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Water Rights, Water Quality & Water Solutions in the West

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COLUMBIA RIVER BASIN RESTORATION

COLUMBIA RIVER BASIN RESTORATION ACT & COLUMBIA RIVER BASIN TOXICS REDUCTION

by Mary Lou Soscia, Columbia River Coordinator, EPA Region 10 Water Division

Introduction

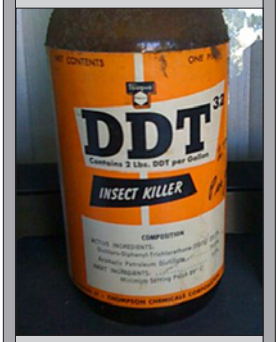
In 2005, the US Environmental Protection Agency (EPA) recognized the importance of reducing toxics in the Columbia River ecosystem and established the Columbia River Toxics Reduction Working Group to share information and coordinate actions to understand and reduce toxics. In 2016, Congress amended the Clean Water Act, creating Section 123, the Columbia River Basin Restoration Act. Section 123 directed EPA to establish the Columbia River Basin Restoration Working Group modeled after the existing Columbia River Toxics Reduction Working Group, and provided a framework for future funding of toxic reduction, monitoring, and outreach actions through a competitive grant program.

This article describes a history of that work effort and the current status of the implementation of CWA Section 123.

Columbia River Basin Restoration

Basin Attributes

Environmental Justice



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Editors' Note: Website addresses for italicized text appear in References, page 12

Background

The Columbia River Basin (Basin) is one of the world's great river basins in watershed size, river volume, and environmental and cultural significance. Covering nearly 260,000 square miles — approximately the size of the state of Texas — the Basin is the nation's sixth largest watershed. The Basin drains portions of Canada's British Columbia province and seven US states (mainly Montana, Idaho, Washington, and Oregon). Within its boundaries are multiple tribal reservations and 45 million acres of tribally co-managed land. The Basin contains great geographic and land-use diversity, including alpine peaks, forested slopes, semi-arid grassland and rangeland, arable agricultural land, and an extensive estuary. From its source in the Canadian Rockies, the mainstem Columbia River flows more than 1,200 miles to the Pacific Ocean. Its average annual flow (averaging 270,000 cubic feet per second) makes it the United States' fourth largest river by discharge. Significant tributaries include the Kootenay, Pend Oreille, Spokane, Okanagan, Yakima, Snake, John Day, Deschutes, Willamette, and Cowlitz Rivers.

Toxic Contaminants: A Priority Focus

The Basin's aquatic ecosystem is critical to support fish and wildlife, with over eight million people who reside in the watershed and depend on its resources for their health and livelihood. There is concern about the health of the Basin's aquatic ecosystem and the potential risk to human health due to the presence of toxics found in fish, wildlife, water, and sediment. Toxic contamination of the environment is a human health risk and a key environmental justice issue for tribal people and other high fish-consuming populations.

Columbia River salmon and steelhead runs were once the largest in the world — as many as 16 million fish would return annually to spawn in the Basin. Columbia River tribes have depended on native fish species, including (but not limited to) salmon, steelhead, sturgeon, and lamprey for thousands of years for spiritual, cultural, and nutritional sustenance. Human activities — including: hydrologic modifications for flood control and power generation; industry; urban development; mining; and agricultural practices — have affected fish spawning and rearing habitat, blocked or impeded fish passage, and contributed toxic contaminants that have impaired water quality. As a result, many of the Basin's salmon and steelhead stocks are threatened or endangered. Many scientists believe that recovery of salmon, steelhead, and other fish populations cannot be achieved without reducing toxics in fish, water, and sediment (*e.g*, Fresh, et al. (2005)).

In 1992, EPA's *National Study of Chemical Residues in Fish* found bioaccumulative toxics in Columbia River Basin fish tissue. Recognizing the historic importance of fish in the diets of tribal people and the potential human health impacts of toxics, the Columbia River Inter-Tribal Fish Commission (CRITFC) and EPA developed the *1994 Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin*. This survey found that tribal consumers were consuming 9 to 12 times more fish than the average US resident. EPA and CRITFC followed up that study with the *Columbia River Fish Contaminant Study 1996-1998*. This study found 92 pollutants in fish from 24 tribal fishing sites, including contaminants with human health impacts such as: **p**oly**c**hlorinated **b**iphenyls (PCBs); dioxin; mercury; **d**ichloro**d**iphenyl**t**richloroethane (DDT); and furans.

The Columbia River Toxics Reduction Working Group was convened by EPA to facilitate information sharing and collaboration between entities and individuals to reduce toxics throughout the Basin. The Working Group led the development of the *2009 Columbia River Basin State of the River Report for Toxics* which addressed four contaminants: DDT, PCBs, mercury, and **p**oly**b**rominated **d**iphenyl **e**thers (PBDEs). This report assessed the risk these contaminants pose to people, fish and wildlife, and highlighted successful efforts to reduce these contaminants.

The 2009 report was followed by the *2010 Columbia River Basin Toxics Reduction Action Plan* (2010 Action Plan).

The Plan identified 61 actions needed in five areas:

- Increasing public understanding to reduce toxics
- Increasing toxics reduction actions
- Conducting monitoring to identify sources and reduce contaminants
- Developing a regional research program
- Developing a shared data management system

In 2014, the Working Group released its *Strategy for Measuring, Documenting, and Reducing Chemicals of Emerging Concern*. The Strategy provided an outline for a research and monitoring strategy and a characterization of the impacts of chemicals of emerging concern on human health, aquatic life, and terrestrial wildlife.

Pesticide Reduction

Another key success was the 2014 Pesticide Stewardship Partnership Workshop in Walla Walla, Washington. Agricultural producers, the US Department of Agriculture's National Resources Conservation Service, industry representatives and state, tribal, and federal leaders assembled to share information on pesticide reduction **b**est **m**anagement **p**ractices (BMPs). In partnership with the Northwest Power and Conservation Council, the Working Group produced the 2018 *Polycyclic Aromatic Hydrocarbons (PAHs) Toxic Contaminant Story Map*. This pilot mapping tool displays PAH monitoring data in water and sediment throughout the Basin, educates the public on aquatic and public health impacts of PAHs, and identifies how PAHs get into the environment (*e.g.*, burning of coal, oil, gas, wood, and other carbon-based materials).

Restoration Program

CWA § 123

Columbia River Basin Restoration Act — Clean Water Act Section 123

On December 9, 2016, Congress passed the Columbia River Basin Restoration Act. The Act is the first legislation to officially designate the national importance of Columbia River Basin restoration. The newly created Section 123 of the Clean Water Act (33 U.S.C. § 1275) authorized EPA to establish a Columbia River Basin Restoration Program. This Program includes a reconstituted Working Group — now the "Columbia River Basin Restoration Working Group" — which includes representation for each state, participating tribal governments, and other entities in the Basin. Section 123 also directed EPA to develop a voluntary, competitive grant program for projects in the Columbia River Basin for "environmental protection and restoration programs throughout the Basin." Amendments in 2018 included an authorization of $30 million for fiscal years 2020 and 2021.

Toxics Focus

The legislation was first introduced in 2010, with passage in the US Senate, with a focus on toxics, referencing the *Columbia River State of the River Report* and the *Columbia River Toxics Reduction Action Plan*. The Lower Columbia Estuary Partnership served as the lead in advocating for this legislation working with Pacific Northwest Waterways Association, Northwest River Partners, Columbia River Inter-Tribal Fish Commission, and Salmon-Safe. The focus of the legislation was on the US portion of the Columbia River Basin including the States of Oregon, Washington, Idaho, and Montana and tribal governments.

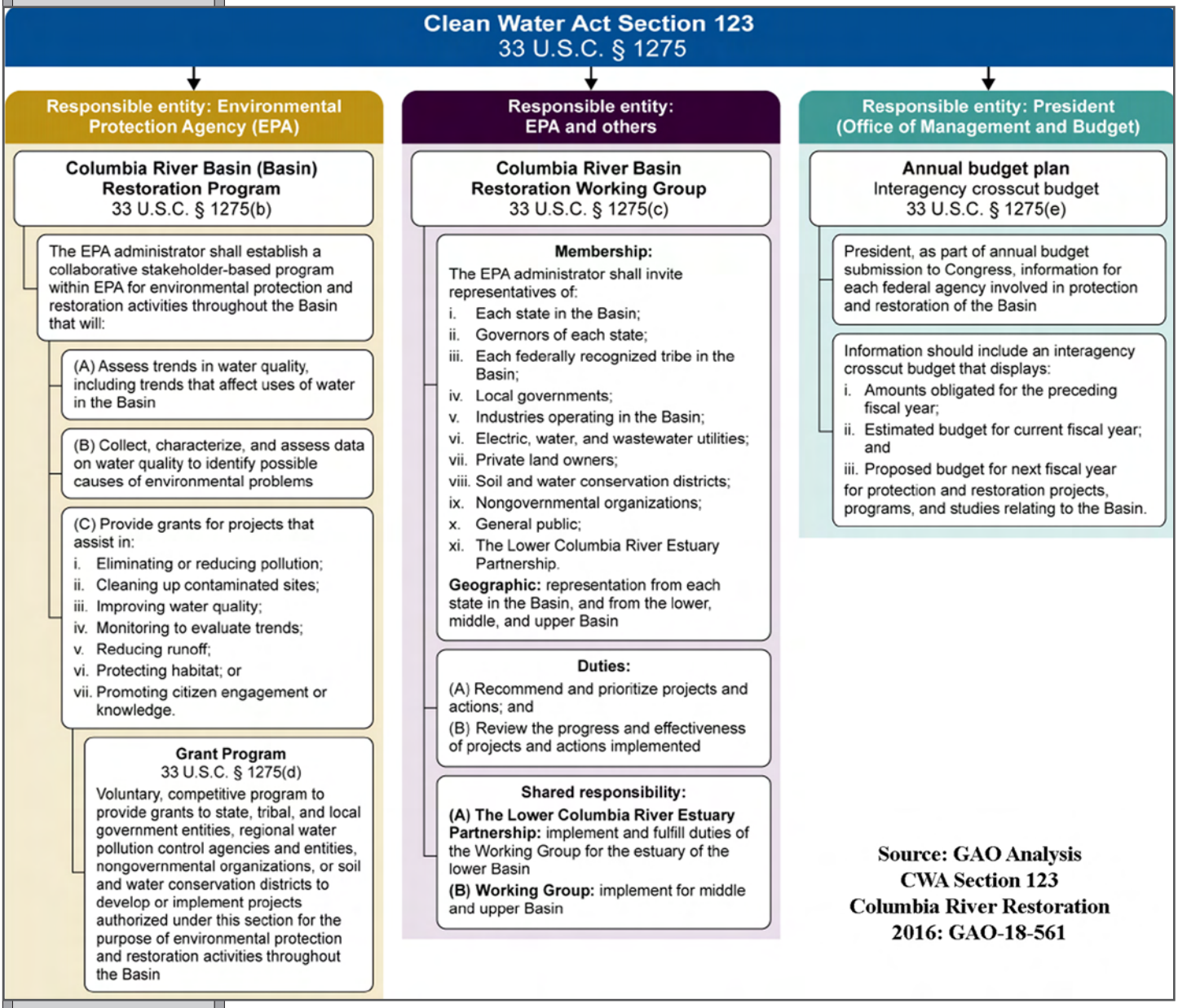
Actions

This legislation was the direct result of years of work and collaboration of the preceding Columbia River Toxics Reduction Working Group and builds off the successful, basin-wide, toxics reduction and assessment work accomplished to date. These actions continue to include: water quality monitoring; agricultural BMPs to reduce toxics; green infrastructure; voluntary certification programs such as Salmon-Safe; green chemistry; public education; pharmaceutical and legacy pesticide collections, and cleanup of contaminated sites.

Columbia River Basin Restoration

GAO Report

In October 2016, the US Government Accountability Office (GAO) began a study on Columbia River ecosystem restoration efforts at the behest of the Chair and Ranking Member of the House Committee on Transportation and Infrastructure. GAO's focus was on the need for water quality work in the Columbia River Basin. EPA work efforts in the States of Oregon, Washington, Idaho, and Montana, as well as work efforts by tribal governments, federal agencies, and other entities, were included in the investigation. In the August 2018 Final GAO Report, *Columbia River Basin: Additional Federal Actions Would Benefit Restoration Efforts*, GAO recommended that EPA develop a program management plan that includes a schedule of actions to be undertaken by EPA to develop and implement the Columbia River Basin Restoration Program and convene the Working Group. In a December 2018 letter to GAO, EPA committed to reconvene the Working Group and develop the program management plan.



Source: GAO Analysis
CWA Section 123
Columbia River Restoration
2016: GAO-18-561

Ongoing Accomplishments

Since the release of the 2010 Action Plan, the following major successes and accomplishments have been identified to reduce and better understand toxics in the Columbia River Basin:

- Safer Chemical Alternatives
- Pollution Prevention Programs
- Oregon's Pesticide Stewardship Partnerships
- Performance-Based Agricultural Certification Programs
- Regulatory Actions
- Site-Specific Clean-up Actions

Columbia River Basin Restoration

Chemical Hazard Tools


Green Chemistry Classroom

Safer Chemical Alternatives

Green chemistry seeks to design chemicals and processes that are safer, healthier, and more sustainable. Certification programs such as EPA's *Safer Choice*, Washington Department of Ecology's *Quick Chemical Assessment Tool*, and similar chemical hazard tools developed by Northwest Green Chemistry and other organizations help consumers and businesses select less-toxic alternatives to traditional products. State agencies in Oregon and Washington have leveraged their buying power by establishing institutional procurement policies that require the purchase of products that meet green chemistry certifications. In Idaho and Washington, green chemistry programs are reducing toxics in classrooms.

Pollution Prevention

Idaho

Washington

Montana

Pesticide Collection


Hazardous Waste Collection

Pollution Prevention Programs

Partners throughout the Basin work with residents and local businesses to identify sources of toxics, reduce toxic runoff or discharges, and prevent the use of toxic materials through voluntary technical assistance programs, such as Idaho's pollution prevention programs, Washington Ecology's *Local Source Control Program*, and Missoula County's *HazWaste Days*.

The Idaho Department of Environmental Quality coordinates collection and diversion events for household hazardous waste, safely disposing of motor oil, mercury, pharmaceuticals, and other materials that would otherwise be dumped into landfills or down storm or sewer drains. Through partnerships with local governments, Washington Ecology's *Local Source Control Program* provides free, on-site assistance to help businesses in Spokane and Clark Counties resolve pollution issues by reviewing their spill prevention practices, providing stormwater BMPs, and locating recycling or disposal resources. In Montana, the Missoula Valley Water Quality District runs similar hazardous waste collection events for household products as a critical pollution prevention measure to protect the region's shallow, sole source drinking water aquifer.

Oregon Voluntary Program


Precision Spraying

Oregon's Pesticide Stewardship Partnerships

Through the Oregon *Pesticide Stewardship Partnership Program*, state agencies partner with landowners and growers, watershed councils, and other natural resource organizations, tribal governments, and soil and water conservation districts to reduce pesticide levels while measuring improvements in water quality. This program works on a voluntary basis with farmers to implement proper storage, handling procedures and application methods for pesticides, and safely dispose of unused agricultural chemicals.

