



# The Water Report™

*Water Rights, Water Quality & Water Solutions in the West*

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## NORTHWEST HYDROPOWER & FISH

COLUMBIA RIVER BASIN SALMON RECOVERY EFFORTS UPDATE

by F. Lorraine Bodi, Bonneville Power Administration

### INTRODUCTION

In January 2008, *The Water Report* featured my article — “Hydropower & Fish — Northwest Challenge: Keeping Fish and Clean Hydro” — which described the Northwest’s efforts to preserve both its iconic salmon and access to affordable hydroelectric power (*see* Bodi, *TWR* #47). It addressed the history, legal underpinnings, and accomplishments of the Columbia Basin Fish & Wildlife Program to recover endangered Columbia Basin salmon and steelhead. Fueled by strong partnerships and reliable funding from electric ratepayers, this program is the largest ecosystem restoration undertaking in the country.

This year, the Bonneville Power Administration (“BPA” — the marketing agent for power from all federally owned hydroelectric projects in the Pacific Northwest) is celebrating its 75th anniversary. BPA is using this milestone as an opportunity to renew the region’s appreciation for the mighty Columbia River, its renewable hydropower, and our commitment to help bring fish back.

There is much progress to report over the last four years.

### BACKGROUND

#### WHAT’S HAPPENED TO DATE

A brief recap of the legal context and turmoil that swirls around Columbia Basin salmon and steelhead is helpful before summarizing our recent accomplishments.

In 1980, Congress passed the Pacific Northwest Electric Power and Conservation Act. This Act, among other things, called on BPA and other agencies that manage the regional hydroelectric system to protect and enhance fish and wildlife affected by the system. Fish and wildlife efforts include mitigating the impact of federal dams and providing “equitable treatment” of fish and wildlife in relation to power generation, flood control, irrigation, and navigation.

The Act also authorized formation of the Northwest Power and Conservation Council, a multi-state oversight agency. It directed the Council to develop a Columbia Basin Fish and Wildlife Program (Program) to guide BPA and other dam managers in meeting their responsibilities for fish and wildlife. BPA has used the Program as its mitigation road map. This Program has become one of the largest mitigation efforts in the world to protect and rebuild the natural resources of a region. Its cost is measured in billions, not millions, of dollars.

In addition, since 1991, thirteen stocks of Columbia Basin salmon and steelhead have been listed under the federal Endangered Species Act (ESA). The impact of hydroelectric dams — both federal and otherwise — contributed to the decline of these fish populations, as did other factors such as intense historic harvests and habitat loss from mining, logging and other development (*see* [www.nwr.noaa.gov/ESA-Salmon-Listings/Index.cfm](http://www.nwr.noaa.gov/ESA-Salmon-Listings/Index.cfm)).

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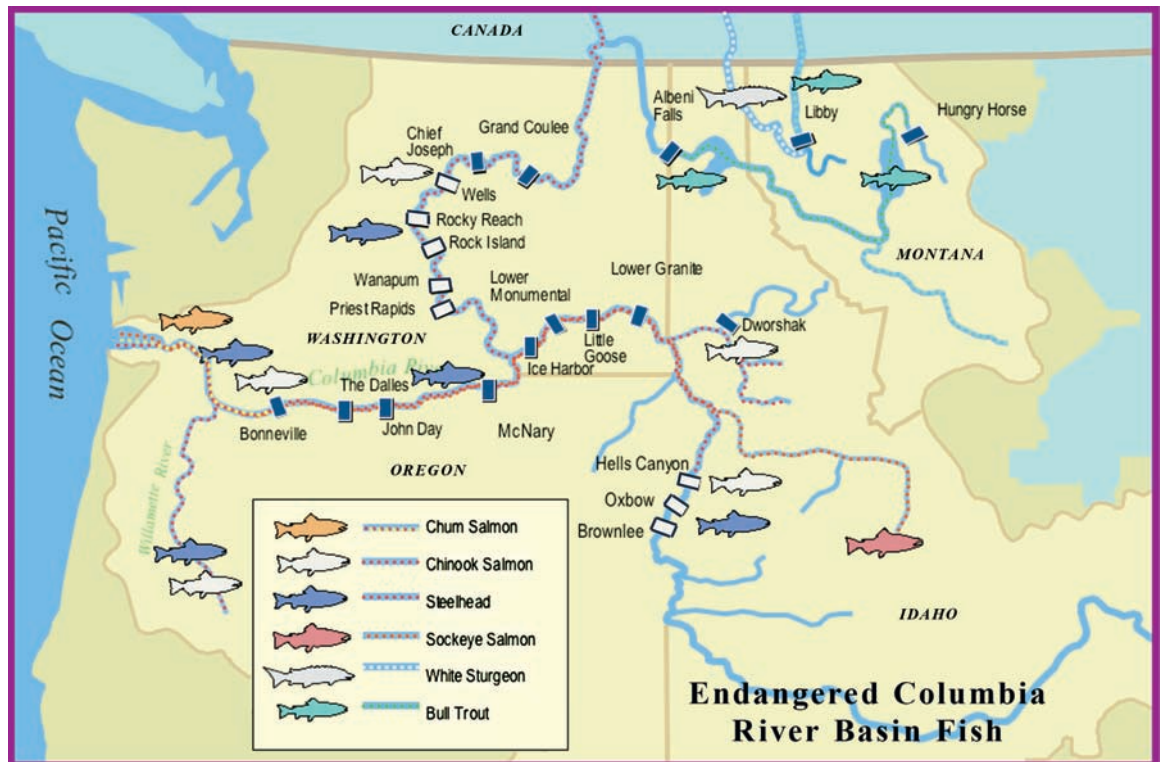
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**Hydro & Fish****BiOps  
Litigation****Conservation  
Expenditures****Fish Accords**

A succession of ESA biological opinions (BiOps) issued by NOAA Fisheries now guide mitigation for the federal dams. Since 2000, these BiOps have relied on an “All H” approach addressing: hydro operations; habitat; hatcheries; and harvest. In addition to major hydro improvements in the operations of federal dams to provide safer fish passage — the cornerstone of the BiOps — BPA and the dam operators are reopening and enhancing important tributary and estuary habitat and using hatcheries to help restore endangered fish. A parallel BiOp for harvest provides a sliding scale for sport, commercial, and tribal harvests of endangered fish, linked to abundance.

Not all stakeholders in the Northwest have supported these BiOps. As a result, fish conservation plans for the federal dams have been in ongoing litigation in federal court since the 1990s. Each successive BiOp built on previous opinions — adding actions to those already in place. The most recent plan, updated in 2010, is supported by the Obama Administration, three states, and seven Indian tribes. It has been challenged by one state, two tribes, and a coalition of conservation groups. Currently, BPA and other federal agencies are in the midst of another “remand” process, with a due date to provide the Court with a further updated BiOp by January 1, 2014 (*see* Water Brief, *TWR* #90).

Despite the litigation, hundreds of positive fish conservation measures have been proceeding apace across the Northwest to help bring fish back to the rivers where they belong. In 2012, BPA will have spent about \$450 million a year for fish and wildlife conservation (not including foregone revenue) — which amounts to about 20 percent of BPA’s annual expenses. BPA conservation program expenses for 2012 include: direct expended funding for projects, \$246M; debt service for capital expenditures (e.g., fish ladders and screens, wildlife lands, and hatcheries), around \$150M; and hatcheries/fish passage O&M expenses, around \$45M. The US Army Corps of Engineers and the US Bureau of Reclamation (which together with BPA are the designated “Action Agencies” for ESA purposes) spend tens of millions more each year on mitigation for the federal dams. Other federal agencies, including NOAA Fisheries, the US Fish and Wildlife Service and the US Forest Service, also contribute millions of dollars to salmon and steelhead recovery annually. These efforts are coordinated through the Federal Caucus, originally established in 2000 (for more information on the Federal Caucus, *see* [www.salmonrecovery.gov](http://www.salmonrecovery.gov)). The progress made since my previous article in 2008 has been significant.

**NEW PARTNERSHIPS PROMOTE SALMON RECOVERY**

Perhaps the most notable event since that last article in *The Water Report* was the cementing of a historic partnership among federal agencies, Northwest tribes and states. In May 2008, the Action Agencies, four Northwest tribes, the Columbia River Inter-Tribal Fish Commission, and the states of Idaho and Montana signed the Columbia Basin Fish Accords (*see* Water Brief, *TWR* #51). Over the next several months, three more tribes and the State of Washington joined them. Collectively, Accord partners decided to end years of litigation in favor of a greater role and say in fish recovery and operation of the hydroelectric system. They chose to get out of the courtroom and into the watersheds.



## Hydro &amp; Fish

The Accords were a landmark development, especially for the involved tribes. The tribes had historically endured the greatest impacts from the decline of salmon, long the centerpiece of tribal culture and a tribal economy dependent on plentiful natural resources. Unfortunately, the tribes had also realized few of the economic benefits the hydroelectric system delivered to the rest of the Northwest in the form of clean, reliable, and inexpensive electricity. Tribal leaders described the Accords as particularly important because they finally provided tribes with a direct voice and role in the protection of fish. Collaboration, long tossed around as a popular buzzword, became a fundamental practice for agencies, tribes, and states that had for years stood on opposite sides in the courtroom but are now working together.

The Accords are 10-year agreements that include a comprehensive \$900 million package of hydro, habitat, and hatchery actions designed to deliver measurable results for the fish. Today, major fish passage improvements, hundreds of habitat restoration actions, and construction of two cutting-edge hatcheries are underway across the Northwest — all backed by the expertise and dedication of the States and tribes with funding provided largely by electric ratepayers who benefit from the hydropower marketed by BPA.

## Columbia Basin Fish Accord Partners

|  |
|--|
| Confederated Tribes of the Colville Indian Reservation     |
| Confederated Tribes of the Umatilla Indian Reservation     |
| Confederated Tribes of the Warm Springs Indian Reservation |
| Confederated Tribes and Bands of the Yakama Nation         |
| Columbia River InterTribal Fish Commission                 |
| Shoshone Bannock Tribes                                    |
| State of Idaho   |
| State of Montana   |
| State of Washington  |
| Kalispel Tribe of Indians                                  |

## HYDRO IMPROVEMENTS REMAIN THE FOUNDATION

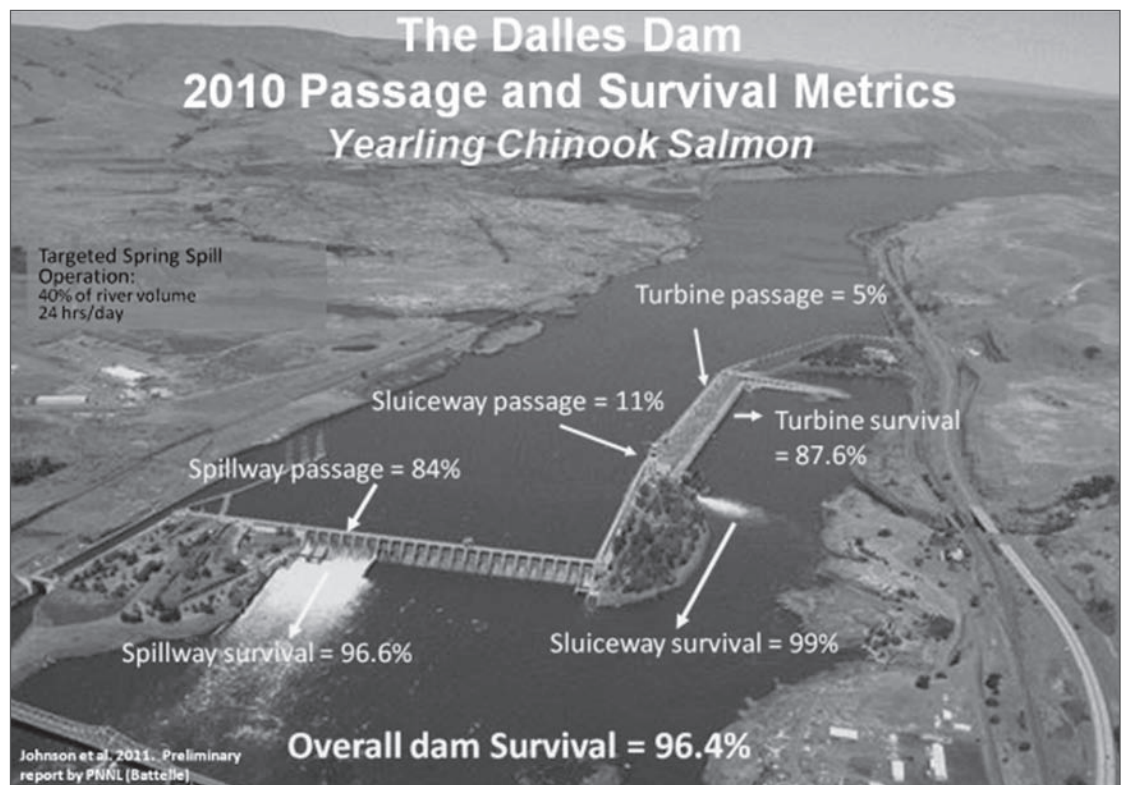
## Fish Passage

The centerpiece of BPA's BiOp commitments is a series of major improvements to its hydropower operations. These improvements include new technologies and operational changes that have remade federal dams from the inside out to provide safer passage for fish, especially vulnerable juveniles. The commitment is evident in the roughly \$1 billion the Action Agencies are investing over 10 years to improve passage at the dams. Congress appropriates funds to the US Army Corps of Engineers (Corps) for these projects and BPA then repays the US Treasury for about 80 percent of the cost.

The monitored results for 2011 continued to show the success on this front. The 2008 BiOp set ambitious standards for juvenile fish survival at the dams — at one time thought by many to be unachievable — i.e., an average survival of 96 percent per dam for spring migrating fish and 93 percent for summer migrants. Scientifically-designed tests at each dam track the progress in meeting those standards. Today, tests show a survival of juvenile steelhead and salmon close to meeting, or on track to meet, the performance standard of 96 percent at Bonneville, The Dalles, and John Day dams. The following photo/diagram provides an example of these results at The Dalles, breaking down the percentage of fish using each route through the dam and the percentage that safely passed through each route.

## Survival Standards

## Survival Rates at Dalles Dam



## Hydro & Fish

### Surface Passage

The “spill” of water to help fish pass quickly through spillways instead of turbines is another cornerstone of the Action Agencies’ program to help ESA-listed fish. The BiOp calls for spilling about 30 to 40 percent of the river’s flow at all eight dams on the lower Snake and Columbia Rivers from early April through August. The spill is especially effective because the Corps has installed surface passage routes at all eight dams. Surface passage routes — such as enormous weirs installed in spillways — allow fish to go over the dams closer to the surface where they naturally migrate, providing an easier and gentler ride for the fish. These spill routes use are considerably more efficient in terms of fish passage and use of water than traditional, subsurface, spill routes. More fish use surface passage per unit of water, and more efficient spill generally reduces total dissolved gas in the river (dissolved gas created by the plunging water can be deadly to fish at high levels). Surface passage routes also speed smolts through dam forebays, where they can be vulnerable to predators. Finally, by helping fish take more advantage of the surface flow where they typically travel, surface passage routes also allow deeper water to flow through turbines and generate renewable power for the region.

## LOOKING BEYOND HYDRO

### “All-H” Strategy

Many factors have contributed to the decline of salmon and no one strategy will recover them. A comprehensive strategy must address limiting factors at all stages of the salmon lifecycle. This is why, since the 2000 BiOp, the Action Agencies have pursued an “All-H” strategy that goes beyond the hydroelectric system to include habitat improvements, hatchery operations and reforms and harvest management. These actions provide “off-site mitigation” for the impacts of the dams.

#### **Increasing Spawning and Rearing Habitat**

### Habitat

Habitat improvements are a key part of the Action Agencies’ comprehensive effort. Since 2007, BPA and its partner federal agencies, states, and tribes have reopened over 1,500 miles of spawning and rearing habitat. This was accomplished by removing irrigation diversions, obsolete dams, and other obstructions.

### Water Purchases

We have also protected over 200,000 acre feet of water through leases, purchases, and irrigation efficiencies. One of many recent examples is in the Lemhi River in Idaho, where irrigation improvements and water transactions revived spawning reaches that once ran dry in the summer. In 2011, state biologists counted numerous newly-hatched fry in the area. In another case, after water leases and other improvements returned water to Oregon’s Lostine River, which once ran dry in sections at critical times, more than 3,700 threatened Snake River spring chinook returned, up from just 13 in 1999 and the most since surveys began in 1986.

### Land Improvements

We have meanwhile protected through land purchase or lease more than 360,000 acres of habitat, and improved nearly 3,000 acres of riparian habitat. Conservation easements are often the most cost-effective means of protecting habitat, allowing BPA to stretch ratepayer dollars while keeping the property in private hands. Streamside improvements such as restoring natural meanders and adding woody debris to provide more attractive spawning and rearing habitat and refuge from predators, shade trees to cool water temperatures and replacement of invasive weeds with native plants all help create a natural environment where salmon and steelhead can thrive.

### Estuary Restoration

Progress has extended to the Columbia River estuary, which has been increasingly recognized by scientists as a critical nursery where juvenile salmon and steelhead grow and gain strength that helps them thrive once they head into the ocean. The BiOp puts a high priority on protecting and restoring estuary habitat, some two-thirds of which has been lost to development over the last century. In 2012 BPA, in cooperation with the Corps and the Columbia Land Trust, funded the largest purchase of riverside habitat in the estuary in nearly 40 years, almost one thousand acres, permanently protecting it and clearing the way for the Corps to undertake more aggressive restoration. Since 2008, the Action Agencies have improved about 750 acres of estuary floodplain to provide rich, essential refuge for young fish.

