

The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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PHOENIX WATER SERVICES

INTERVIEW WITH KATHRYN SORENSEN, DIRECTOR
CITY OF PHOENIX WATER SERVICES DEPARTMENT

Editors' Introduction: Recently, Kathryn Sorensen, Director of the City of Phoenix Water Services Department, graciously took the time to answer *The Water Report's* questions concerning the City of Phoenix's water management and how her department is addressing the challenges of 2020. We offer our sincere thanks and appreciation for her time and service.

Introduction

PHOENIX WATER SERVICES OVERVIEW

(Q) What is the population served by Phoenix Water Services (Water Services, or Phoenix Water, or PWS)?

Phoenix Water Services provides safe, clean drinking water for approximately 1.7 million people. Water Services also provides wastewater collection services within the City of Phoenix (City), and reclaims wastewater for approximately 2.5 million people in the Valley of the Sun.

Q: What is the per capita use per day of the City of Phoenix's water users? Has consumption been reduced in the last twenty years?

Phoenix's gallons per capita per day (GPCD) stands at 169 today, a number that includes all customers — residential, commercial, and industrial. Phoenix's GPCD use of water has fallen roughly 30% over the last twenty years. Phoenix customers used less water in 2018 than in 1997, despite adding 400,000 residents to our population.

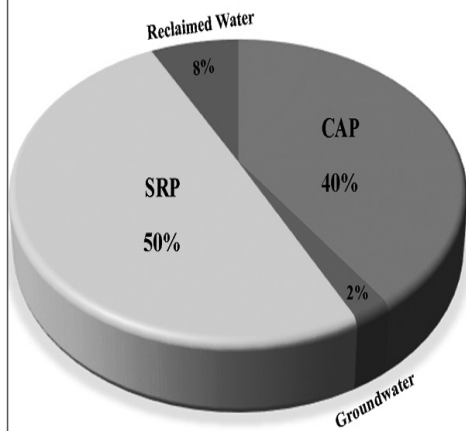
Q: Please describe, in general, the extent of the Water Services' system.

Phoenix operates one of the largest water and sewer utilities in the country — running and maintaining 7,000 miles of water pipelines, 440,000 service lines, 5,000 miles of sewer lines, 8 treatment plants, hundreds of pump stations, wells, and reservoirs, and 50,000 fire hydrants. After the water leaves the water treatment plant it enters the Phoenix water distribution system, which is comprised of about 7,000 miles of water mains, 70 reservoirs, 110 booster pump stations, 50,000 fire hydrants and 119,000 valves. Phoenix's water and sewer rates are among the lowest of comparable-sized cities nationwide.



Kathryn Sorensen

PHOENIX WATER SOURCES 2012-2015 AVERAGE



"100-Year" Supply

Water Availability

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Water Supply & Conservation

Q: What is the percentage of the water supply of Phoenix Water Services from its sources of water?

- 58% - Salt River Project (Salt and Verde Rivers)
- 40% - Central Arizona Project (Colorado River Water)
- 2% - Groundwater

Q: What are the most important water supply concerns and how is Phoenix Water addressing those concerns?

Water shortages on the Colorado River are the biggest concern. Arizona holds the most junior rights to Colorado River water and will be the first to realize cuts. Several strategies are underway to mitigate this risk including:

- Developing the infrastructure necessary to deliver Salt and Verde River water supplies to areas that today are entirely dependent on Colorado River water supplies;
- Exchange agreements with other water providers (i.e. the Phoenix-Tucson water exchange);
- Recharging local aquifers, and expanding our well capacity to increase groundwater pumping during periods of surface water supply shortages
- Ramping up our water conservation efforts; and
- Continuing to partner with local Indian communities, irrigation districts, the state, and other cities to ensure regional collaboration in water resource planning.

Q: Please explain Arizona's "100-Year Supply" rule and how it works for Phoenix Water Services.

In 1995, Arizona's Assured Water Supply (AWS) Rules became effective. These Rules require a demonstration of at least 100 years of renewable water supplies before land can be subdivided for new development. Phoenix's success in water resource planning led the State of Arizona to grant a "Designation of Assured Water Supply" to the City in 1998. This "designation" was reconfirmed in 2010, and attests that Phoenix maintains sufficient water supplies to serve existing customers and all anticipated growth occurring through the year 2025 (the furthest date considered by the State at that time) for at least 100 years. More recent data concludes that sustainable water supplies exist for all growth currently anticipated through 2070 for at least 100 years under normal supply (non-shortage) conditions. Arizona's Assured Water Supply Rules are among the most progressive in the world, and probably the first to tie water availability to the ability to grow (subdivide land).

Q: Is the Assured Water Supply program an integral part of the supply strategy?

"The Assured Water Supply program in particular has provided Valley residents, local businesses, and potential investors with certainty and stability for the past 35 years: under the program, cities and developers must demonstrate a 100-year water supply before developing new land." (From Mayor Stanton's presentation in 2016).

Q: What conservation or efficiency programs has Phoenix Water Services implemented or have future plans for?

Our water conservation programs are extensive and long-standing. When it comes to conservation, we have focused on changing culture through education and outreach. We don't want our customers to react to hydrology. Rather, we want them to use water wisely, every day, as a way of life in the desert.

The use of Hydrogel technology is just one small example of the many conservation programs PWS has implemented. We have a conservation team solely dedicated to conservation outreach and education in our community. This can include presentations at community events and schools. In 2018, PWS provided conservation education to nearly four thousand students; provided 20 tours at our various facilities; attended nearly 30 community events; and provided roughly 40 conservation workshops in the community. Some other notable conservation programs include the Water Smart HOA program, designed to increase a Home Owners Association's landscape water irrigation efficiency and the Water Smart Business program, which provides a free water efficiency check-up for businesses.

Cutting-Edge Lawn Water Conservation

Phoenix Water Services was the recipient of an approximately \$100,000 grant by the US Bureau of Reclamation for an innovative water conservation program. The grant will allow Water Services, in partnership with Arizona State University (ASU), to pilot new technology to reduce lawn water usage between 40 and 45 percent, based on results experienced in California. The press release "*Cutting-Edge Water Conservation Technology to be Piloted in Phoenix*" (8/22/19) is available at: www.phoenix.gov/news/waterservices/2396.



PHOENIX WATER SERVICES

- WHAT WE DO #1**
SUPPLY QUALITY DRINKING WATER
- WHAT WE DO #2**
PROVIDE EXCELLENT CUSTOMER SERVICE TO 1.7 MILLION RESIDENTS
- WHAT WE DO #3**
ENSURE RELIABLE INFRASTRUCTURE THROUGH CAPITAL IMPROVEMENT PROGRAMS
- WHAT WE DO #4**
ENSURE SUSTAINABLE AND RESILIENT WATER SUPPLIES
- WHAT WE DO #5**
PROVIDE WASTEWATER COLLECTION AND TREATMENT FOR 2.5 MILLION VALLEY RESIDENTS
- WHAT WE DO #6**
WATER CONSERVATION EDUCATION
- WHAT WE DO #7**
REGULATORY COMPLIANCE FOR CITY'S STORM SEWER SYSTEM
- WHAT WE DO #8**
USE BEST PRACTICES FOR ENVIRONMENTAL STEWARDSHIP

PHX WATER SMART LEARN MORE: WWW.PHOENIX.GOV/WATER

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/PHXWATER

Q: How does the Arizona Water Banking Authority (AWBA) work for the City of Phoenix?

Beginning in 1997, the AWBA began storing Arizona's unused Colorado River entitlement underground and, today, it has stored and accrued credits for over 4 million acre-feet of water for future use when backup supplies are needed. During shortage, these credits can be used to replace portions of reduced Colorado River supplies by allowing recipients of the credits to pump the water previously stored underground. However, the AWBA needs to expediently work with the Arizona Department of Water Resources and municipal and industrial users, including Phoenix, to develop a detailed recovery plan that clarifies how restored credits will be apportioned and delivered to users when needed during shortage conditions.

Q: Is groundwater used as a reserve for Phoenix?

Yes. Phoenix intentionally uses renewable surface water supplies today so that fossil groundwater supplies can be saved for the future. Approximately 40 years ago Phoenix invested in the surface water treatment plants and other infrastructure that allows us to use renewable surface water supplies instead of fossil groundwater supplies, which are intentionally saved as a source for the future. [Editor's Note: "Fossil" groundwater is ancient, typically undisturbed, groundwater.]

Q: Blending Sources: Are all the water sources of Phoenix blended for drinking water (groundwater, Colorado River, etc.)?

The mix of supplies that a Phoenix Water customer receives depends on the time of year and that customer's location in our service territory. There is some mixing of Salt, Verde, and Colorado River water in our system, but for the most part customers receive either Salt and Verde River water or Colorado River water. Very little groundwater is used.

Q: Does Phoenix Water Services blend Central Arizona Project and Salt River Project (SRP) water?

Phoenix receives Colorado River water through the Central Arizona Project aqueduct. Colorado River water is treated at our Union Hills and Lake Pleasant water treatment plants and delivered mostly in north Phoenix. Salt and Verde River water supplies are delivered through the Salt River Project canal system to our Val Vista, 24th Street, and Deer Valley Water Treatment Plants, which are all located on the SRP canals.

Q: What is the purpose of the Tucson/Phoenix Exchange and how it is implemented?

Water Exchange - Mayor Stanton's Speech (2016): "Phoenix and Tucson — traditional rivals — are now collaborating through an innovative water exchange to better serve Arizona's two largest population centers. Through the agreement, Phoenix stores some of its currently unused Colorado River supplies in Tucson aquifers. This stored water supports groundwater levels in the Tucson area, decreasing Tucson's costs in operating its wells. In return, if there is a future shortage on the Colorado River, Tucson will send an equivalent portion of its Colorado River water to Phoenix surface water treatment plants. In all, the exchange allows our two cities to leverage infrastructure costs and use our respective competitive advantages — this is the cutting-edge of water management policy."