Columbia River Basin Restoration

Stormwater Permits

Performance-Based Agricultural Certification Programs

Voluntary performance-based certification programs, such as Salmon-Safe, have proven effective in improving water quality through agricultural BMPs that promote soil and water conservation and reduce the discharge of toxics such as actively-used and legacy pesticides from agricultural lands.

Regulatory Actions

In 2018, Oregon Department of Environmental Quality updated its *1200-Z General Industrial Stormwater Permit* in accordance with a settlement agreement with Columbia Riverkeeper and Northwest Environmental Defense Center. The revised permits include: special protections for impaired waterbodies; more frequent required reporting; and establishing procedures to investigate if more stringent numeric permit limits for certain toxic stormwater pollutants are feasible.

Washington TMDLs

Through the work of the *Spokane River Toxics Reduction Task Force*, six additional watersheds have Total Maximum Daily Loads (TMDLs) for toxics: Mission Creek (a tributary to the Wenatchee River), Yakima, Okanagan, Walla Walla, and Palouse Rivers, and Lake Chelan.

Cleanup & Remediation

Site-Specific Clean-up Actions

Washington Ecology's *Toxics Cleanup Program* remediates soils at contaminated sites to prevent the release of toxics from leaking underground tanks and other accidental spills. Additional investigation and site characterization activities required by Ecology of potentially responsible parties at two sites adjacent to the mainstem Columbia River in Klickitat County — the Goldendale Aluminum Plant and the Burlington Northern Santa Fe site near Wishram, Washington — were viewed as successes by interested parties.

Sediment Removal

In addition, progress was made at two sites in Montana under EPA's *Superfund Program's National Priorities List* for cleanup and remediation actions. Following the removal of the Milltown Dam at the confluence of the Blackfoot and Clark Fork Rivers in 2008, more than 2 million cubic yards of toxic reservoir sediments contaminated by historic mining activities were removed. The Smurfit-Stone Mill near Missoula was proposed for listing; and the Columbia Falls Aluminum Company site near Glacier National Park was added to the National Priorities List. Both these sites have undergone initial site characterization and risk assessment.

Grant Program

Recent Accomplishments

In February 2019, EPA received a $1 million **f**iscal **y**ear (FY19) appropriation under CWA Section 123, to begin the planning process to implement the Act and develop a voluntary competitive grant program. A second appropriation of $1.2 million was provided for FY20. EPA established a formal voluntary Working Group as directed by the legislation and invited participation of states, tribal governments, local governments, as well as others specified in the legislation. Also in 2019, as directed by the legislation, EPA welcomed the State of Montana, the Confederated Salish and Kootenai Tribes and other interested Montana groups into a Working Group collaboration.

Technical Assistance

In 2020, EPA and partners developed technical assistance products to assist the Working Group including the *Columbia River Basin Toxic Contaminants Reference List* featuring: links to federal, tribal, and state government publications and peer-reviewed science; and a report on the *Toxics-Impaired Waterbodies on 303d Lists in the Columbia River Basin*. EPA and the US Geological Survey co-led a subgroup of approximately 24 individuals to update the *Contaminants of Concern Framework* in the Basin, updating the Prioritization of Toxics in the Columbia River developed in 2007. All of these documents can be found on EPA's Columbia River Basin website. EPA held the first "all remote" Working Group meeting in May 2020, which enabled participation from many entities throughout the Basin. And finally, EPA initiated a Story Map for the Working Group to present information on the Columbia River Basin and the Columbia River Basin Restoration Program focusing on toxics reduction and assessment. EPA anticipates finalizing the Columbia River Basin Story Map in the Spring of 2021.

Grant Criteria

Columbia River Basin Restoration Funding Assistance Program

In October 2019, EPA Region 8 and Region 10 launched the first request for applications from its competitive grant program. EPA identified projects which would: increase agricultural best practices, green infrastructure, and monitoring and assessment; promote pollution prevention; and increase citizen education and involvement as priority focus areas for grant program funding. In September 2020, EPA announced the award of $2 million in 14 grants to tribal, state, and local governments, non-profits and community groups throughout the Columbia River Basin. EPA's goal for this inaugural grant funding is that these projects will serve as models for toxics reduction and assessment throughout the Basin so that others may replicate these successes for years to come.

Columbia River Basin Restoration

CWA § 123 Grants

Agricultural Pesticides

EPA identified the following priorities for grant funding:

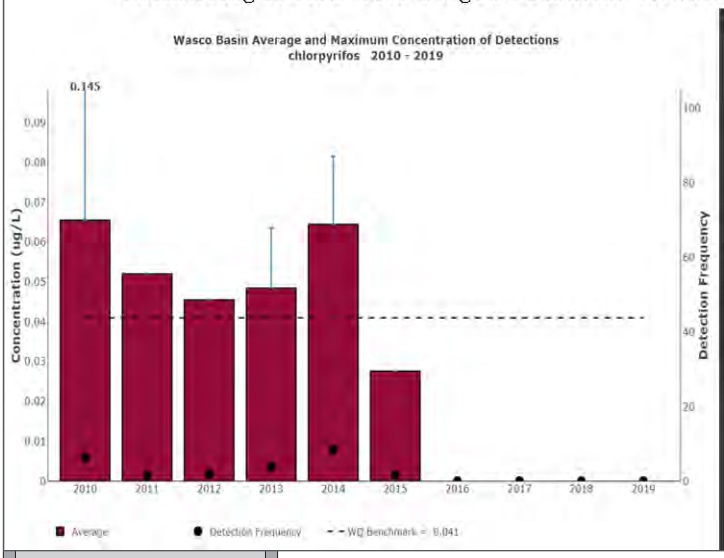
- Increased monitoring and access to data from monitoring
- Reducing stormwater and agricultural runoff
- Promoting citizen engagement or education
- Cleaning up contaminated sites

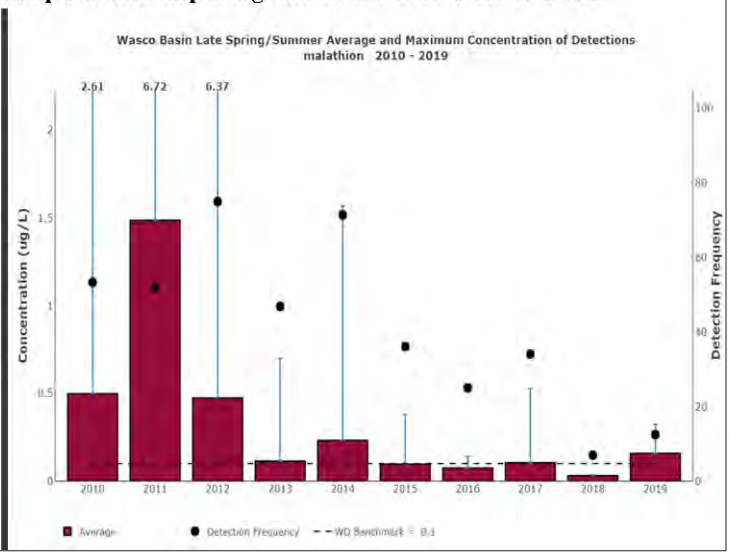
Inaugural 2020 CWA Section 123 grants:

Project 1: Monitoring, reduction, and collection of agricultural pesticides in the Columbia River Basin (Washington / EPA Grant amount: $200,000)

The Washington State Department of Agriculture will expand Oregon's successful *Pesticide Stewardship Partnership Program* into two Washington watersheds, the Palouse and the Yakima River watersheds. These watersheds were chosen because each is a unique agricultural production region in Washington and are located upstream from critical habitat for Endangered Species Act-listed species. This project will focus on surface water monitoring for agricultural pesticides, waste pesticide collection, and outreach to agricultural producers. Sampling will look for more than 150 legacy and currently used pesticides, including DDT and its breakdown products. Key partners include: the Palouse Conservation District; EPA Region 10's Manchester Environmental Laboratory; and *Clean Harbors*.

Monitoring Results from Oregon's Pesticide Stewardship Partnership Program in the Wasco River Basin





Chemical Alternatives

Project 2: Ecological Business (EcoBiz) and safer alternatives training for chemicals of high concern in the lower Columbia River Basin (Oregon / EPA Grant amount: $88,304)

This project will expand the Pacific Northwest Pollution Prevention Resource Center's support to two programs: 1) the *EcoBiz Program*, which certifies environmentally friendly landscaping, car wash, and automotive businesses in Oregon and provides pollution prevention assistance; and 2) the *Safer Chemicals Alternatives Training Program*, which is overseen by the Oregon Department of Environmental Quality. Project activities will occur within the Portland Metro area, focused on the jurisdictions of key local partners: Clean Water Services; City of Portland; City of Gresham; and Clackamas County Environmental Services. The effort will focus on multiple pollutants produced by the automotive sector (*e.g.*, oil products, solvents, and metals) and the landscaping sector (*e.g.*, pesticides and herbicides).

Agricultural Practices

Project 3: Accelerating water quality protection practices on agricultural lands in the interior Columbia Basin (Idaho, Oregon, Washington / EPA Grant amount: $190,000)

This long-term project conducted by Salmon-Safe is aimed at reducing toxics in the Columbia River Basin by inspiring the transition of 30,000 acres of large-scale and diversified farms across the interior Basin to certification practices that protect water quality and wildlife habitat. Salmon-Safe will focus its efforts to engage with farmers in Oregon, north central and eastern Washington, and eastern Idaho to: reduce pesticide use; prevent erosion; improve irrigation efficiency; protect habitat; and enhance biodiversity. The grant will support outreach to 500 or more agricultural growers, transitioning at least 60 growers to adopt Salmon-Safe certification practices, and aligning Salmon-Safe to *GlobalGAP* — a global certification program that provides comprehensive whole farm assessments.

Columbia River Basin Restoration

Fish Tissue

Project 4: Columbia River mainstem fish tissue and water quality monitoring framework (Oregon, Washington / EPA Grant amount: $188,378)

The Confederated Tribes and Bands of the Yakama Nation will partner with the US Geological Survey, Columbia River Inter-Tribal Fish Commission, and Washington State Department of Ecology (Ecology) to implement this project to develop a fish tissue and water quality monitoring framework aimed at tracking the status and trends of toxics (including mercury, DDT, PCBs, PBDEs, and PAHs) in the Columbia River. This project will track toxics found in fish and invertebrates; water; and sediments along the approximately 600-mile length of the mainstem Columbia River from the Canadian border to the Bonneville Dam.

Pesticide Outreach

Project 5: Pesticide reduction outreach campaign (Oregon, Washington / EPA Grant amount: $174,045)

This project is a multi-year behavior-change campaign intended to reduce the use of residential herbicides and insecticides and will be led by *Clean Rivers Coalition*, a voluntary collaborative group of over 60 local governments, state and federal agencies, and water-related non-profits, with Multnomah County (OR) serving as the fiscal agent. The project will promote citizen engagement and knowledge through new video and social media content, digital advertising buys, and targeted outreach to Latinx communities in the lower and middle Columbia River region — including the Willamette, Hood, and Deschutes River watersheds and areas in southwest Washington.

Source Control

Project 6: Washington State Department of Ecology local source control City of Vancouver FY21-22 (Washington / EPA Grant amount: $105,000)

Ecology will lead a *Pollution Prevention Assistance to Businesses Project* in the Vancouver, Washington metro area. With support from Ecology, the City of Vancouver will: provide free onsite technical assistance to businesses to help them reduce hazardous waste; manage, store, and dispose of hazardous waste; assist businesses with switching to safer alternatives; and prevent pesticides and other contaminants from entering stormwater and wastewater streams. With this funding, Ecology will bring the City of Vancouver into its statewide Pollution Prevention Assistance Partnership, which includes other key partners preventing pollution to the Columbia River watershed such as: Clark County Public Works; Clark County Health District; and Spokane County Regional Health District.

Baseline & Monitoring

Project 7: Clearwater River watershed baseline monitoring and toxics assessment (Idaho/ EPA Grant amount: $200,000)

The Nez Perce Tribe Water Resources Division (WRD), located in north-central Idaho, will partner with the Idaho State Department of Agriculture, the University of Idaho, and the US Fish and Wildlife Service to implement toxin, metal, and nutrient monitoring in the Clearwater River watershed. The project will sample water and soil as well as fish, mussel, and lamprey ammocoete tissues for: DDT; mercury; methyl mercury; PCBs; PBDEs; other metals; and nutrients. Additionally, WRD will conduct a small study in collaboration with the University of Idaho to look for the presence of microplastics in sediment and fish tissue samples to establish a baseline for whether microplastics are present in the Clearwater River watershed.

Metals Discharge

Project 8: Grattix boxes to reduce toxics or the GREAT (Get Real Environmental Attenuation of Toxics) Grattix Box Project (Oregon, Washington / EPA Grant amount: $67,597)

The Lower Columbia Estuary Partnership (LCEP) aims to improve lower Columbia River water quality by reducing zinc and copper discharges using *Grattix boxes — i.e.*, inexpensive, low-tech raingardens that reduce contaminants in stormwater runoff. A three-year pilot study found that Grattix boxes reduced the concentration of zinc in stormwater runoff by 90–95% and copper by 85%. LCEP will partner with the Port of Vancouver, Washington and Oregon State University to build and deliver the Grattix boxes to industrial areas where there are large extents of galvanized metal roofs in Longview, Washington and in the Saint Helens and Rainier areas in Oregon.

Mercury Engagement

Project 9: Using crowd-sourced crayfish in education, engagement, and bio-monitoring relative to mercury pollution in the Spokane and Boise River Basins (Idaho, Washington / EPA Grant amount: $198,957)

The University of Idaho's Water Resources Research Institute will facilitate community collaboration by encouraging citizens to become involved in a program to monitor mercury concentrations in the tissues of crayfish captured by community members in two watersheds: the Spokane River Basin (ID, WA); and Boise River Basin (ID). Community members will participate in monitoring and engagement campaigns with the anticipated impact of fostering an enhanced understanding of the importance of mercury pollution to public health. Key partners include: Spokane Riverkeeper; IdaH2O; The River Mile Network's Columbia River Watershed Crayfish Study; the Boise River Enhancement Network; the Northwest Knowledge Network; the Analytic Sciences Laboratory at the University of Idaho; and the College of Natural Resources.

Columbia River Basin Restoration

Fish Consumption

Project 10: Fish consumption and advisory awareness among food pantry patrons receiving products of lake trout suppression on Flathead Lake (Montana / EPA Grant amount: $128,992)

This project, led by the University of Montana, will initiate a monitoring scheme on Flathead Lake to estimate a baseline condition of methylmercury that differentiates between atmospheric inputs and changes due to lake trout suppression. The Confederated Salish and Kootenai Tribes have made a concerted effort to suppress the invasive lake trout population on Flathead Lake (donating caught trout to local food pantries). The Tribe's efforts to reduce the population of lake trout can alter methylmercury levels in the fish, which may impact food webs. In addition, the project will assess awareness of fish consumption advisories among food pantries receiving lake trout.

Emerging Contaminants Concerns

Project 11: Evaluating and prioritizing contaminants of emerging concern in the Lower Columbia River (Oregon, Washington / EPA Grant amount: $76,601)

Researchers at the University of Washington Tacoma at the Center for Urban Waters will direct this project to monitor previously unmonitored contaminants, such as endocrine disruptors, in the Columbia River to determine whether they harm important species. Monitoring will take place from the Portland metro area to Wauna, OR, and also at locations in the Willamette River. Key partners include the Working Group and the *Puget Sound Ecosystem Monitoring Program*.