#### **Improving Hatcheries**

### Hatchery Programs

Today, about 200 salmon hatchery programs operate in the Columbia River Basin, most funded by the Action Agencies as hydro mitigation. BPA alone spends more than \$60 million annually for the operation and maintenance of about 45 percent of the Basin’s hatcheries. BPA also funds research to evaluate the effectiveness of hatcheries.

The contribution of hatchery fish to the recovery of listed fish has been the subject of much analysis, discussion, and litigation. Hatchery evaluation and reforms are critical in ensuring that hatchery fish boost — rather than impede — the recovery of naturally spawning fish. In 2012, BPA completed Hatchery Genetic Management Proposals (HGMPs) for all of the hatcheries that it funds. These HGMPs are the first step in NOAA Fisheries’ review of these hatcheries to ensure they bolster natural stocks as intended.

## Hydro &amp; Fish

## Wild Genes

In recent years, though, the region has seen increasing evidence that hatcheries can help “jump start” nature and recover listed fish. One of the most striking examples is the Snake River sockeye hatchery program, operated by the Idaho Department of Fish and Game. NOAA Fisheries listed Snake River sockeye as endangered in 1991. That same year biologists began a hatchery program for the Snake River. This program was designed and carefully managed to preserve the genes of the very few wild fish that remained. However, results were slow to appear. In 2006, a science panel said the species was no longer viable and recommended that the Council terminate the hatchery program. With the urging of Idaho leaders, however, the program continued.

## Returns Jump

Then, finally, efforts paid off. Adult Snake River sockeye returns past Lower Granite Dam, the last dam the fish pass on their return home to spawn, took a dramatic jump from 52 fish in 2007 to 909 in 2008. More than a thousand returned in 2009, 2010 and 2011. Even more important, some of these fish spawned in the wild. In 2011, of the 1,118 adult fish that returned to Redfish Lake, 150 of them had been born in the wild. NOAA Fisheries’ interim recovery goal for Snake River sockeye is 2,000 naturally produced fish returning to spawn.

## New Hatcheries

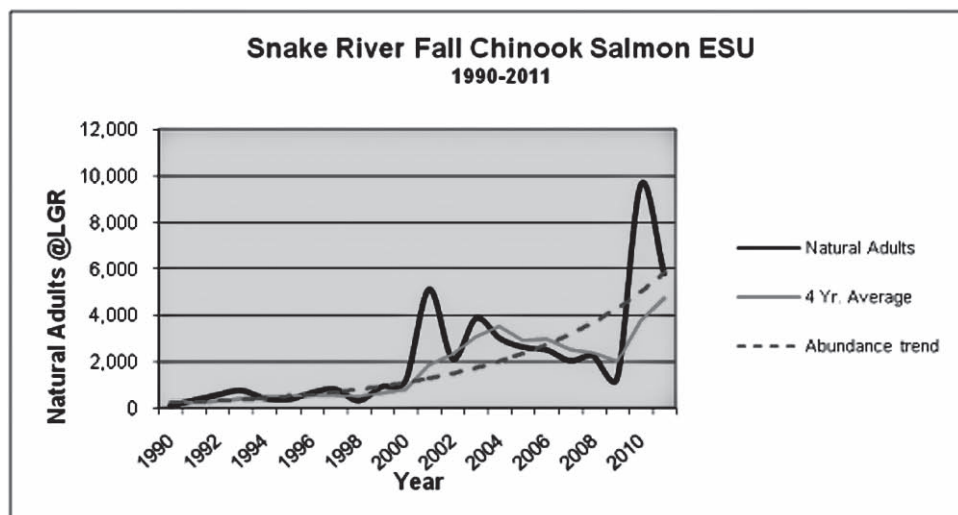
In July of 2012, construction began on a major new hatchery facility in Idaho, funded under BPA’s Fish Accord with the State of Idaho. The \$13.5 million Springfield Hatchery will expand production of the endangered Snake River sockeye salmon five-fold — from the current 200,000 smolts to as many as one million. The facility is expected to be completed in August 2013 and its first smolts released in 2014.

Idaho’s program is not the only hatchery success in the region. The Yakama Tribe’s Cle Elum hatchery in Washington is successfully re-introducing sockeye into areas where they had once been extirpated. The Nez Perce Tribal Hatchery in Idaho is outplanting Snake River fall chinook in Idaho’s Clearwater River and other tributaries and streams in the Snake River basin.

The Nez Perce program has been so successful that last year, 41,000 Snake River fall chinook returned over Lower Granite Dam on their way to spawning grounds. This was twice the previous record for adult returns of this species; that record was set in 2010.

## De-Listing Goal

Today, these fish, too, are spawning in the wild. In 2011, aerial surveys identified 5,010 fall chinook salmon nests, known as redds, throughout the basin, the second highest count (after 5,630 the year before) since intensive surveys began in 1988. For the past several years, Snake River fall chinook have been meeting NOAA’s interim de-listing goal of annually having 3,000 wild Snake River fall chinook over an eight year period.



## Predator Management

Predators have become an increasing concern in the effort to protect and recover listed Columbia Basin fish. The Corps works to manage bird predation on juvenile fish and sea lion predation on adult fish. East Sand Island in the Columbia River Estuary is home to the largest double-crested cormorant colony in western North America, with about 13,000 breeding pairs in 2011. In 2011 double-crested cormorants at East Sand Island consumed approximately 22.6 million juvenile salmon, the highest smolt consumption estimate ever recorded at the cormorant colony.

## Bird Predation



## Hydro &amp; Fish



Sea Lion with Salmon

## Annual Returns

## Fishing Improvements

## Wind Development

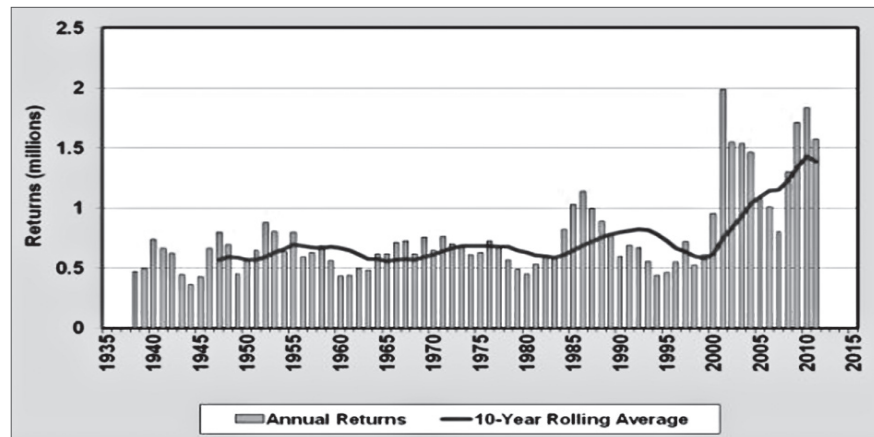
## Spring Generation Conflicts

In 2011, fencing and barriers were erected to deter double-crested cormorants from using 15 percent of the available nesting habitat, but these obstructions had little to no effect on nesting numbers. To reduce predation on juvenile salmon by double-crested cormorants in the Columbia River Estuary, it may be necessary to further reduce the size of the cormorant colony on East Sand Island. The Corps is developing a management plan, expected to be complete this coming December, that will identify potential next steps.

California sea lions, protected under the Marine Mammal Protection Act, swim more than 140 miles up to Bonneville Dam to prey in increasing numbers on adult spring chinook salmon, winter steelhead, and white sturgeon. Generally arriving from middle to late February and leaving by the first week in June, these male sea lions are looking to gain weight in preparation for the summer mating season. Sea lions have eaten more fish every year from 2006 to 2010. In 2008, States and tribes petitioned NOAA Fisheries to lethally remove sea lions that were eating the most fish. Lethal take has proceeded, though subject to a series of legal challenges, since 2008. In 2011, the number of fish eaten by sea lions, at 3,557, was about 1.6 percent of the adult salmon run. This was the lowest percentage since 2003. Although California sea lions remained the primary salmon predator, accounting for 71 percent of the observed catches, catches by Steller sea lions increased, from 0.3 percent in 2007 to 16 percent in 2010 and to 29 percent of total.

## HOW ARE THE FISH DOING?

The goal of all of this work is healthy, harvestable populations of adult fish returning to the Columbia. And they are starting to appear. In 2011, more than 1.5 million salmon and steelhead passed Bonneville Dam. This number exceeds historical averages from the late 1930s through 2000 and stands above the 10-year average.



Northwest States are opening fishing seasons in areas that haven't allowed salmon and steelhead fishing for years. In 2011, parts of Oregon's John Day River were open for steelhead fishing for the first time since 1976. In Northeast Oregon's Catherine Creek, a chinook harvest took place for the first time since 1978. The upper Snake River was open to fall chinook fishing for the first time in more than 40 years.

Put briefly, the decline of salmon runs didn't happen overnight and their recovery will, similarly, take time. But we are seeing encouraging signs.

## EMERGING ISSUES: WIND AND THE COLUMBIA RIVER TREATY

## Wind Power Issues

In recent years, BPA has encountered a new challenge in the spring, when juvenile fish typically migrate downstream. Wind energy has come into its own as an increasingly cost effective and technologically feasible resource. Certain areas in the Columbia Gorge offer strong wind and opportunities to connect to BPA's transmission grid. As a result, wind developers have built and interconnected about 4,000 megawatts of wind energy to BPA's transmission grid in the last five years. That represents among the fastest growth rates of wind energy in the nation. If the Idaho-sized section of the grid managed by BPA were a state, it would have more wind than any other state in the country except Texas.

The hydrosystem can work very well with wind energy. More than most other electricity resources, hydropower can ramp up and back down quickly. This helps to balance the times when wind energy peaks or ebbs, because, of course, wind doesn't blow all the time.

However, during the spring, when melting snow pushes up river levels, flows on the Columbia River system can peak at the same time as wind generation. However, demand for electricity often declines in the spring because the winter heating season has passed and summer air conditioning demand has not yet arrived. If demand for power is low, hydro operators typically spill all the water beyond what is needed to meet regional needs or commitments to export electricity to other regions such as California.

## Hydro &amp; Fish

Generation  
OversupplyReservoir  
CoordinationFlow  
Shaping

## Flexibility

## Treaty Review

The catch is that these levels of spill can exceed the requirements in the BiOp. In fact, too much spill creates dissolved gas in the tailwater below dams that can be lethal to young fish. BiOp and Clean Water Act standards specify the maximum dissolved gas levels that spill can generate.

In these conditions, the safest option is to run as much water through the dams' turbines as possible, which produces extra power at a time of reduced demand for it. To do this, BPA offers to sell federal hydroelectric power for very low prices or even give it away to protect fish and allow wind generators to operate. However, if BPA cannot find a place to send all the power to make room on the grid for wind energy, wind generators may also have to back off generation in order to protect fish. For the past three years, BPA has worked closely with the region to find an equitable solution to these conditions of generation oversupply that will protect fish and preserve electric reliability.

## Columbia River Treaty Issues

Another set of emerging issues involves the coordinated operation of upper Columbia reservoirs located in Canada. Today, Columbia Basin fish operations each year draw on eight million acre-feet of stored water. This amount of water constitutes about a quarter of the 30 million acre-feet of storage in Columbia Basin's US and Canadian reservoirs, with operations coordinated under the Columbia River Treaty (see Miller, *TWR* #101). The Treaty governs the use of available storage in Canada. Use of additional space in Canadian reservoirs not covered under the Treaty is known as "non-treaty storage" and requires negotiation of additional agreements. BPA and BC Hydro have coordinated use of non-Treaty storage space in Canada under a series of long- and short-term agreements since 1977.

In 2012, BPA and the British Columbia Hydro and Power Authority signed a new long-term agreement that will allow additional flow shaping capability to provide safer flows for ESA-listed fish. The new Non-Treaty Storage Agreement (NTSA) will use upstream reservoir storage in Canada to shape the release of water to aid migrating juvenile salmon.

The NTSA provides flexibility for BPA to reduce the flow of water from upstream reservoirs in the spring when flows are high and increase the flow of water in the summer when Columbia River flows are low. In the spring this can help reduce flows and spill at federal dams at times when dissolved gas levels would exceed state standards at the federal dams on the Columbia.

BPA and the Corps have begun a review of the Columbia River Treaty because, beginning in 2014, either the United States or Canada can request to terminate the Treaty, with 10 years notice, which would result in a 2024 termination. The review will include stakeholder input and will examine many more issues than were considered when the original Treaty was developed.



## Hydro &amp; Fish

Continuing  
Challenges

## CONCLUSION

A WORD ABOUT THE FUTURE . . .

Given the magnitude of the salmon recovery task in the Columbia, and the many factors and interests in play, there are no quick fixes. Certainly no one entity and no single biological opinion can do it alone. A comprehensive, science-based program that engages states, tribes, local landowners and federal agencies on all levels and actions is the surest way to preserve the region's priceless salmon for the future. However, given past experience, it won't be easy.

As for the region's valuable hydropower, similar challenges lie ahead. Emission-free hydropower is becoming more and more important as the region adopts ambitious carbon reduction goals. How these goals may play out in combination with hydro operations for salmon remains unclear. For example, the Northwest Power and Conservation Council has estimated that if Snake River dams were breached, as some recommend, replacing them with gas-fired generation would produce 4.4 million tons of carbon dioxide — the equivalent of almost 770,000 more cars on the road every year. As with the 2008 article, stay tuned on this one.

## FOR ADDITIONAL INFORMATION:

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**Lorri Bodi** is Vice President for Environment, Fish and Wildlife at the Bonneville Power Administration, where she oversees the agency's fish and wildlife, environmental compliance, and cultural resource programs. She is an attorney with over 25 years experience in natural resources, fisheries, and hydroelectric issues. She has been a leader in negotiations to resolve natural resource conflicts, including the Columbia Basin Fish Accords, the Willamette Wildlife Agreement, and other settlements balancing environmental, economic, and power needs. Before coming to BPA, Ms. Bodi was co-Director of the Northwest Office of American Rivers, a national conservation group. She has also worked for the National Oceanic and Atmospheric Administration and the US Environmental Protection Agency.



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10<sup>th</sup> Annual

# Comprehensive Review of Hydropower in the Northwest

OCTOBER 31, 2012 ♦ WASHINGTON STATE CONVENTION CENTER ♦ SEATTLE, WA

Includes "Columbia River Update" presentation by Author Lorri Bodi



## Arizona Groundwater

# ARIZONA GROUNDWATER MANAGEMENT

by Sharon B. Megdal, PhD, Director, Water Resources Research Center, University of Arizona

## INTRODUCTION

During my first-ever sabbatical this spring 2012, I traveled to four continents as part of my project on comparative policy analysis. I participated in the 6th World Water Forum in Marseille, shared lessons learned with Australian, Israeli and other water researchers and professionals, and heard views on good groundwater governance practices in Latin America and South America as a member of the team working with the Global Groundwater Governance Project ([www.groundwatergovernance.org](http://www.groundwatergovernance.org)). These experiences have reminded me that Arizona's approach to groundwater management is unique in the nation — and in the world.

Arizona's water banking program is of interest to many, including Australian water management researchers and professionals. Our most populous areas' utilization of Colorado River water through the 336-mile constructed Central Arizona Project, which moves massive quantities of water uphill, has enabled us to deploy some innovative and successful water management methods. I often use the graphic of the glass half-full and half-empty in my seminars and lectures to signify the status of Arizona's water situation. Although it is easy to dwell on our many outstanding water challenges — and there are many — Arizona water policy makers and managers have in fact accomplished a lot.

In this article, I discuss Arizona groundwater management with a look at the tools that have been developed to support achievement of multiple policy objectives. The geographic focus is Central Arizona, the location of Arizona's most populated metropolitan regions. I explain how the foundation of the 1980 Groundwater Management Act has been built upon to facilitate meeting groundwater policy objectives. The framework allows for significant flexibility — or choices — on the part of those who must comply with the regulations. I also discuss several unresolved issues, or, as we sometimes call them, “holes in our water bucket.” I hope the article will leave you with an appreciation of the value associated with sharing water management approaches.

It is important that we draw upon the lessons of others as, in keeping with the theme of the 6<sup>th</sup> World Water Forum, we continue our search for solutions.

## ARIZONA'S 1980 GROUNDWATER MANAGEMENT ACT

As Arizona's population and economy grew after World War II and pumping technology improved, groundwater levels in many parts of Arizona declined. Concerns about: the extent of groundwater “mining” (overdraft in excess of maintaining aquifer levels); legal decisions related to the transport and use of groundwater away from the overlying land; and the need to show the federal government that Colorado River water delivered through the Central Arizona Project (CAP) would at least in part substitute for groundwater use, led to the 1980 adoption during a special session of the Arizona Legislature of the Groundwater Management Act (GMA). Arizona Revised Statutes, Title 45, Section 401 ff. *See* [www.azwater.gov/AzDWR/WaterManagement/documents/Groundwater\\_Code.pdf](http://www.azwater.gov/AzDWR/WaterManagement/documents/Groundwater_Code.pdf) for a brief overview of the GMA. [The Arizona Department of Water Resources' website ([www.azwater.gov](http://www.azwater.gov)) contains additional overview information. For a good overview of Arizona water management, see the chapters in Bonnie G. Colby and Katharine L. Jacobs, eds., *Arizona Water Policy: Management Innovations in an Urbanizing, Arid Region*, RFF Press, Washington, DC, 2007.]