Phoenix Water

Aquifer Storage

Q: What amount of water has been stored in the aquifers?

As of 2018, about 80,000 acre-feet has been stored in Tucson aquifers.

Q: What accounting methodologies are employed for the stored water?

There is a five percent cut allotted to the aquifer, with 95% of water stored accrued as credit.

Q: Aquifer Recharge: Does Phoenix Water Services have any aquifer recharge programs besides the Tucson/Phoenix Exchange?

There is a similar agreement with the City of Avondale. Phoenix also recharges local aquifers in partnership with the Salt River Project and others.

Regional Drought Plan

Drought & Climate Change

Q: How does the new Colorado River Drought Contingency Plan affect Phoenix Water Services?

The Drought Contingency Plan (*see* sidebar below) reduces the risk of extreme shortages on the Colorado River system but does not eliminate the risk. The Colorado River remains significantly overallocated and scientists tell us that flows of the river may diminish by as much as 25% as the climate warms. It is for this reason that Phoenix Water Services is developing infrastructure that allows us to move water supplies from the Salt and Verde Rivers to portions of our service territory that today are entirely dependent on Colorado River water.

Q: Explain the plan for the “Phoenix Drought Pipeline Project” (DPP).

The Drought Pipeline Project (DPP) is part of the City’s preparation for resiliency in a hotter, drier future and is essential to public health and economic vitality in Phoenix. The improvements will provide more flexibility to move Salt and Verde River water supplies to areas that are currently entirely dependent on Colorado River water. New and improved infrastructure will ensure Phoenix Water can provide clean, reliable drinking water for all customers, come what may on the Colorado River. The magnitude and length of shortages on the Colorado River are unknown. The DPP will ensure that when shortages occur, there will be no service interruption to our customers, no matter where they are in our service area.

DPP Improvements include:

- 12 miles of new transmission mains
- 4 water booster pump stations to transport and boost clean water throughout the water distribution system
- Pressure-reducing valve stations — Regulate and maintain safe water pressure to provide better water distribution
- Engineering design for the improvements commenced in early 2019, and construction is anticipated to occur from early 2020 through the end of 2022

Drought Pipeline Project

Climate Change

Q: Addressing Climate Change - Has Phoenix Water Studies studied the impact of climate change on its existing programs or made plans for new programs to specifically address climate change?

Scientists tell us the flows of the Colorado River will diminish by as much as 25%. We are preparing for this contingency by building the infrastructure that allows us to move Salt and Verde River water supplies to areas that today are entirely dependent on Colorado River water supplies. Also, see our answers to questions above regarding water supply concerns and aging infrastructure for additional information.

Colorado River Basin Drought Contingency Plan

The Colorado River Basin Drought Contingency Plan is a collection of agreements within and among the seven western states in the Colorado River Basin. A principal aim of these coordinated plans is to boost storage levels in Lake Mead and Lake Powell and prevent the reservoirs from reaching critically low levels. On March 19, 2019, the Governors’ representatives of the seven Colorado River Basin States (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) and key regional water districts formally submitted the Drought Contingency Plan to Congress requesting immediate implementation. See: Kowalski & Snyder, *TWR* #179 and Editors’ Article, *TWR* #182.

Phoenix Water

Aging Infrastructure

Infrastructure Upkeep

Q: Aging Infrastructure: On the Water Services' website I noticed a reference to Phoenix's "Aging infrastructure" and the statement, "Our critical infrastructure is aging and needs to be replaced." What are the most important parts of your infrastructure that need to be replaced? What are PWS' current plans to address those infrastructure needs?

It's all equally important. We continually work to develop and maintain water and wastewater systems that are reliable with adequate redundancy and resiliency to ensure quality service to the customer. We have a rigorous pipeline replacement program to address our aging pipelines, which is important because Phoenix Water maintains 7,000 miles of water pipelines and 5,000 miles of sewer pipelines. Phoenix is increasing the amount of money we are putting toward the replacement or rehabilitation of aging pipelines. Approximately 75% of our five-year Capital Improvement Program will be directed towards advanced renewal of our infrastructure and ensuring the reliability of our water services for future generations.

Q: How is Phoenix Water Services approaching its water infrastructure planning?

With shortages looming on the Colorado River, we must build the infrastructure needed to pump and move alternative water supplies to portions of our distribution system normally served with Colorado River water. Although people think of Phoenix as a young city, its water utility has been in operation for more than 110 years. Our water infrastructure is aging, with some pipes as old as 100 years, still servicing residents. To ensure reliable deliveries of clean, safe water to our community, we must continue to invest in the replacement and rehabilitation of aging infrastructure.

Rate Increase

Water Rates

Q: How much was the recent rate increase?

On January 9, 2019, the Phoenix City Council approved a 6% percent water rate increase in 2019 and a 6% water rate increase for 2020. This rate roughly translates into a monthly increase of \$2.00 in 2019 and an additional monthly increase of \$2.37 in 2020 for the average residential water customer.

Water Rate Increase: Statement from Water Services website:

What will the extra funding from the rates increase be used for?

Phoenix Water spends 60% of its annual budget on capital infrastructure, to ensure the delivery of water supplies, and to safely remove wastewater from our homes. In order to ensure reliable deliveries of clean, safe water to our community, we must continue to invest in the replacement and rehabilitation of our infrastructure. In addition to aging infrastructure, the cost of raw water supplies, electricity and chemicals are increasing.

We also expect the cost of Colorado River water to increase as we face shortages in the coming years.

As with any water and wastewater utility, the need to periodically increase water rates is driven by the need to invest in aging infrastructure.

Costs

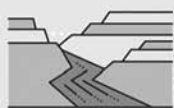
WATER QUALITY

DRINKING WATER & WASTEWATER - TREATMENT & MONITORING

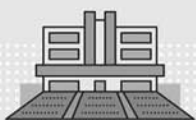
The City of Phoenix provides drinking water to more than 1.5 million people within our 540 square-mile service area. On average, about 95 percent of Phoenix's water comes from surface water (lakes and rivers) and the remaining water comes from groundwater (wells). Each May, the City distributes and posts to the web a Water Quality Report that contains important information about the quality of your water. Phoenix is committed to providing the highest quality drinking water and service to our customers. Excerpts from Phoenix Water Services website (2020); Water Quality Report available at: www.phoenix.gov/waterservices/waterquality/water-quality-reports

Drinking Water Quality Report

WHAT WE DO: THE DRINKING WATER SYSTEM



1 OUR MAIN WATER RESOURCES COME FROM THE VERDE, SALT AND COLORADO RIVERS



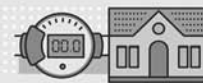
2 WATER SOURCES ARE THEN DIRECTED TO 1 OF 5 PHOENIX WATER TREATMENT PLANTS



3 WE ENSURE THE PHOENIX WATER SUPPLY IS DELIVERED WITH THE HIGHEST QUALITY



4 WE MANAGE AND MAINTAIN DISTRIBUTION TO MEET DEMAND AND ENSURE SUPPLY FOR FIRE PROTECTION



5 CUSTOMER ACCOUNTS ARE MANAGED AND SERVICED THROUGH A METERING SYSTEM

Phoenix Water

Quality Issues

Q: What are the water quality issues or problems that Phoenix deals with regularly? How does Phoenix Water Services address those quality issues?

From the customer point of view: The Environmental Services Division (ESD) receives two most common concerns. One is for hardness/total dissolved solids (TDS). The US Environmental Protection Agency (EPA) establishes a Maximum Contaminant Levels (MCL) for various parameters that all public water systems must comply with. These are enforceable standards. EPA also establishes Secondary MCL's for various parameters that all public water systems may comply with. These are not enforceable standards but rather, recommended standards. Secondary MCL's are those things associated with aesthetic effects such as odor, color, scaling, and others. TDS has a Secondary MCL of 500 Mg/L. TDS itself is associated with hardness, deposits, color, staining, and salty taste. These minerals are naturally occurring in the strata and are imparted in the water as the water flows across the strata. The City does provide filtration of the drinking water during the treatment process. The City of Phoenix drinking water is constantly tested to ensure it meets very stringent regulations. Over 5 million analytical tests a year are performed to ensure it meets all federal and local regulations.

See ESD website at: www.phoenix.gov/waterservices/envservices.

Turbidity

From the treatment point of view: Occasionally, the Phoenix area experiences heavy rainfall that can lead to runoff into the surface water that we treat for drinking water. The heavy rainfall causes elevated turbidity, or cloudiness in the water. We address this issue by monitoring weather and streamflow data, and by taking samples of the water in the rivers or canals before it reaches the treatment plants. We then devise treatment strategies by testing different chemical doses to see what best treats the water that is entering the canal system. This advance monitoring and testing ensures that we can continue to produce clean drinking water, even during heavy storms.

Disinfection Byproducts

Another occasional problem is that the runoff from storms can lead to elevated organic carbon content in the water, even after the cloudiness has settled. This can cause elevated disinfection byproducts, such as Trihalomethanes, when the treated water is disinfected with chlorine. In Phoenix, we carefully monitor and control treatment to ensure that the average for total Trihalomethanes stays below the Maximum Contaminant Level for all locations in our large distribution system. This requires frequent monitoring at the plants and throughout the distribution system, especially during the hottest months of the year, because the Trihalomethanes form more rapidly in higher temperatures.

Algae

Q: Does Phoenix experience algae, chromium-6, or other quality issues?

Algae are naturally occurring in freshwater lakes, rivers, and streams, as well as man-made structures such as canals. Any body of water that has sufficient nutrients, sunlight, and a high enough water temperature can grow algae. Most algae are not harmful, but can be a nuisance as far as clogging screens at the treatment plant or leaving taste and odor compounds behind. Some algal blooms can be harmful, particularly those with a type of blue-green algae called cyanobacteria. Phoenix recently completed several rounds of testing for cyanotoxins during the most recent Unregulated Contaminant Monitoring Rule (UCMR 4), and we did not have any cyanotoxin detections in our drinking water.