Stormwater Retrofits

Project 12: Upper Willamette urban waters partnership development and program expansion (Oregon / EPA Grant amount: $199,999)

Cascade Pacific Resource, Conservation & Development will work with: four watershed councils; the Cities of Eugene and Springfield; Lane County; the University of Oregon; two publicly owned water and electric utilities; and local businesses to install voluntary green stormwater infrastructure retrofits and develop a monitoring framework to identify trends and monitor efficacy of the stormwater retention projects. The project will address multiple contaminants found in urban stormwater — including heavy metals, PAHs, and multiple pesticides — as well as work to reduce peak stormwater runoff volumes within the Upper Willamette Metro Area including the Cities of Eugene, Springfield, and Glenwood.

Stormwater Influence

Project 13: City of Vancouver, Columbia Slope water quality monitoring (Washington / EPA Grant amount: $144,039)

The City of Vancouver Public Works Department will lead a study to conduct water quality sampling at six locations within the Columbia Slope sub-watershed. The sampling will expand the City's understanding of how stormwater influences water quality and inform decisions about the feasibility of future stormwater infrastructure retrofits. Water samples will be tested for: temperature; pH; dissolved oxygen; metals; and nutrients — as well as pesticides and hydrocarbons in limited cases. This project will expand the City's monitoring program to a sub-watershed that has not been studied before, and the project results will help drive decisions about how and where to make water quality improvements.

Education & Outreach

Project 14: Columbia Gorge pollution prevention education and outreach project (Oregon, Washington / EPA Grant amount: $91,991)

Managed by Columbia Riverkeeper, this project will reduce toxic pollution in the Columbia Gorge by educating and inspiring students and community members to prevent pollution discharges. Through this project, students will learn how pollution prevention protects the Columbia River, including how riparian zones protect water quality and create habitat, as well as specific actions individuals can take to prevent pollution. The project is anticipated to provide pollution prevention education to more than 20,000 students and community members through events and outreach in Hood River, Wasco, and Klickitat Counties. Online-based pollution prevention educational materials will reach communities throughout the Columbia River Basin. Key partners include Radio Tierra and the Hood River Soil & Water Conservation District.

Ongoing Planning / Future Needs

Needs

As the CWA Section 123 Columbia River Basin Restoration Program is implemented, the following significant needs to address toxics were identified. These needs reflect the diversity of the Basin's geographic, political, and land use and the multiple strategies required to address the sources of toxic contaminants found throughout the Basin.

Identified needs include:

- Systematic, Coordinated Monitoring
- Agricultural Best Management Practices (BMPs)
- Green Infrastructure
- Pollution Prevention Programs
- Public Education and Outreach
- Leadership and Resources

EPA Water Quality Monitoring

Systematic, Coordinated Monitoring

Monitoring of water, sediment, and biota is critical to identify sources of toxic contamination, detect trends through time and space, and evaluate the effectiveness of management actions on a short- and long-term basis. There is a need to work toward a continuous, system-wide program for priority toxic contaminants and to monitor for contaminants of emerging concern (e.g. nanoparticles, glyphosate, pharmaceuticals, and **p**er- and **p**oly**f**luoroalkyl **a**cids (PFAS), among others). In portions of the Upper Basin affected by historic and active mining operations, there is a need for monitoring of heavy metals and other toxics for source identification and prioritization of site-specific cleanup activities.

Irrigation Return Flows

Agricultural BMPs

Irrigated and non-irrigated agriculture can degrade water quality by contributing soil contaminated with pesticides and toxic organic compounds to nearby waters in irrigation return flows and runoff from fields. Agricultural BMPs can be used to improve water quality, often with the added benefits of conserving water and soil and improving soil fertility. Successful programs, such as Oregon's *Pesticide Stewardship Partnership Program* and performance-based farm certifications, should be increased throughout the Basin to include new partner organizations, crop types, and agricultural practices.

DDT Advisory

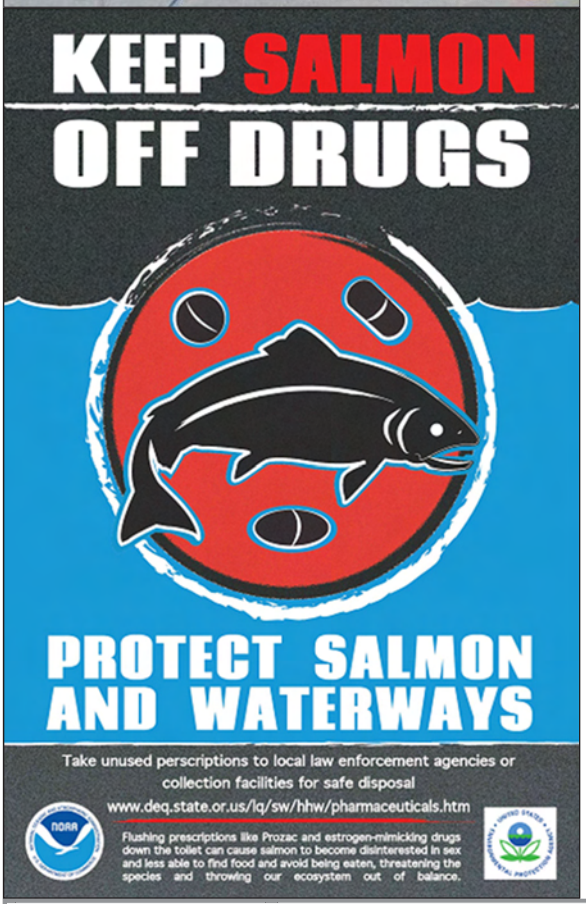
Irrigation Practices

Yakima Basin Agricultural BMP Success Story

The implementation of best management practices in Washington's Yakima River Basin to control soil erosion and reduce pesticide runoff was a major success. The work was the result of a collaborative partnership between: Washington Department of Ecology; Yakima Valley growers; water purveyors; local conservation districts; and the Confederated Tribes and Bands of the Yakama Nation. The goal of the project was to lift the fish advisory for DDT on the Yakima River within 20 years.

To prevent the discharge of contaminant-laden sediment in irrigation return flows — a major source of DDT — local growers upgraded to drip irrigation on 8,000 acres of hops and installed vegetated buffer strips to keep soil on the fields. Following implementation of the BMPs, suspended sediment loading to the Lower Yakima River decreased 67 to 80 percent during the irrigation season and total DDT concentrations in the fish were reduced 30 to 85 percent. Fish advisories for DDT on the Yakima River were lifted five years after the project started — 15 years earlier than the initial goal.


Sulphur Creek before and after Best Management Practices



Green Infrastructure

In urban landscapes, the installation of green infrastructure has proven to be effective in reducing the discharge of contaminated runoff from impervious surfaces such as roads and roofs. Local governments and industries should expand the use of bioswales, constructed wetlands, planter boxes, downspout disconnection and other methods to infiltrate toxic-containing runoff before it reaches local waterways.

Pollution Prevention Programs

Preventing pollution is essential to reducing actively-used toxics. Local source control and pollution prevention programs should be expanded to identify and address toxics before they reach waterways. Examples of successful programs include: pesticide collection events; pharmaceutical take-back programs; and no-cost technical assistance provided on a voluntary basis for residents and small-medium businesses.

Public Outreach and Education

There is a need to raise awareness about toxics contamination in the Basin, both to encourage behavior change and to educate people about the impacts of toxics on their health. Due to higher exposure rates to toxics and the associated increased health risks, there is a need for increased outreach to high fish-consuming populations, including many tribal members, about the presence of toxics in the river and fish tissue. Additionally, public workshops to engage farmers about the contribution of toxics from agricultural fields and how to implement BMPs could be expanded in the Basin.

Conclusion

The Columbia River Basin Restoration Program is proving to be a great opportunity to promote community and citizen engagement and leadership in reducing toxics in fish, wildlife, and people.

Any interested party is encouraged join us as we make the Columbia River Basin a healthier ecosystem for all.

For Additional Information:

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Columbia River Basin Restoration Working Group website:
www.epa.gov/columbiariver/columbia-river-basin-restoration-working-group
EPA's Columbia River Basin website: www.epa.gov/columbiariver

Mary Lou Soscia is the Columbia River Coordinator for EPA Region 10. Mary Lou provides senior EPA representation on Columbia River Basin work efforts. Mary Lou represents EPA on Columbia River forums including the Columbia River Federal Caucus. Mary Lou is currently leading the implementation of the Columbia River Basin Restoration Program, CWA Section 123, and led the Columbia River Basin Toxics Reduction Working Group (which led to the 2016 CWA amendments). Mary Lou provided leadership for EPA on the Columbia River Temperature TMDL. She has led many important work efforts for EPA including EPA's participation in the Columbia River Treaty and Tribal Baseline Water Quality Standards. Mary Lou has over forty years of experience with state, federal, and tribal government in watershed and river management issues. Ms. Soscia has a Bachelors in Geography from Virginia Tech and a Masters in Geography from University of Maryland.

Columbia River Basin Restoration

COLUMBIA RIVER BASIN RESTORATION

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Colorado Basin Plans

Drought Contingency Plan

Over-Allocation

Reservoir Storage

COLORADO BASIN DROUGHT PLANNING

UPDATE ON DROUGHT CONTINGENCY PLANNING IN THE COLORADO RIVER BASIN

by Brett Bovee, WestWater Research LLC (Fort Collins, CO)

Introduction

In early 2019, the seven states of the Colorado River Basin, including various water users and stakeholders in those states, finalized the Drought Contingency Plan to define the various actions that would be taken by state governments and water users in response to continued water supply-demand imbalances in the Basin. [*See*: Snyder & Kowalski, *TWR* #179; Editors' Article, *TWR* #182]

Congress signed the Colorado River Drought Contingency Plan Authorization Act in April 2019 and it is now added to a long list of laws, policies, and agreements known as the "Law of the River" that govern how the Colorado River Basin is managed.

This article provides a brief update on implementation of the Drought Contingency Plan since its enactment in April 2019.

Background

IMPETUS FOR NEW PLANS & ACTIONS

It is well known in the Colorado River Basin (Basin) water community that there is insufficient water supply in the Basin to meet the full suite of water demands, regardless of whether those demands are quantified as legal entitlements or actual water uses. The Basin has an annual average natural (undepleted) flow volume estimated to be approximately 14.5 to 14.7 **m**illion **a**cre-**f**eet (MAF) (USBR, *Natural Flow at Lees Ferry*, 1906-2020). Legal entitlements to this supply total 16.5 MAF (1.8 to 2.0 MAF annual deficit). Present-day consumptive water uses total approximately 13.7 MAF (USBR, *Upper Basin Consumptive Use Reports, Lower Basin Water Use Accounting Reports*). This 13.7 MAF annual consumption compares to a natural flow supply of 12.7 MAF over the same time period as a 1.0 MAF annual deficit. The supply-demand imbalance in the Basin has been mitigated over the past decade by the significant reservoir storage held in Lake Mead and Lake Powell, as well as other smaller reservoirs in the system. Reservoir storage continues to decline however, resulting in less mitigation for future years of supply deficit. Collectively, the water users and managers in the Basin saw a need to do more to reduce the supply-demand imbalance and to provide more certainty on how federal and state water managers would respond to declining reservoir levels. The Drought Contingency Plan was created in response to this need.

Although titled as a Drought Contingency Plan, there is fairly widespread acknowledgement that the Basin is facing a general aridification pattern of sustained lower streamflow as opposed to a short-term drought cycle (Colorado River Research Group (2019), *When is Drought Not a Drought?*). In other words, the problems are not likely to go away.

Elements of the Drought Contingency Plan

The Drought Contingency Plan (DCP) is really two separate efforts divided into the Lower Basin and Upper Basin. The Upper Basin is defined as the watershed area above Lees Ferry (downstream of Glen Canyon Dam forming Lake Powell) and consists of Colorado, Wyoming, Utah, and New Mexico, as well as a small portion of Arizona. The Lower Basin is defined as the watershed area below Lees Ferry and consists of Arizona, Nevada, and California.

The *Law of the River*

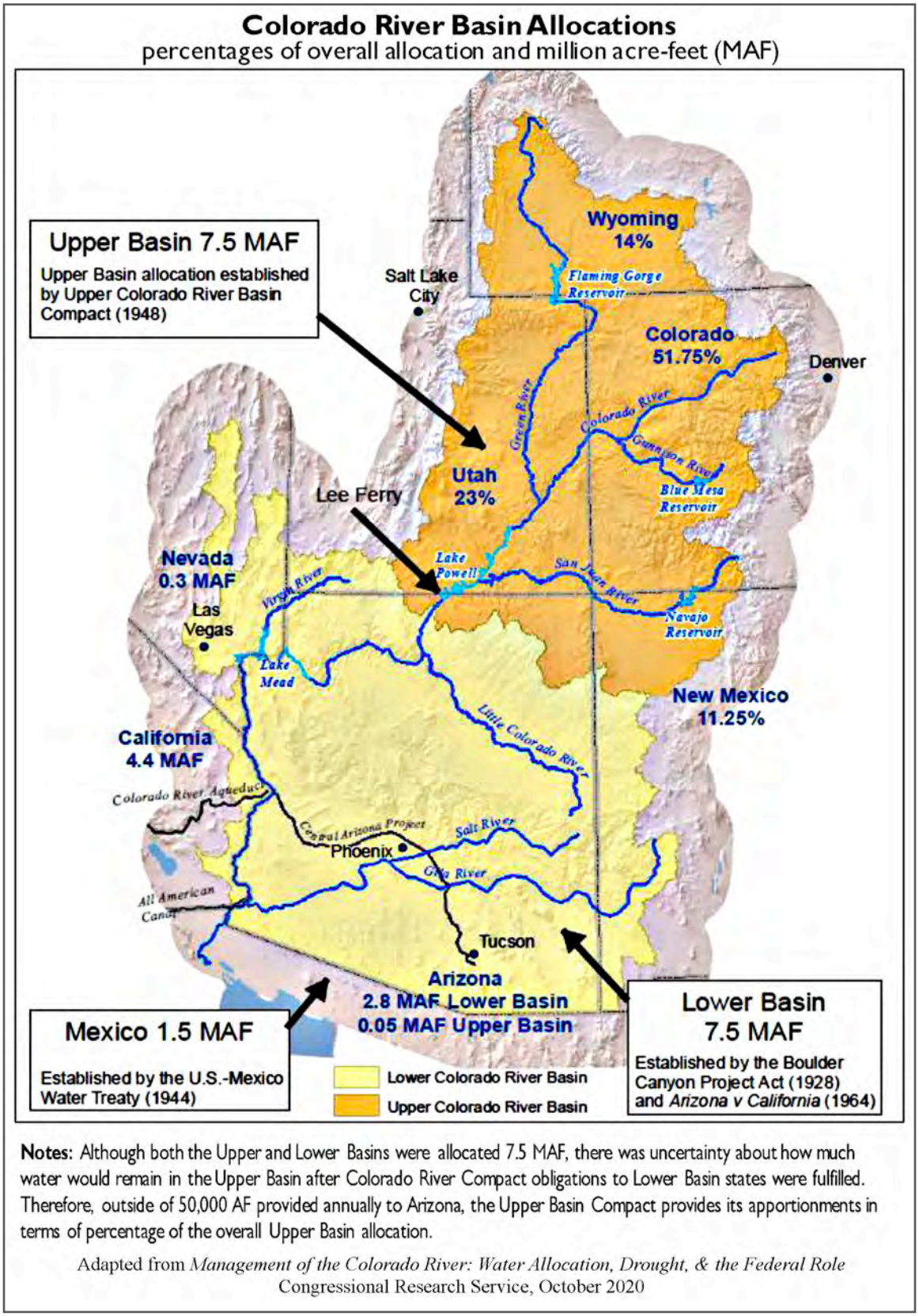
The *Law of the River* is the commonly used shorthand for the multiple laws, court decisions, and other documents governing Colorado River operations. The foundational document of the Law of the River is the Colorado River Compact of 1922. Pursuant to the compact, the basin states established a framework to apportion the water supplies between the Upper and Lower Basins of the Colorado River, with the dividing line between the two basins at Lees Ferry, AZ (near the Utah border). The Upper and Lower Basins each were allocated 7.5 **m**illion **a**cre **f**eet (MAF) annually under the compact; an additional 1.5 MAF in annual flows was made available to Mexico under a 1944 treaty. Future agreements and court decisions addressed other issues (including intrastate allocations of flows), and subsequent federal legislation provided authority and funding for federal facilities that allowed users to develop their allocations. A 1963 Supreme Court ruling also confirmed that Congress designated the Secretary of the Interior as the *water master* for the Lower Basin, a role in which the federal government manages the delivery of all water below Hoover Dam.