Arizona's GMA was, and likely still is, the most far-reaching groundwater management regulatory framework in the United States. The law established the Arizona Department of Water Resources (ADWR) to implement and monitor GMA compliance. The GMA was designed primarily to address significant groundwater overdraft in areas designated by statute as Active Management Areas (AMAs). The law specified groundwater management goals for each of the AMAs and required a system of groundwater rights and permits for most groundwater pumps. The statutorily mandated AMA Management Plans would establish conservation regulations, which would be periodically updated, for the municipal, industrial, and agricultural sectors. These Management Plans, which are approved by the ADWR Director after review and public input, have the force of administrative rule. The GMA limited the footprint of agriculture by restricting use of water for irrigation to lands that had been irrigated at some time during 1975 through 1979. This non-expansion of agriculture included all lands in the AMAs, as well as lands

Unique  
Approach

Water  
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Development  
&  
Unresolved  
Issues

Groundwater  
Concerns

Regulatory  
Framework

Management  
Plans

## Arizona Groundwater

### Assured Supply

### Safe-Yield

### AMAs & INAs

included in areas designated by law as Irrigation Non-expansion Areas (INAs). INAs are not subject to groundwater regulations other than this non-expansion provision. Also included were requirements for owners of large wells to meter/measure groundwater pumping and to report groundwater withdrawals.

The truly path-blazing provision of the GMA was the requirement for an assured water supply (AWS) program. The AWS program, which was fully implemented by administrative rule in 1995, requires that new municipal growth in the AMAs be based on a 100-year supply of legally, physically, and continuously available water that meets water quality standards. Water providers serving new development, whether operated by municipalities or privately owned companies, would also have to show they had the financial wherewithal to meet the requirements of the rules. Finally, water use would have to be consistent with the AMA management plan and with the statutory management goal for the AMA, which in three of the four initial AMAs was safe-yield. Safe-yield “means a groundwater management goal which attempts to achieve and thereafter maintain a long-term balance between the annual amount of groundwater withdrawn in an active management area and the annual amount of natural and artificial recharge in the active management area” (ARS 45-561).

Figure 1 shows the location of the five current AMAs and three INAs. AMA boundaries were largely determined by hydrological considerations. AMAs include parts of counties and some include parts of more than one county. The Santa Cruz AMA was separated from the Tucson AMA in 1994 in order to better acknowledge and address the different groundwater conditions in the two regions. The Phoenix,

Prescott, and Tucson AMAs have safe-yield as their water management goal. The goal for the largely agricultural Pinal AMA is “to allow development of non-irrigation uses...and to preserve existing agricultural economies in the active management area for as long as feasible, consistent with the necessity to preserve future water supplies for non-irrigation uses.” The Santa Cruz AMA goal is “to maintain a safe-yield condition in the active management area and to prevent local water tables from experiencing long-term declines.” This goal recognizes the shallow aquifer conditions or micro-basins in parts of the Santa Cruz AMA and effectively connects groundwater use to the surface water flows that recharge these micro-basins. The non-AMA portions of Arizona are not subject to groundwater regulation.

Since 1980, the focus of the safe-yield AMAs has been achieving/maintaining safe-yield by the statutory deadline of 2025. ARS 45-462 states: “The management goal of the Tucson, Phoenix and Prescott active management areas is safe-yield by January 1, 2025, or such earlier date as may be determined by the director.” Although the GMA Act specifies this deadline for achieving the management goal, recall that the definition of the safe-yield goal includes the word “attempts.” It would appear that a documented “attempt” to achieve and thereafter maintain a balance between inputs and outputs of groundwater could signal meeting the goal. Moreover, there are no penalties established in the GMA for non-compliance.

Figure 1: Arizona Active Management Areas and Irrigation Non-Expansion Areas



## Arizona Groundwater

### Detailed Assessments

### Colorado River Water

Efforts to develop the Fourth Management Plan for each AMA are ongoing. In preparation, ADWR staff developed detailed Assessments for each AMA, which are available on the ADWR website ([www.azwater.gov](http://www.azwater.gov)). These Assessments characterized water use by source and by sector and projected groundwater overdraft. To put the available numbers in context, the sources and uses of water statewide are shown for 2006 in Figure 2. Components of these figures are estimated, as water use is not reported for certain users and from many parts of the State. Groundwater constituted almost 39 percent of the 6.86 million acre feet of water diverted or extracted. The comparable percentage reliance on groundwater for the Phoenix, Pinal, and Tucson AMAs, as reported in the Assessments posted on the ADWR website, are 31 percent, 42 percent, and 39 percent respectively. For the municipal sector, the figures are even lower in each of the AMAs, as shown in Table 1.

#### CENTRALITY OF THE CENTRAL ARIZONA PROJECT

We see that Colorado River water delivered through the CAP (hereafter “CAP water”) figures prominently. The CAP was constructed to deliver the approximately 1.5 million acre feet of Arizona’s 2.8 million acre foot Colorado River entitlement that is not otherwise used by Arizona’s on-River users into CAP’s three-county service area — i.e., Maricopa, Pinal and Pima Counties. The CAP started water deliveries to the Phoenix area in the mid-1980s, with deliveries as far south as Tucson occurring in the early 1990s. From Figure 1, we can see that the borders for the three counties do not correspond exactly to

the three Phoenix, Pinal, and Tucson AMAs. Although this lack of congruent boundaries introduces certain complexities, for purposes of this article, it is sufficient to note that the users of CAP water are water users in the three AMAs that reside in the three aforementioned counties.

CAP water is a critical enabler of plans to meet the statutory and other water management goals of the Central Arizona AMAs. It is used to reduce groundwater mining in the municipal sector and substitute for groundwater use by the agricultural sector. The institutions and mechanisms used to accomplish these goals are involved and sometimes interrelated. This is especially true with regard to the requirements of the rules related to showing an Assured Water Supply. These institutions and mechanisms include: 1) recharge and recovery; 2) membership in the Central Arizona Groundwater Replenishment District; and 3) the Arizona Water Banking Authority. A quick explanation of each of these will help inform the more detailed discussion which follows.

#### Recharge and Recovery

Not all who wish to use CAP water have long-term contractual agreements for its use, and not all CAP water users, whether with or without contracts, have direct access to the canal. CAP water requires treatment before use for potable purposes. One option for meeting drinking water standards is to directly treat CAP water for potable use. Another is to make use of Arizona’s statutorily authorized underground storage (recharge) and recovery program. Through recharge, the CAP water seeps into groundwater basins, thereby using the filtration ability of soils. The CAP water is then diluted/mixed with groundwater, and later water is recovered for use using wells either in the area of hydrologic impact of the recharge or outside it.

#### Central Arizona Groundwater Replenishment District

A main driver for using CAP water is the Assured and Adequate Water Supply Rules (AWS Rules), which were approved in 1995. The AWS Rules for the Central Arizona AMAs allow groundwater to be used to demonstrate the 100-year assured physically available water supply required to serve new development, but most of that groundwater use must be offset by recharge of renewable supplies. This demonstration can occur two ways. The first way involves a water provider establishing it can comply with the component of the AWS Rules for its entire

Figure 2: Statewide Sources and Uses of Water for 2006

Figure 2A: AZ Water Sources (in Maf), 2006

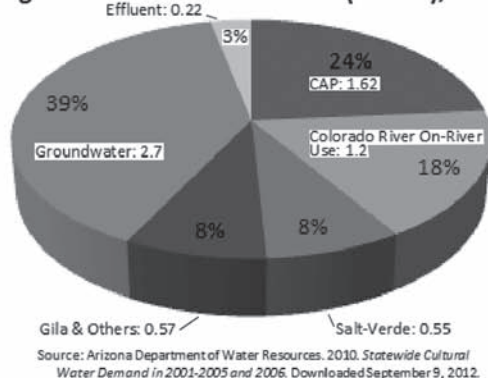


Figure 2B: AZ Water Demand by Sector (in Maf), 2006

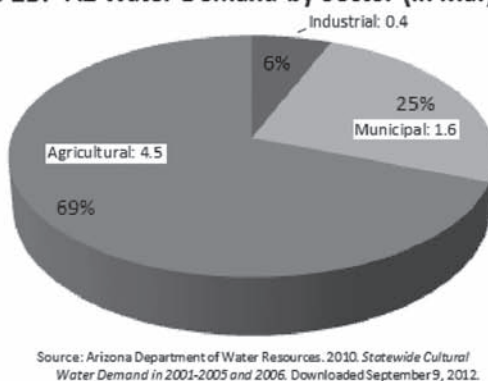


Table 1: Groundwater as % of Total Municipal Water Use by AMA 1985, 1995 and 2006

|         | 1985 | 1995 | 2006 |
|---------|------|------|------|
| Phoenix | 36%  | 32%  | 23%  |
| Pinal   | 100% | 96%  | 88%  |
| Tucson  | 100% | 96%  | 53%  |

Source: AMA Assessment Reports, Arizona Department of Water Resources web site ([azwater.gov](http://azwater.gov)), Downloaded September 23, 2012.



|   |   |
|---|---|
| <div data-bbox="97 149 365 283"> <b>Arizona<br/>Groundwater</b> </div> <div data-bbox="97 283 365 409"> <b>Limiting<br/>GW Use</b> </div> <div data-bbox="97 409 365 535"> <b>After-the-Fact<br/>Replenishment</b> </div> <div data-bbox="97 535 365 661"> <b>Demand<br/>Exceeds Supply</b> </div> <div data-bbox="97 661 365 787"> <b>Climate<br/>Considerations</b> </div> <div data-bbox="97 787 365 913"> <b>Junior Rights</b> </div> <div data-bbox="97 913 365 1039"> <b>Storage &amp;<br/>Recovery</b> </div> <div data-bbox="97 1039 365 1165"> <b>Tribal Rights</b> </div> <div data-bbox="97 1165 365 1291"> <b>Accounting<br/>Framework</b> </div> <div data-bbox="97 1291 365 1417"> <b>Infiltration<br/>Mediums</b> </div> <div data-bbox="97 1417 365 1543"> <b>Savings<br/>Facilities</b> </div> | <p>service area. If it can do so, ADWR qualifies the service provider with a “Designation of Assured Water Supply” and the public or private water company is called a “designated water provider.” The other option is for new development to certify that it will be served by a non-designated water provider and that the development’s water use will meet the requirements of the AWS Rules. In these instances, the development receives a “Certificate of Assured Water Supply,” and the land subject to development is known as “certificated land.” A key requirement of the AWS Rules is that the proposed water use be consistent with the AMA management goal. For the safe-yield Phoenix and Tucson AMAs, as well as the Pinal AMA, which does have to preserve sufficient groundwater for future municipal growth, this means limiting groundwater use. Those demonstrating an Assured Water Supply are granted an allocation of groundwater they draw upon, much like individuals have a bank account of funds upon which they can draw, and they can use the water according to their desired schedule. For the rest of the water supplied, they must show annually that they are using non-groundwater sources. Use of CAP water directly through treatment and delivery, storage of CAP water in advance of recovery, and/or after-the-fact replenishment allow for meeting requirements to stay within groundwater allocations. The after-the-fact replenishment mechanism is carried out by a subsidiary unit within the CAP, which was named the Central Arizona Groundwater Replenishment District (CAGRD) by statute. The CAGRD relies on Arizona’s storage and recovery framework to meet its statutory obligations.</p> <p><b>Arizona Water Banking Authority</b></p> <p>Clearly, there is significant demand for CAP water, both by those with long-term entitlements and those looking to purchase on a year-by-year basis. This demand has already exceeded the available supply to Central Arizona. The challenge of meeting ongoing water demand is compounded by climate variability considerations — including the inevitability of periods of low flows.</p> <p>Most know that Arizona is currently in a drought period. Overlay expected climate variables with the knowledge that tree ring studies indicate that average annual Colorado River flows are much lower than the amount allocated to the Upper Colorado River Basin states (Colorado, Utah, New Mexico, and Wyoming), the Lower Basin States (Arizona, California and Nevada) and the Republic of Mexico. Then add the additional uncertainty associated with climate change. Even without consideration of the latter, Central Arizona has to be concerned about shortage conditions along the river due to its junior status in times of shortage. CAP water is among the first to be cut in times of shortage. All CAP deliveries will be curtailed before California experiences any cutbacks in its deliveries. This junior priority status was one of the factors leading to the 1996 formation of the Arizona Water Banking Authority (AWBA), with the responsibility for storing CAP water for interruptions of deliveries due to shortage or canal outage. Water stored by the AWBA and later recovered must comply with Arizona’s storage and recovery framework, again pointing to the central role of recharge in meeting Arizona water policy objectives.</p> <p>Arizona Indian Nations also have rights to significant quantities of CAP water. A discussion of Native American utilization of CAP water is beyond the scope of this article. The water use of Native American Nations is managed by the respective tribal governments and on-reservation use does not fall under the GMA or any of its provisions.</p> <p style="text-align: center;"><b>ARIZONA’S RECHARGE AND RECOVERY FRAMEWORK</b></p> <p>The statutory provisions for recharge (storage) and recovery were added in the mid-1980s and thoroughly revised in 1994 (ARS 45-801 ff). These provisions provide a regulatory and accounting framework that considers: the water quality and quantity impacts on aquifers; procedures for operating and maintaining recharge facilities; accounting for storage; and accounting for recovery.</p> <p><b>Facility Permits</b></p> <p>Permits are issued by ADWR to the owner and operator of storage facilities, which include both underground storage facilities (USFs) and Groundwater Savings Facilities (GSFs). The USF category applies where water infiltrates down to aquifers and includes definitions of subcategories of USF. The most commonly deployed USF involves shallow constructed infiltration basins. Another USF involves infiltration using a river or stream as the infiltration medium and a third involves use of injection wells. GSFs are the other major facilities type and, as the name suggests, these are facilities where a non-groundwater source, such as CAP water of effluent, is used in place of (to save) groundwater. GSFs are most commonly agricultural lands. Facility permits are issued for a set number of years and specify the maximum amount of storage that can occur annually and the maximum total amount that can be held in storage at the facility.</p> |
|---|---|

|  |   |   |
|--|---|---|
| <b>Arizona<br/>Groundwater</b>               | <b>Storage Permits</b>                                    | <p>The second type of permit used in this framework is the storage permit. Storage permits can be issued to the facility permit holder as well as others. If not the owner/operator of a facility, the holder of a storage permit must enter into an agreement with the facility owner. Storage permits can be issued to multiple parties for amounts that in combination exceed the annual permitted volume — however, the actual volume stored in a given year cannot exceed this amount. For example, two entities could have storage permits for 1,000 acre-feet a storage facility permitted for 1,000 acre-feet annually. Both entities could not store that full amount in one year. It could be that in one year entity A stores 1,000 acre-feet and in the next year entity B stores 1,000 acre-feet — <i>or</i>, in any given year, they might split storage of the allowed total of 1,000 acre-feet in any number of ways.</p>   |
| <b>Permitted<br/>Storage</b>                 | <b>Storage Credits</b>                                    | <p>Associated with storage is the issuance of credits for water stored. The amount of credits issued will depend on several factors. Among them are evaporation, whether the water will be withdrawn in the same year as the storage, and, in some cases, the type of water stored (CAP versus effluent). The permitting process is a rigorous and technical process.</p>   |
| <b>Recovery<br/>Provisions</b>               | <b>Recovery Permits</b>                                   | <p>The third type of permit is the recovery permit, which allows wells to be used for recovery of the water stored. Key criteria for recovery well permitting relate to whether the well is within or outside of the area of hydrologic impact of the storage and, if outside, the rate of decline in groundwater levels in the vicinity of the well under consideration. If water level declines have exceeded a level established in the AMA Management Plan, a recovery well permit for recovery outside the area of hydrologic impact will not be issued. This provision is designed to guard against recovering stored water where water levels are declining more than a certain level. The accounts are kept by AMA. When recovered, the water retains the characteristic of the water that was stored. So, if CAP water was placed into the aquifer, the water recovered through a permitted recovery well is considered CAP water, even if the water was stored at a distance from the well. In fact, it is considered CAP water if stored anywhere within the AMA. Water stored in an AMA must be recovered within that same AMA.</p> |
| <b>Effluent Storage</b>                      | <b>Additional Permits</b>                                 | <p>Additional permits may be required from the Arizona Department of Environmental Quality (ADEQ). State law does not require a permit for CAP recharge, although ADEQ examines facility permit applications. For example, there may be requirements for piezometer installation and monitoring near landfills, with storage curtailment requirements if water levels rise to levels established in the permit. ADEQ must issue a permit prior to operation of a recharge facility for storing effluent.</p>  |
| <b>Property Tax</b>                          | <b>Framework Funding</b>                                  | <p>The Arizona Legislature facilitated storage of CAP water in the early 1990s when it authorized a temporary property tax to support the development of demonstration facilities for recharge of CAP water. This tax, authorized at up to \$.04 dollars per \$100 of secondary assessed valuation in Pima County and Maricopa County, was levied by the Central Arizona Water Conservation District, the formal name for the body that operates the CAP. The CAP Board has the responsibility of setting the tax rate annually. The Arizona Legislature later extended the tax to 2016 and to Pinal County and specified that its use would be for CAP purposes, such as payment or repayment (to the federal government) of CAP construction or annual operations, maintenance and replacement costs. Funds not so used are to be deposited in the Arizona Water Banking Fund at the office of the State Treasurer.</p>   |
| <b>Reducing<br/>Groundwater<br/>Reliance</b> | <b>CENTRAL ARIZONA GROUNDWATER REPLENISHMENT DISTRICT</b> |   |
|  |   | <p>Recall that an Assured Water Supply program was required by the GMA, which was approved in 1980. It was expected that CAP water would play a critical role in reducing groundwater reliance by the municipal sector. Not all entities were at the table at the time the CAP allocations were determined and many did not have their own facilities in place (or expected to be in place) for utilizing CAP water. Developers, in particular, many of whom develop large-scale projects outside of the service areas of existing water providers, expressed their willingness to work with ADWR on an AWS rules package if they were assured a facilitating mechanism for compliance with the expected requirement that renewable water supplies be used. In other words, the development of an agency or institution to facilitate compliance with the expected AWR Rules was a prerequisite for final approval of the Rules.</p>  |
|  |   | <p>Thus, the Central Arizona Groundwater Replenishment District (CAGRD) was borne. The CAGRD authorizing legislation was approved in 1993, fully two years before the AWS Rules were effective. The CAGRD is not an actual district but rather an operating unit or subsidiary within the CAP. It operates in CAP's three-county service area.</p>  |

## Arizona Groundwater

### Replenishing Water

There are many complexities associated with the CAGRDR, as there are with most aspects of Arizona groundwater law. The complexities often stem from the flexible strategies associated with complying with the many requirements. Fundamentally, membership in the CAGRDR by member service areas and member lands establishes for ADWR that the AWS designation or certificate is in compliance with the requirement that water use be consistent with the AMA management goal. The CAGRDR assumes the responsibility for replenishing water that is deemed excess groundwater by the annual reports filed at ADWR by CAGRDR members. Membership comes with some fees and application review (particularly a demonstration of physical availability of groundwater to ADWR), but CAGRDR cannot turn away qualifying members if they meet ADWR's requirements. The CAGRDR must develop a Plan of Operation every 10 years, in which it shows the replenishment obligation for existing members and members expected to join within the 10 year period. The replenishment obligation is projected for 100 years, and the CAGRDR must show how it expects to meet the replenishment obligation, with the expectation that the last 80 years are less predictable than the first 20. ADWR must review and approve the plan. The approved plan basically certifies that the AWS designations and certificates for CAGRDR members are in full force. The last Plan of Operation was submitted to ADWR in 2004. It showed a 100-year replenishment obligation of over 225,000 acre feet (See C.A. Avery et al., "Good Intentions, Unintended Consequences: The Central Arizona Groundwater Replenishment District," Arizona Law Review, Vol 49, No. 2, 339-359, Summer 2007).