Algae is not a frequent problem for Phoenix. It can cause aesthetic issues such as taste and odor, as mentioned below. We occasionally have some taste and odor compounds depending on algal activity and the manner in which the water is released to us by the water supplier (e.g. whether it is released from the top or bottom of the lakes). When water is released from the top of the lake, more taste and odor compounds can be present due to algae growing in the top layer of the lakes.

Algae Treatment

Algae is removed during treatment at the water treatment plants, through coagulation, flocculation, sedimentation, and filtration. Taste and odor compounds are removed using activated carbon, either before, during, or after filtration.

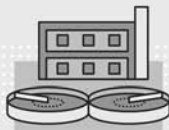
Chromium-6

Chromium-6: EPA has set a Maximum Contaminant Level (MCL) of 0.1 mg/l (100 parts per billion) for Total Chromium but does not have a separate standard for Chromium-6. However, Phoenix Water has tested for Chromium-6 through the EPA's Unregulated Contaminant Monitoring Rule. Based on this round of sampling, Chromium-6 levels in Phoenix drinking water delivered to customers ranges from a low of 0.13 parts per billion (ppb) to a high of 1.6 ppb and average of 0.39 ppb. These numbers are well

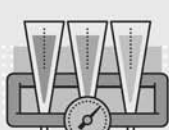
WHAT WE DO: THE SANITARY SEWER SYSTEM



1 WASTEWATER MOVES FROM HOMES, SCHOOLS AND BUSINESSES INTO THE SANITARY SEWER SYSTEM



2 WASTEWATER IS TREATED TO THE HIGHEST STANDARDS IN 1 OF 3 PHOENIX WASTEWATER TREATMENT PLANTS



3 WASTEWATER IS SCREENED, FILTERED AND DISINFECTED INTO HIGH QUALITY RECLAIMED WATER



4 RECLAIMED WATER COOLS POWER PLANTS, IRRIGATES CROPS AND RECHARGES RIVERS



5 WE SUSTAINABLY REUSE BIO-SOLIDS FOR FERTILIZER AND BIO-GAS FOR POWER

<div>Phoenix Water</div> <div>Reclaimed Water</div> <div>Wetlands Treatment</div> <div>"Purple Pipes" Reuse</div> <div>Cooling Water</div> <div>Stormwater</div> <div>Sludge Use</div> <div>Biogas Facility</div>	<p>below California's MCL of 10 ppb. Chromium in the Valley of the Sun is naturally occurring and when present, comes mainly from wells. Phoenix pumps very little groundwater.</p> <p>Q: Does the treated wastewater discharged from Phoenix's wastewater plants end up in Phoenix's water treatment plants or groundwater?</p> <p>Wastewater is treated and beneficially used. Reclaimed water is treated wastewater that is beneficially reused. All of the wastewater treated at the City of Phoenix treatment plants is reused. It is used for the cooling towers at Palo Verde, wetland restoration, or for irrigation for non-edible crops. Non-edible crops include hay, alfalfa, cotton, grass, etc.</p> <p>The treated wastewater, also known as effluent, is discharged for either inedible crops, irrigation, to replenish natural habitats such as the Tres Rios Environmental Wetlands, or as cooling water for the Palo Verde Nuclear Generating Station. Some of the water discharged to the Salt River from Phoenix's two wastewater treatment plants may percolate into the groundwater. However, there are few, if any, potable water supply wells that would intercept the percolated water. Phoenix uses very little groundwater for its tap water supply. Over 95% of Phoenix's tap water supply is from precipitation up north that becomes surface water.</p> <p>Phoenix Water Services Statement (3/26/12).</p> <p>Tres Rios Environmental Wetlands is a constructed wetlands. It is part of the treatment process of the plant and uses nature to polish the effluent.</p> <p>Q: Reclaimed Water: How does Phoenix Water Services utilize reclaimed water?</p> <p>Approximately 40 percent of water delivered to all Phoenix customers ends up at one of the City's two operational wastewater treatment plants and is treated for other uses. Nearly all of this water is used to meet non-potable water demands in the Valley (as described above). Currently, the City of Phoenix irrigation program is through irrigation districts. However, when the Cave Creek Water Reclamation plant is returned to service, many parks and golf courses in the North East part of the city will be watered using reclaimed water. These facilities are supplied with irrigation water through "purple pipes." [Editor's Note: "Purple pipes" distinguish reclaimed water supply pipes from other water lines].</p> <p>Most of the reclaimed water from the 91st Avenue Wastewater Treatment Plant is delivered to Palo Verde Nuclear Power Plant for cooling purposes.</p> <p>Q: What is the level of treatment needed prior to use as cooling water?</p> <p>Class B effluent from the 91st Ave WWTP is used for cooling water. At present, approximately 80,000 acre-feet (AF) of effluent is used per year.</p> <p>Q: How does Phoenix currently handle its stormwater — is it treated or captured for reuse? Are any "green infrastructure" programs in place?</p> <p>Since the 1980s, Phoenix has required new developments to retain the 100-year, 2-hour rain event onsite (<i>see</i> Phoenix Stormwater Policies and Standards Manual: available at: www.phoenix.gov/streets/reference-material/sw-manual). Therefore, onsite retention and infiltration has been implemented for decades. Low Impact Development (LID) and Green Infrastructure (GI) is encouraged, but not required (<i>see</i> Phoenix City Code Chapter 32C-110).</p> <p>Q: Does Phoenix Water use sludge for fertilizer?</p> <p>Biosolids are beneficially reused and land applied on non-edible crops.</p> <p>Q: Methane Gas Capture and Use: Ameresco, Inc. plant — Please describe this biogas plant and its development.</p> <p>The City partnered with Ameresco, Inc., to design, build, own, operate, and maintain the largest wastewater treatment biogas-to-renewable natural gas facility of its kind in the nation. The facility is located at the 91st Avenue Wastewater Treatment Plant, which is owned by the Sub-Regional Operating Group (SROG) made up of Phoenix, Glendale, Mesa, Scottsdale, and Tempe. The biogas project processes raw biogas generated in the anaerobic digesters into renewable natural gas (RNG), which Ameresco sells to the vehicle market through the natural gas pipeline grid.</p> <p>The project is expected to produce \$1.2 million in annual revenue, to be shared among the cities that jointly own the 91st Avenue Wastewater Treatment Plant. Approximately 50% of this revenue will go directly to Phoenix.</p> <p>FOR ADDITIONAL INFORMATION: VIELKA ATHERTON, Phoenix Water Public Information Officer, 602/ 261-8681 or vielka.miller@phoenix.gov PHOENIX WATER WEBSITE: www.phoenix.gov/water</p>
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Kathryn Sorenson is the Director of the City of Phoenix Water Services Department. Kathryn oversees one of the largest potable water utilities in the United States, which treats and reliably delivers high quality tap water to 1.6 million customers throughout approximately 540 square miles. Phoenix Water Services also reclaims wastewater for 2.5 million residents in the Valley of the Sun. Kathryn has a PhD in Resource Economics and a Bachelor of Arts in Economics. She serves as a member of the Arizona Water Banking Authority Commission, an Advisory Committee member of Arizona State University's Decision Center for a Desert City, as a member of the State of Arizona's Colorado River Advisory Committee, on the Board of Advisors of the Kyl Center for Water Policy at Morrison Institute, as an Advisory Committee member of the Water Resources Research Center, on the Board of Directors of the Water Research Foundation, on the Board of Directors of the Association of Metropolitan Water Agencies, and as a member of the Rates and Charges Subcommittee of the American Water Works Association.

ESA

ENDANGERED SPECIES ACT

THE BASICS IN DETAIL

by Elizabeth Howard, Schwabe, Williamson & Wyatt PC (Portland, OR)

Editors' Introduction: Author Elizabeth Howard provided the opening "Introduction to the ESA" presentation at The Seminar Group's 27th Annual Endangered Species Act Conference, held January 23rd and 24th in Seattle. Her written materials provided the basis for the following article. As readers will be aware, the present Administration's ESA "streamlining" efforts are engendering significant controversy (see Water Brief, *TWR* #188). This article provides a practical overview of how the ESA functions. Next month we will be providing an update on the ESA's current status.

Purpose

Introduction

Enacted in 1973, the federal Endangered Species Act (ESA) was a response to development and economic growth that was leading to species extinction or the threat of extinction. 16 U.S.C. § 1531(a). It is an ecosystem conservation program designed to conserve and recover species. 16 U.S.C. §1531(a)-(b). The ESA implements these purposes by requiring the federal government to conserve endangered and threatened species, by precluding the import and taking of protected species by "any person," and by encouraging federal cooperation and coordination with State and local agencies. 16 U.S.C. § 1531(c); 16 U.S.C. §1538(a).

Listing Agencies

Listing Threatened and Endangered Species

Under the ESA, at risk species can be designated as "endangered" or "threatened." 16 U.S.C. § 1533. Endangered species are those determined to be "in danger of extinction" and threatened species are likely to become endangered within the foreseeable future. 16 U.S.C. §1532(6), (19). The US Secretary of Interior (hereafter "Secretary"), through the US Fish & Wildlife Service (USFWS), and the US Secretary of Commerce through NOAA Fisheries, make the determination whether to list a species as endangered or threatened — thus, they are sometimes referred to as the "listing agencies." 16 U.S.C. § 1533(a). Listing decisions are published as regulations. 16 U.S.C. §1533(a)(1). Foreign and domestic species can (and are) both listed. [Editors Note: As NOAA Fisheries is sometimes referred to as the National Marine Fisheries Service (NMFS), the "listing agencies" (USFWS and NMFS) are also often collectively referred to as "the Services" within the ESA context.]