Excerpt from *Management of the Colorado River: Water Allocation, Drought, & the Federal Role*
Congressional Research Service, October 2020

Colorado Basin Plans

Basin Challenges

The challenges faced by each basin area are unique and therefore the purpose of the DCP is unique for each. In the Lower Basin, the challenge remains the continued decline in Lake Mead reservoir levels due to the sustained water supply-demand imbalance known as the "structural deficit." In the Upper Basin, the challenge is the unprecedented threat of an enforcement action to ensure the legal obligation to deliver water down to the Lower Basin states. The DCP was intended to mitigate and reduce uncertainty associated with these challenges.



Notes: Although both the Upper and Lower Basins were allocated 7.5 MAF, there was uncertainty about how much water would remain in the Upper Basin after Colorado River Compact obligations to Lower Basin states were fulfilled. Therefore, outside of 50,000 AF provided annually to Arizona, the Upper Basin Compact provides its apportionments in terms of percentage of the overall Upper Basin allocation.

Adapted from *Management of the Colorado River: Water Allocation, Drought, & the Federal Role* Congressional Research Service, October 2020

Colorado Basin Plans

DCP

Documents forming the DCP include the following:

- Colorado River Drought Contingency Plan Authorization Act
- Agreement Concerning Colorado River Drought Contingency Management and Operations
  - Attachment 1: Agreement for Drought Response Operations at the Initial Units of the Colorado River Storage Project Act
  - Attachment A2: Agreement Regarding Storage at Colorado River Storage Project Act Reservoirs under an Upper Basin Demand Management Program
  - Attachment B: Lower Basin Drought Contingency Plan Agreement

Available for download at: www.usbr.gov/dcp/finaldocs.html

New Tools

The following sections expand upon some of the new tools established by the 2019 DCP. This article does not provide a comprehensive summary of the DCP agreements and all policy and operational changes reflected in the documents. Instead, certain key provisions are discussed.

Upper Basin DCP - Obligation

Upper Basin Obligation

Under the terms of the 1922 Colorado River Compact, the Upper Basin states have an obligation to provide a large annual volume of streamflow to the Lower Basin states. There are multiple aspects of this obligation to consider.

Major aspects of this obligation include:

1922 Compact Provision: the obligation under the 1922 Compact is 75 MAF over a 10-year period calculated as a running total.

1944 Treaty Provision: the obligation has been modified to include half of the delivery obligation to Mexico under a 1944 Treaty.

2007 Interim Guidelines: the annual obligations to release water from Lake Powell to the Lower Basin are currently defined under the US Bureau of Reclamation's (Reclamation's) *2007 Interim Guidelines* and vary from 7.0 to 9.5 MAF plus additional releases for balancing storage between Lake Mead and Lake Powell.

This delivery obligation is fixed, regardless of whether the Basin experiences low or high annual streamflow conditions. Accordingly, the Upper Basin states bear the risk and responsibility to manage hydrologic conditions to ensure that the legal obligation is met.

Lake Powell Pool

Lake Powell was constructed in the 1960s in large part to provide an insurance pool for the Upper Basin states to reduce their annual risk of meeting their Lower Basin obligation. Reservoir storage levels continue to decline in Lake Powell due to a combination of factors. Upper Basin states are concerned that they might have to face their obligation to the Lower Basin without the full benefit of Lake Powell concurrent with greater exposure to the volatility of Colorado River Basin hydrology. To help address this concern, the Upper Basin states created agreements under the Upper Basin DCP.

The Upper Basin DCP proposals include:

Reservoir Operations

Revised Reservoir Operations: *Agreement for Drought Response Operations at the Initial Units of the Colorado River Storage Project Act.* This agreement is a plan for revised reservoir operations to allow the higher elevation reservoirs in the Upper Basin to release storage water down to Lake Powell in order to increase the storage elevation in Lake Powell. The storage elevation in Lake Powell is an important factor because if it drops below a critical elevation of 3,490 feet (minimum power pool), hydropower generation (and associated revenue) is not possible and the release capacity downstream to the Lower Basin is significantly reduced. This action (if implemented) involves simply moving the location of reservoir storage water, but it allows the Upper Basin states to push stored water down to Lake Powell as a one-time effort to avoid critical reservoir elevations in Lake Powell, which could have unfortunate consequences. The agreement does not define how reservoir operations will be modified. Instead, the agreement states that negotiations among Upper Basin states and the Department of Interior will commence once Lake Powell is projected to drop to a target elevation of 3,525 feet over the subsequent 24-month period.

Lake Powell Elevations

Conservation Pool

Insurance Storage / Demand Management: *Agreement Regarding Storage at Colorado River Storage Project Act Reservoirs under an Upper Basin Demand Management Program*. This agreement is intended to temporarily reduce water demands in the Upper Basin states in order to build a dedicated insurance (conservation) pool in Lake Powell to help meet the obligations to the Lower Basin. The agreement creates a 0.5 MAF dedicated storage pool in Lake Powell to hold water created under a demand management program. The conservation pool is managed by the Upper Basin states and is protected from reservoir rebalancing requirements defined under the *2007 Interim Guidelines*. Only water that is created by reducing consumptive water use through a demand management activity is allowed to be stored in the conservation pool. A demand management program for the Upper Basin is required to first undergo a feasibility determination. If and when it has been deemed feasible, the process for creating a demand management program includes the following steps: 1) a finding by the Upper Colorado River Commission (UCRC) that a demand management program is necessary; 2) agreements between the UCRC and the Department of Interior, including consultation with the Lower Basin states; 3) approval of a demand management program by the UCRC; and 4) approval of a demand management program by each Upper Basin state.

Demand Management Program

Colorado Basin Plans

Demand Imbalance

Lake Mead Storage

"Intentionally Created Surplus" (ICS)

Water Use Cutbacks

Water Use Allocations

Lower Basin DCP: Supply-Demand Imbalance

The Lower Basin states have experienced decades of unsustainable water use. The DCP is the latest round of efforts to better manage and provide greater certainty for this critical water supply in the American Southwest. Past efforts to address the supply-demand imbalance in the Lower Basin include the 2003 Quantification Settlement Agreement (QSA) and the *2007 Interim Guidelines*. Lower Basin water uses are sourced out of Lake Mead, and therefore Lake Mead is a useful indicator of present-day management and future water supply certainty for the Lower Basin. Over the last 20 years, Lake Mead has presented a gloomy outlook, with reservoir elevations falling to low levels not seen since the reservoir started filling in the 1930s (*see*: www.usbr.gov/lc/region/g4000/lakemead_line.pdf).

The Colorado River system operates under a "structural deficit" that each year allows more deliveries and uses from the river system than the supply provided from the Upper Basin. Lake Mead storage makes up the difference, which under current conditions results in continued decline of the reservoir's storage.

The Lower Basin DCP expands upon water use cutbacks defined in the *2007 Interim Guidelines* and defines additional cutbacks in water use by each Lower Basin state depending on the storage elevation in Lake Mead (*see* Table below). The water use cutbacks are referred to as *DCP Contributions* in the Plan and can be generated by conversion of "Intentionally-Created Surplus" (ICS) or by the reduction in state water use below the decreed entitlement for that state.

ICS can be created under the following categories of activities:

- Extraordinary Conservation such as: fallowing irrigated land; canal lining; and desalination projects
- Tributary Conservation by purchasing water rights on tributary rivers with priority dates prior to 6/25/1929
- System Efficiency by making capital contributions to the Department of Interior for projects that reduce mainstem losses and increase efficiency of water use
- Importation: by introducing non-Basin water to the mainstem Colorado River system

The Lower Basin DCP also reduced limitations on delivery and use of ICS by modifying the required Lake Mead elevation to take delivery of ICS from 1,075 to 1,025 feet.

The water use cutbacks required under the *2007 Interim Guidelines* and 2019 Lower Basin DCP amount to demand reductions varying from 2% to 15%, depending on the Lake Mead elevation. Importantly, the planned cutbacks may not be sufficient to stop the decline in Lake Mead storage. The "structural deficit" that exists in the Lower Basin has been estimated to be 1.2 MAF (Kuhn, 2019), which is not fully addressed at even the highest cutback levels when Lake Mead drops to an elevation of 1,025 feet.

Water Use Reductions in Lower Basin States

Projected January 1 Lake Mead Elevation *(feet msl)*	2007 Interim Guidelines Shortages		DCP Contributions			Combined Volumes *(2007 Interim Guidelines Shortages & DCP Contributions)*			
	Arizona	Nevada	Arizona	Nevada	California	Arizona	Nevada	California	Lower Division States Total
	(thousand acre-feet)								
At or below 1,090 and above 1,075	0	0	192	8	0	192	8	0	200
At or below 1,075 and at or above 1,050	320	13	192	8	0	512	21	0	533
Below 1,050 and above 1,045	400	17	192	8	0	592	25	0	617
At or below 1,045 and above 1,040	400	17	240	10	200	640	27	200	867
At or below 1,040 and above 1,035	400	17	240	10	250	640	27	250	917
At or below 1,035 and above 1,030	400	17	240	10	300	640	27	300	967
At or below 1,030 and at or above 1,025	400	17	240	10	350	640	27	350	1,017
Below 1,025	480	20	240	10	350	720	30	350	1,100

Note: The predicted January 1 storage elevation in Lake Mead provided by the August 24-Month Study by Reclamation is used to establish water use reduction requirements in each state.

Colorado Basin Plans

Reclamation Projections

Risk Probabilities

Upper Basin Storage

Update on DCP Activities

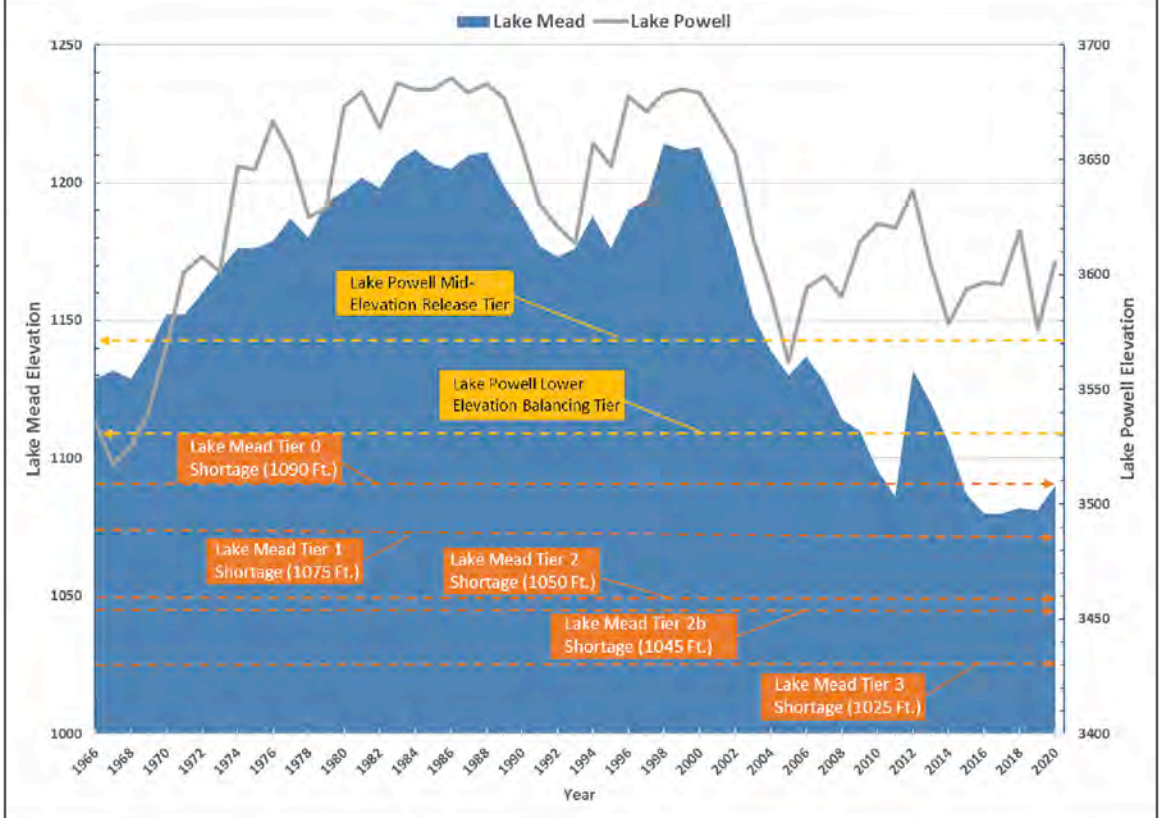
The DCP has been in place for about 18 months and various activities are underway. Several aspects of the DCP are tied to reservoir elevations in Lake Powell and Lake Mead. The most utilized projection of future river conditions is the 24-Month Study of future hydrology and river operations conducted monthly by Reclamation (*see* www.usbr.gov/uc/water/crsp/studies/). The most recent 24-Month Study (as of writing this article) was for September 2020 and it projected that: 1) Lake Powell would remain above the target elevation of 3,525 feet; and 2) Lake Mead elevations would range from 1,081 to 1,094 feet.

Reclamation also publishes a 5-Year Outlook of river conditions twice per year (*see*: www.usbr.gov/lc/region/g4000/riverops/crss-5year-projections.html). The most recent August 2020 outlook (using 1988-2018 hydrology) shows a 23% chance that Lake Powell will drop below target elevation 3,525 feet by the year 2025 and a 10% chance that Lake Powell will drop below minimum power pool elevation of 3,490 feet. By the year 2025, Lake Mead is projected to have a 77% chance of triggering cutbacks (*see* Table), divided as: a 42% chance of having an elevation between 1,050 and 1,075 feet; a 16% chance of having an elevation between 1,025 and 1,050 feet; and a 19% chance of dropping below elevation 1,025 feet. These probabilities provide a useful measure of risk that the Colorado River Basin will see further stress and to what extent tools developed by the DCP will be implemented.