### Water Acquisition Strategy

The slow-down in growth and land development associated with the recession has resulted in a much lower growth in the CAGRDR replenishment obligation, and the CAGRDR has successfully met its replenishment obligation to date. However, replenishment obligations, even in the short run, still exceed the water under contract to the CAGRDR. With the expectation that CAP water available for purchase on a short-term (annual) basis will not be available in the not-too-distant future, the CAP Board has authorized a CAGRDR water acquisition strategy. The next CAGRDR Plan of Operation will be prepared in 2014. The CAGRDR has established a replenishment reserve to help get through times of fluctuations in water available for replenishment, but the replenishment reserve is not the solution to the need for water supplies for long-term replenishment. Along with the issue of future replenishment obligation, the CAP Board and its stakeholders have long been focusing on the question of the location of replenishment relative to pumping. Pumping is done by the water providers. Replenishment is done after the pumping by the CAGRDR. There is no legal requirement that the replenishment be hydrologically connected to the pumping, although it must occur within the same AMA. This effectively means that replenishment occurs in the same, usually large, groundwater basin as the pumping, but not necessarily the same sub-basin. Replenishing in a location hydrologically connected to the pumping would involve significantly higher costs for the CAGRDR's customers. While all recognize that water costs will continue to go up, there is concern about the significantly higher costs associated with requiring that replenishment occur close to the pumping in all cases. What might be good for the aquifer is not always good for the wallet. It should be noted that this disconnect between storage and recovery is allowed under Arizona's statutory framework and not an issue only for CAGRDR replenishment activities.

### Storage v. Recovery Disconnect

### New Guiding Principles

The CAP Board approved in September 2012 a set of Guiding Principles for the CAGRDR. The intent is for the CAGRDR staff and members of the CAGRDR & Underground Storage Committee of the CAP Board to work intensively with stakeholders to lay the foundation for the next Plan of Operation. These guiding principles: address issues related to member land de-enrollment (member service areas already can de-enroll); enrollment of new members; hydrologic location of replenishment; conservation; collection of water assessment from member lands; and direct water deliveries by CAP. [The Guiding Principles document is available at <http://cap-az.com/Portals/1/BoardMeetings/09-06-12%20Board%20Meeting/11bi.%20CAGRDR%20Guiding%20Principles%20revCOMBINED.pdf>.]

## THE ARIZONA WATER BANKING AUTHORITY

### Future Shortages

The Arizona Water Banking Authority (AWBA) is the last of the mechanisms created by the Arizona Legislature that utilizes the recharge and recovery framework to address issues related to utilization of CAP water in Central Arizona. The AWBA was established in 1996 and began water storage in 1997. Its operations are well documented on its website ([www.azwaterbank.gov](http://www.azwaterbank.gov)), where Annual Plans of Operation and Annual Reports can be found. The AWBA was created to assist Arizona in making full utilization of CAP water and storing for future water shortage or canal outage. Through 2011, nearly 3.7 million acre-feet of water have been stored in Central Arizona for multiple purposes. Included in the cumulative figure is storage of approximately 600,000 acre-feet on behalf of Nevada as part of an interstate water banking agreement. A significant portion of the remaining 3.1 million acre-feet has been stored to firm municipal water supplies in the three Central Arizona AMAs in times of shortage. This storage has occurred through use of both Underground Storage Facilities and Groundwater Savings Facilities. It is expected that this water will be recovered by CAP to meet delivery obligations to municipal users. To

### Interstate Banking



## Arizona Groundwater

### Storage Credits Sale

date, no water has had to be recovered for Central Arizona as an official shortage has not been declared pursuant to the Shortage Sharing Record of Decision. Work on recovery planning is ongoing. [See, *Record of Decision, Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead*, December 2007, available at: [www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf](http://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf) and CAP's *Colorado River Shortage Issue Brief*, available <http://cap-az.com/Portals/1/Documents/Shortage-Issue-Brief-Jan-19.pdf>.]

In addition to storage by the AWBA, individual water providers and others are storing water for future use. There may be a strong market for credits as water supplies get tighter and tighter. Arizona law does allow for sale or assignment of storage credits. Examination of ADWR's long-term storage credit accounts will confirm that banking of water has been ongoing by several entities for many years.

### CONCLUDING REMARKS

While challenges remain, Arizona has made great strides in groundwater management in the Central Arizona AMAs. Great progress is being made in reducing reliance on groundwater by the municipal sector at the same time that non-municipal uses of groundwater may still grow. Arizona's innovative recharge and recovery framework is strong and provides opportunity to meet various regulations in a cost-effective and flexible manner, but some aquifers are experiencing drawdown as pumping occurs at locations not benefiting from active recharge programs.

A key question is whether the AMAs are moving toward meeting their statutory management goals. ADWR has tracked groundwater overdraft by AMA. The AMA Assessments include detailed tables of water use by sector and water source for the years 1986, 1996 and 2006 and projections for 2025 for three scenarios. The calculations are complicated by several factors, including how groundwater allocations per the Assured Water Supply Rules and groundwater not pumped as part of the Groundwater Savings storage program are considered (see S.B. Megdal and T. Shipman, "*Gains from Trade: Arizona's Groundwater Savings Program*" available at: <https://wrrc.arizona.edu/publications/gains-trade-arizonas-groundwater-savings-program>, 2010). Though the interested reader should refer to the AMA Assessments for more information, suffice it to say that the middle projections for 2025 show that neither the Tucson AMA nor the Phoenix AMA is projected to be in safe-yield.

Work is ongoing. ADWR is considering aquifer management as it develops the AMA Fourth Management Plans. The search for water supplies to meet the CAGRDR replenishment obligation will be a long-term and likely expensive effort. Non-AMA areas of the State are growing, too. Communities throughout Arizona are looking to the long term and identifying options for addressing supply-demand imbalances. The legislatively authorized Water Resources Development Commission (WRDC) has recommended regional water augmentation authorities be formed, but did not recommend a particular funding option. A WRDC working group examined the water needs of riparian systems, but legislative action to address environmental water needs is not contemplated (For a discussion of Arizona water law and the environment, see, Megdal et al., "*The Forgotten Sector: Arizona Water Law and the Environment*" Arizona Journal of Environmental Law and Policy, Vol. 1, No. 2 (2011), pp.243-293; available at: [www.ajelp.com/](http://www.ajelp.com/)). Privately owned water companies are important to many Arizona communities, but they often face more hurdles in gaining approval to incorporate certain costs into their rate structures than municipally operated companies.

Arizona's groundwater management, though not perfect, has led to significant changes in water using behaviors. A growing state in a semi-arid region, Arizona has to keep its eye on its water bucket. Others can learn from our practices, just as we should look to learn from the successful approaches of others.

#### FOR ADDITIONAL INFORMATION:

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### Groundwater Overdraft

### Regional Augmentation

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## Ben Grumbles



## Mission

## Water Vision

## Federal Role

## BEN GRUMBLES &amp; THE U.S. WATER ALLIANCE

BEN GRUMBLES — INTERVIEWED BY TOM LINDLEY, PERKINS COIE, LLP

"The thinking of the past needs to change. No longer can we afford to look at drinking water, wastewater and stormwater challenges from a segregated perspective. No longer can we afford to look at water issues outside the context of sustainable cities and climate change. To secure a sustainable future for future generations, we need a more comprehensive approach, and an integrated, holistic national water policy." U.S. Water Alliance

## INTRODUCTION

Ben Grumbles is President of the U.S. Water Alliance. The Alliance is a not-for-profit organization committed to uniting people and policies for water sustainability throughout the US. Before joining the Alliance, Ben served both as Director of the Arizona Department of Environmental Quality (ADEQ) and as Assistant Administrator for Water at the US Environmental Protection Agency (EPA). While at ADEQ, Grumbles focused on conservation and reuse of water (e.g. wastewater recycling), clean energy and climate change (e.g. solar power, vehicle emissions, uranium mining), and various collaborations (e.g. the Colorado River, the Mexican Border, e-waste recycling). While serving as Assistant Administrator for Water at the US EPA in Washington, DC, Ben led its National Water Program from 2004 to 2009 and was known for using collaboration, innovation, and technology to improve environmental performance and reduce costs.

The Alliance uses public awareness and collaboration to advance holistic, watershed-based approaches to water quality and quantity challenges and improve overall sustainability. In it a cross-section of interests have come together to explore and analyze issues important to the nation's ability to provide clean and safe water for future generations, to offer information and education to citizens and policy-makers on key issues, and to recognize organizations and individuals for innovation and outstanding achievements in the water quality and quantity arena. According to the Alliance, in the United States — with its population of more than 300 million, an aging industrial base, a resource-intensive farming system, and a network of sprawling cities — elevating the health of our cities and watersheds requires a new approach.

For *The Water Report*, Ben Grumbles spoke with Tom Lindley of Perkins Coie LLP on August 29, 2012.

**Lindley:** How would you characterize the mission of the U.S. Water Alliance?

**Grumbles:** Our goal is to be a convener of collaborations for water quantity, water quality, drinking water, wastewater, stormwater, water reuse, and the nexus between water and energy. Ultimately, our goal is to bring people together towards a national vision on a more integrated approach to water.

We are not out to establish a national one-size-fits-all water policy that neglects local variation or puts the feds in charge. We want to bring people together from all the different sectors that touch on water and identify principles for water sustainability that will form a framework for a national water vision that recognizes while all water is local and every watershed is unique, the nation as a whole will benefit from greater attention to water principles of sustainability, which also respect appropriate roles at the local, state, and federal levels and with the private sector as well.

**Lindley:** You are not proposing a new federal water act or program but rather a federal-state consortium to share ideas?

**Grumbles:** Excellent point. We are not advocating a big, new federal law, policy, or program. We are an educational advocacy organization and our focus has been on bringing together leaders in the local, state, and federal level and also in the private sector to identify the biggest opportunities and the barriers to those opportunities. One of our first national dialogues was on the need for an integrated national water vision and we call it the water "vision" because "policy" for many people sounds too much like a regulatory, top-down command and control approach, which isn't something we've ever advocated.

Clearly, there are important roles for the federal government. First and foremost is its scientific leadership. Interior, EPA, United States Department of Agriculture (USDA), and other water-related agencies add tremendous value by helping states and localities have the best science available. Particularly when you're looking at regional or interstate water issues that transcend political boundaries, it's essential to have the best possible scientific information. The reality is that sometimes that's not available in the private sector or in the universities. Federal scientific agencies have a huge role in that effort. Our organization also sees a role for federal agencies in facilitating interstate collaborations,

**Ben Grumbles****Local  
Implementation**

such as a large ecosystem restoration effort. There is a necessary and proper role for the federal government. But we also work closely with the Western Governors Association, the Western States Water Council, and others. My experience as a state environmental official and the membership of our organization underscore the importance of local decisions and state-led efforts — the closer they are to the constituencies involved and the watersheds involved, the better. That's why we are emphasizing the country will benefit from a national water vision but that vision's implementation requires state and local development and involvement.

**Lindley:** Frequently the biggest obstacles to achieving what everyone agrees is a great shared interest are the siloed federal regulatory programs that preclude less siloed experimentation at the state level. How does the Alliance propose to help break out of or through those silos?

**Silos &  
Fragmentation**

**Grumbles:** When it comes to water there's a proliferation of silos — even more than in agriculture, ironically enough. There are regional differences and there are deep divisions among statutes, programs and people — all leading to fragmentation that's often more harm than good. No one in our organization is naïve enough to believe it's just a simple matter of waving a magic wand. Water is complex. It touches multiple boundaries and bureaucracies. We do not plan to develop a legislative wish list to Congress to break down the silos. Instead, we plan to convene the right people who are involved in those regional and local and statutory segments in the same room; there they together hear what the problem is and then explore solutions. Sometimes those solutions do require state or congressional action; other times though they can be achieved through administrative collaboration.

**Municipal Role**

With respect to our green infrastructure efforts, we're seeing great opportunities emerge when municipalities — with the help of facilitators — bring in all the stakeholders, the regulators and the environmental advocates, lay out the facts, and define the challenges and the barriers. Then we're able to get at some of those silos when everyone from the local transportation agency to the electric utility, which is focused on trees and power lines, and the environmental regulatory agency get together and talk about how to come up with some alternatives that save money and energy and ensure that water is clean over time.

**Collaboration**

But all of this takes collaboration. And there has to be trust and a willingness to be innovative and do something different; not just rely on a command and control, NPDES permits, or the same old way of using consent decrees that take a set timeframe of 20 years or sooner, and will not allow for flexibility or innovation.

**Facilitator  
Organization**

The U.S. Water Alliance came about not to try to displace or disenfranchise others, or to become the single voice on all water matters. Our burning platform is that because water is forgotten and taken for granted, because water policies and programs are so fragmented and fractured, because water policy is often frozen in place and time and so resistant to change, there must be at least one organization that serves as a facilitator to convene collaborations where the different water sectors and voices come together in the same room on key issues and come out singing, maybe not with multiple voices, but at least in harmony. That's the best way we know to manage risk and spark innovation.

**Lindley:** As a facilitator addressing these tough issues and entrenched positions, what do you see as your biggest difficulties?

**Resistance  
to  
Innovation**

**Grumbles:** Turf, silos, distrust of new players, and just the cold hard reality that the water sector has over the decades been very resistant to innovation. It understandably views with some distrust those who preach holistic and integrated strategies. But the good news is that when stakeholders and trade associations see our diverse membership and understand that we're not trying to be the single voice, the be-all and end-all, that we want to convene collaborations on these issues to move the country as a whole towards a more integrated approach, they're more willing to engage. Then we find common ground and actually build trust and make progress. An example of that is the One Water Network we're developing: we've got 13 national water associations who are willing to collaborate and support a new network of organizations promoting integrated, sustainable water resource management.

**"One Water  
Network"**

**Lindley:** Who are some of those?

**Network  
Participants**

**Grumbles:** The Association of State Drinking Water Administrators, the Association of Clean Water Administrators, the WaterReuse Association, the Alliance for Water Efficiency, the American Public Works Association, the National Association of Flood and Stormwater Management Agencies, National Association of Clean Water Agencies, and the Water Environment Research Foundation. It's not all of the key organizations but it's a very good start. These are diverse organizations that touch on drinking water, wastewater, stormwater, groundwater, and water quantity and efficiency. They want to have a



**Ben Grumbles****Staff Exchange**

network to share ideas, identify success stories, and develop some pilot projects. Also something I'm really excited about would be a staff exchange program, for instance, where an employee of a local drinking water utility would work for a week or a month at the local wastewater agency. And the overarching goal of this One Water Network is to share information, identify research priorities and pilot projects that can work towards a more integrated approach to water and watersheds, and build support with the federal agencies and others who are involved in integrated water management.

**Lindley:** When we spoke earlier, you noted the importance of bringing a diverse set of perspectives to the table. In your One Water Network, you're doing that within the agency context. However, at least at times, some environmental NGOs view regulatory agencies as pawns of industry while some industry representatives view regulatory agencies as either bureaucratic blockades or as tools of environmental NGOs. Will One Water include representatives from either industry or environmental NGOs?

