-water-utilities.com/?join=VR

May 27 WEB
Seeking Funding for Your Infrastructure Project - CFCC 2021 Virtual Funding Fair, Presentations: 9:00 am - 12:30 pm; Virtual Booths 12:30 pm - 3:00 pm Pacific Time. Presented by the California Financing Coordinating Committee; Learn About Available Grant, Loan & Bond Financing Options for Infrastructure Projects from Federal, State & Local Agencies. For info: www.cfcc.ca.gov

June 1 WEB
WIFA Notice of Funding Availability Webinar, 2:00 pm - 3:30 pm Eastern Time. RE: How to Subit a WIFIA Letter of Interest & How EPA Selects Projects; EPA Will Walk Through Key Components of the Notice of Funding Availability, Explain Submittal & Selection Process, and Provide Tips for Completing Letter of Interest. For info: www.epa.gov/wifia/wifia-webinars

June 10-11 WEB/WA
Water Law in Washington Seminar, For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

June 14-15 WI
Strategic Communications: H2O Workshop, Milwaukee. Saint Kate - The Arts Hotel. Presented by National Assoc. of Clean Water Agencies. For info: www.nacwa.org/conferences-events/event-at-a-glance/2021/06/14/nacwa-events/strategic-communications-h2o-workshop

June 15-16 Canada
Grey to Green 2021 Conference: Designing for Tomorrow - Green Infrastructure & the Post COVID-19 Recovery, Toronto. Virtual Platform. Biophilic Design, Integrated Stormwater Management Practices, Urban Agriculture, Green Roof and Green Wall, Best Practices & More. For info: https://greytogreenconference.org

June 18 CO
SEER Climate Change Conference, Denver. TBA. Presented by the American Bar Association - Section of Environment, Energy & Resources Law. For info: https://www.americanbar.org/groups/environment_energy_resources/events_cle/section_calendar_archive/

June 23-24 TX
Hydraulic Fracturing & Production Chemicals 2021, Houston. Hotel Derek. For info: https://www.hydraulic-fracturing-chemicals.com/?join=VR

June 30-July 1 TX
Annual Texas Groundwater Conference, Austin. Omni Austin Hoel Southpark. Presented by the American Groundwater Trust. For info: https://agwt.org/civicrm/event/info?id=323&reset=1

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

(continued from previous page)

June 30-July 1 WEB
Western Governors' Association 2021 Annual Meeting, TBA. For info: https://westgov.org/

July 11-14 WA
Utility Leadership Conference & Annual Meeting, Seattle. Hyatt Regency Seattle. Presented by National Assoc. of Clean Water Agencies; 50th Anniversary Gala on July 11th. For info: www.nacwa.org/conferences-events/event-at-a-glance/2021/07/11/nacwa-events/utility-leadership-conference-51st-annual-meeting

July 19-26 WEB
Virtual 67th Annual Rocky Mountain Mineral Law Institute, Presented by Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org/conferences

July 26-27 Alberta
Montney & Duvernay Shale Water Management 2021: Water Strategies for Northern Alberta & BC, Grande Prairie. Stonebridge Hotel. For info: www.alberta.shale-water-management.com/?join=VR

July 28-30 OR
2021 Association of Clean Water Agencies Summer Conference, Eugene. TBA. Presented by OACWA. For info: https://oracwa.org/conferences-workshops/

August 3-5 TN
Association of Clean Water Administrators Annual Meeting, Memphis. The Guest House at Graceland. For info: www.acwa-us.org/event/annual-meeting-2021/

August 25 WEB
Contaminated Properties in the Northwest: Navigating the Redevelopment Process - Live Webcast. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

August 25-26 ND
Bakken Oil & Gas: Shale Water Management 2021 - Cost-Effective Water Strategies for North Dakota, Bismarck. TBA. For info: www.bakken.shale-water-management.com/?join=VR

August 26 WA
Fourth Annual Water Law in Central Washington Conference, Ellensburg. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

August 31-Sept. 2 TX
10th Annual Texas Groundwater Summit, San Antonio. Hyatt Regency Hill Country Resort. Texas Alliance of Groundwater Districts Event. For info: https://texasgroundwater.org/news-events/events/texas-groundwater-summit/