Upper Basin Storage Operations

As stated above, the 24-Month Study does not predict that the elevation of Lake Powell will fall to elevation 3,525 feet. Therefore, no further negotiations regarding Upper Basin storage operations are triggered. The current 5-Year Outlook predicts that the target elevation may have a low probability of occurrence starting in 2024, which means that the negotiations called for in the DCP may start in 2022.

Lake Powell and Lake Mead Elevations and Operational Tiers
as of fall 2020



Notes: Depicts January 1 elevations for each year. Pursuant to the 2019 Lower Basin Drought Contingency Plan, California would begin to curtail its deliveries at Tier 2b (i.e., 200,000 AF), with curtailments increasing by 50,000 AF for each five feet reduction of Lake Mead elevation until Tier 3 is reached. Pursuant to the Binational Water Scarcity Contingency Plan, Mexico would also curtail its deliveries by increasing amounts under Tier 2b.

Adapted from *Management of the Colorado River: Water Allocation, Drought, & the Federal Role* Congressional Research Service, October 2020

Colorado Basin Plans

Demand Feasibility

Four States' Planning

Upper Basin Demand Management

In the Upper Basin, the first step in developing a demand management program is to determine its feasibility. The four Upper Basin states are independently evaluating demand management feasibility. Demand management feasibility efforts include:

Colorado: The Colorado Water Conservation Board (CWCB) is managing the feasibility investigations for Colorado. The CWCB first established a set of eight workgroups covering various subject areas related to demand management (*see*: https://cwcb.colorado.gov/focus-areas/supply/demand-management). These workgroups met periodically from August 2019 to June 2020. The CWCB recently compiled workgroup findings (*CWCB Demand Management Update*, July 2020) and is developing a new work plan for continued investigations over the next year (*CWCB Demand Management Feasibility Investigation,* September 2020).

Wyoming: The State Engineer's Office and Attorney General's office are leading the process in Wyoming with outreach assistance from the University of Wyoming (*see*: www.uwyo.edu/uwe/wy-dm-ucrb/index.html#add). The state conducted public outreach meetings in November 2019 and conducted a set of focus group meetings on curtailment, mitigation, and conserved consumptive use.

Utah: The Utah Division of Water Resources (UDWR) is leading the evaluation process in Utah. UDWR held a public workshop in June 2019 and intends to conduct additional outreach tasks in the future. Parallel but separate efforts in Utah include implementation of the recently passed state legislation on water banking (*see*: https://le.utah.gov/%7E2020/bills/static/SB0026.html), and facilitation of demand management projects by environmental non-profits.

New Mexico: The New Mexico Interstate Stream Commission (ISC) within the State Engineer's Office is managing demand management investigations in New Mexico. The ISC held phone meetings in November 2019 and an in-person meeting in January 2020. No further work by the ISC has been identified.

Reserved Tribal Rights

Increasing Use

Tribal Water Rights

Twenty-two federally recognized tribes in the Colorado River Basin have quantified water diversion rights that have been confirmed by court decree or final settlement. These tribes collectively possess rights to 2.9 MAF per year of Colorado River water. However, as of 2015, these tribes typically were using just over half of their quantified rights. Additionally, 13 other basin tribes have reserved water rights claims that have yet to be resolved, although the total potential amount of these claims has not been estimated. Increased water use by tribes with existing water rights, and/or future settlement of claims and additional consumptive use of basin waters by other tribes, is likely to exacerbate the competition for basin water resources.

The potential for increased use of tribal water rights (which, once ratified, are counted toward state-specific allocations where the tribal reservation is located) has been studied in recent years. In 2014, Reclamation, working with a group of 10 tribes with significant reserved water rights claims on the Colorado River, initiated a study known as the *10 Tribes Study*. The study, published in 2018, estimated that, cumulatively, the 10 tribes in the study could have reserved water rights (including unresolved claims) to divert nearly 2.8 MAF per year. Of these water rights, approximately 2 MAF per year were confirmed by a court decree or final settlement and an additional 785,273 AF (mostly in the Upper Basin) remained unresolved. The report estimated that, overall, the 10 tribes are diverting (i.e., making use of) almost 1.5 MAF of their 2.8 MAF in resolved and unresolved claims. The table below shows these figures at the basin and sub-basin levels. According to the study, the majority of unresolved claims among the 10 tribes are Upper Basin claims associated with the Ute Tribe in Utah (370,370 AF per year), the Navajo Nation in Utah (314,926 AF), and the Navajo Nation in the Upper Basin in Arizona (77,049 AF).

10 Tribes Study: Tribal Water Rights and Diversions

values in terms of acre-feet per year

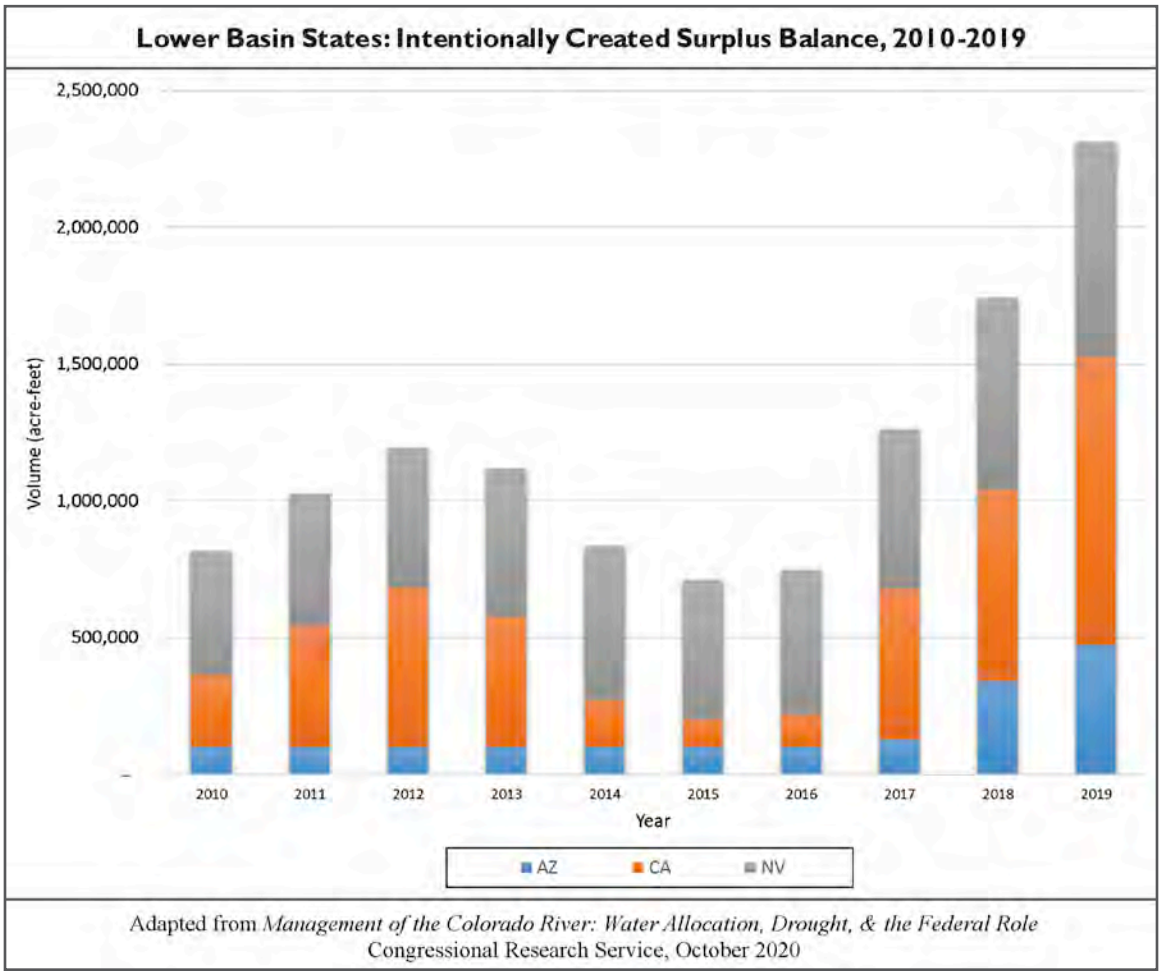
	Current Use Diversions	Reserved/Settled Water Rights	Unresolved Water Rights	Total Estimated Tribal Water Rights
Upper Basin	672,964	1,060,781	762,345	1,823,125
Lower Basin	800,392	952,190	22,928	975,119
Total Basin	**1,473,356**	**2,012,971**	**785,273**	**2,798,244**

Note: Unresolved water rights include claims for potential water rights that have yet to be resolved.

Adapted from *Management of the Colorado River: Water Allocation, Drought, & the Federal Role* Congressional Research Service, October 2020

Colorado Basin Plans

ICS



Adapted from *Management of the Colorado River: Water Allocation, Drought, & the Federal Role* Congressional Research Service, October 2020

Contractors Identified

In addition to the feasibility evaluations being conducted by each state, the UCRC is conducting its own set of investigations (legal, technical, economic) and recently completed a solicitation process to identify contractors (*see*: www.ucrcommission.com/rfp-2019-01-ucrc/). Contracts for completing the UCRC investigations have not yet been finalized. The UCRC has proposed completing its investigations by September 2022 (*see*: www.ucrcommission.com/wp-content/uploads/2019/10/UCRC-Demand-Management-RFP.Final_.pdf).

Timing Conflicts

For Upper Basin demand management, the lengthy process set up to evaluate, negotiate, and then approve a program is likely to run up against unfortunate timing conflicts with renegotiation of the *2007 Interim Guidelines*. The term of the Demand Management Storage Agreement remains in effect only through 12/31/2025 and it may be the case that no Upper Basin demand management program is established and implemented by this termination date. Feasibility analyses and approvals currently in process may need to be duplicated or revisited after 2025. *See* Upper Basin Demand Management Storage Agreement Section III.B.4 – *Considerations Post-2025*.

Arizona & Nevada Reductions

Lower Basin Cutbacks

The Lower Basin DCP was set up to be implemented immediately, with no further negotiation or evaluation required. The terms of the Lower Basin DCP are now in effect. The August 2020 24-Month Study by Reclamation predicts a January 2021 elevation of 1,089.62 feet in Lake Mead. The result is that Arizona and Nevada will reduce annual water use by a combined 0.2 MAF as DCP Contributions.

2022 Discussions

What's Next

There are not likely to be significant new DCP developments for the next couple of years. The Lower Basin DCP will continue in its present form through 2025. Negotiation of the Upper Basin DCP storage operations will not be triggered until Lake Powell water levels drop and the 24-Month Study predicts an elevation below 3,525 feet. Current projections indicate that these initial discussions will not occur until 2022. Feasibility evaluations for Upper Basin demand management are likely to continue through 2022, followed by demand management program development and stakeholder negotiations. A functional Upper Basin demand management program is not likely to be in place for several years.

Colorado Basin Plans

Interim Guidelines Renegotiation

As indicated by the term of the various agreements, the DCP was intended to be a short-term plan leading up to the renegotiation of Reclamation's *2007 Interim Guidelines*. The current Interim Guidelines expire on 12/31/2025, and the Guidelines require that the Department of Interior "initiate a formal review for purposes of evaluating the effectiveness of these Guidelines." Reclamation initiated this formal review in March 2020 and is expecting to produce its findings by early 2021 (*see* www.usbr.gov/lc/region/programs/strategies/docs/7D_Kickoff_Webinars_March2020_Final_508.pdf and www.usbr.gov/lc/region/programs/strategies.html).

It is likely that renegotiation of the Interim Guidelines will commence after Reclamation's review. The renegotiation of the Interim Guidelines represents the next major milestone in Colorado River Basin water management policy. The new iteration of the Interim Guidelines could significantly change the risk paradigm and risk mitigation strategies for both the Lower and Upper Basins. The DCP has been an important step forward to address the supply-demand imbalance in the Colorado River Basin, but the tools represented by the DCP may need to be re-evaluated in 2026. For now, both water supply challenges and new ideas for solving them (including the DCP) will remain and provide fertile ground for dialogue among Basin stakeholders.

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Brett Bovee is the Rocky Mountain Regional Director for WestWater Research and leads the Colorado office in Fort Collins, CO. Brett has over 12 years of experience conducting a variety of engineering, economic, and water rights studies across the Western states. Many of these projects have been focused on water resources management and water development concepts in the pursuit, protection, and utilization of water rights. Since joining WestWater, Brett has performed dozens of focused water right valuation studies and broader economic and water market analyses. Brett has performed water right investigations for Federal, Tribal, and private clients, and has completed a variety of studies focused on water valuation, comprehensive water planning, irrigated agriculture, scenario modeling, and water project feasibility. Brett has prepared expert witness and technical reports, completed hydrographic surveys of water use, and reviewed settlement agreements. He has also participated in several technical working groups for multi-stakeholder negotiations. Brett holds B.S. and M.Eng. degrees in biological and environmental engineering from Cornell University, with a focus in water resources. He is a licensed professional civil engineer in five western states, and is also a recognized hydrologist. Prior to joining WestWater, Brett worked for Natural Resources Consulting Engineers managing and assisting with water rights projects across the West.

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Resilience

RESILIENT WATER RESOURCES MANAGEMENT

THE CHALLENGES OF CHANGE

by Tony Willardson, Western States Water Council (Salt Lake City, UT)

Editor's Note: The following article is an edited expansion of the keynote address presented by Tony Willardson at the 2020 American Water Resources Association - Washington Chapter's Annual State Conference (Virtual Webinar) on October 6, 2020.

Introduction

Western States Water Council

The Western States Water Council (Council) was created in 1965 by governors in the western states to advise them on water policy issues. We are a government entity — an instrumentality of each of the eighteen participating states — which presents a collective state voice. The Council works closely with the Western Governors' Association (WGA) seeking to foster state/state and federal/state collaboration. Our members are appointed by and serve at the pleasure of their respective governors.

Council Mission

The Council's mission is to ensure that the West has an adequate, secure, and sustainable supply of water of suitable quality to meet its diverse economic and environmental needs now and in the future. Water in the American West is an increasingly scarce and precious resource. Western States have and will continue to face unique hydrologic, legal, and infrastructure challenges. Population growth, competing economic and ecological demands, and changing social values have left surface and groundwater supplies stressed in many areas. This has increased the number and complexity of conflicts among users and uses.

This article provides a brief overview of the Council's regional and national efforts to foster resilient water management equal to future challenges.

Resiliency

Resiliency Attributes

One definition of resiliency refers to our capacity to recover quickly from difficulties — toughness. As it relates to water supplies and water resources management, some synonyms that we use include: secure; sustainable; robust; and reliable. Another definition of resiliency might be preparedness in the face of uncertainty. For example, the Council has a long history of supporting drought preparedness.

The pursuit of resiliency raises questions related to the appropriate level of confidence in our preparation. At what point can we say we are truly resilient? How do we measure resilience? Are we prepared to face economic, environmental, hydrologic and social uncertainty? What is our related statistical level of confidence? What about public health?

Our resilience as a nation is being tested by the current Covid-19 pandemic. The pandemic has exposed weaknesses in our health care, and access to clean water is an important prerequisite for good hygiene.

Principles for a Resilient Water Future

Challenges

A secure, sustainable, and resilient water future is becoming more costly. Attaining resiliency is increasingly uncertain given data limitations regarding water supplies and demands. There is also our inability to predict seasonal/subseasonal water supplies, with competing or poorly-defined water rights, aging and often inadequate infrastructure, our unpredictable climate and extreme events, and a constantly evolving regulatory landscape.