**Grumbles:** Absolutely. Our alliance embraces the notion that all perspectives need to be part of the discussion; so our membership, beyond just the One Water Network that is one of several discrete identifiable projects we're doing, needs to reflect the full range of public and private sector involvement.

Our membership has environmental NGOs from American Rivers to The Nature Conservancy, to the Conservation Fund, and also private sector membership from The Fertilizer Institute to some of the nation's and the world's largest private water companies (and their CEOs), to some manufacturers, to local water and wastewater utilities, and stormwater and drinking water utilities.

The One Water meeting we convened in February in Washington, DC, had every major national water association there as well as leadership from EPA, Interior, and CEQ [the White House Council on Environmental Quality], and representatives of agriculture.

Tom, your question points out that as we seek a successful integrated approach to water, we see suspicion and distrust from the different segments. And that's why we look to bring groups together on green infrastructure; that is one of the most successful stories being told. If it is done correctly, you can get environmental regulators to feel comfortable enough to take a leap of faith with a large utility in the city and the regulated community and have the local environmental community supportive also, to embrace some different approaches that may take a little bit more time but yield greater environmental results. And, it's through collaborating and having a more integrated approach to water and wastewater.

There's no doubt, particularly now with the political climate the way it is in different parts of the country, that there is tremendous suspicion of the federal EPA or any other regulatory body. I think one of the unique features of the U.S. Water Alliance is that we want to provide forums for all these different perspectives to come in. Both our leadership and our membership reflect that this isn't just a public and regulatory endeavor; a lot of the success will depend on meaningful engagement of the private sector.

**Lindley:** Ben, the U.S. Water Alliance is growing but how large is it now?

**Grumbles:** When you look at the size of our conference (about 200-250) and the budget of our organization (less than \$1 million), we're still young and small. We're growing and winning hearts and minds. We embrace the notion of quality over quantity, and when it comes to our annual conference on urban water sustainability, we are providing a truly unique forum for utility executives and green city leaders, private company CEOs, and environmental champions from around the country to come together and share success stories on what works and what doesn't work in advancing green infrastructure and resource recovery.

A national water vision must include far more than simply green infrastructure, shifting the paradigm from gray infrastructure to green infrastructure. It must include viewing utilities as more than just treat-and-discharge facilities, but as centers of regeneration, producing energy and recovering the resources from nutrients to biosolids. But those two topics of green infrastructure and resource recovery have really become focal points of our annual urban water sustainability conference.

We're still young. Our third conference will be this year in Cincinnati in mid-October, and it will have 250 people. It will be attracting leaders from the different sectors and segments of society, and we will have five cities spotlighted. It's not simply one person coming in and describing what their city is doing for green infrastructure and resource recovery as part of a broader urban water sustainability effort. Those cities will be represented by multi-disciplinary teams of people: someone from the local transit, a transportation agency and/or the mayor's office, coupled with the water utility and the wastewater utility, a private manufacturer, the parks and recreation district, or the local environmental organization.

These teams of individuals from the cities we spotlight will describe what they're doing, and the audience will engage. All of us in the water sector are familiar with the model of going to a water conference and listening to someone talk and then going to a coffee break. We'll have not only the five cities spotlighted, but we'll have strategic sidebar planning sessions on six or seven of the most important topics, like financing sustainable infrastructure or how you bring water and parks people together

**Diverse Membership****Integrated Approach****Urban Water Sustainability****Resource Recovery****Multi-Disciplinary Teams**

**Ben Grumbles**

with a common purpose. And then we'll also have rapid-fire roundtable discussions where members and attendees of the conference can hop around from one table to another and hear from a leader on a particular topic, what's happening on this topic, what's happening on integrated water permitting or what's happening on nutrient recovery from a municipal perspective.

**Green Infrastructure**

**Lindley:** Your group recently prepared a publication called "*Barriers and Gateways to Green Infrastructure*" (see Water Brief, *TWR* #99). Could you describe why you did that and whether that's part of what you're now doing?

**Grumbles:** Early on, our first strategic plan developed over three years, we identified broadly the idea of helping convene collaborations that move the country towards a more integrated approach to water and establishing a national water vision founded on principles of water sustainability, but we identified a few key areas where we could really make progress in shifting some paradigms. One of the paradigm shifts was the shift from gray to green infrastructure.

**Lindley:** By that, what do you mean?

**Grumbles:** Over the last decade, there has been progress towards looking at natural systems to capture, manage, treat, and recover the water. By green infrastructure, what I mean is using natural systems and processes in lieu of concrete and centralized treatment plants and pipes, relying more on onsite capture, infiltration, evapotranspiration and recovery of water to help reduce the cost and complications from sewer overflows and stormwater.

Green infrastructure incorporates low impact development tactics and principles. It's more than simply rain gardens and green roofs. It can include bioswales, and it relies on onsite capture, infiltration, evapotranspiration, and recovery. The important point, though, is that there are many shades of green, and green and gray must work in combination — not as either/or alternatives. Our organization is not the sole voice on the green infrastructure movement. Others such as American Rivers, NRDC, NACWA, and the Conservation Fund, have seen its value and promoted its use for years.

We received a grant from the Turner Foundation to identify barriers to green infrastructure. We sent out questionnaires and did interviews with about 250 public and private sector water experts and utilities leaders around the country on barriers to green infrastructure. And we compiled the report which identifies technical, legal, regulatory, financial, and cultural barriers but also identified gateways or solutions to advance green infrastructure.

**Low Impact Development****Greening Infrastructure & Recovering Resources**

The Alliance puts a priority on helping communities embrace green infrastructure strategies. I encourage Members to read our 2011 "*Barriers and Gateways to Green Infrastructure*" report [available online at [www.uswateralliance.org](http://www.uswateralliance.org)]. It reveals that a prime motivator of communities in meshing more green infrastructure with gray infrastructure is to save money and energy. Your hearing focus is on financing, but it bears repeating what you already know: Efficient use of green infrastructure systems can avoid more costly end-of-pipe, concrete, basin-based and tunnel-driven solutions. We know hard and gray infrastructure has been at the heart of much of America's progress in meeting Clean Water Act and Safe Drinking Water Act goals and requirements. We also know the data is coming in that communities can manage stormwater and prevent overflows, improve air quality, reduce the "urban heat island effect," and enhance livability through innovative approaches that integrate more green infrastructure with existing gray infrastructure. Our Urban Water Sustainability Council is documenting case studies and developing common practices to help reduce the demand on infrastructure and improve water quality.

Congressional Testimony of Ben Grumbles  
March 21, 2012 - Hearing on Water Infrastructure Funding  
US House Transportation and Infrastructure Committee

**Need for Partnership**

**Lindley:** In one of your recent blogs, you reference various ways to gain funding under a portion of the Clean Water Act's revolving loan funds, nonpoint source management money for parks and districts and the Land and Water Conservation Fund, among others. Is that the source of extra funding you're talking about for the gateway?

**Grumbles:** That's one of the gateways. It's to broaden the pool of participants involved in water management decisions, and for green infrastructure as you and others have recognized for years. Protecting water shouldn't simply be a decision of the utility that's operating under the Clean Water Act or the Safe Drinking Water Act. It involves local land use decisions; it involves the parks and recreation districts; and the forest managers upstream so that the forest to faucet linkage is made clear.

The basic point, maybe the most obvious point, is public funds are increasingly scarce and partnerships are needed more than ever. It's important to build partnerships with a wide range of players affecting the health of the watershed. There are different sources of funding and many of those may be increasingly

**Ben Grumbles****Private Sector  
Funding****Credit Trading****Grey-to-Green  
Blend****Water  
Reclamation****Market-Based  
Approaches****Water Reuse  
Shift****Distrust of  
Privatization**

limited, but don't just look at the Clean Water Act or the Safe Drinking Water Act programs. Look at other types of funds that can help maintain open space, ensure that there's a natural resiliency in the watershed, and help filter out pollutants. And don't just look to public sector monies — look to the private sector, which is why the phrase “public rust doctrine” was in one of my blogs. [See: [www.uswateralliance.org](http://www.uswateralliance.org)]

The Alliance feels strongly that private/public partnerships are critically important and that there should not be artificial barriers to partnerships with the private sector, that it's up to each community to build the relationships to ensure there's public accountability and trust. But, when you're financing water projects, you really need to find some innovative approaches and partnerships.

Green infrastructure is a prime area where you have groups, like the Natural Resource Defense Council who are saying this is an area where the private sector can really shine. You develop some credit trading finance mechanisms in Philadelphia and other cities around the country where there will be private sector money that will help retrofit storm systems, stormwater systems in cities without relying solely on public funds.

**Lindley:** You referenced green infrastructure and its funding as one tool in the toolkit to better address water issues, but you've also referenced stormwater regulatory tools and water recycling.

**Grumbles:** Right.

**Lindley:** On the issue of regulatory tools, one concern is that entities that engage in some of these activities don't necessarily get appropriate credit from the relevant regulatory agencies.

**Grumbles:** Right.

**Lindley:** Another tool appears to be water recycling, but there tends to be some public resistance to water recycling. Can you talk about the various tools in the toolkit and what you see as the strengths and weaknesses of each?

**Grumbles:** Yes. I mentioned that one of the paradigm shifts the Alliance is focused on helping to usher in is from gray infrastructure to green infrastructure. That doesn't mean we're trying to say that it's all or nothing; you have to go from gray to green. Finding the right mix or blend can really help from a financial, environmental, and social standpoint.

Another paradigm shift is to move water from being invisible to being invaluable, and that's where you really get at some tools, some mechanisms. What we are trying to do through these collaborations that we convene and through various dialogues and reports, is to help the public see that there is no such thing as wastewater, just wasted water and that as utilities increasingly become water reclamation facilities — not just treat-and-discharge facilities — there's value to be gained in the resources recovered. Effluent goes from being waste to wealth. And so, trying to help establish a market value for that reclaimed wastewater is going to help, and that will be a tool to provide additional funding.

But that will not go very far if the public is unwilling because of the “yuck factor” — the understandable concerns and perceptions about safety and appropriateness of reclaimed and recycled water and wastewater. Then you run into a brick wall. So, it takes a lot of not just hard science, but communications and sociology to bring people together.

So different types of tools are important, market-based approaches where there are credit trading systems. You and I have been talking about these and studying them and trying to make them work over time for years. There are a lot of barriers at times or there are specific reasons why they don't always take hold or are viewed with such suspicion. When we get closer and closer to a crisis on water, whether it's quality or quantity in a particular region of the country, there's a greater willingness to try some innovative approaches. I continue to believe that when water is viewed as a resource, and when stormwater and wastewater are viewed as true resources with value, as just additional parts of the water cycle, they will also help communities and utilities finance additional water projects.

**Lindley:** Do you see this paradigm shift as already happening?

**Grumbles:** Slowly. Yes, I do see it happening. I mean, unfortunately, only 7.3% of the wastewater effluent generated in the US is reclaimed or reused. And a very, very small percentage of that is used for potable water supplies. But increasingly the country is willingly embracing, in selected regions, indirect potable reuse and is seeing the value of reclaimed wastewater to keep parks green and healthy, to serve dual-plumbed systems in certain facilities. I do see progress; I just think it's too slow.

I also see some progress in the move towards greater acceptance of public/private partnerships in the design, operation, management and financing of water-related facilities, but it's also moving too slowly. I think one of the real unique features of US water policy is the continued deep distrust of private involvement in the operation, maintenance, and ownership of water and wastewater services in a community.



**Ben Grumbles****Invaluable Water**

The Alliance is not taking sides. We're not disciples of privatization; we just realize that communities need to have a full array of options and increasingly public/private partnerships can provide solutions and financing for water-related projects. There needs to be a willingness to explore innovative approaches. We're not the only organization touting innovative financing policies, but we think that's a very important piece of the puzzle of sustainability.

In fact, as you know Tom, any organization that's promoting sustainability has got to focus on finance. Today I'm going to a national summit on water rates and revenue loss because we feel that a fundamental challenge for sustainable water policy in the country is the failure to appreciate the value of water. More work needs to be done in increasing public awareness, in shifting that paradigm of water being invisible to invaluable.

**Cost Pricing**

A key part of that is moving towards fuller cost pricing, where the price and cost more closely resemble the true value of the water services and the water infrastructure systems being provided. But, you know, that is one of the most difficult yet important issues, and we aim to tackle it. And we won't tackle it successfully by declaring from Washington, DC, that local water rates ought to be X, Y, or Z in order to reflect the true cost of the local systems. What we've got to do is bring in the economists as well as the water experts and develop a toolkit that every locality can consider. All politics is local and all water rates are local.

**Conservation**

I'm very much aware that environmental advocates like myself really tout conservation pricing and water and wastewater utilities doing everything they can to encourage their rate payers and consumers to use less water and to install low-flow WaterSense labeled toilets and faucets, etc. It can also have ripple effects that put the local water utility in a very difficult situation where they are losing revenue. And, there's a real messaging problem where a local citizen might think, well, you know, what's the message here; I save more but I have to pay more in order to make up for the revenue. So, that's another issue where we're combining forces with different organizations to shine a spotlight on financing and rate setting. Can you think of anything more counterproductive than to set some national one-size-fits-all principle on the right rate to charge for your local city water or your local agricultural water? I cannot.

**Water Quality Trading**

**Lindley:** In the Pacific Northwest, Clean Water Services developed a watershed-wide multiple point source and stormwater consolidated NPDES permit that's been in place over ten years. Recently the City of Medford put in place an NPDES permit that relies on tree shading in certain areas overseen by The Freshwater Trust. Both these permits are addressing temperature, but in other markets, nutrient trading is a developing water quality trading mechanism. What do you, Ben Grumbles, think about water quality trading?

**Numeric Nutrient Criteria**

**Grumbles:** I think it's the future. We need to develop the policies further and build public support and recognize that it's not a good fit in every watershed, but it has tremendous potential, and I'm excited about that. That type of innovative thinking is exactly what's needed. One reason that it hasn't advanced is entirely legitimate, and that is the concern over accountability, measuring progress at the end of the day. With nutrients, I see value in numeric nutrient criteria. I also recognize that the science on developing legally and scientifically defensible criteria takes time. It's hard, and it needs to be done at the state level with help at the federal level under the Clean Water Act, but that's been a very controversial topic. I do see that more can be done to facilitate the development of measurable milestones and numeric nutrient criteria can help because it's very difficult, as you know, to have a market-based trading system if you can't measure.

**Trust Needed**

Maybe the most important piece of innovative trading and watershed-based permitting approaches is you've got to develop the trust among the constituencies and the stakeholders, and that takes time, but it's worth it. Water's worth it and it's very important to move and continue to build those success stories and learn from the difficulties and how to overcome those.

**Federal Leadership**

And I think there needs to be more leadership at the federal level in advancing trading, market-based approaches. Have you been following the EPRI project in the Ohio River Basin? I get encouraged by efforts where the federal leadership of EPA and USDA are joining together on the multi-state water quality trading project to help reduce nutrients and advance in innovative approaches. So I think it's important.

I don't diminish the concerns that some have about accountability and progress at the end of the day. I just know we can't afford to continue the status quo, relying on the same old NPDES permits and following models from 10, 15, 20 years ago.

**NPDES Term Extension**

For that matter, Tom, I've been a big proponent of the idea of extending the term of NPDES permits by Congressional amendment from five years to seven or 10 years, if that can be done with appropriate safeguards and help advance watershed-based permitting and greater synchronization of the different sources within a watershed. We're not a lobbying organization, and we haven't developed many specific points on particular legislation. So my point about the NPDES permit terms being extended is something that's just Ben Grumbles' perspective.

## Ben Grumbles

**Lindley:** Ben, you were the longest serving assistant administrator for water ever at the US Environmental Protection Agency and you were the director of the Arizona Department of Environment Quality. Each was a very high-level, very influential, and very powerful governmental position. What led you to leave those to become the director of an advocacy organization?

**Grumbles:** It's been a natural flow of family and career opportunities. The EPA position was just an extraordinary experience, and I was there for a very long time and enjoyed it immensely. As the new administration came on board, it was a great opportunity for me to transition to something else — and this is where family needs pointed me — in the direction of Arizona. The Grand Canyon State was also a great opportunity where I could do something I've wanted to do for a long time and that was to serve as a state official and learn more about western water and other aspects of the environment, such as air and waste. And then family, it was pure and simply family needs that directed me back to the Washington, DC, area where my wife and kids grew up and wanted to be. It wasn't politics, it wasn't budget constraints in the Arizona agency, which different reporters have loved to speculate on. I've always enjoyed public service, and this just came up and was a wonderful fit for me, to continue serving a public interest but now as the head of a truly unique organization focused on water and advancing the country towards a national water vision.

**Lindley:** Ben, as we conclude this, could you give us a few of the specific projects that you and the Alliance have completed, or on which you are working, that represent critically important activities or efforts?

**Grumbles:** Our strength is in convening collaborations, providing needed research, and increasing public awareness. We recently helped the White House Council on Environmental Quality and US EPA plan and conduct a one-day national summit at the White House on municipal stormwater and green infrastructure. It was a high energy microcosm of the urban water sustainability conferences we convene each year around the country, with people of all stripes and perspectives identifying barriers and solutions. The Alliance also convened 10 water and wastewater utility leaders last year for a workshop on climate change and water adaptation, funded by the Water Research Foundation and overseen by Stratus Consulting. It will result in Final Report — “*Changing Organizational Culture to Promote Sustainable Water Operations*” — which is expected by the end of the year. It provides a toolkit for the utility of the future to successfully transition and maintain support through outreach and inreach. We've also helped bring together wildly diverse organizations, agencies, and people to celebrate America's water champions through our annual U.S. Water Prize. Check it out and watch it grow. Water champions deserve a first class Oscar-, Emmy-, Heisman-styled awards program. It's one positive way to increase the visibility of the “silent servants” and unsung heroes.”