Distinct Population Segment (Policy)

Fish, wildlife, and plants can be listed as by species or subspecies. Fish and wildlife can also be listed by a "distinct population segment" (DPS) that interbreeds when mature. 16 U.S.C. § 1532(16). The term "distinct population segment" is not defined by the ESA or in rule, nor is it a scientific term. To fill this gap, the Services (USFWS and NOAA Fisheries) jointly published a policy in 1996, titled the "*Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act.*" 61 Fed. Reg. 47222 (Feb. 7, 1996) (the "DPS Policy"). The DPS Policy provides two factors for designating a population a DPS: discreteness and significance. The DPS Policy has been extensively challenged, reviewed, and upheld by federal courts. *See e.g., Northwest Ecosystem Alliance v. U.S. Fish and Wildlife Service*, 475 F.3d 1136 (9th Cir. 2007).

Evolutionarily Significant Unit

Another conservation or listing unit, is referred to as an "evolutionarily significant unit" (ESU). "[A] stock of Pacific salmon is considered a DPS if it represents an [ESU] of a biological species," in that it is "substantially reproductively isolated from other conspecific population units;" and it "represent[s] an important component in the evolutionary legacy of the species." DPS Policy at 4722; see also 56 Fed. Reg. 58612 (the "ESU Policy").

Listing Petitions

Any person may petition the Services to list a species as threatened or endangered. 16 U.S.C. § 1533(b)(3). Petitions must be supported by scientific or commercial information in order to receive consideration by the Secretary. *Id.* The Secretary has 90 days to determine whether a petition presents "substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. §1533(b)(3)(A). Within 12 months of receiving a petition presenting substantial information, the Secretary must determine whether a listing is warranted or not, or that a listing is warranted but precluded by other pending proposals to list a species. 16 U.S.C. §1533(b)(3)(B). Species under consideration for listing are referred to as candidate species.

Listing Decisions

Listing decisions are to be based on the "best scientific and commercial data available" to the Secretary and require a review of the status of the species as well as efforts being made by a State, political subdivision of a State, or foreign nation to protect such species. 16 U.S.C. §1533(b)(1)(A). The ESA

<div>ESA</div> <div>Listing Factors</div> <div>Delisted</div> <div>Efforts to Protect</div> <div>Critical Habitat</div> <div>Economic Impact</div> <div>Species Occupation</div> <div>Unoccupied Areas Rule</div> <div>"Essential" Areas</div>	<p>requires the Secretary to consider five factors to determine whether a species is endangered or threatened. Any one of the five factors can support a listing determination, though normally multiple factors support the decision. 16 U.S.C. §1533(a)(1).</p> <p>The five ESA listing factors are:</p> <ul style="list-style-type: none"> A) the present or threatened destruction, modification, or curtailment of the species' habitat or range; B) overutilization; C) disease or predation; D) inadequate existing regulatory mechanisms; or E) other natural or manmade factors affecting its continued existence. <p>16 U.S.C. §1533(a)(1); 50 C.F.R. §424.11(c) (2019).</p> <p>Species are reclassified (to endangered or threatened) or delisted based on the same type of data and the same five factors. New rules issued by the Secretary further confirm that there is no higher standard for delisting a species than for listing it in the first instance. 50 C.F.R. §424.11(e)(2) (2019). A species shall also be delisted if extinct or the population no longer meets the definition of species under the ESA. 50 C.F.R. §424.11(e) (2019). The listing agencies are required to conduct a review of each listed species every five years.</p> <p>In both listing and delisting decisions, "[t]he Secretary shall take into account...those efforts" being made by a State, political subdivision of a State, or foreign government "to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction, or on the high seas." 50 C.F.R. §424.11(g) (2019).</p> <p style="text-align: center;">Critical Habitat Designations & Recovery Plans</p> <p>Concurrent with a listing decision, to the "maximum extent prudent and determinable," the Secretary is to designate "any habitat" of the species that is "then considered to be critical habitat." 16 U.S.C. §1533(a)(3). Any person may petition the Secretary to revise a critical habitat designation. 16 U.S.C. §1533(b)(3)(D). A finding as to whether the petition presents substantial scientific information indicating the petition may be warranted is due in 90 days, and a determination as to how to respond to the petition is due 12 months after receipt. <i>Id.</i></p> <p>Critical habitat designations are to be determined based on the "best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat." 16 U.S.C. §1533(b)(2); <i>Bennett v. Spear</i>, 520 U.S. 154 (1997). Any area may be excluded from critical habitat if the benefits of exclusion outweigh the benefits of specifying the area as critical habitat, unless the exclusion will result in extinction of the species. <i>Id.</i>; see <i>Weyerhaeuser Co. v. United States Fish & Wildlife Serv.</i>, 139 S.Ct. 361 (Oct. 1, 2018) (establishing the standard of review for decisions to (or not to) exclude habitat).</p> <p>Land essential to the conservation of endangered and threatened species is to be designated as critical habitat. Critical habitat is the "specific areas within the geographical area occupied by the species at the time it is listed..." with features "essential to the conservation of the species" that may require special management consideration or protection. 16 U.S.C. §1532(5)(A). Critical habitat need not be occupied by the species if the Secretary determines it is essential to the conservation of the species. <i>Id.</i> However, the Act establishes a preference that the Secretary not designate the entire geographical area which can be occupied by the species. 16 U.S.C. §1532(5)(C). Since 2007, roughly 97 percent of critical habitat was occupied at the time of listing. See https://elr.info/news-analysis/48/10953/trump-administrations-proposed-esa-regulations.</p> <p>New rules adopted under the Trump Administration require that all occupied areas be designated before unoccupied areas can be considered and that unoccupied areas only be designated if the occupied areas are insufficient to ensure conservation of the species. 50 C.F.R. § 424.12(b)(2) (2019). According to the summary of the new rule:</p> <p>50 CFR 424.12(b)(2) provides that the Secretary will designate as critical habitat, at a scale determined by the Secretary to be appropriate, specific areas outside the geographical area occupied by the species only upon a determination that such areas are essential for the conservation of the species. When designating critical habitat, the Secretary will first evaluate areas occupied by the species. The Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied would be inadequate to ensure the conservation of the species. In addition, for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species.</p> <p>84 Fed Reg 45020 (2019) (See https://www.federalregister.gov/d/2019-17518/p-23).</p>
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<div>ESA</div> <div>Recovery Plans</div> <div>Revising Plans</div> <div>Section 7 Consultation</div> <div>Biological Assessment</div> <div>Biological Opinion</div> <div>Reasonable & Prudent Alternatives</div> <div>"Incidental Take"</div>	<p>The same rule was in place until 2016 (<i>see</i> www.fws.gov/endangered/improving_ESA/pdf/Designating_Critical_Habitat-2016-02680-02112015.pdf). Further, habitat can only be designated as critical if it is in fact habitat. <i>Weyerhaeuser Co. v. United States Fish & Wildlife Serv.</i>, 139 S. Ct. 361 (Oct. 1, 2018) (only habitable land can be designated as critical habitat).</p> <p>For species “that are most likely to benefit from such plans,” the Secretary is also required to develop recovery plans. 16 U.S.C. §1533(f). Recovery plans are to be developed and implemented to further the conservation and survival of the species. Only where such a plan will <i>not</i> further the conservation of the species may the Secretary choose not to issue a recovery plan. <i>Id.</i> Recovery plans incorporate site-specific management actions to achieve recovery goals, objectives with measurable criteria that could lead to removing the species from the list, and estimated timeframes and cost to carry out the measures needed to achieve the recovery goals. <i>Id.</i> Recovery plans are subject to public notice and comment, and all public comment information must be considered by the Secretary before the plan is finalized. 16 U.S.C. §1533(f)(5).</p> <p>According to The Wildlife Society, “[j]ust over 1,600 U.S. species are listed as threatened or endangered under the ESA, and almost 1,200 of these have active recovery plans.” (<i>See</i> https://wildlife.org/recovery-plans-updated-for-42-species). In 2010, the USFWS developed guidance under which it can revise recovery plans based on new scientific information without having to formally revise the plan in its entirety. The USFWS is currently working to update 182 recovery plans covering 305 species by early 2020 to ensure they include quantitative and measurable recovery criteria. <i>Id.</i></p> <p style="text-align: center;">Consultation: Regulating Acts by the Federal Government</p> <p>Under Section 7 of the ESA, all federal agencies are required to engage in consultation with USFWS (for wildlife and non-anadromous fish) or NOAA Fisheries (for anadromous fish) to insure that any action the agency authorizes, funds, or carries out will not “jeopardize the continued existence” of the species or result in the “destruction or adverse modification” of critical habitat of such species. 16 U.S.C. §1536(a)(2). Each “acting agency” must use the best scientific and commercial data available to meet this obligation. <i>Id.</i></p> <p>As a first step in this “consultation” process, the acting agency prepares a biological assessment to identify any endangered or threatened species that may be adversely affected by its action. 16 U.S.C. §1536(c). The acting agency then determines whether the proposed action is likely to adversely affect (LAA) or not likely to adversely affect (NLAA) the species. In practice, agencies use the biological assessment to evaluate impacts and to design the activity to avoid affects. Further, if they determine that the proposed action is not likely to adversely affect the species or critical habitat, the acting agencies generally request a letter of concurrence (LOC) from the consulting agency to confirm their determination.</p> <p>Notably, once consultation is initiated, the federal acting agency “shall not make any irreversible or irretrievable commitment of resources” that has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives to the proposed action. 16 U.S.C. §1536(d). Consultation is initiated once the acting agency has provided the biological assessment to the consulting agency.</p> <p>From the date that formal consultation is initiated, the Service is allowed 90 days to consult with the agency and applicant (if any) and 45 days to prepare and submit a biological opinion; thus, a biological opinion is submitted to the action agency within 135 days of initiating formal consultation. The 90-day consultation period can be extended by mutual agreement of the action agency and the Service; however, if an applicant is involved the consultation period cannot be extended more than 60 days without the consent of the applicant. The extension should specify a schedule for completion.</p> <p>At the culmination of the consultation process — which is required to be 135 days (90 days to consult and 45 days to prepare and submit a biological opinion), but is often longer — the Secretary develops a written “biological opinion” about the impacts of the proposed action to the species or its critical habitat. 16 U.S.C. §1536(b)(3). In the biological opinion, the Secretary may determine that the action, as proposed, will not jeopardize or adversely affect critical habitat. 16 U.S.C. §1536(b)(4). As part of the opinion, the Secretary may also develop reasonable and prudent alternatives that, if implemented, would avoid jeopardy or adverse modification of critical habitat — in other words, the Secretary may prescribe actions necessary to avoid jeopardy in order to prepare a no jeopardy biological opinion so that the action may proceed. <i>Id.</i></p> <p>Finally, the Secretary may determine that the “take” of a species “incidental to” the proposed action will not result in jeopardy and issue an “incidental take statement” (ITS). <i>Id.</i> The ITS specifies reasonable and prudent measures necessary to minimize impacts to the species, and issues terms and conditions that must be complied with in order to implement the measures. Failure to comply with the terms and conditions can lead to the re-initiation of consultation. An ITS is a very valuable tool because it authorizes “take” without liability for the action agency and permittee whose action is authorized by the acting agency, so long as the terms and conditions are followed.</p> <p>A federal agency may also engage in informal consultation prior to the date that it completes the packet of information (the biological assessment) and presents it to the consulting agency. 16 U.S.C. §1536(a)(3).</p>
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<div data-bbox="191 176 269 216">ESA</div> <div data-bbox="142 254 318 321">Informal Consultation</div> <div data-bbox="147 531 313 569">"4(d) Rules"</div> <div data-bbox="110 636 350 674">"Take" Definition</div> <div data-bbox="142 919 318 987">Blanket Rule Repealed</div> <div data-bbox="142 1094 318 1131">Citizen Suits</div> <div data-bbox="159 1163 302 1230">Criminal Violations</div> <div data-bbox="139 1373 321 1411">Habitat Plans</div> <div data-bbox="126 1793 334 1860">"No Surprises" Policy</div>	<div data-bbox="378 149 1528 300"> <p>During this time, the acting agency can work with the consulting agency to modify the project design and to add conservation actions so that it would not be likely to adversely affect the species or its habitat and thus avoid the need for formal consultation. Informal consultation is an optional process but is designed to help the acting agency, or permit applicant if one is involved, avoid formal consultation if possible. Informal consultation has no set timeframe.</p> </div> <div data-bbox="768 327 1141 365">Take Prohibitions and 4(d) Rules</div> <div data-bbox="545 365 1365 390">REGULATING ACTS BY INDIVIDUALS, ENTITIES, & STATE AND LOCAL GOVERNMENTS</div> <div data-bbox="378 390 1528 636"> <p>To protect species from private and non-federal government activities, the ESA prohibits "take" of endangered species. 16 U.S.C. §1538(a)(1)(B). It further prohibits the violation of any regulations pertaining to listed species, including threatened species of fish and wildlife, and plants. 16 U.S.C. §1538(a)(1)(G), (a)(2)(E). These regulations can include "take" prohibitions if necessary and advisable for the conservation of species, but take prohibitions do not automatically apply to threatened species. 16 U.S.C. §1533(d). Because the regulations pertaining to threatened species are issued pursuant to Section 4(d) of the ESA, they are often referred to as "4(d) Rules." 4(d) Rules work best when designed to relax prohibitions as species recover, incentivizing land owners to participate more willingly in species recovery.</p> </div> <div data-bbox="378 636 1528 821"> <p>The term "take" is defined in the ESA much more broadly than killing a species. By statute, it encompasses activities that harass and harm a species, in addition to actions such as pursuing, killing, shooting, or wounding a species. 16 U.S.C. §1532(19). It is further, and more broadly, defined by rule to include any actions that harm the species, including "habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering." 50 C.F.R. § 17.3.</p> </div> <div data-bbox="378 821 1528 1066"> <p>In 1975, USFWS of the Department of the Interior issued a blanket rule applying the take prohibition to all threatened species unless it adopted a 4(d) Rule relaxing the prohibition for a particular species. This rule was recently repealed, restoring the statutory approach of determining whether the take prohibition is necessary and advisable for the conservation of a species on a case-by-case basis. The rule repeal also aligns the USFWS's approach with that of NOAA Fisheries'— which has followed the statutory scheme to develop 4(d) Rules for each threatened species from the enactment of the statute. This rule repeal is prospective only, meaning that the 1975 blanket take rule continues to apply to species previously listed as threatened by the USFWS.</p> </div> <div data-bbox="378 1066 1528 1312"> <p>The ESA authorizes citizen suits as well as civil and criminal penalties. Civil penalties may be issued for knowing violations of any provision of the act, for up to \$25,000 per violation of the act, a permit, or any regulation related to Section 9 (which includes the "take" prohibition) of the act. 16 U.S.C. §1540(a)(1). Violations may also be criminal and result in up to \$50,000 in fines or up to one year in jail. 16 U.S.C. §1540(b). Citizen suits may be commenced to enjoin any person alleged to be in violation of the Act, to compel the Secretary to act, or against the Secretary where there is an alleged failure to act under Section 4, where the act is not discretionary. Citizen suits require 60 days written notice to the Secretary and are commenced in federal district court. 16 U.S.C. §1540(g).</p> </div> <div data-bbox="643 1341 1266 1379">Incidental Take Permits & Habitat Conservation Plans</div> <div data-bbox="378 1379 1528 1564"> <p>Take may be allowed, if incidental and not the purpose of an activity under Section 10 of the ESA. These Section 10(a) or Incidental Take Permits are only issued if accompanied by a habitat conservation plan (HCP). 16 U.S.C. §1539(1), (2). HCPs must describe the extent of incidental take, its impact to the species, actions to minimize and mitigate that impact, and show that funding will be available to implement the mitigation activities. 16 U.S.C. §1539(2)(A). HCP and Section 10(a) Take Permit applications are subject to notice and public comment.</p> </div> <div data-bbox="378 1564 914 1589"> <p>The Secretary can issue a Section 10(a) Permit, if:</p> </div> <div data-bbox="402 1589 1446 1743"> <ul style="list-style-type: none"> • the taking will be incidental; • the applicant will mitigate impacts to the maximum extent practicable; • the applicant can demonstrate that adequate funding will be available to implement the plan; • the taking will not appreciably reduce the likelihood of survival and recovery of the species; and • the conservation measures required by the Secretary as part of the HCP will be met. </div> <div data-bbox="378 1743 633 1772"> <p>16 U.S.C. §1539(2)(B).</p> </div> <div data-bbox="378 1772 1528 1986"> <p>In 1998, the USFWS and NOAA Fisheries (at that time referred to as the National Marine Fisheries Services or NMFS) adopted into rule the "no surprises policy" they had been implementing under the Endangered Species Habitat Conservation Planning Handbook issued on December 2, 1996. This rule provides regulatory assurances to the holder of a Section 10(a) Permit that no additional land use restrictions or financial compensation will be required of the permit holder with respect to species covered by the permit, even if unforeseen circumstances arise after the permit is issued indicating that additional mitigation is needed for a given species covered by a permit. 50 C.F.R. 17.22(b)(5).</p> </div>
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ESA**Experimental
Populations****Experimental Populations**