Principles

The Council has agreed on a number of principles for addressing our future challenges and increasing the resiliency of water resources management. A central principle is that water must be recognized as a critical public policy priority given the importance of the resource to our public health, economy, food security, environment, and western way of life. Further, we must cultivate a western water conservation ethic through greater understanding of, and appreciation for, water's value.

Infrastructure & Storage Options

Sustainable water resource management and development should yield: long-term economic growth; enhanced protection and restoration of significant aquatic ecosystems; and improved economic and environmental security and quality of life. A secure and sustainable water future will be determined by our ability to maintain, replace, expand, and make the most efficient use of critical water infrastructure. We must preserve and improve existing infrastructure, as well as encourage and support innovative water supply strategies and new storage options to better balance supplies with demands. Further, all levels of government must prioritize the collection, analysis, and open sharing of reliable data regarding water availability, quality, and usage given its importance to research for sound science and data driven decision-making.

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Cooperation

Effectively addressing these challenges will require stronger collaboration and cooperation that transcends political and geographic boundaries between states, federal agencies, tribes, and local communities.

The Council's statement of principles — "*A Vision for Water*" — is available at: www.westernstateswater.org/wp-content/uploads/2019/01/Vision-on-Water_2018Oct26.pdf.

Transfer Proposals

Background

A VIEW FROM THE SIXTIES

The same year the Council was organized (1965), the American Water Resources Association held its first annual meeting at the University of Chicago. The theme was a Regional Approach to Watershed Management Planning. At the time, steep post-WWII projections of population growth in the West led to proposals that water might be moved between regions and across the continent from areas of surplus to areas with shortages. The Council prepared a *Review of Inter-Regional and International Water Transfer Proposals* in 1969 that concluded such proposals were not much more than lines drawn on maps. Some of those lines were drawn from the Columbia River or its tributaries to points in the Southwest. Even more ambitious proposals, including what was called the North American Water and Power Alliance, would have brought water from the Yukon and Western Canada to much of the American West from Montana to Texas and westward. Of note, we did not reach the 1969-anticipated levels of population until the 1990s.

Needs & Strategies

Council Projects & Reports

REGIONAL MANAGEMENT PLANNING & COOPERATION

As noted in the Council's *Vision for Water*, water in the West is an increasingly scarce and precious resource. The Council continues to build on work presented in a June 2006 report on *Water Needs and Strategies for a Sustainable Future*, adopted by the Western Governors Association, that encouraged States to develop sustainable growth policies and plans, as well as identify the water demands and impacts associated with future growth. Additionally, States should develop integrated growth and water resource scenarios so that the consequences of various growth scenarios can be evaluated for both the near and long-term.

The 2006 report addressed:

- Growth and Water Policy
- Meeting Future Water Demands
- Water Infrastructure Needs and Strategies
- Resolution of Indian Water Rights Claims
- Climate Change Impacts
- Protecting aAquatic Species under the Endangered Species Act (ESA)

See: www.westernstateswater.org/publications/other-reports/ (2006)

WestFAST

Western States Federal Agency Support Team (WestFAST)

A related WGA/Council *Next Steps* report in June 2018 included scores of recommendations. A priority recommendation that was soon implemented was the creation of a Western States Federal Agency Support Team (WestFAST) through a Declaration of Cooperation related to working together for the sustainable and efficient use of western water resources. There are now thirteen federal agencies participating in regular calls and meetings. Each has named a representative to work with the Council, and WestFAST supports a federal liaison position, a two-year detail rotating among the federal agencies, that until recently was located in the Council office (but now serves virtually).

Support Team

WestFAST participating departments and their agencies include: the Department of Agriculture's Natural Resources Conservation Service and Forest Service; the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA); the Department of Defense and the Army Corps of Engineers; the Department of Energy; the US Environmental Protection Agency; the Department of the Interior's Bureau of Land Management and Bureau of Reclamation; US Fish and Wildlife Service; US Geological Survey (USGS); and the National Parks Service.

Again, to effectively address the challenges we face in building a resilient water future, the Council relies on partnerships with its member state agencies, WestFAST, and other multistate and non-profit and non-governmental organizations.

See: www.westernstateswater.org/westfast/

Native American Rights Fund

Tribal Water Rights Settlements / Ad Hoc Group

One organization I would like to highlight is the Native American Rights Fund (NARF) and a so-called Ad Hoc Group supporting the negotiated settlement of tribal water right claims in the West, as well as subsequent approval and funding by the Congress. Since 1991, NARF and Council cosponsored

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biennial symposiums on tribal settlements (*see*: www.narf.org/cases/water-rights-symposium/). The two organizations also coordinate on quarterly calls with Interior's Indian Water Rights Office and regularly visit congressional offices in support of settlements. States and Tribes benefit from the resolution of these outstanding claims, which provides greater certainty for both.

Data & Metadata

Water Data Exchange (WaDE)

The Council's Water Data Exchange (WaDE) is a cutting-edge effort to compile and present in a user-friendly manner different aspects of state water rights and water uses across different platforms. It will include data on water rights ownership, point of diversion, priority date, place of use, purpose of use, and other parameters. It will also provide information on water use by county or basin, with metadata that includes various special regulatory overlays. *See* www.wade.westernstateswater.org.

Eventually, WaDE will also include or provide access to instrumented data such as streamflow and water quality from western states, as well as data on decreed federal and tribal reserved water rights. The goal is to assist in water resources planning, management, protection, and decision-making, as well as facilitating water rights transfers, banking and marketing among willing buyers and sellers, including leasing. Efficient water markets require well-defined rights.

See: www.wade.westernstateswater.org

Transfers Policy

Water Transfers

In December 2012, the Council and WGA authored *Water Transfers in the West: Projects, Trends and Leading Practices in Voluntary Water Trading*. The forward by Utah Governor Gary Herbert and then Colorado Governor John Hickenlooper reads in part:

> Western Governors recognize the economic and social value of agricultural water use, an intrinsic part of our shared history and culture. To examine the issues associated with water transfers, we directed the WGA and its affiliate the Western States Water Council to identify the economic and policy drivers behind such transfers in the West, as well as how western states administer their transfer programs and what steps they have taken to mitigate or avoid adverse impacts. The goal of this report is to provide policy options and information that states can consider as they work to make the transfer process more effective. Importantly, the report recognizes that each state's individual circumstances will determine how it should address transfers and does not attempt to provide a "blueprint" for states to follow. Water is a precious commodity for westerners — no matter the sector, no matter the citizen. With a sound approach to water transfers, our states will continue to grow and thrive.

See:
www.westernstateswater.org/wp-content/uploads/2012/12/Water_Transfers_in_the_West_2012.pdf

Infrastructure

Infrastructure

Storage Options

Reclamation Fund

Another important principle for a sustainable, secure, and resilient water future is our ability to maintain, replace, expand, and make the most efficient use of critical water infrastructure, as well as encourage and support innovative water supply strategies and new storage options to better balance supplies with demands. WGA Policy Resolution 2018-8 recognizes that infrastructure investments are essential to our continued economic prosperity and environmental protection, and has called on Congress to appropriately authorize and fund related federal programs. This should include fully appropriating receipts accruing to the Reclamation Fund, created by the Reclamation Act of 1902, for their intended purposes. In the past, the Congress has not appropriated all of the fund receipts, leading to a large unobligated balance. The WSWC supports the use of the Reclamation Fund for authorized purposes, including rural water projects and projects constructed as part of tribal water rights settlements.

Priorities

A 2010 Council report, *Western Water Resources Infrastructure Strategies: Identifying, Prioritizing and Financing Needs*, noted that water stress could put the West at a competitive disadvantage. Further, water needs to be carefully conserved, and present and future infrastructure needs and priorities evaluated based on risks to human health and safety, economic growth, and environmental protection. Further investments need to be based on long-term capital budgeting and asset management principles, also recognizing the need for increasing and stable funding. The report also explored the advantages of public private partnerships.

See www.westernstateswater.org/publications/other-reports/ (2010).

Public Policy Priority

National Efforts

The Council has called for the recognition of water development, management, and protection as a public policy priority, on par with its role in sustaining our economy, environment, food security, public health and western way of life. Over the past five years, we have seen a number of White House public policy initiatives that have raised the visibility of our water-related challenges.

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Federal Efforts

In 2015, the Obama Administration released a *Public-Private Water Innovation Strategy to Build a Sustainable Water Future* and held a White House Drought Symposium. In 2016, there was a White House Water Summit. Water was a part of the Trump Administration's White House Infrastructure Plan Outline in 2018, and there was a Presidential Memorandum on *Promoting the Reliable Supply and Delivery of Water in the West*. In 2019, a White House outline followed for *Ensuring the Nation's Water Security*. Most recently, President Trump issued an Executive Order on *Modernizing America's Water Resource Management and Infrastructure*, which formally established an interagency "Water Subcabinet." Whatever the results of this election, it is important that we work together to maintain such momentum in the future.

Information Needs

Reliable Data

The Council has called on all levels of government to prioritize the collection, analysis, and open sharing of reliable data regarding water availability, quality, and usage given its importance to sound science and data driven decision-making. WGA Policy Resolution 2018-8 emphasized the need to collect, maintain, and enhance the use of basic water data. It also supports critical federal programs that provide information on: evapotranspiration; groundwater; precipitation; snow; and streamflow. WGA recognized the essential role of federal partnerships and the need for coordination on water data. WGA also recognized the potential water impacts of extreme weather events, and promoted communication and sharing of best management practices.

Science Collaboration

The Council continues to collaborate with the National Aeronautics and Space Administration (NASA), NOAA, and USGS on various water data related projects to enhance our understanding of the resource and improve our decision-making. The Council was a critical player helping insure that Landsat 8, as part of the Landsat Data Continuity Mission, included the same thermal infrared imagery on Landsat 5 and 7 that western states have used to measure and monitor consumptive water uses, and administer water rights for various purposes.

"OpenET"

Such remote sensing data is also critical for "OpenET" — the data accessibility improvements being undertaken by NASA and the Desert Research Institute at the University of Nevada Reno, with support from the Environmental Defense Fund. E. Joaquin Esquivel, Chair of the California State Water Resources Control Board has said: "Reliable water data is almost as critical to farmers and water managers as the water supply itself. With added pressure from population growth and the uncertainty that climate change impacts have on existing and future water supply, OpenET allows planning for agricultural water needs in a way that just wasn't possible before."

See https://openetdata.org.

Drought Preparedness

Climate Adaptation Strategies

Resiliency also requires recognition of the importance of climate impacts and includes support for climate adaptation strategies. There is a need for more research and a better understanding of the physics of dynamic coupled earth systems (including climate drivers) and advances in computing power for more robust modeling to prepare national and regional impact assessments, as well as forecast watershed scale impacts.

The Council has been a leader on drought preparedness, response, and mitigation and an active participant in the National Drought Resiliency Partnership and co-chairs the National Integrated Drought Information System. The Council has also cosponsored a series of workshops on improving **s**ub-seasonal **to s**easonal (S2S) precipitation forecasting for drought preparedness and water management.

Regional Cooperation

State Primacy & Federal Engagement With the States

When Governor of California, Ronald Reagan stated: "I am impressed with the need for the states of the West to look beyond sectional interests and to approach water resource development on a regional basis. Few endeavors offer more challenge…and greater potential for lasting benefit. Unless we are successful, lack of water will soon limit development throughout much of the West. …I am convinced that the best approach to westwide regional planning is through cooperative state action." Reagan added: "I see no need, certainly at this time, for the states to look to Washington [DC] to act as a broker in this endeavor."

State Primacy

State primacy is fundamental to a sustainable water future. Federal water planning, policy development, and regulation must recognize and defer to state water law and administration. The federal government should contribute its fair share of funding to support implementation of state water planning and management. An integrated, collaborative, and grassroots approach to water resources management is critical to the environmentally sound and efficient use of our water resources. States, federal agencies, tribes, and local communities should work together to identify water problems and develop optimal solutions at the lowest appropriate level. Striving for cooperation rather than litigation, we must recognize and respect national, state, regional, local, and tribal differences in values related to water resources.

Resilience

State-Federal Relationship

WOTUS Input

Federal Issues

CWA § 401 Certification

State Approaches

Another important principle for resilient and sustainable water management is federal engagement with States — early and often — in meaningful consultation regarding federal regulatory mandates. WGA Policy Resolution 2020-01 on *Strengthening the State-Federal Relationship* notes that improving state-federal communication and coordination is among the Western Governors' highest priorities. In the absence of a Constitutional delegation of authority to the federal government, state authority should be presumed sovereign. Each federal department and agency should have a clear and accountable process to provide States with early, meaningful, and substantive input in the development of federal regulatory policies. Where authority has been delegated by the federal government to the States, States should be granted the maximum administrative discretion possible and should be treated as partners and co-regulators.

The Council and its member states have been active in addressing state interests related to the EPA/Corps definition of Waters of the United States (WOTUS) under the recent Navigable Waters Protection Rule. Other areas the Council has been actively engaged includes efforts to map federal jurisdiction, EPA's water transfers rule, continuing discussions on the Corps Water Supply Rule, BLM's hydraulic fracturing rule, and a subsequently withdrawn US Forest Service Ground Water Directive.

The Council has strongly supported state authority under the Clean Water Act Section 401 to grant, condition, or deny State Certification that federally authorized actions are consistent with state water quality standards. The law states: "No license or permit shall be granted until the certification required by this section has been obtained or has been waived… ." In August 2018, the Council testified before the Senate Environment and Natural Resources Committee on this topic, reiterating its position that States have primary jurisdiction over water quantity and quality issues and should retain primary jurisdiction under the Clean Water Act for the integration of water quantity and water quality considerations through the water quality certification process set forth under Section 401.

The Council also signed a joint letter together with western governors, legislators, attorneys general, and various interstate associations of state water and wetland agencies recognizing the "importance of partnerships between states and the federal government," and that a "balanced system of cooperative federalism has enabled states to implement the CWA effectively and with flexibility…A vital component of the CWA's system of cooperative federalism is state authority to certify and condition federal permits of discharges into waters of the United States under Section 401."

A 2017 WGA Statement declares: "Effective public policy is achieved when there is competition among the several states in the fashioning of different approaches to public policy issues. The search for enlightened public policy is advanced when individual states and local governments are free to experiment with a variety of approaches to public issues. One-size-fits-all national approaches to public policy problems can inhibit the creation of effective solutions to those problems."

Conclusion

The States play a pivotal role in promoting resilient water resources management. The Western States Water Council and its member state representatives have worked for 55 years to ensure that the West has an adequate, secure, and sustainable supply of water of suitable quality to meet its diverse economic and environmental needs.

Much more remains to be done, but I look forward to a bright future.

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Tony Willardson was named Executive Director of the Western States Water Council in July 2009. The Council is a government entity, an instrumentality of each of the eighteen participating States, created by western state governors in 1965 to advise them on water laws, policies, and programs. Tony joined the Council in 1979. He holds a BA in political science from Brigham Young University, with minors in economics and business management, and a MS in public administration from the University of Utah. He is a member of the National Honor Society for Public Affairs and Administration (Pi Alpha Alpha). Tony is the author of numerous articles, reports, and policy papers covering a wide range of water resource issues, including water-related data gathering and monitoring, remote sensing of water use, water conservation, drought, water use fees, water project financing and cost sharing, groundwater management and recharge, interregional water transfers, intrastate water transfers, and future water needs and sustainable water supply strategies.