### FOR ADDITIONAL INFORMATION:

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**Ben Grumbles** launched EPA's water efficiency labeling program, WaterSense, and initiatives on green infrastructure, water and climate change, and pharmaceuticals. He carried out and defended the nation's clean water, drinking water, ocean and coastal, and wetlands laws and worked on great waterbody collaborations from coast to coast. Ben also served as associate administrator for EPA's Office of Congressional and Intergovernmental Relations in 2004, working with mayors, governors, and state and federal legislators. Prior to EPA, Grumbles worked as a Senior Counsel for the Water Resources and Environment Subcommittee of the US House Transportation and Infrastructure Committee and Environmental Counsel and Deputy Chief of Staff for the Science Committee; he also taught at the Environmental Law Program of George Washington University Law School from 1994 to 2004. Ben has a BA degree in English from Wake Forest University in North Carolina, a JD degree from Emory Law School in Georgia, and an LLM (Masters) degree in environmental law from George Washington Law School in Washington, D.C.

**Tom Lindley.** For *The Water Report*, Ben spoke with Tom Lindley. Tom leads the national Environment, Energy & Resources Practice at the law firm Perkins Coie LLP. For over 25 years, Tom has represented wastewater and stormwater dischargers on every aspect of permitting and compliance. Tom helped to conceive and create the nation's first watershed-based multiple source NPDES permit, is actively engaged in efforts to expand water quality trading, and serves on the Advisory Board for the Smithsonian's Environmental Research Center.

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## WATER BRIEFS

## LAND USE &amp; WATER SUPPLY— COMMENTS

Article in *The Water Report* #102 prompts exchange

In *The Water Report* #102, the cover article — *Land Use Decisions & Water Supply* by Dave Monthie — dealt with two important decisions from the Washington Supreme Court on the subject. We decided to print Sarah E. Mack's comment on the article; Sarah is an attorney with Tupper Mack Wells LLC in Seattle.

We are also including Dave Monthie's response to Mack's comment.

**Mack Comment**

Dave Monthie makes the following statement in his article on land use and water rights: "Washington courts have also inferred a requirement from various State codes that Ecology must find that the proposed transfer is in the public interest," citing *An Introduction to Washington Water Law* (Washington State Office of the Attorney General, January 2000), VII: 7-9). This is misleading in two respects.

First, the groundwater code expressly requires consideration of the four-part test (availability of water; beneficial use; no impairment to existing rights; not detrimental to the public welfare) for an amendment of a groundwater permit or certificate under RCW 90.44.100. However, the surface water code requires only a determination that the water right change will not cause detriment or injury to existing rights. Under RCW 90.03.380, the governing statute for changes to surface water rights, vested groundwater claims, or (according to Ecology) changes to the "purpose" of use of groundwater rights, consideration of "detriment to the public welfare" is not required. This was established in the *Pend Oreille PUD* case, which was decided by the Supreme Court after the Attorney General's office published its *Introduction to Washington Water Law*. (The Supreme Court reversed the PCHB ruling cited for this proposition at VII:9 of the *Introduction*.) Moral: beware of uncritical reliance on the little blue treatise, which has not been updated since its original publication over 12 years ago.

Second, even with respect to changes governed by RCW 90.44.100, the test is *not* whether "the proposed transfer is in the public interest." That misstates the "public interest" prong of the four-part test. The test is whether the proposed transfer/change would prove *detrimental* to the public welfare/public interest. Obviously, there is a difference.

**For info:** Sarah E. Mack, 206/ 493-2315 or [mack@tmw-law.com](mailto:mack@tmw-law.com)

**Monthie's Response**

My thanks to Sarah for her gentle reminder. She is correct with regard to the holding in the *Pend Oreille* case, which is to be expected, since she was one of the attorneys in that case. To use the language of the Washington Supreme Court in that decision, the groundwater code (Chapter 90.44 RCW) "affirmatively requires consideration of the public interest" where groundwater rights are proposed for change, whereas (as Sarah notes), the surface water change/transfer statute (RCW 90.03.380) does not include such a requirement. That is because the groundwater code (RCW 90.44.100(2)) expressly requires that changes in groundwater rights must include the same findings as are required in original applications, whereas RCW 90.03.380 (governing surface water changes) does not, and the Court in *Pend Oreille* did not agree with Ecology's argument that the "public interest" standard could be inferred for surface water changes from other statutory provisions.

With regard to what is required for original water right applications (both groundwater and surface water), the relevant statute (RCW 90.03.290(3)) requires both a finding by Ecology that, if granting the application, the proposed use "not be detrimental to the public welfare," and also an obligation on Ecology to deny the application if it "threatens to prove detrimental to the public interest." To paraphrase Sarah, there is an obvious difference in those two phrases. What that different language means, and whether the term "public welfare" and "public interest" have the same meaning, remains for a future judicial decision.

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## WATER CONFLICT POLICY US

## FED AGENCIES &amp; CONFLICT RESOLUTION — OMB/CEQ DIRECTIVE

The Federal Office of Management and Budget (OMB) and the President's Council on Environmental Quality (CEQ) have issued a memo outlining the use of conflict resolution practices for water and other environmental issues. The memo directs federal agencies to use third-party facilitation to settle conflicts, including matters related to energy, transportation, water and land management.

"With the magnitude of environmental challenges facing the nation, coupled with the need for careful stewardship of tax dollars and budgets, all Federal departments and agencies should leverage environmental collaboration and conflict management approaches to minimize and resolve environmental conflicts," the memo states.

The policy applies to all executive branch agencies as they carry out their responsibilities under enabling legislation, the National Environmental Policy Act (NEPA) and other laws aimed at managing and conserving the environment, natural resources and public lands.

It also supports an executive order ([www.whitehouse.gov/the-press-office/2012/03/22/executive-order-improving-performance-federal-permitting-and-review-infr](http://www.whitehouse.gov/the-press-office/2012/03/22/executive-order-improving-performance-federal-permitting-and-review-infr)) from March directing agencies to improve the federal permitting process of infrastructure projects.

**For info:** Complete memo available at: [www.ecr.gov/Resources/FederalECRPolicy/MemorandumECR.aspx](http://www.ecr.gov/Resources/FederalECRPolicy/MemorandumECR.aspx)

**WATER BRIEFS****ARMY CORPS INFRASTRUCTURE US****MANAGEMENT OF AGING SYSTEMS**

The US Army Corps of Engineers (Corps) faces an “unsustainable situation” in maintaining its national water projects at acceptable levels of performance, according to a report from the National Research Council released on October 4. The report suggests expanding revenues and strengthening partnerships among the private and public sectors as options to manage the Corps’ aging water infrastructure.

“The country’s water resources infrastructure is largely built-out, and there are limited sites to construct new projects,” said David Dzombak, chair of the committee that wrote the report and director of the Steinbrenner Institute of Environmental Education and Research at Carnegie Mellon University. “Today, the Corps focuses mainly on sustaining its existing structures, some of which are in states of significant deterioration and disrepair. Funding for maintenance and rehabilitation of Corps water resources infrastructure — which includes navigation locks and dams, flood management levees and dams, and other facilities — has been inadequate for decades. We now have a scenario where the water infrastructure is wearing out faster than it is being replaced or rehabilitated. Some components could be decommissioned or divested, but the Corps does not have the authority to do this.”

The Corps is authorized to carry out projects in several mission areas that include navigation, flood risk management, ecosystem restoration, hurricane and storm damage reduction, water supply, hydroelectric power generation, and recreation. Its extensive infrastructure consists of approximately 700 dams, 14,000 miles of federal levees, and 12,000 miles of river navigation channel and control structures. Because of its many different authorities and programs, the Corps’ successes in addressing maintenance and rehabilitation issues in one mission area often do not transfer easily to other mission areas.

The Corps’ division and district offices set some priorities for maintenance and rehabilitation of existing projects within annual budgets. However, there is no defined distribution of responsibility among Congress, the Office of Management and Budget, and the Corps for national-level prioritization of investments in maintenance and rehabilitation for existing water infrastructure, the report notes. For major rehabilitation projects, decisions about funding are the responsibility of Congress and OMB.

A more systematic approach toward water infrastructure maintenance and rehabilitation will require breaking with some management traditions and practices, the committee said. For example, for Congress and OMB to place higher priority on maintenance issues, some reorientation away from a current strong focus on new projects via periodic Water Resources Development Acts is needed. In addition, more specific direction from the executive branch and Congress regarding priorities for maintenance investments will be crucial to sustaining the Corps’ high-priority and most valuable infrastructure, the committee emphasized. Decommissioning or divesting some components should also be considered.

The committee said that partnerships with states, communities, and the private sector could yield new resources and more efficient methods, especially in hydropower generation, flood risk management, and port and harbor maintenance. Based on other hydropower systems such as the Tennessee Valley Authority, the committee estimated that Corps hydropower revenues could be increased by rehabilitating and upgrading hydropower projects to improve efficiency of turbine and related power generation and distribution systems. With regard to flood risk management, reducing federal resources available to construct traditional, structural projects would present opportunities to implement nonstructural flood control options, such as zoning and building codes, that often are efficient, cost less, and provide greater environmental benefits. They also offer a chance for the Corps to extend its partnerships with local communities in providing technical advice and other types of support.

The report calls for an independent investigation of the opportunities for additional partnerships for operations and maintenance of Corps water infrastructure. Examples of such partnerships include those developed with private entities by state and local governments for port operation. Given the complexities of each Corps mission area, opportunities for new arrangements and greater efficiencies need to be investigated separately and carefully for each mission area.

The report was sponsored by the Corps. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. Panel members, who serve pro bono as volunteers, are chosen by the Academies for each study based on their expertise and experience and must satisfy the Academies’ conflict-of-interest standards. The resulting consensus reports undergo external peer review before completion.

A free pre-publication version of the report is available at [www.nap.edu/catalog.php?record\\_id=13508](http://www.nap.edu/catalog.php?record_id=13508).

**For info:** Jennifer Walsh, NAS, 202/ 334-2138 or [news@nas.edu](mailto:news@nas.edu)

**KEYSTONE XL PIPELINE NE****INFORMATION WEBSITE**

The Nebraska Department of Environmental Quality (NDEQ) has developed a website to keep the public informed about the evaluation being undertaken by NDEQ concerning the Keystone XL Pipeline. The website contains information about the role of the NDEQ in the process, public meetings and documents, press releases, maps, reports, and frequently asked questions. It also tells people how to contact the agency to receive additional information. The site explains how to access public documents submitted to the agency as part of the review and allows citizens to post their own comments on the review process.

**For info:** <https://ecmp.nebraska.gov/deq-seis/Default.aspx>

## WATER BRIEFS

**ENFORCEMENT AUTHORITY CA**  
**WATERMASTER CITES DEFICIENCIES**

In a report that was to be discussed at the State Water Resource Control Board's (SWRCB's) September 19th meeting, Delta Watermaster Craig Wilson concluded that compared to its water quality authority, SWRCB's water right monitoring and enforcement authority is weak. Wilson also noted that there is "an unnecessary abundance of process" that results in delayed or postponed compliance. *Improving Water Right Enforcement Authority*, Wilson (p. 3).

"Enhancing the State Water Board's water rights authority will benefit the state's ability to improve water supply planning and make sound water use decisions. Delayed or postponed compliance can foster situations where individuals make decisions, take action, or fail to take action that are adverse to the public interest in maximizing the reasonable and beneficial use of water and in protecting the environment. Efficient and timely water rights enforcement promotes a level playing field where all persons must play by the same rules and not conduct unfair business practices." *Id.*

Wilson also addressed the issue of "waste" of water rights: "Finally, the current process for enforcing the constitutional prohibition against the waste or unreasonable use of water is unnecessarily convoluted." *Id.* at 4.

The Report contains Specific Recommendations to amend California's Water Code, noting in his conclusions that "recommendations contained in this report would enhance the ability of the State Water Board to take appropriate enforcement actions over water right matters." *Id.* at 10. "It is the recommendation of this report that additional water right administrative and enforcement authority be provided to the State Water Board." *Id.* at 5.

Craig Wilson was appointed as California's first Delta Watermaster for a four-year term on July 7, 2010 by SWRCB.

**For info:** Craig Wilson, 916/ 327-3289 or [deltawatermaster@waterboards.ca.gov](mailto:deltawatermaster@waterboards.ca.gov); Report at: [www.waterboards.ca.gov/board\\_info/agendas/2012/sep/091912\\_11\\_wr\\_enf\\_auth.pdf](http://www.waterboards.ca.gov/board_info/agendas/2012/sep/091912_11_wr_enf_auth.pdf)

**STATE TRUST LANDS AZ**  
**NO FEDERAL RESERVED RIGHTS**

On September 13, the Arizona Supreme Court (Court) affirmed a Superior Court decision and unanimously ruled that the State of Arizona (Arizona) does not have federal reserved water rights on state trust lands. *In Re General Adjudication*, Case No. WC-11-0001-IR (September 12, 2012). The issue arose in the Little Colorado River and Gila River general stream adjudications when Arizona asserted that the US impliedly reserved water rights to support education and other public institutions when lands were granted to Arizona (currently totaling 9.2 million acres of "State Trust Lands"). More than 14,000 claims (Little Colorado) and 82,000 claims (Gila) have been made in the stream adjudications to date. A special master had submitted a report to the Superior Court, which adopted the master's findings and conclusions that the reserved water rights doctrine is inapplicable to State Trust Lands.

Arizona's reserved rights claims, totaling nearly 8 million acre-feet, resulted in widespread opposition to the claims, including municipalities, tribes, corporations and irrigation districts. The potential for disruption from such large claims was not lost on the Court: "We agree with other courts that have adopted a rule of narrow construction for federal reserved water rights, recognizing the doctrine's disruptive effect in prior appropriation jurisdictions." (citations omitted). *Slip Op.* at 11.

The decision turned on the purpose of the reservation of the lands. "That use — the reservation's purpose — must be federal for the federal reserved water rights doctrine to apply. *Cappaert*, 426 U.S. at 138." *Id.* at 20. In its Conclusions, the Court held, "...we find no withdrawal, no reservation for a federal purpose, and no congressional intent to reserve water rights for the State Trust Lands." *Id.* at 25.

The Court went to great length to explain its rationale for the decision and is recommended reading for anyone faced with questions regarding federal reserved water rights.

**For info:** Case at: [http://info.swlaw.com/reaction/2012/Alerts\\_2012\\_HTML/ALERT\\_AZSupremeCourt\\_AZNoWaterRightsTrustLands\\_Sept2012/WC-11-0001-IR.PDF](http://info.swlaw.com/reaction/2012/Alerts_2012_HTML/ALERT_AZSupremeCourt_AZNoWaterRightsTrustLands_Sept2012/WC-11-0001-IR.PDF)

**RESERVOIR PURCHASES CO**  
**VARIOUS BUYERS PURCHASE RIGHTS**

The Colorado River Water Conservation District (District) announced on October 1 that the remaining 19,000-plus acre-feet of marketable water from Ruedi Reservoir is being sold to buyers that vary from municipalities to energy companies. In a move designed to pay off construction debt from 50 years ago, the District advertised the water sale three months ago, which resulted in more requests for water than was available.

At \$1,300 per acre-foot, the water rights are expensive, but entities like Garfield County want to have that water on-hand, especially now with droughts becoming more regular. Commissioner Mike Samson says the County is purchasing about 700 acre-feet — almost a million dollar investment. "Our reasoning with that is, we'd like to have it so that if Glenwood, Rifle or whoever comes up short, we can say, 'hey we can sell you some water,'" said Samson. Other local and regional governments are lining up to buy water from Ruedi Reservoir. The City of Aspen, the Town of Carbondale and Town of Palisade are bidding, as well as oil companies like Exxon and Encana. The largest buyer is the Ute Water Conservation District, which provides drinking water to rural areas in the Grand Valley.

The water sale will raise an estimated \$34 million that will go to paying off the loans made to build Ruedi Reservoir in 1962. Federal loans were used in the construction and the Colorado River District noted in their July 2011 newsletter that the "unpaid debt...was growing exponentially because of uncontracted water." In that newsletter, the District also noted that "the total amount of water requested is 27,532 acre feet...7,532 af more than is available." The Bureau of Reclamation operates the reservoir.

*The Water Report* wishes to thank Mari Krivonen of Aspen Public Radio for use of her article to help prepare this brief.

**For info:** Marci Krivonen, [marci@aspenpublicradio.org](mailto:marci@aspenpublicradio.org); District's website: [www.crwcd.org/](http://www.crwcd.org/)



## WATER BRIEFS

**TRIBAL WATER RIGHTS MT  
RECLAMATION CONTRACT**

On August 30, US Bureau of Reclamation (Reclamation) officials, including Great Plains Regional Director Michael J. Ryan, joined Crow Tribal Chairman Cedric Black Eagle and other tribal members in a signing ceremony initiating planning, design and construction of the municipal, industrial, and rural water system (MR&I) for the tribe. Reclamation and the tribe completed contract negotiations for the planning, design, and construction of the MR&I system in August.