Section 10(j) of the ESA allows the Secretary to introduce essential and non-essential experimental populations. 16 U.S.C. §1539(j). These populations must be geographically separate from nonexperimental populations and are designated via a 10(j) rule. The release must further conservation of the species and be determined by the Secretary to be essential or non-essential to the continued existence of the species. Where the population is non-essential, the species is treated as proposed for listing and no critical habitat is designated. Where the population is essential, it is treated as a threatened species. *Id.*

According to the USFWS, “essential experimental populations are defined as those populations whose loss would be likely to appreciably reduce the likelihood of the survival of the species in the wild.” See U.S. Fish & Wildlife Service, Endangered Species Act Experimental Populations Fact Sheet, Pacific Region, November 2016. The 10(j) rule accompanying the designation is subject to peer review and public notice, and addresses the following:

- A method for identifying the experimental population (e.g., boundaries of the population area);
- A finding whether the population is essential or non-essential;
- Restrictions, protective measures, and other management concerns; and
- A process for periodic review.

Id.

Evaluation

The 10(j) Rule also employs the best scientific and commercial data available to evaluate potential adverse effects on existing populations; the likelihood that the experimental population will become established and survive in the foreseeable future; the relative effects that an experimental population will have on the recovery of the species; and the extent to which the population may be affected by actions within or near the experimental population area. *Id.*

Examples of experimental populations include the California condor introduced in Arizona, bull trout, grey wolves, and the whooping crane.

Conclusion

Though one of the shorter (in length) environmental statutes, the ESA is still quite comprehensive — addressing federal, state, local government, and private actions that impact listed species and their habitats. The sum of the interaction of its parts is an overarching program designed to reverse species trends toward recovery and away from extinction or the threat thereof.

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Climate & Floods

Congressional Climate Hearings

Costliest Hazard

Climate Flood Impacts

Intense Rainfall

Data Systems Needed

Updating Data

NOAA Budget

Texas Rainfall Update

FLOOD RISK & CLIMATE

NATIONAL FLOOD RISK INCREASING DRAMATICALLY

Excerpts from the US House Select Committee on Climate Crisis Hearings Testimony

Editors' Introduction: Over the past year, the US House Select Committee on Climate Crisis has held a series of very informative hearings addressing the severe risks and possible responses to global warming. The following is primarily derived from the written testimony of Chad Berginnis, Executive Director, Association of State Floodplain Managers (ASFPM), for the Committee's November 20, 2019 hearing on "*Creating a Climate Resilient America: Reducing Risks and Costs.*" Director Berginnis' testimony has been greatly abridged and slightly edited. The full testimony, included dozens of recommendations not included below, is available from the Committee's website: <https://climatecrisis.house.gov/committee-activity/hearings>.