WATER BRIEFS

"STOLEN" GROUNDWATER US

SPECIAL MASTER REPORT

On November 5, Special Master Eugene E. Siler, Jr. issued the long awaited *Special Master Report (Report)* in the *Mississippi v. Tennessee* case before the US Supreme Court. "Mississippi believes the City of Memphis is stealing its groundwater. So it sued Tennessee, the City of Memphis, and Memphis Light, Gas & Water Division ('MLGW') for injunctive relief and money damages." *Report* at 1.

The *Report* succinctly lays out the basic factual issues in the matter:

> Mississippi's claims are simple: Tennessee has, by pumping in Shelby County, Tennessee, taken groundwater that would have remained in Mississippi for centuries…Mississippi thinks Tennessee has stolen and continues to steal its water. Easy enough.
>
> Underground, however, things get a little more complicated. The geology contains various rock formations and complex hydrology. And Mississippi claims those subsurface differences require distinguishing its water from the water that sits below other states. Tennessee, on the other hand, thinks any of those geological differences are much ado about nothing. *Report* at 1-2.

The Special Master agreed with Tennessee's assertions of fact and law to arrive at his conclusion. "Accordingly, it is recommended that the Supreme Court find: (1) the groundwater contained in the Middle Claiborne Aquifer is the resource at issue; (2) that resource is interstate; and (3) equitable apportionment is the appropriate remedy for the alleged harm. Because Mississippi has explicitly not requested equitable apportionment in this action, it is also recommended that the complaint be dismissed with leave to amend, unless Mississippi declines the favor, in which case the complaint should be dismissed with prejudice."

In other words, the case is far from over — assuming that Mississippi accepts the "favor" of amending its complaint to request equitable apportionment. If Mississippi doesn't amend its complaint, the Special Master is recommending to the US Supreme Court that it dismiss the case "with prejudice" (*i.e.* once dismissed, it cannot be brought again).

The Special Master's Conclusion sets out the parameters of the case going forward:

> Water is finite. Especially the usable kind. And the Middle Claiborne Aquifer holds lots of it. Unsurprisingly, both Mississippi and Tennessee want it. Luckily, instead of war, the law requires they share it. *South Carolina v. North Carolina*, 558 U.S. 256, 289 (2010) (citing *Texas v. New Mexico*, 462 U.S. at 571 n.18). But Mississippi has not sought equitable apportionment. Therefore, the Special Master recommends that the Supreme Court dismiss Mississippi's complaint with leave to file an amended complaint based on an equitable-apportionment theory.

Report at 32.

The issues that will ultimately be decided in this case are of great importance. How states divide groundwater that lies under their respective borders is critical in the future due to increased reliance on groundwater for water supplies. *The Water Report* will be publishing a major article in next month's issue that will fully discuss the Special Master Report and the issues of this case as it moves forward.

For info: Report available at: https://www.ca6.uscourts.gov/special-master

PFAS RESOURCES US

AWWA PFAS INFORMATION

On November 5, the American Water Works Association (AWWA) announced the release oif three new resources about **p**er- and poly**f**luoro**a**lkyl **s**ubstances (PFAS) to support water systems' information needs and ability to educate the public and policy makers about issues related to PFAS in drinking water.

The new resources are:

Drinking Water Treatment for PFAS Selection Guide, which supports water systems in making drinking water treatment decisions regarding PFAS. These compounds are expensive to analyze and challenging to remove from water. The guide reviews proven treatment technologies, discusses technical questions important to selecting technology, and reviews how to develop and organize data needed in decision-making.

Source Water Evaluation Guide for PFAS, which is designed to help communities evaluate their water supply for PFAS contamination, identify potential sources of contamination and consider potential actions that may be appropriate for their use in identifying and managing PFAS in drinking water.

Summary of Toxicological Research for PFAS, which provides an overview of major state, federal, and international PFAS research programs and risk assessments to inform drinking water utilities about the current state of PFAS toxicology.

For info: PFAS resource page: www.awwa.org/Resources-Tools/Resource-Topics/PFAS

FLOODWATER INFO US

USGS WATER DASHBOARD

The US Geological Survey has announced the completion of a new mobile tool that provides real-time information on water levels, weather, and flood forecasts all in one place on a computer, smartphone, or other mobile device. The new USGS National Water Dashboard (NWD) provides critical information to decision-makers, emergency managers, and the public during flood events, informing decisions that can help protect lives and property. In addition to giving the public key information on what's happening in their communities, it will also help improve the response of federal, state and local agencies during storms, floods, and drought conditions. The tool can be used by forecasters and local emergency managers as they issue

flood- and evacuation warnings, verify safe evacuation routes, and coordinate emergency response efforts. The NWD can assist the USACE as they manage water supplies in river basins and operate flood-control reservoirs. During a drought, the tool can help state resource managers identify areas where water supplies are at risk.

The NWD presents real-time stream, lake and reservoir, precipitation, and groundwater data from more than 13,500 USGS observation stations across the country. This information is shown along with NOAA weather data such as radar, watches and warnings, past precipitation totals, precipitation forecasts and drought conditions from other open water-data sources. The NWD also links to the USGS WaterAlert system, which sends out instant, customized updates about water conditions.

For info: Dashboard At: https://dashboard.waterdata.usgs.gov/app/nwd/?region=lower48

RIO GRANDE AGREEMENT SW

MEXICO WATER DELIVERY

The International Boundary and Water Commission, United States and Mexico, has signed Minute No. 325, "*Measures to End the Current Rio Grande Water Delivery Cycle without a Shortfall, to Provide Humanitarian Support for the Municipal Water Supply for Mexican Communities, and to Establish Mechanisms for Future Cooperation to Improve the Predictability and Reliability of Rio Grande Water Deliveries to Users in the United States and Mexico*." The agreement (referred to as a "Minute" under the 1944 Treaty) ensured Mexico would meet the October 24, 2020 deadline to deliver Rio Grande water to the US by transferring an amount of Mexican water stored in Amistad and Falcon International Reservoirs to the United States.

In accordance with the 1944 Water Treaty, the US is entitled to a portion of the water arriving in the Rio Grande from six Mexican tributaries for a total of at least 1,750,000 acre-feet (2158.6 **m**illion **c**ubic **m**eters) over five years. The current five-year cycle began on October 25, 2015 and ended on October 24, 2020. Mexico delivered the final pending amount of approximately 105,000 acre-feet (130 mcm) by transferring water from Mexican ownership to US ownership at Amistad and Falcon International Reservoirs on the Rio Grande. Sally Spener, the US Section Secretary, told *TWR* that Mexico "completed all required deliveries by the deadline" of October 24th. "We appreciate the efforts by Mexican government officials to fulfill their treaty obligations on time. This agreement sets us on a path to improve Rio Grande management in the future to the benefit of both countries," said US Commissioner Jayne Harkins. Water deliveries under the 1944 Water Treaty are vital for irrigating crops, supplying water to municipalities, and conducting mining and industrial operations along the Rio Grande in Texas.

Minute No. 325 also establishes work groups to analyze and develop water management tools to provide for increased reliability and predictability in Rio Grande water deliveries to users in the United States and Mexico (*see* Minute 325, Resolutions 4 and 5). Moreover, it includes a provision for US humanitarian support to Mexico, if needed, to guarantee municipal water supplies for Mexican communities along the Rio Grande downstream from Amistad Dam. "In the event that, as a result of the transfer described in Resolution 1, Mexican storage at the Amistad and Falcon International Reservoirs reaches a storage volume of zero or is insufficient to cover one month of municipal needs for urban use in Mexico downstream from Amistad Dam, the United States, for humanitarian reasons, will negotiate with Mexico the terms for potential temporary use of U.S. water for Mexico's minimum municipal water needs downstream from Amistad Dam. This Resolution will no longer apply when Mexico's combined storage in the Amistad and Falcon International Reservoirs reaches a volume of 129,714 acre-feet (160 million cubic meters) or on October 31, 2021, whichever occurs first." Minute 325, Resolution 2, page 3. Mexican Commissioner Humberto Marengo stated, "Mexico has always been committed to complying with its obligations. I appreciate the humanitarian support offered by the United States so that, if needed, the Mexican communities that depend on the Rio Grande for their supply will have the necessary backing to cover their municipal needs, as established in Article 4 of Mexico's Constitution."

Minute No. 325 received immediate approval from the US Department of State and Mexico's Secretariat of Foreign Relations and has entered into force. Mexico completed the water transfer to the US on October 23, 2020. The International Boundary and Water Commission, United States and Mexico, is responsible for applying the boundary and water treaties between the two countries and settling differences that arise in the application of the treaties.

For info: Sally Spener, IBWC, 915/832-4175 or Sally.spener@ibwc.gov; Minute 325 available at: https://ibwc.gov/Files/Minutes/Min325.pdf; US IBWC website at: www.ibwc.gov/home.html

STORMWATER DECREE CO

POLLUTED RUNOFF

On October 29, the US Department of Justice (DOJ) and EPA announced a settlement with the City of Colorado Springs, Colorado, to resolve violations of the Clean Water Act with respect to the City's storm sewer system in order to reduce polluted stormwater runoff. The proposed consent decree alleges that Colorado's second-largest city failed to control stormwater from large residential complexes, office developments, and construction sites. This resulted in sediments and bacteria flowing into area waterways and eroding streams.

Colorado Springs' storm sewer system serves more than 460,000 people and comprises approximately 250 miles of stormwater ditches and channels, with more than 690 major outfalls. Colorado Springs' storm sewer system discharges to Monument Creek, Fountain Creek, Camp Creek, Cheyenne Creek, Shooks Run, and other waters within the Arkansas River watershed. EPA and the Colorado Department of

WATER BRIEFS

Public Health and the Environment, working in partnership, discovered the violations through inspections and follow up investigations of the storm sewer program.

The settlement also includes the State of Colorado as a co-plaintiff, and the Lower Arkansas Valley Water Conservancy District and the Board of County Commissioners of the County of Pueblo as plaintiff-intervenors. The improvements made by the city under this settlement will result in significant reductions in the discharge of pollutants, such as sediment, oil and grease, heavy metals, pesticides, fertilizers, and bacteria, into Fountain Creek and its tributaries in Colorado Springs. Communities downstream of Colorado Springs will also see significant water quality improvements from the settlement.

The DOJ, EPA, and the State of Colorado alleged claims against Colorado Springs in an amended complaint filed in the federal district court on January 26, 2017. The Lower Arkansas Valley Water Conservancy District, and the Board of County Commissioners of the County of Pueblo were joined as plaintiffs on February 16, 2017. The amended complaint generally alleged that Colorado Springs violated its National Pollutant Discharge Elimination System (NPDES) permit for its municipal stormwater management program by failing to require the installation and maintenance of stormwater management structures at residential and commercial developments. The complaint also alleged that the city failed to enforce requirements to prevent polluted stormwater from running off active construction sites.

The city has since taken significant steps to improve its stormwater management program. The proposed settlement requires the city to take additional actions, including developing standard operating procedures and increased staff training for critical elements of its stormwater management program. In addition, under the settlement the city will capture the volume of stormwater that was required to be captured under the city's NPDES permit using an innovative approach that identifies capacity needs and the appropriate locations for adding capacity on a watershed basis. The proposed settlement also requires the city to mitigate the damage to Fountain Creek and its tributaries through stream restoration projects. These projects could include habitat restoration, channel restoration, constructed wetlands, and similar projects intended to reduce stormwater pollutants entering Fountain Creek or its tributaries. The city will spend a total of $11 million on this mitigation. Finally, Colorado Springs will pay a $1 million federal civil penalty. In lieu of paying a civil penalty to the state, the city will perform state-approved supplemental environmental projects valued at $1 million that will improve water quality in the Arkansas River, into which Fountain Creek flows south of the city.

The proposed settlement, lodged October 29th in the district court, is subject to a 30-day public comment period and final court approval.

For info: DOJ website at: www.justice.gov/enrd/consent-decrees

"ZOMBIE" DAMS PERIL NW

DAM OPERATION FAILURES

A whistleblower is asserting that the US Army Corps of Engineers for decades has systematically failed to assess the environmental consequences of how it operates its dams, reservoirs, and hatcheries in the Pacific Northwest. Over the last three years, the US Office of Special Counsel has been investigating the Corps' response to the whistleblower's charges.

Ms. Judith (Jody) Marshall served as a senior environmental resource specialist and as Section Chief of the Environmental Planning Section in the civil works division at the Corps' Portland District office. Her disclosure to the Special Counsel details how for years and, in some cases, decades, the Corps blocked reviews mandated by laws such as the Endangered Species Act, National Environmental Policy Act, Clean Water Act, and National Historic Preservation Act. Marshall is represented by Public Employees for Environmental Responsibility (PEER). Marshall's disclosure also lays out how the absence of meaningful oversight has led to serious damage to the Willamette, Columbia, and Rogue River watersheds, by:

- Decimating impacts on federally protected fish populations
- Spawning hazardous algae bloom outbreaks
- Stripping protections from historic properties and archaeological resources
- Introducing and spreading invasive species
- Contaminating surface waters with arsenic, mercury, and other toxic elements from residual stockpiles left after the dams were constructed
- Aggravating adverse effects of climate change

After Ms. Marshall reported these legal violations to Corps senior managers, they chose to take no action but instead bullied and harassed her, including requiring her to wear a HAZMAT suit to work after she suffered severe reactions to chemicals used in an office remodeling. In frustration over stonewalling and mistreatment, she took early retirement in 2017.

"By shirking its legal obligations, the Corps also completely shut the public and stakeholders out of the decision-making process for these highly consequential facilities," stated Pacific PEER Director Jeff Ruch, noting that the Corps took the position that because the dams and other facilities were built decades ago they no longer needed to be reexamined. "The Corps has allowed 'zombie' dams to plod on for decades without any check on the havoc they wreak. We owe Jody Marshall a debt of gratitude for sacrificing her career to expose this entrenched and damaging dysfunctional management of water resource facilities."

In forwarding Ms. Marshall's disclosures to the US Army for investigation, the Special Counsel in his Referral for Investigation dated July 9, 2018, found they carried a "substantial likelihood that the information provided to OSC discloses a violation of law, rule or regulation." *See* www.peer.org/wp-content/uploads/2020/08/8_27_20_OSC_LTR.pdf . The Special Counsel is now exploring whether the Corps' promises to become compliant are credible and reasonable.

Additional information is available

on PEER's website, including a Supplemental Filing by Ms. Marshall dated August 17, 2020 that includes an Update and Ongoing Violations (see "Latest Developments" on PEER website at: www.peer.org/zombie-dams-imperil-pacific-northwest-waters/).
For info: Jeff Ruch, PEER, 510/ 213-7028; Kirsten Stade, PEER, kstade@peer.org; PEER website at: www.peer.org

WASTEWATER TESTING US
COVID EARLY INDICATION

On October 8, the EPA highlighted two actions that support the water sector and public health in response to the COVID-19 public health emergency. First, the agency is working with federal, state, and local partners to develop new and emerging wastewater monitoring technologies that can provide an early indication of COVID-19 infections at the community-level to help inform state and local public health decisions. Second, the agency is continuing its support of the operational and financial resiliency of drinking water and wastewater utilities by releasing a voluntary survey to help assess the challenges faced by these entities as a result of COVID-19.