The contract is the latest step in implementation of the Claims Resolution Act of 2010 signed by President Obama which included four major water rights settlements — totaling more than \$1 billion — for American Indian tribes including the Crow Nation. It authorizes the Secretary of the Interior, through Reclamation, to rehabilitate the Crow Irrigation Project (CIP) and to design and construct the MR&I system. The Crow Tribe Water Rights Settlement will bring a cumulative total of more than \$460 million to the Crow Nation to ensure safe drinking water for the reservation and rehabilitate the irrigation project. The Crow Reservation encompasses more than two million acres, and is home to roughly two-thirds of the approximately 12,000 Crow tribal members. The drinking water system on the Reservation has significant deficiencies in capacity and water quality and many tribal members must at times haul water.

**For info:** Tyler Johnson, Reclamation 406/ 247-7609; Crow Tribe: [www.crowtribe.com/](http://www.crowtribe.com/)

**DESALINATION PLANT CA  
PROPOSED PURCHASE AGREEMENT**

On September 27, the San Diego County Water Authority (Authority) released for public review a proposed Water Purchase Agreement with Poseidon Resources (Poseidon) for the purchase of desalinated seawater from the Carlsbad Desalination Plant. The agreement calls for the Authority to purchase at least 48,000 acre-feet (AF) of desalinated water per year for 30 years. The Authority would also be

able to purchase up to 8,000 additional AF of water per year at a reduced cost, for a total potential supply from the plant of 56,000 AF per year. The term can be extended up to three additional years due to unexpected or uncontrolled events. At the end of the term, the Authority will have the option — but not an obligation — to purchase the plant for \$1. The Water Authority also has the option to buy the plant after 10 years under certain terms.

In 2020, the project would account for approximately 7 percent of the total projected regional supply and about one-third of all locally generated water in San Diego County. The Authority provides water to its 24 member agencies.

Under the agreement, the total price for the water — including costs to make improvements to the Authority's pipelines and treatment plant to accommodate the new supply — is estimated at \$2,042 to \$2,290 per AF in 2012 dollars, depending on how much water is purchased annually. The impact of this new supply on an individual's water bill will vary depending upon their local water agency; an average household's water bill would increase \$5 to \$7 a month by 2016 to pay for the new supply.

The Authority's Board of Directors has not approved the agreement, and will set a date for voting on the proposed agreement after it has received public comment and deliberated on the proposed agreement's terms. The Authority scheduled two public meetings to share information on the agreement and to receive public comment on October 2 and 10.

The Authority's focus in negotiating the agreement has been to assign appropriate risks to the private developer (Poseidon and its investors), while keeping costs for water ratepayers as low as possible. Under the agreement, the Authority will have no responsibility or liability for the design, permitting, financing, construction and operation of the project.

Additional information on the proposed Water Purchase Agreement terms is included in documents available on the Authority's website listed below.

**For info:** [www.sdcwa.org/issue-desal](http://www.sdcwa.org/issue-desal)

**WATERSHEDS REPORT WA  
TREATY TRIBES RELEASE**

On September 21, the Northwest Indian Fisheries Commission (NWIFC) released *State of Our Watersheds*, a report by the treaty Indian tribes. *State of Our Watersheds* was created by the tribes to gauge progress toward salmon recovery and guide future habitat restoration and protection efforts. It tracks key indicators of salmon habitat quality and quantity over time from the upper reaches to the marine shorelines of 20 watersheds in western Washington. The report confirms that salmon habitat is being lost faster than it can be restored, and that this trend shows no sign of improvement. The report includes data gathered over decades of tribal, state, and federal efforts to provide a view of watersheds across western Washington, as well as recommendations for protecting those watersheds and the salmon they produce.

Key findings noted in the report cover several areas affecting salmon recovery. A 75 percent loss of salt marsh habitat in the Stillaguamish River watershed is believed to be a main factor in limiting chinook populations in that river system. Since the 1970s, the status of herring stocks in the Port Gamble Klallam Tribe's area of concern has dropped from healthy to depressed because of degraded nearshore habitat (herring are an important food source for salmon). In the Chehalis River system, the Quinault Indian Nation estimates that culverts slow or block salmon from reaching more than 1,500 miles of habitat. Since 1980, the number of permit-exempt wells in the Skagit and Samish watersheds alone has exploded from about 1,080 to 7,232. Property owners not served by a community water system are allowed a water right permit exemption to pump up to 5,000 gallons of groundwater per day.

*State of Our Watersheds* is part of the Treaty Rights at Risk initiative created by the treaty tribes in 2011 to address the erosion of tribal treaty-reserved fishing rights from the ongoing loss of salmon and their habitat. The initiative is a call to action for the federal government to fulfill its trust

## WATER BRIEFS

responsibility to the tribes and its duty to recover salmon by leading a more coordinated salmon recovery effort. More information is available at [www.treatyrightsatrisk.org](http://www.treatyrightsatrisk.org).

**For info:** Tony Meyer, NWIFC, 360/438-1180 or [tmeyer@nwifc.org](mailto:tmeyer@nwifc.org); *State of Our Watersheds* available on NWIFC's website: [www.nwifc.org/sow](http://www.nwifc.org/sow)

### ENVIRONMENTAL FLOWS TX BRAZOS STAKEHOLDER REPORT

The Brazos River and Associated Bay and Estuary System Stakeholder Committee (BBASC) submitted its final report, *Environmental Flows Standards and Strategies Recommendations*, to the Texas Commission on Environmental Quality (TCEQ) and the Environmental Flows Advisory Group in fulfillment of Texas Water Code Section 11.02362 on August 31. The report and the *Environmental Flow Regime Recommendations Report* from the Brazos River Basin and Bay Expert Science Team (BBEST), submitted on March 1, can be downloaded from the BBASC's page on TCEQ's website.

**For info:** Cory Horan, TCEQ, 512/239-4026, [Cory.Horan@tceq.texas.gov](mailto:Cory.Horan@tceq.texas.gov) or [www.tceq.texas.gov/permitting/water\\_rights/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team](http://www.tceq.texas.gov/permitting/water_rights/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team)

### TRANSBOUNDARY CASE WA AGREEMENT ON LIABILITY FACTS

Shortly before trial was set to begin in US District Court in Yakima over Teck Metals, Inc.'s (Teck's) liability for contamination from smelter discharges in Canada, the company entered into an agreement to avoid the need for a trial over technical issues in the liability phase of the case. *Pakootas et al v. Teck Metals Ltd.* Teck conceded that "some portion of the slag discharged from Teck's Trail Operations into the Columbia River between 1896 and 1995, and some portion of the effluent discharged from Trail Operations, have been transported to and are present in the Upper Columbia River in the United States, and that some hazardous substances from the slag and effluent have been released into the environment within the United States." Teck Press

Release, 9/10/12. As further noted by the Press Release, the facts stipulated to "are expected to provide the minimum requirements to allow the court to find in favour (sp) of the plaintiffs on their claim for a declaratory judgment that TML is liable under CERCLA for response costs, the amount of which will be determined in a subsequent phase of the case."

Teck also noted that the subsequent hearing — dealing with claims for natural resource damages and costs — is expected to be deferred while the remedial investigation and feasibility study with respect to environmental conditions in the Upper Columbia River are completed. That study is being undertaken by Teck American Incorporated pursuant to a 2006 agreement with US EPA and is currently expected to be completed in 2015.

Washington's Department of Ecology (Ecology) issued its own press release regarding the admission by Teck, noting that it "comes after eight years of litigation by the Colville Confederated Tribes and the state of Washington. Teck admits it intentionally discharged nearly 10 million tons of slag—waste separated from ore during smelting—along with industrial sewage containing hundreds of thousands of tons of toxic metals such as mercury, copper, cadmium, arsenic, lead, and zinc to the river in Canada over the last century." Ecology went on to state, "Teck now admits these substances are hazardous and that they came to rest in the sediments along the shores of the Upper Columbia River in Washington state. They also concede that heavy metals continue to leach from its waste into Washington state's environment, meaning they are potentially available to cause harm. Establishing liability is the first step to hold the company accountable for assessing and addressing the risks posed to the public and the environment."

According to Ecology, Teck still intends to re-argue it is not subject to United States law, given that the initial discharge of waste occurred less than 10 miles north of Washington in Canada. Arguments to this effect were already rejected in an early phase of the case, but Teck is entitled to renew them on appeal. Judge Lonny Suko in the Eastern District of Washington will first decide liability

under US law. This decision will be based on evidence already submitted to the court and will be the subject of legal arguments to the court on October 10, 2012.

**For info:** Marcia Smith, Teck, 604/699-4616 or [marcia.smith@teck.com](mailto:marcia.smith@teck.com); Jani Gilbert, Ecology, 509/329-3495 or [jani.gilbert@ecy.wa.gov](mailto:jani.gilbert@ecy.wa.gov)

### MINE STORMWATER AK CWA PENALTY & SETTLEMENT

The Alaska Gold Company has paid a penalty for alleged Clean Water Act (CWA) violations at the Rock Creek mine near Nome, Alaska. According to a settlement announced on September 19 by EPA, the company allegedly violated permit requirements for controlling stormwater pollution during construction activities. In addition to paying a \$177,500 penalty, the company has already taken corrective actions to comply by submitting and implementing an upgraded Stormwater Pollution Prevention Plan and reclaiming a portion of the area disturbed during construction.

EPA and the Alaska Department of Environmental Conservation performed six inspections at the mine between June 2009 and September 2011, which revealed numerous alleged violations of federal construction stormwater regulations. Infractions included drainage channels without rock armoring, creating bank erosion, and undercutting and sloughing of channel sidewalls. Inspectors also noted areas where proper erosion control measures were not installed or maintained, which caused the discharge of large amounts of silt and sediment to Rock Creek and Lindblom Creek. The company also failed to create, maintain, and implement an adequate Stormwater Pollution Prevention Plan that met all requirements of the NPDES General Permit for Storm Water Discharges from Construction Activities. Both Rock Creek and Lindblom Creek are tributaries to the Snake River, which enters the Bering Sea near Nome.

**For info:** Suzanne Skadowski, EPA, 206/553-6689, [skadowski.suzanne@epa.gov](mailto:skadowski.suzanne@epa.gov) or [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=6](http://cfpub.epa.gov/npdes/home.cfm?program_id=6)

## WATER BRIEFS

## WATER REUSE GUIDELINES US

## EPA RELEASES 2012 UPDATE

Water reclamation and reuse have taken on increasing importance in the water supply of communities in the US and around the world to achieve efficient resource use, ensure protection of environmental and human health, and improve water management. On September 29, EPA released their interim *2012 Guidelines for Water Reuse*. The 2012 reuse guidelines update and build on the Agency's previous reuse guidelines issued in 2004, incorporating information on water reuse that has been developed since the 2004 document was issued. In addition to summarizing existing regulations, the document includes water reuse practices outside of the US, case studies, information on planning for future water reuse systems, and information on indirect potable reuse and industrial reuse. Disinfection and treatment technologies, emerging contaminants, and public involvement and acceptance are also discussed.

More information and a copy of the Guidelines are available on EPA's website listed below. The 2012 Guideline document posted there is an interim posting; once all internal clearance is complete with incorporation of minor edits, EPA will post a final version on its website.

**For info:** [www.waterreuseguidelines.org/](http://www.waterreuseguidelines.org/)

## RIGHT TO WATER CA

## NEW CALIFORNIA STATE POLICY

On September 25, Governor Jerry Brown signed AB 685 establishing a "right to water" in California state law. The legislation declares that it is "the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." The law also requires state agencies to "consider this state policy when revising, adopting or establishing regulations, policies, and grant criteria when those...are pertinent to the uses of water described above."

**For info:** Bill at: [www.leginfo.ca.gov/pub/11-12/bill/asm/ab\\_0651-0700/ab\\_685\\_bill\\_20120925\\_chaptered.pdf](http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0651-0700/ab_685_bill_20120925_chaptered.pdf)

## TMDL REPORT US

The Congressional Research Service released a report for Congress entitled "Clean Water Act and Pollutant Total Maximum Daily Loads (TMDLs)" by Claudia Copeland on September 21st. "After nearly 40 years of implementing the CWA, EPA and states acknowledge that a substantial portion of the nation's waters still are impaired or threatened by pollution. The most recent national inventory of water quality reported that nearly 40% of surveyed water bodies remain too polluted for fishing, swimming, and other designated uses. Yet those numbers only represent rivers, streams, and lakes actually surveyed by state monitoring programs — typically about one-third of all waters. The TMDL assessments developed by states yield more precise water quality information and identify large numbers of waters requiring additional measures before water quality standards are attained.

The TMDL program is in a period of transition. Many states are emerging from earlier consent decree mandates and are increasingly addressing new challenges — for example, more complex and resource-intensive TMDLs, larger scale impairments, and nonpoint sources. Whether the program as it now exists is well suited to address some of these problems, such as ocean acidification or climate change, is debatable. In August 2011, EPA and state program managers launched discussions of developing new goals for the program. One year later, these discussions produced a draft 'long-term vision' for reforming the process, including allowing states the option to consider protecting healthy waters, using alternative approaches that incorporate adaptive management, and integrating TMDLs with other CWA and Safe Drinking Water Act programs. See Amena H. Saiyid, 'Draft TMDL Plan Focuses on Protecting Waters, Not Just Restoring Impaired Ones,' Daily Environment Report, August 20, 2012, [www.bna.com/draft-tmdl-plan-n12884911304/](http://www.bna.com/draft-tmdl-plan-n12884911304/).

Other than recent oversight hearings on the Chesapeake Bay TMDL, Congress has not shown active interest in the TMDL program for more

than a decade. Some stakeholders, especially states, believe that several issues present Congress with an opportunity to examine the TMDL provisions of the CWA. Issues could include integrating TMDLs into a larger clean water program that considers all steps — from designation of uses to implementation — in order to meet water quality standards, recognizing and striking a balance between water quality restoration and pollution prevention, changing focus from point sources to nonpoint sources, and addressing resource and funding needs." Report at 18.

**For info:** Claudia Copeland, [ccopeland@crs.loc.gov](mailto:ccopeland@crs.loc.gov); Report at: [www.fas.org/sgp/crs/misc/R42752.pdf](http://www.fas.org/sgp/crs/misc/R42752.pdf)

## WATER &amp; CLIMATE NW

## WHITE PAPER

*Water and Climate in the Pacific Northwest* are inextricably linked.

This new white paper of the same name from the Institute for Water & Watersheds and the Oregon Climate Change Research Institute explores how climate has changed and is projected to change during the 21st century, and the implications for water in the Pacific Northwest and greater western United States.

In the future of the Pacific Northwest, as winter temperatures warm, mountain snowpacks will continue to diminish and summer water supply will likely decline. As the paper notes, "Cascade mountain snowpacks are projected to be less than half of what they are today by mid-century with lower elevation snowpacks being the most vulnerable." Another aspect of climate change which is sometimes overlooked is water quality. "Water quality is also likely to be impacted with rising air temperature and seasonal shifts in flow availability." *Water and Climate* at 5. This white paper provides the latest look at that future and the challenges that lie ahead.

**For info:** [http://water.oregonstate.edu/sites/default/files/water\\_and\\_climate\\_in\\_the\\_pacific\\_northwest\\_v3\\_0.pdf](http://water.oregonstate.edu/sites/default/files/water_and_climate_in_the_pacific_northwest_v3_0.pdf)



## WATER BRIEFS

## NAVAJO-GALLUP WATER AZ

WATER SUPPLY PROJECT FUNDING  
EXPEDITED PERMITTING & REVIEW

In September, the US Department of the Interior (DOI) announced a \$43 million financial assistance agreement for design and construction of a portion of the Navajo-Gallup Water Supply Project (Project). The agreement will enable the Navajo Nation to complete the lower reaches of the Cutter Lateral — one of two branches of the Project. The Project will provide a long-term, sustainable water supply to: 43 Navajo Chapters; the City of Gallup, New Mexico; and the southwestern portion of the Jicarilla Apache Nation.

Under the terms of the agreement, the Navajo Nation will be responsible for the design, construction, and oversight of Reaches 24.1, 25, and 26 of the Cutter Lateral, which consists of approximately 43.4 miles of water pipeline, a pumping station, and four storage tanks. The Bureau of Reclamation will be responsible for the design and construction of the uppermost reach of the Cutter Lateral.

The Project is the cornerstone of the Navajo Nation Water Rights Settlement in the San Juan River Basin in New Mexico. Authorization was provided by Congress in the Omnibus Public Lands Management Act of 2009, and supplemental funding for the project was obtained in the Claims Settlement Act of 2010. The Project consists of two separate branches, Cutter and San Juan Laterals; approximately 280 miles of pipeline; two water treatment plants; and several pumping plants and storage tanks.

The project is one of 14 high-priority infrastructure projects identified by the Obama Administration to be expedited through the permitting and environmental review process. The entire project is scheduled to be completed by 2024. The current status of the project is publicly available through the Federal Infrastructure Projects Dashboard website — <http://permits.performance.gov/> — designed to enhance efficiency, accountability, and transparency of the federal permitting and review process for all 14 high-priority infrastructure projects.

**For info:** Barry Longwell, Reclamation, 970/ 799-3217

## FISH PASSAGE US

## DAM &amp; OBSTRUCTIONS REMOVAL — USFWS FISH PASSAGE REPORT

The US Fish and Wildlife Service (USFWS) and community partners across the nation worked together to remove or bypass 158 dams, culverts, and other structures in 2011, opening more than 2,180 miles of streams to native fish populations. These efforts, coordinated through the National Fish Passage Program, have also contributed to improved water quality, provided additional recreational and economic opportunities, and even addressed serious threats to human health and safety.