Introduction

Floods are the nation's most frequent and costliest hazard. Every year the costs to taxpayers continue to increase. The Association of State Floodplain Managers (ASFPM) estimates that in the 1990's average annual flood losses were about \$5.6 billion. This increased to an average annual flood loss of \$10 billion in the 2000s and in this decade will likely double again to around \$20 billion per year.

Climate change is manifesting itself in several ways as it relates to flood risk. But the two primary ways are sea level rise and more intense storms. For the former, the impact of rising sea levels depends on the pace and magnitude of the change — two factors about which there is great uncertainty. For instance, a 2016 study which updated the estimates on the amount of ice melting in Antarctica concluded that the increase in sea level may be twice the level that was previously estimated. And, an additional source of uncertainty is the willingness and ability of the world's nations to change the trajectory of climate change. The success of agreements like the Paris Climate Conference and future agreements hold the potential to mitigate some of the projected impacts of climate change.

In inland areas, all across the country, local officials are observing more intense rainfall events. And this is showing up in the data too. Warming conditions mean more water vapor in the air. When rain-triggering conditions are favorable more saturated air leads to heavier precipitation.

Data, Analysis and Information:

If we do not have robust systems in place to provide updated and anticipated hydrologic data, track disaster losses, analyze events, and provide sufficient resources going to research and development, we will simply never get ahead of new development in flood risk areas. One trend that we are seeing all over the country is that rain events are getting more intense. To compound matters, our nation tends to use outdated hydrology which only further underestimates the risk. The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) has been updating precipitation frequency estimates for various parts of the United States and affiliated territories. Updated precipitation frequency estimates, accompanied by additional relevant information, are published as NOAA Atlas 14 and are available for download from the Precipitation Frequency Data Server (<https://hdsc.nws.noaa.gov/hdsc/pfds/>). It is these data that are used in everything from hydrologic modeling for producing flood maps to thousands of design decisions every day for development and redevelopment in our communities throughout the nation. However, NOAA has neither the budget nor mandate to provide this in a timely way. In fact, a note in NOAA's most recent progress report which was through March 2019 indicated that "No funding is available to extend NOAA Atlas 14 coverage to the remaining five northwestern states: ID, MT, OR, WA, WY in Volume 12.1." Consider the new Atlas 14 data for Texas that came out last fall. That data basically determined that the 100-year rainfall amounts for Houston is now about a 25-year event. In Austin, the previous 100-year rainfall amount is now about a 50-year event. As one of ASFPM's Texas members put it, "pretty much all of the flood maps in the state of Texas are now outdated." And this particular Atlas 14 update was not even looking at the future; rather it is updating 40-50 year old data that was developed in the 1960s and 1970s. ASFPM is supportive of current NOAA efforts to test the feasibility of incorporating future climate projections into precipitation frequency analysis examining the inclusion of such data into future Atlas 14 updates.

- *NOAA should be given the mandate and full budget to update our nation's rainfall frequency information at least every 10 years and this update must include future climate projections into precipitation frequency analysis.*

Climate & Floods

Streamgages Need

Stream and Tidal Gages:

Ask any local official about a critical data need and most will say that there needs to be more streamgages. Yet funding for even those deemed critical by the federal government is in short supply. For example, the Federal Priority Streamgages (FPS) Network (previously known as the National Streamflow Information Program) was conceived in 1999 to be a core, federally funded network. The original network design included 4,300 then active, previously discontinued, or proposed new gages that were strategically positioned across the country to address long-term Federal information needs (such as supporting NWS flood forecasts, or interstate and international compacts and decrees). At present (2018), more than 4,700 locations meet the criteria for inclusion in the FPS network, but only about 3,600 FPS are active because of funding limitations. These active FPS are supported through a combination of Federal and partner funding — less than one-quarter are fully funded by the United States Geologic Survey.

- *Congress should fully fund our critical national stream gage and tidal gage networks.*

Flood Maps:

Another critical piece of data that influences thousands of development decisions every day as it relates to flood resilience are the Federal Emergency Management Agency's (FEMA's) flood maps. Since 2012, FEMA has been mandated to not only provide flood maps for the entire nation but also provide future conditions flood risk information. Why future conditions? A 2013 study prepared for FEMA estimated that the 100-year floodplain area would increase by 45% nationally by the end of this century. Yet, little progress has been made on either since that time. In the continental United States, we have 3.5 million miles of streams, rivers and coastlines. Yet, FEMA has only mapped floodplains on 1.2 million miles of them. While the FEMA Technical Mapping Advisory Council (TMAC), a congressionally-authorized advisory committee, is helping FEMA oversee the nation's flood mapping program, and completed the Future Conditions Risk Assessment and Modeling report in December 2015, it appears little has been done and we have yet to have these data appear on FEMA flood maps or in the data provided to communities. ASFPM has previously prepared a programmatic cost estimate for implementing FEMA's National Flood Mapping Program which includes both of the aforementioned mandates, concluding it will cost between \$4.5 billion and \$7.5 billion to "get the job done" in initially mapping the nation.

- *Congress should provide adequate funding to finish the job of providing flood mapping for the nation, to include future conditions mapping, in a short (5 to 10-year) timeframe.*

Today's flood maps are based on models that incorporate hydrologic information and topographic information. Good progress has been made on high quality topographic information for the nation through the United States Geological Survey (USGS) 3D Elevation Program (3DEP). These high quality topographic data inform critical decisions that are made across the nation every day ranging from immediate safety of life, property and long-term planning for infrastructure projects. Currently at 60% complete, the goal of 3DEP is to complete the acquisition of nationwide high resolution elevation data by 2023.

- *Congress should ensure that the USGS 3DEP program is fully funded to provide nationwide high quality topographic information for the entire nation.*

Mapping Costs

Topographic Data

Climate Tool Update

National Oceanic & Atmospheric Administration's Climate Explorer Tool Updated

An expanded and redesigned version of NOAA's online, open-source Climate Explorer tool was released last month. The tool provides local planners, policy leaders, and facility and resource managers a way to explore conditions projected for their locations in the coming decades.

For years, the tool has provided easy access to decision-relevant climate variables — both historical observed and projected future data — for every county in the contiguous United States. Now the tool also offers data for Alaska's boroughs and will soon expand again to include Hawai'i and US island territories.

In response to user feedback, the following changes were made in this new version:

- the tool is mobile-friendly, allowing tablet and smartphone users to check future climate projections for their locations;
- navigation has been streamlined to provide direct access to all six of the tool's main features from a single screen, after a user enters a location of interest
- new maps show projections of annual averages for diverse temperature and precipitation variables, as well as the four monthly averages used to represent each season
- maps for all temperature variables now use the same color palette, so users can compare maps of historical and projected conditions across seasons and decades (from 1950-2100)
- charts showing projections from two climate models runs for a higher emission scenario (RCP8.5) are now available for all boroughs in Alaska (except Aleutians West, which is coming soon)

The open-source Climate Explorer tool is available at: <https://crt-climate-explorer.nemac.org>

Climate & Floods

Flood Inundation Mapping

Security Concerns

Extreme Precipitation

Even if good flood data is developed, there are some policy hurdles preventing it from being publically available. For example, the US Army Corps of Engineers (Corps) new policy on Emergency Action Plans (EAPs) requires several types of flood inundation mapping. This policy standardizes inundation mapping and establishes inundation mapping requirements for dams and levees. In theory, having inundation mapping available to the public can help avoid debacles like those we witnessed around Barker and Addicks Reservoirs post-Harvey when thousands of homes in inundation areas of those structures were impacted. Had local land use planners, property owners and others been aware of these risks, steps could have been taken to reduce that risk.

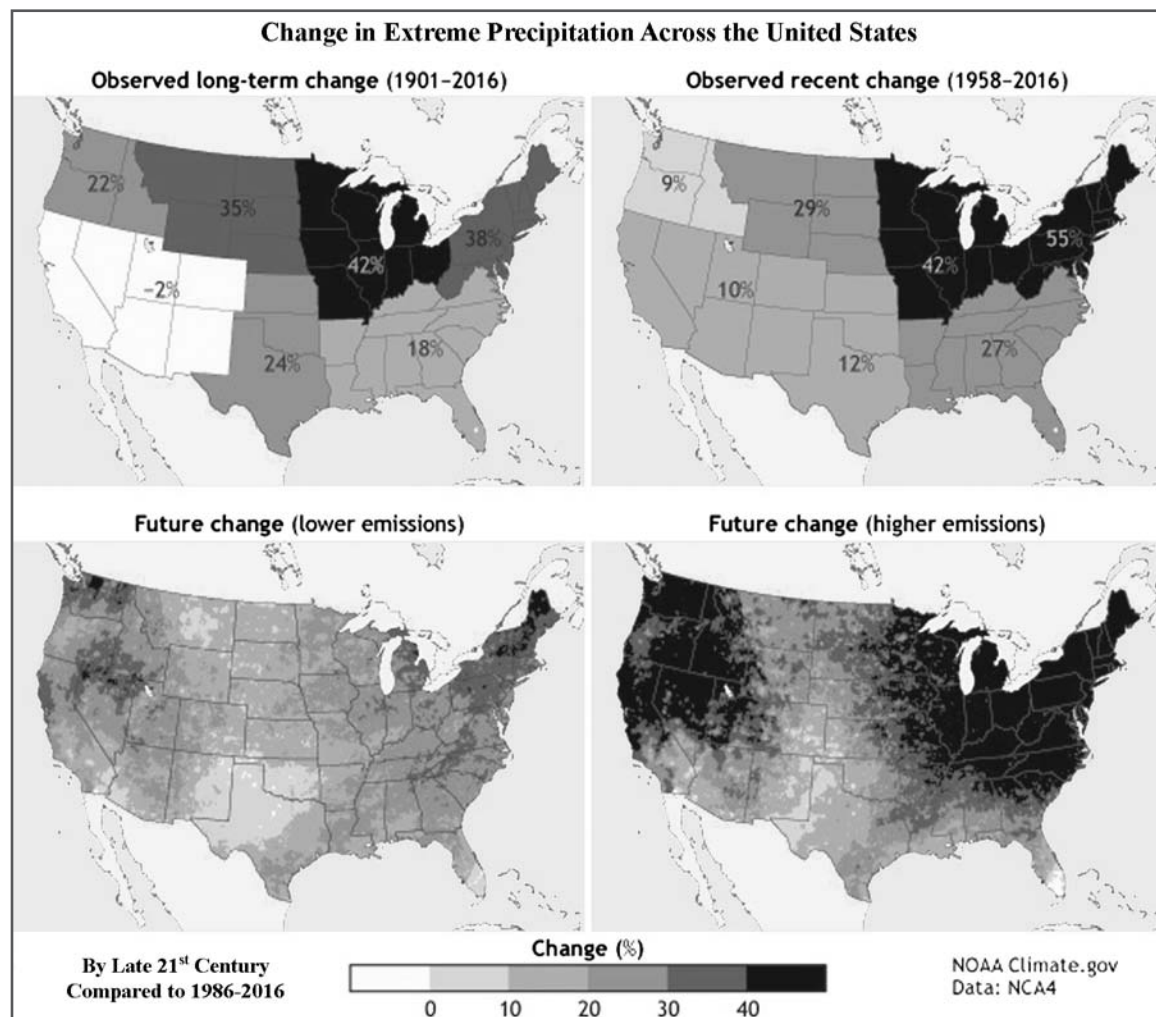
However, the new EAP policy includes the following statement:

“EAP maps are considered sensitive data and must be marked ‘For Official Use Only’ according to AR 380-5 and DoDM 5200.01.”

In other words, inundation maps associated with EAPs are not publically available. Why would we be withholding this vital information on flood risk from property buyers and owners?

The 2016 TMAC report National Flood Mapping Program Review, identified a legacy Department of Homeland Security (DHS) policy through its Security Classification Guide for the Protection of Critical Infrastructure and Key Resources, which listed dam failure inundation maps as “For Official Use Only.” However, this policy conflicts with the National Flood Mapping Program requirements that such areas be provided on Flood Insurance Rate Maps and on publically-available databases. As noted in the report, a Virginia law passed in 2008 essentially requires that all inundation mapping developed for state-regulated dams be made available to communities and the public. This has now been implemented for a decade without issues and state officials there believe in supporting wider public availability of these data. More recently, when speaking to agency officials, there has been a mistaken belief that this issue had been dealt with. It is clear to ASFP that it has not and the unwillingness of agencies to act on it demands congressional intervention.

- Congress should mandate that any flood risk data, including all dam/levee inundation mapping, developed by the federal government and/or associated with any federal program be made publically available.



<div>Climate & Floods</div> <div>Economic Losses</div> <div>Tracking Payouts</div> <div>Learning from Mistakes</div> <div>Disaster Analysis</div> <div>Standing Board</div> <div>Sea Level Rise Viewer</div> <div>Future Conditions</div> <div>Climate Adaptation</div> <div>Proactive Strategies</div>	<p>As a nation, we neither have the system to effectively track disaster losses nor analyze them comprehensively in order to learn lessons that we can apply to future resiliency efforts.</p> <p>Despite the frequency and expenses of natural disasters, there exists no system in either the public or private sector for consistently compiling information about their economic impacts. Any data collection effort should focus on the losses as a result of natural disasters, or negative economic impacts. The loss from a disaster is a broader concept than its cost, a term that conventionally refers only to the losses that are reimbursed by insurance companies and governments through disaster relief. A National Academies of Sciences report on this topic made several good recommendations that ASFPM supports including recommendations for also tracking disaster payouts incurred by federal agencies to improve tracking federal disaster spending — not only to individuals and businesses but also to communities and even spending on repairing federal facilities such as levees or Department of Defense facilities.</p> <ul style="list-style-type: none"> • <i>One agency of the federal government should be made responsible for compiling a comprehensive database containing the losses of natural disasters and disaster spending.</i> <p>One vital, yet inexpensive, doable step is to adopt the culture of learning from mistakes that we show in other contexts. Consider aircraft accidents. After each crash, we don't gather around the crash site, mourn, confine our blame to the hapless pilots, and solemnly promise to "rebuild the aircraft just as before." The investigation is handled by a standing, independent federal agency, the National Transportation Safety Board (NTSB). Investigators immediately report to the crash scene. They analyze flight recorders and other data to understand the actions of pilots and crew in response to the emergency conditions, but they do not stop there. They go on to consider possible design flaws in the air frame, errors in equipment manufacture, irregularities or shortcomings in airline inspection and maintenance, air traffic control procedures, the prevailing weather — in short, all aspects of aviation that might have any bearing on the incident. Moreover — and this is not so generally appreciated — the NTSB coordinates and leads the team, but the team includes experts from all the stakeholders — the airframe manufacturer, the airline, the FAA, etc. Finally, though NTSB findings and recommendations do not carry the force of law, stakeholders ignore them at their peril. The result? A safety record that has steadily improved over the years with very few aircraft deaths resulting. Something similar is needed with respect to analysis and evaluation of the entire range of all major natural disasters.</p> <ul style="list-style-type: none"> • <i>Congress and the administration ought to work together to explore the establishment of a standing National Disaster Reduction Board (NDRB), to analyze and report on disasters. Each report would provide opportunities and incentives for communities and businesses, and state and federal governments, as well as policy makers like Congress to learn from mistakes and make ongoing adjustments to decisions and policies.</i> <p>For the past decade, a novel approach to data management, tool development and data dissemination has been piloted at NOAA through the Digital Coast Partnership. Developed and maintained by NOAA, hundreds of organizations and federal, state, and local agencies have contributed to this curated collection of high-quality authoritative data and tools focused on coastal and ocean issues. One of the most popular tools being used by practitioners today on the Digital Coast website [https://coast.noaa.gov/digitalcoast/] is the Sea Level Rise viewer. ASFPM was a founding member of the partnership and strongly believes that to better understand the future flooding risk in coastal areas and manage that risk, programs like Digital Coast will be vital.</p> <p>Federal Agency / Programs and Policies:</p> <p>While there are numerous programs and federal agencies that address the threat of flooding and floodplain management, most do not take into consideration the future flood condition that will be exacerbated by climate change.</p> <p>In 2012, ASFPM analyzed more than 130 federal programs that had some impact on the use and development of floodplains. At the time, our evaluation also looked at climate adaptation as it pertained to these programs which, for most was either non-existent or just beginning to be explored.</p> <p>Adaptation and Hazard Mitigation:</p> <p>Community and individual adaptation to climate change will not be quick nor easy. Any community facing flood risk often is also facing a multi-decadal timeframe to reduce that risk enough that they will be resilient in the face of current and future flood threats. Property owners facing increased sea level rise have a very real prospect of their property value plummeting to nothing — for the single asset that, for most Americans, is their most valuable. To say we have an adaptation problem in this country is vastly understating the issue and delay will only add hundreds of billions of dollars in estimated flood related damages that will already likely occur due to climate change.</p> <p>In some communities, coastal in particular, it is not going to be feasible to stay along the coast given the risks from sea level rise and resources available to adapt. We will need to take proactive strategies</p>
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<div>Climate & Floods</div> <div>Relocation</div> <div>Standards</div> <div>Mitigation Incentives</div> <div>Streamline Programs</div> <div>Buyouts</div> <div>Research</div> <div>Rural Area Buyouts</div> <div>Acquisition Barriers</div> <div>Floodplain Easements</div> <div>Floodproofing Technologies</div>	<p>and provide technical assistance to help communities make more informed decisions on when to rebuild more smartly versus when it would be time to start phasing in relocation. Developing innovative assistance programs like the Digital Coast to support the evaluation process, decision making and potential infrastructure/community moves would be important to advance progress.</p> <p>Recommendations include:</p> <ul style="list-style-type: none"> • <i>Develop national hazard resilience standards</i> for the location, design, construction, and reconstruction of all public infrastructure and buildings that consider: alternative locations, future conditions, green or nature based options, mitigation and a No Adverse Impact approach. These standards should then become a condition of federal funding. • <i>Minimize use of federal taxpayer dollars to rebuild</i> in areas we know have greatly increasing flood risk. • <i>Incentivize mitigation through changes to the tax code like a mitigation tax credit.</i> Flood mitigation actions like buyouts and relocations in particular, will be effective in adapting to climate change, especially in communities where the flood hazard area becomes too difficult for continued occupation. However, our current programs for buyouts and relocations have several issues which make them too time consuming and complex to be done in the manner that they need to be implemented. Congress should examine the buyout and relocation programs that are offered by multiple agencies (FEMA, HUD, USACE, NRCS) to ensure that they are streamlined to the maximum extent possible and also support area-wide or community-wide buyouts/relocations. In fact, largely due to the complexity of such a project and the inability of federal programs to work together, we rarely see these options used on a large scale. An exception to this is the community relocation project of Newtok, Alaska where both FEMA Hazard Mitigation Grant Program and Pre-Disaster Mitigation grant funds are being used, as well as support from the Bureau of Indian Affairs and the U.S. military through the innovative DoD Innovative Readiness Training (IRT) program. • <i>Place priority on buyouts and relocation as a way to adapt to climate change.</i> • <i>Ensure buyout programs/projects pair buyout assistance with the development of affordable housing in less flood-vulnerable areas.</i> • <i>Fund research on evidence-based buyout practices and dissemination of the results to practitioners.</i> Require the FIFM-TF or other task force to examine the hurdles to community-wide or neighborhood buyouts / relocations, with a focus on federal programs working together. • <i>Explore a more widespread usage of the Department of Defense Innovative Readiness Training Program for flood mitigation projects</i> — especially community/neighborhood relocations. • <i>Permanently authorize the Community Development Block Grant – Disaster Recovery program.</i> <p>Congress needs to address the lack of a buyout program for flood-prone land in rural areas. Such areas are often those places next to be developed and it would be significantly less costly to acquire either permanent easements or the properties outright then to do so after development occurs. In many areas of the country more floodplain land is needed to safely accommodate floodwater through leveed stretches of river. While urban buyouts will improve public safety and reduce property damage, portions of floodplain that are currently protected from flooding by levees must be utilized to convey floodwaters away from towns and critical infrastructure. At the moment, no comprehensive program for land acquisition to improve flood management in rural areas exists. Agencies like the US Department of Agriculture (USDA), the Corps, and FEMA have various limitations and restrictions on acquisition or easements that make land acquisition a primary barrier to floodplain reconnection projects.</p> <p>One example would be to improve the USDA Emergency Watershed Protection-Floodplain Easement Program (EWPP-FEP). Floodplain easements allow for restoration of natural and beneficial functions of floodplains on land that has been damaged by flooding and allows for floodplains to be utilized to safely convey floodwater on undeveloped land. However, this emergency funded program is only activated when infrastructure damages reach a critical threshold to automatically trigger a Stafford Act Federal Emergency Declaration, or if Congress declares easement funding to be available through an emergency appropriation. Unfortunately, both avenues are difficult to achieve. First, the critical infrastructure damage thresholds are almost impossible to reach in many rural counties. Second, if flood damage is localized it can be hard to garnish the requisite national attention needed for an emergency appropriation bill. This can leave rural landowners with unfarmable, flood-prone land following a flood disaster.</p> <ul style="list-style-type: none"> • <i>The EWPP-FEP program should be reformed to allow for the release of funding based on more locally based flood damage thresholds or set up as a non-disaster easement program.</i> <p>While buyouts and relocations are good long-term solutions, there must also be options available in the short to medium term. One approach in the short and medium term timeframe is to use the latest floodproofing technologies. There is an incredible amount of innovation occurring right now as new technologies are coming online to help solve flooding problems. However, are these technologies as good</p>
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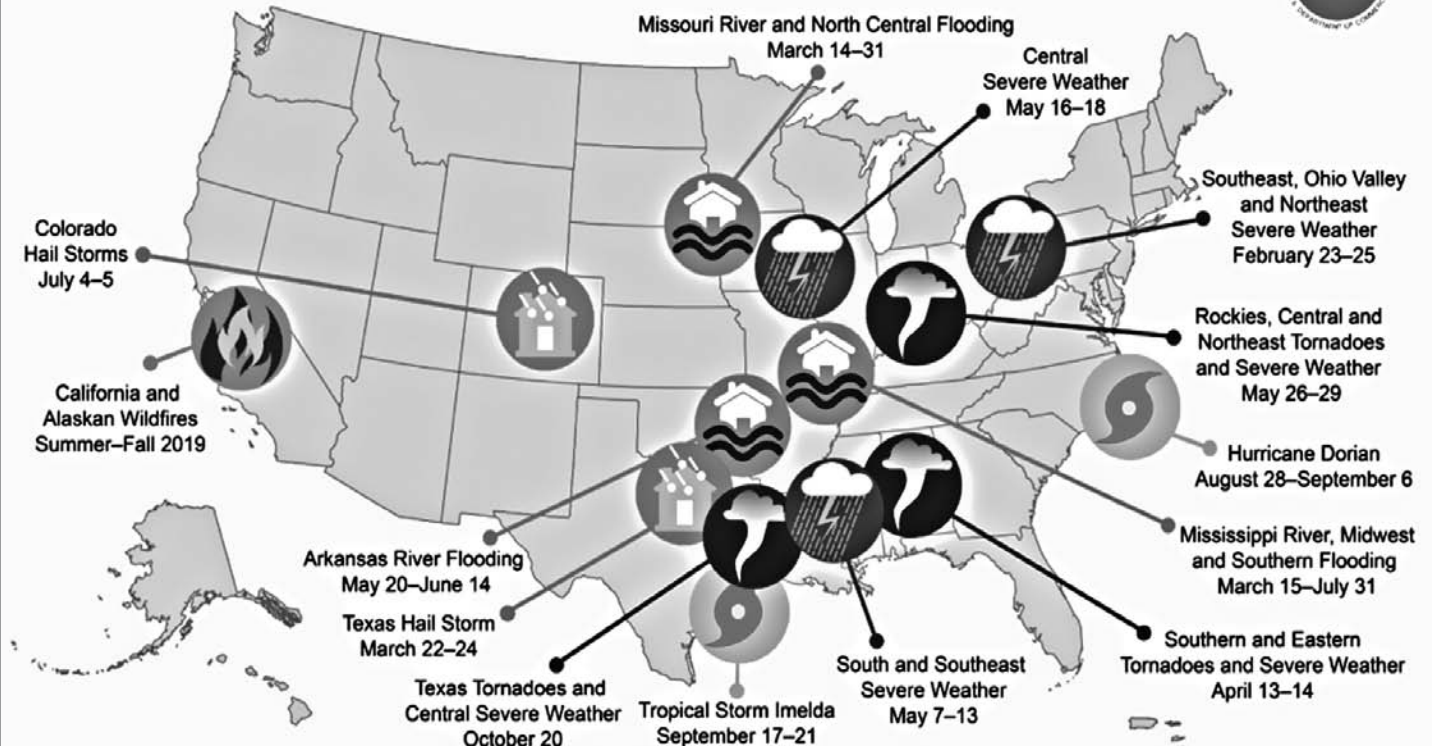
Climate & Floods