Researchers are working with the Centers for Disease Control and Prevention (CDC) to develop and evaluate methods for detecting different forms of RNA from SARS-CoV-2, the virus that causes COVID-19. Once developed, researchers will use the methods to quantify the levels detected in untreated wastewater. This research also involves interpreting the data generated by these analytical methods and accurately relating virus levels in wastewater to potential infection trends within the community. This work is being conducted in coordination with CDC, US Department of Health and Human Services, and other federal agencies through the National Sewage Surveillance Interagency Leadership Committee. This research, both in the near term and after full validation, can assist local and state decision-making related to COVID-19. While SARS-CoV-2 can be shed in the feces of individuals with COVID-19, there is no information to date that anyone has become sick with COVID-19 because of direct exposure to treated or untreated wastewater.

EPA has been working with the State of Ohio to develop a pilot project wastewater monitoring plan for SARS-CoV-2. Ohio began posting the wastewater monitoring results on its public Coronavirus Dashboard for use by the Governor and state health department as an additional metric for determining public health advisory levels. EPA's collaboration with Ohio not only expands the sampling capacity of the wastewater monitoring effort, but also increases its effectiveness by informing analytical approaches, facilitating interlaboratory comparisons, and standardizing data reporting approaches across utilities and labs. The efforts of early adopting states, like Ohio, are being used by CDC to develop recommended approaches for a SARS-CoV-2 National Wastewater Surveillance System.

To support continued water sector resiliency, EPA is conducting a voluntary survey to learn how drinking water and wastewater utilities across the country have been affected — operationally and financially — by COVID-19. The 2020 COVID-19 Water Sector Survey will help identify and evaluate certain impacts to water utilities stemming from operational and financial challenges. This voluntary survey will facilitate the collection of useful information in a uniform format to guide the development of technical assistance, which could help sustain water utility operations and supports planning for the future. Information collected in the survey will be anonymized prior to any public release.
For info: www.epa.gov/ground-water-and-drinking-water/covid-19-water-sector-survey

WATER REUSE ACTION US
PROPOSED ACTIONS

On October 27 at the *Future of Water Infrastructure and Innovation Summit*, EPA Assistant Administrator for Water David Ross announced four new proposed actions under the National Water Reuse Action Plan (WRAP). The event featured members of the newly formed Water Subcabinet and highlighted, among other issues, the importance of federal coordination on water reuse.

As part of the second quarterly WRAP update, four new proposed actions were released for stakeholder feedback. Action leaders from DOE, EPA, and the Water Research Foundation proposed new actions for development under WRAP.
The proposed actions include:
- Engaging disadvantaged and small communities to evaluate needs and opportunities to improve water security, sustainability, and resilience through water reuse;
- Funding research through the Science to Achieve Results (STAR) program to support safe and sustainable water resources;
- Developing early-stage research on desalination and water reuse treatment technologies to secure affordable and energy-efficient water supplies for the nation from nontraditional water sources, including brackish groundwater, municipal wastewater, produced water, agricultural drainage, and seawater; and
- Sharing information on monitoring practices with the water reuse community, focusing on current and novel monitoring practices and techniques related to finished water quality and treatment process performance in water reuse systems.

The second WRAP quarterly update also featured activities from July through September 2020, highlighting progress that action leaders and partners across the water user community have made to advance reuse. Details on the four newly proposed actions and information about WRAP implementation can be found on the WRAP Online Platform. WRAP is a collaborative initiative representing the efforts of 29 unique action leaders and 80 partnering organizations across the federal, state, tribal, and local levels to enhance and strengthen the security, sustainability, and resilience of our nation's water resources. The update on the collaborative implementation of the National Water Reuse Action Plan is available at: www.epa.gov/waterreuse/national-water-reuse-action-plan-quarterly-update.
For info: EPA website at: www.epa.gov/waterreuse/water-reuse-action-plan

WATER BRIEFS

FORBEARANCE FLOWS CA INSTREAM FLOWS

On October 15, CalTrout announced the latest results from a program which uses short-term forbearance agreements to secure water for salmon. Under these agreements, landowners and water rights holders leave water instream for salmon in exchange for fair compensation. Because forbearance agreements are contracts negotiated directly between CalTrout and landowners (and therefore don't require state agency approval), this leasing method allows CalTrout to secure water quickly and efficiently.

CalTrout and its agency partners knew this was going to be a year when water would be needed. CalTrout used funding from the National Fish and Wildlife Foundation (NFWF) Klamath Basin Restoration Funds to add roughly 640 acre-feet of flows instream, equivalent to approximately 20 cubic feet per second (cfs) of additional water in Shasta River for fall Chinook salmon in the last two weeks of September.

Generally, salmon in the Shasta River need water during the last couple weeks of September. Salmon need water in the lower Shasta where adult fish tend to hold as they enter the river, congregating in pools until flows improve at the end of the irrigation season. In the Shasta and Scott Valleys, the irrigation season ended on October 1st. It was a rough season for fish in both watersheds. Flows in the Shasta River in mid-September — the beginning of the fall Chinook salmon run — were lower than Ada Fowler, CalTrout's Mt. Shasta/Klamath Project Manager, has ever seen in 12+ years working with the Shasta Fall Flow Program.

On September 15, before the forbearance agreements were initiated, flows in the Shasta River were less than 13 cfs. Once the forbearance water was left instream, flows doubled in the lower Shasta and by the 30th flows were averaging between 35-40 cfs. California Dept of Fish and Wildlife has a video counting weir at the mouth of the Shasta that records Chinook salmon entering the Shasta — during the last two weeks of September over 1500 adult Chinook entered. The additional water left instream by landowners significantly improved conditions for those adults (see Willis et al, 2015, *Instream Flows: New Tools to Quantify Water Quality Conditions for Returning Adult Chinook Salmon*).

This season was also very tough for juvenile coho salmon trying to survive in the Scott River in extremely low flows. CalTrout and its partners, the Scott River Water Trust and the Scott River Watershed Council, were awarded Emergency Funding from PacifiCorp and National Fish and Wildlife Foundation (NFWF) Coho Enhancement Funding to again use short-term forbearance agreements to leave water instream for these rearing juvenile coho. This funding allowed CalTrout and partners to collaborate with willing landowners in critical tributaries of the Scott River Watershed. In one critical tributary system, CalTrout was able to negotiate with many of the high priority water users to have them leave water instream. With their help, the pools stayed connected and kept young coho salmon healthy. Having so many cooperating landowners had not happened previously; CalTrout attributed that to the work of its partners.

For info: CalTrout website: https://caltrout.org/; NFWF website: www.nfwf.org

ENERGY CONSERVATION US TRUMP ON SHOWERHEADS

The US Department of Energy (DOE) published a notice of proposed rulemaking in the Federal Register on August 13th to revise energy conservation standards for showerheads by instituting a new regulatory definition for the statutory term "showerhead." The existing definition requires that the flow of the entire showerhead unit shall not exceed 2.5 gallons per minute (gpm). The proposed definition, however, applies the 2.5 gpm standard to each individual nozzle, allowing unlimited total flows.

The Energy Policy Act of 1992 set the maximum flow rate for showers at 2.5 gpm. The DOE's rulemaking, however, is aiming to change that standard, following comments made a week earlier by President Donald Trump. On August 6, President Trump spoke at the Whirlpool Corporation Manufacturing Plan in Ohio, at one point turning his attention to showers: "And the same thing with sinks, toilets, and showers. You go into a new home, you turn on the faucet; no water comes out. You turn on the shower — if you're like me, you can't wash your beautiful hair properly. (Laughter and applause). You waste 20 minutes longer. 'Please come out.' The water — it drips, right? You know what I'm talking — they put restrictors on. I got rid of that. I signed it out. That's common sense." (*See* Remarks at: www.whitehouse.gov/briefings-statements/remarks-president-trump-whirlpool-corporation-manufacturing-plant/).

Meanwhile, the International Association of Plumbing and Mechanical Officials (IAPMO), a "nearly 100-year old trade association that is an important voice in [the] plumbing industry" submitted comments to the DOE on October 12th objecting to the proposal. "Such high flow showerhead devices, which under the Department's revised test procedures, will be permitted to flow at unlimited flow rates as long as each outlet has a maximum flow rate of 2.5 gpm, can result in serious plumbing system performance concerns in buildings, especially new buildings with properly sized plumbing systems designed for modern water efficient plumbing products and appliances... The plumbing industry, led by IAPMO, is currently working hard along with academia, public health experts and other stakeholders to address the fact that our plumbing systems are grossly oversized. Oversized plumbing systems contribute to wasted water and energy use, increased water aging and declining water quality in our nation's buildings."

Leading water expert Robert Glennon of the University of Arizona, weighed in on the proposal in a commentary dated September 2nd. "The sad part of this foolishness is that the Environmental Protection Agency's WaterSense program, which identifies water-efficient projects and promotes water conservation, has been spectacularly successful, at virtually no cost to consumers or the regulated community. Showers constitute 17% of residential water use. That's 40 gallons per day for the average family, or 1.2 trillion gallons annually in the United States."

For info: Glennon Commentary available at: https://robertglennon.net/

CALENDAR

November 16-17 WEB
Endangered Species Act, Wetlands, and Stormwater Regulatory Compliance for Energy & Utilities Course, Navigating ESA Permitting Processes. For info: www.euci.com

November 17 WEB
Digital Solutions to Climate and Water Challenges Webinar - GreenTech Conference (FREE), 2:00 pm - 3:15 pm ET. Presented by Marten Law & Environmental Law Institute; Register at: https://my.demio.com/ref/VNumklsnttUt1TGM. For info: www.greentechconference.org/webinar-series

November 17 US/WEB
Troubled Water Webinar, Part 3: "What's Wrong With What We Drink, and What Can Be Done", 2:00 pm ET. Presented by Global Water Works. For info: www.workcast.com/register?cpak=1448147292306883

November 17 WEB
6th Annual Tribal Natural Resource Damages Assessments Seminar, Interactive Online Broadcast. For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

November 17-19 WEB
NACWA 2020 National Clean Water & Enforcement Seminar, Virtual Event. National Association of Clean Water Agencies Event. For info: https://www.nacwa.org/20law

November 18 WEB
AWRA-WA November 2020 Virtual Lunch Meeting: Pilchuck River Dam Removal: A River Reconnected, Speaker: Brett Shattuck; Noon to 1:00 pm PT. Presented by American Water Resources Assoc. - Washington Section. For info: www.waawra.org

November 19 WEB
Water Law Institute Webinar, Presented by the Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org/conferences

November 19 WEB
Wild & Scenic Film Festival, Online. Hosted by the Upper Willamette Stewardship Network. For info: mckenzieriver.org/events

November 19 WEB
Eastern Boot Camp on Environmental Law Webinar, Substance & Practice of Environmental Law; Afternoon Sessions on Nov. 5, 12 & 19. Presented by Environmental Law Institute; Registration Required by Oct. 23rd. For info: www.eli.org

November 20 WEB
California Land Use Law & Policy Conference 2020 - Webinar: "Land Use 2020: The Housing Crisis, COVID-19, CEQA, and Endangered Species Take Center Stage", Register at: https://argentco.com/2020cluconference/. Presented by Best Best & Krieger. For info: www.bbklaw.com

December 1 WEB
"Where Are We Now? Water Law, Tribal Rights, and Climate Change" - Virtual Workshop, Workshops on 12/1, 12/3 & 12/7 (2 hours each). Presented by The Center for Environmental Law & Policy. For info: www.celp.org

December 1-2 WEB
Water Utility Resilience Virtual Forum, Presented by National Assoc. of Clean Water Agencies. For info: https://www.waterresilienceforum.org/

December 3 WEB
"Where Are We Now? Water Law, Tribal Rights, and Climate Change" - Virtual Workshop, Workshops on 12/1, 12/3 & 12/7 (2 hours each). Presented by The Center for Environmental Law & Policy. For info: www.celp.org

December 3-4 WEB
Long-Term Financial Planning for Municipal/ Public Water & Wastewater Utilities, Benefits & Funding Sources. For info: www.euci.com

December 3-4 WEB
PFAS Litigation in California Webinar, Virtual Via Interactive Zoom Broadcast. For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

December 7 WEB
"Where Are We Now? Water Law, Tribal Rights, and Climate Change" - Virtual Workshop, Workshops on 12/1, 12/3 & 12/7 (2 hours each). Presented by The Center for Environmental Law & Policy. For info: www.celp.org

December 7-8 WEB
CEQA Conference 16th Annual - Vitual Event, Morning Event. For info: CLE International, 800/ 873-7130 or www.cle.com

December 9 WEB
Creating the Water Workforce of the Future: Technology Adoption - It's All About the People (EPA Webinar Series), 11:00 am - 12:30 pm Eastern Time. New Technologies & Staff Training; Series Available at: www.epa.gov/sustainable-waterinfrastructure/water-sector-workforce. For info: Jim Horne, EPA, 202/ 564-0571 or horne.james@epa.gov; Webinar Register at: https://rossstrategic.zoom.us/webinar/register/WN_KD9z55A1RbuBF1FAsTwZ7w

December 10 WEB
Western Governors' Association 2020 Winter Meeting, Virtual Event. For info: https://westgov.org/

December 10-11 WEB
9th Annual Advanced Conference on Litigating Natural Resources Damages, Interactive Online Broadcast. Special Panel on Deepwater Horizon After 10 Years. For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

December 14-15 TX
Pipeline Leak Detection 2020: Advances in Crude Oil & Gas Pipeline Technology Summit, Houston. Hotel Derek. For info: http://texas.pipeline-leak-detection.com/?join=VR

The Water Report
Water Rights, Water Quality & Water Solutions in the West
260 N. Polk Street • Eugene, OR 97402

CALENDAR

(continued from previous page)

January 21-22 WEB
California's Changing Coastal & Shoreline Management - Legal and Regulatory Insights and Responses Seminar, Live Webcast Broadcast from San Francisco. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

January 28-29 WEB
Endangered Species Act Conference - 28th Annual - Live Webcast, For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

January 28-29 WEB
Electric Power in the West, Interactive Online Broadcast. For info: Law Seminars International, 206/ 567-4490, registrar@lawseminars.com or www.lawseminars.com

March 4-5 OR & WEB
The Mighty Columbia Seminar, Portland. Available Via Live Webcast; PROMO Code SPP50 for $50 off for *TWR* Readers. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

March 23-26 TX
Western States Water Council Spring 2021 (195th) Meeting, El Paso. Hopes to Return to In-Person Meeting. For info: www.westernstateswater.org/upcoming-meeings

April 19 WEB
12th National Water Quality Monitoring Conference - "Working Together for Clean Water", National Water Quality Monitoring Council Event. For info: www.nalms.org/2021nmc/

April 19-22 CA
2021 AEP California State Conference: Planting the Seeds of Knowledge, Yosemite. Presented by Assoc. of Environmental Professionals. For info: www.califaep.org/programs.php

April 19-23 WEB
12th National Monitoring Conference: Working Together for Clean Water, Virtual Event. Presented by the National Water Quality Monitoring Council. For info: https://acwi.gov/monitoring/ or https://www.nalms.org/2021nmc/

April 25-May 1 DC
Water Week 2021, Washington. TBA. Presented by National Assoc. of Clean Water Agencies. For info: www.nacwa.org/conferences-events/events-at-a-glance