“The National Fish Passage Program serves as a vital catalyst for grass-roots community action that not only benefits native species and habitat, but also contributes to local economies and addresses aging and sometimes dangerous infrastructure,” said USFWS Director Dan Ashe.

Documenting these successful efforts, USFWS released its 2011 Annual Report for the National Fish Passage program this week. The Report provides dozens of stories and examples of projects completed in the past year that have provided tremendous benefits to fish, wildlife, and local communities (*see* [www.fws.gov/fisheries/facilities/nfpp.html](http://www.fws.gov/fisheries/facilities/nfpp.html)).

The National Fish Passage Program, administered by USFWS, is a voluntary initiative active in all 50 states. The non-regulatory program addresses barriers that limit fish movement vital for their survival. Fish passage is gained by removing dams, replacing poorly designed culverts, constructing low-water crossings, and installing fishways. These projects are done in close cooperation with state and federal agencies, non-government organizations, universities, and supporting individuals. Program staff identifies, prioritizes, funds, designs, and reviews these conservation projects, while working closely with a wide variety of programs and partners to provide technical support to local communities.

Since the program’s creation in 1999, USFWS and more than 700 project partners have removed 1,118 barriers to fish passage, reopening 17,683 stream miles to access by more than 90 native species of fish and freshwater mussels and reconnecting nearly 120,000 acres of wetlands to their historic water sources. In turn, these projects have contributed an estimated \$9.7 billion to local economies and supported nearly 220,000 jobs.

From the earliest days of the American colonies, people have sought to harness streams and redirect them to provide valuable services such as irrigation, power production, drinking water, flood control, and transportation. As a result, millions of culverts, dikes, water diversions, dams, and other artificial barriers have been constructed to impound and redirect water flowing through every river system and watershed in the nation. While many of these structures continue to serve a purpose, thousands of them are obsolete, abandoned, or deteriorating.

An estimated 74,000 dams alone dot the American landscape, thousands of which are small dams built decades ago that no longer serve a purpose. These structures impede the passage of native fish and destroy spawning habitat, as well as degrading water quality by preventing stream flow that flushes sediment and pollutants out of river systems. They also reduce fishing and other river-based recreational and economic opportunities for people. In some cases, aging dams threaten downstream communities should they fail, or otherwise endanger human life and safety by creating dangerous drowning conditions.

In the Klamath Basin of Northern California, USFWS worked with the Karuk Tribe, the US Forest Service, and local watershed and salmon restoration councils to restore fish passage on ten miles of the Klamath River. Completed in 2011, the project identified and addressed 48 barriers to fish passage in this stretch of the river. By using tribal youth to do much of the work, it provided summer jobs to dozens of young men and women and introduced them to potential careers in fisheries science.

**For info:** Chris Tollefson, USFWS, [chris\\_tollefson@fws.gov](mailto:chris_tollefson@fws.gov) or 703/ 358-2222  
Report website: *see* [www.fws.gov/fisheries/facilities/nfpp.html](http://www.fws.gov/fisheries/facilities/nfpp.html)

**October 15-17 OH**  
**Urban Water Sustainability Leadership Conference, Cincinnati.** For info: Lorraine Loken, UWS, 202/ 533-1819, lloken@cwaa.us or www.cleanwateramericaalliance.org

**October 16 OR**  
**Swimming the Hydro-Trifecta: Negotiations through the Lens of Water Security, Water Conflict Transformation & Water Diplomacy Seminar, Corvallis.** Burt Hall, OSU, 4-5pm. For info: http://calendar.oregonstate.edu/event/72192/

**October 16 OR**  
**The Changing Glaciers of the American West (Brownbag), Portland.** USGS Oregon Water Science Center, 2130 SW 5th Ave. For info: http://or.water.usgs.gov/brownbag/bb\_sched.html

**October 16-17 LA**  
**Gulf Coast Groundwater Issues Conference, Baton Rouge.** Marriott Hotel. For info: NGWA: www.ngwa.org/Events-Education/conferences/5010/Pages/5010oct12.aspx

**October 16-18 CA**  
**7th Biennial Bay-Delta Science Conference: Ecosystem Reconciliation - Realities Facing the San Francisco Estuary, Sacramento.** Convention Ctr. For info: http://scienceconf.deltacouncil.ca.gov/sites/default/files/documents/BD12ProgramFinal\_100112.pdf

**October 17 OR**  
**Regulatory Takings Seminar, Portland.** World Trade Ctr. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

**October 17 CA**  
**Litigating Property Rights Cases: Eminent Domain, Takings & Due Process Claims (Seminar), Los Angeles.** Marriott LA Downtown. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

**October 17 OR**  
**Bona Fide Prospective Purchasers: Part II (Brown Bag), Portland.** Davis Wright Tremaine, 1300 SW 5th Ave., RSVP. Sponsored by Environmental & Natural Resources Section. For info: Anzie Nelson@portofportland.com

**October 17 AZ**  
**INT-N-EXT Water Use Study (Brownbag), Tucson.** WRRC, 350 N. Campbell Ave. For info: Jane Cripps, WRRC, 520/ 621-2526, jcripps@cals.arizona.edu or http://ag.arizona.edu/azwater/

**October 17-19 CA**  
**Northern California Tour (Field Trip), Sacramento.** Sponsored by Water Education Foundation. For info: www.watereducation.org/toursdetail.asp?id=841&parentID=821

**October 17-20 CA**  
**Dividing the Waters Annual Conference: Making the Connection: Surface & Groundwater, Davis.** UC Davis King Hall School of Law. Note: Judges Only. For info: Susan Conyers, DTW, 775/ 327-8213, conyers@judges.org or www.judges.org/dividingthewaters/news.html

**October 18-19 LA**  
**Urban Water Resources: Stormwater Management, Groundwater Recharge & LID Course, Baton Rouge.** Sponsored by National Ground Water Ass'n. For info: www.ngwa.org/Events-Education/Pages/

**October 19 WA**  
**Ecological & Environmental Mitigation Banking Seminar, Seattle.** Edgewater Hotel. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

**October 19 OR**  
**In Situ Sensors for Measuring River Ecosystem Processes Seminar, Corvallis.** OSU, 3-4pm. Cyberseminar Connection. For info: http://calendar.oregonstate.edu/event/72856/

**October 19 CO**  
**Colorado WaterWise 4th Annual Water Conservation Summit, Denver.** Police Protective Association, 2105 Decatur Street. For info: www.coloradowaterwise.org

**October 19 CA**  
**The Future of California Water: What's in Store & How to Prepare Program, Riverside.** Western MWD's Training Facility. Sponsored by Ass'n of California Water Agencies - Regions 9 & 10. For info: https://acwa.eventready.com/index.cfm?fuseaction=reg.page&event\_id=1437

**October 20-24 FL**  
**Coastal & Estuarine Habitat Restoration 6th National Conference: Restoring Ecosystems, Strengthening Communities, Tampa.** Sponsored by Restore America's Estuaries. For info: http://program.estuaries.org/

**October 23 WEB**  
**Water Quality Portal for Water Quality Data Webinar, WEB.** Sponsored by EPA's Watershed Academy. For info: www.epa.gov/watershedwebcasts

**October 23 ND**  
**Third Annual WRRRI Distinguished Water Seminar, Fargo.** Rose Room, NDSU Memorial Union. Sponsored by North Dakota Water Resources Research Institute. For info: www.ndsu.edu/wrrri/

**October 23 OR**  
**Occurrence & Fate of Endocrine-Disrupting Compounds and other Trace Organic Contaminants in Onsite Wastewater Treatment Systems (Brownbag), Portland.** USGS Oregon Water Science Center, 2130 SW 5th Ave. For info: http://or.water.usgs.gov/brownbag/bb\_sched.html

**October 23-25 ID**  
**2012 Western States Source Water Protection Forum, Sun Valley.** Sponsored by IDEQ. For info: Amy Williams, IDEQ Source Water Program Coordinator, 208/ 373-0115 or amy.williams@ideq.idaho.gov

**October 24 OR**  
**Update on the State of Oregon's Integrated Water Resource Strategy (Lunch), Salem.** OWRD, 725 Summer Street, NE. For info: http://events.constantcontact.com/register/event?llr=fdcb rhjab&oeidk=a07e6fijattc489e0a3

**October 24 AZ**  
**Tucson Conserve to Enhance Workshop for Funding Local Enhancement Projects (Brownbag), Tucson.** WRRC, 350 N. Campbell Ave. For info: Jane Cripps, WRRC, 520/ 621-2526, jcripps@cals.arizona.edu or http://ag.arizona.edu/azwater/

**October 25 CA**  
**Southern California Water Committee 28th Annual Meeting & Dinner, City of Industry.** Pacific Palms Hotel. For info: Kym Belzer, 818/ 760-2121 or kbelzer@rionahuttonassoc.com

**October 25 MT**  
**Maintenance & Safety of Your Dam: Montana Dam Owner Workshop, Malta.** 8:30am-12:30pm. Sponsored by The Montana Watercourse. For info: www.mtwatercourse.org

**October 25-26 CA**  
**California Water Law Conference, San Francisco.** Hotel Nikko. For info: CLE Int'l, 800-873-7130 or www.cle.com

**October 25-26 CA**  
**CalDesal 1st Annual Desalination Conference, Sacramento.** Hyatt Regency. For info: Ronald Davis, CalDesal, 916/ 492-6082, rdavis1228@gmail.com or www.caldesal.org/

**October 25-26 NE**  
**Great Plains Aquifers (Beyond the Ogallala) Conference, Omaha.** Embassy Suites Downtown/Old Market. Sponsored by Ground Water Protection Council. For info: http://www.ngwa.org/Events-Education/conferences/5028/Pages/5028oct12.aspx

**October 26 OR**  
**Energy Efficiency: The Next Generation Conference, Portland.** U of O's White Stag Block. Sponsored by CUB Policy Ctr. & UO School of Law. For info: http://cubpolicycenter.org/conference

**October 26 HI**  
**Climate Change Impacts in Hawaii Seminar, Honolulu.** YMCA, 1040 Richards Street. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

**October 26-28 WA**  
**6th Graduate Climate Conference, Seattle.** UW's Park Forest Conference Ctr. For info: www.atmos.uw.edu/gcc/GCC\_Home.html

**October 27 OR**  
**Celebration of Oregon Rivers (10th Annual), Portland.** Ambridge Event Ctr. Sponsored by WaterWatch of Oregon. For info: Michele, WW, 503/ 295-4039 x2, michele@waterwatch.org or www.waterwatch.org

**October 29-30 CA**  
**CalDesal 1st Annual Desalination Conference, Irvine.** Hyatt Regency. For info: Ronald Davis, CalDesal, 916/ 492-6082, rdavis1228@gmail.com or www.caldesal.org/

**October 30 SD**  
**2012 Eastern South Dakota Water Conference (7th Annual), Brookings.** University Student Union. For info: http://www.sdstate.edu/abe/wri/activities/ESDWC/index.cfm

**October 31 WA**  
**Hydropower in the Northwest Seminar, Seattle.** WA State Convention Ctr. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

**October 31-Nov. 2 TX**  
**2012 Texas Water Law Conference, Austin.** AT&T Center. Sponsored by University of Texas School of Law. For info: www.utclerc.org/conferences/WL12

**November 1 CA**  
**Ecosystems Services & Markets Course, Sacramento.** Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

**November 1-2 CA**  
**NWRA Annual Convention, San Diego.** Hotel del Coronado. For info: National Water Resources Ass'n: www.nwra.org

**November 2 WA**  
**Washington Stormwater & Source Control Conference, Seattle.** For info: Environmental Law Education Center: www.elecenter.com/

**November 4-8 Canada**  
**2012 Water Quality Technology Conference & Exposition, Toronto.** Sheraton Centre Hotel. Sponsored by American Water Works Ass'n. For info: www.awwa.org/wqtc/ep

**November 5-7 South Africa**  
**International Conference on Fresh Water Governance for Sustainable Development, Drakensberg.** Champagne Sports Resort. Organized by Water Research Comm'n & Dept. of Water Affairs-South Africa. For info: www.wrc.org.za/freshwater/Pages/default.aspx

**November 5-7 CA**  
**CASQA 8th Annual Stormwater Conference, San Diego.** Hilton at Mission Bay. Sponsored by California Stormwater Quality Ass'n. For info: http://stormwaterconference.com/

**November 6-7 CA**  
**Environmental Management & Sustainability, Sacramento.** Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

**November 7 MT**  
**Maintenance & Safety of Your Dam: Montana Dam Owner Workshop, Miles City.** 8:30am-12:30pm. Sponsored by The Montana Watercourse. For info: www.mtwatercourse.org



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## CALENDAR

(continued from previous page)

### **November 8-9** **OR**

**21st Annual Oregon Water Law Conference, Portland.** Hotel Monaco. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

### **November 8-9** **CA**

**San Joaquin River Restoration Tour (Field Trip), Friant Dam** - Merced River. Sponsored by Water Education Foundation. For info: [www.watereducation.org/toursdetail.asp?id=845&parentID=821](http://www.watereducation.org/toursdetail.asp?id=845&parentID=821)

### **November 8-9** **CO**

**Upper Colorado River Basin Water Conference, Grand Junction.** Colorado Mesa University. Hosted by Water Center. For info: [www.coloradomesa.edu/WaterCenter](http://www.coloradomesa.edu/WaterCenter)

### **November 8-9** **WA**

**Growth Management & Land Use Seminar, Seattle.** WA State Convention Ctr. For info: Law Seminars Int'l, 800/ 854-8009, email: [registrar@lawseminars.com](mailto:registrar@lawseminars.com) or [www.lawseminars.com](http://www.lawseminars.com)

### **November 9** **TX**

**Securing Water Supplies for the Future: Risks, Challenges & Opportunities Symposium, Fort Worth.** Texas Wesleyan School of Law. [Sponsored by Texas Wesleyan Journal of Real Property Law. For info: <https://sites.google.com/site/twuwaterlaw/>

### **November 12-15** **FL**

**2012 AWRA Water Resources Conference, Jacksonville.** Hyatt Regency Jacksonville Riverfront. For info: American Water Resources Ass'n, [www.awra.org](http://www.awra.org)

### **November 13-14** **WA**

**Washington Future Energy Conference, Seattle.** WA State Convention Ctr. Presented by Northwest Environmental Business Council & Washington Dept. of Commerce. For info: Shauna DeLaMare, 503/ 274-0971 or [shauna@futureenergyconference.com](mailto:shauna@futureenergyconference.com)

### **November 14** **NE**

**Water Law Conference 2012, Lincoln.** Cornhusker Hotel. Sponsored by Nebraska Water Center & College of Law. For info: Lorrie Benson, NWC, 402/ 472-7372, [lbenson2@unl.edu](mailto:lbenson2@unl.edu) or <http://watercenter.unl.edu/WaterLawConf2012/index.asp>

### **November 14** **AZ**

**Biofuel Production & Water in the Southwest (Brownbag), Tucson.** WRRRC, 350 N. Campbell Ave. For info: Jane Cripps, WRRRC, 520/ 621-2526, [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu) or <http://ag.arizona.edu/azwater/>

### **November 14-15** **IL**

**American Water Summit 2012, Chicago.** Intercontinental O'Hare. For info: [www.americanwatersummit.com/](http://www.americanwatersummit.com/)

### **November 14-16** **AZ**

**Water Management Symposium, Phoenix.** DoubleTree Suites. Sponsored by Western States Water Council. For info: [www.westgov.org/wswc/meetings.html](http://www.westgov.org/wswc/meetings.html)

### **November 15-16** **MT**

**Hydropower in Montana Seminar, Missoula.** Holiday Inn Downtown. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

### **November 15-16** **NY**

**Western Water Law Conference, Las Vegas.** The Cosmopolitan. For info: CLE International, 800/ 873-7130 or [www.cle.com/](http://www.cle.com/)

### **November 15-16** **CO**

**Environmental Regulation of Energy Development Conference, Denver.** Grand Hyatt. For info: CLE International, 800/ 873-7130 or [www.cle.com/](http://www.cle.com/)

### **November 20** **AZ**

**2012 Summer Extern Update: County Sustainability Projects that Improve the Lives of Arizonans (Brownbag), Tucson.** WRRRC, 350 N. Campbell Ave. For info: Jane Cripps, WRRRC, 520/ 621-2526, [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu) or <http://ag.arizona.edu/azwater/>

### **November 26-29** **Mexico**

**Disinfection of Water, Wastewater & Biosolids Conference, Mexico City.** Sponsored by Intn'l Water Assoc. For info: <http://eventos.iingen.unam.mx/DisinfConfMex2012/Default.htm>

### **November 29** **AZ**

**Searching for Water Solutions: Experiences from My Sabbatical & Other Travels - Sharon Megdal, Director of WRRRC (Brownbag), Tucson.** WRRRC, 350 N. Campbell Ave. For info: Jane Cripps, WRRRC, 520/ 621-2526, [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu) or <http://ag.arizona.edu/azwater/>

### **November 29-30** **ID**

**IWUA Winter Water Law Seminar, Boise.** DoubleTree Riverside Hotel. Sponsored by Idaho Water Users Ass'n. For info: [www.iwua.org](http://www.iwua.org)

### **November 30** **TX**

**Hydraulic Fracturing Conference, Austin.** Omni Southpark. For info: CLE International, 800/ 873-7130 or [www.cle.com/](http://www.cle.com/)

### **December 1-2** **AZ**

**Western Governors' Ass'n 2012 Winter Meeting, Phoenix.** Montelucia Resort. For info: [www.westgov.org](http://www.westgov.org)