Building Codes

as promised? For buyers, one way to achieve some certainty is to ensure that the product has met the ANSI 2510 standard. ASFP, in partnership with FM Approvals, assisted with the creation of the 2510 standard over a decade ago. The standard applies to floodproofing technologies such as: perimeter barriers; opening barriers; flood mitigation pumps; backflow valves; and sealants and glazing systems. ASFP, in partnership with FM Approvals and the Corps oversees the National Flood Barrier Testing and Certification program; products that have been tested and certified to the 2510 standard can be found on the website: <https://nationalfloodbarrier.org/>. ASFP is encouraging communities to adopt the 2510 standard and also incorporate it into the nation's building codes.

- *Require federal agencies who purchase and use flood fighting products and federal grant programs that authorize the use of such products ensure such products are 2510 certified and are used in floods that meet that certification.*

U.S. 2019 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location of 14 separate billion-dollar weather and climate disasters that impacted the US during 2019.

Disaster Events

During 2019, the US experienced a very active year of weather and climate disasters. In total, the US was impacted by 14 separate billion-dollar disasters including: 3 major inland floods, 8 severe storms, 2 tropical cyclones (Dorian and Imelda), and 1 wildfire event. 2019 also marks the fifth consecutive year (2015–19) in which 10 or more separate billion-dollar disaster events have impacted the US.

The 14 separate US billion-dollar disasters in 2019 represent the fourth highest total number of events (tied with 2018), following the years 2017 (16), 2011 (16) and 2016 (15). The most recent years of 2019, 2018, and 2017 have each produced more than a dozen billion-dollar disasters to impact the US — totaling 44 events. This makes a 3-year average of 14.6 billion-dollar disaster events, well above the inflation-adjusted average of 6.5 events per year (1980–2019).

On a slightly longer timeframe, the US has experienced 69 separate billion-dollar disaster events over the last 5 years (2015–2019), an inflation-adjusted average of 13.8 events per year. Over the last 40 years (1980–2019), the years with 10 or more separate billion-dollar disaster events include 1998, 2008, 2011–2012, and 2015–2019.

<div data-bbox="159 178 310 262">Climate & Floods</div> <div data-bbox="134 300 331 369">At-Risk Group (Low Income)</div> <div data-bbox="151 825 313 892">Combatting Future Risk</div> <div data-bbox="134 999 331 1033">Tidal Flooding</div> <div data-bbox="134 1102 331 1171">Disclosure Requirements</div> <div data-bbox="118 1350 347 1383">Greater Extremes</div> <div data-bbox="151 1524 313 1558">Rising Costs</div> <div data-bbox="164 1627 300 1696">Events Frequency</div> <div data-bbox="151 1766 313 1835">"High Risk" Identified</div>	<div data-bbox="378 149 786 174">Social and Housing Considerations:</div> <div data-bbox="378 178 1529 531"> <p>More and more, there is a nexus of issues surrounding disaster losses, climate change, social issues (i.e., the effects on low/moderate income populations and social justice), and housing. The moral issue is this: how/why do we put those who have the most to lose during a flood in harm's way through our housing, zoning, infrastructure, and other policies? Unfortunately, this is exactly what federal policy does. For example, the Department of Housing and Urban Development (HUD) does not have a universal policy against paying for housing in flood prone areas. At the same time, we recognize that much of the nation's affordable housing stock was built before climate change was well understood, and many affordable housing options are at risk of flooding. Thus, under current policies, the extreme shortage of affordable housing for low income families is squarely at loggerheads with the realities of flood risk. According to a recent study, nationwide about 450,000 government subsidized households are in mapped floodplain. Therefore, if HUD were to withdraw support from all properties in the floodplain it would create a new crisis of homelessness creating a whole new set of problems.</p> <ul style="list-style-type: none"> • <i>HUD should examine its housing programs and create innovative mechanisms (i.e., targeted flood mitigation programs for existing at-risk affordable housing units) to incentivize communities, housing authorities, and landlords to undertake mitigation actions with a long-term goal of substantially reducing or eliminating flood risk.</i> • <i>Incentivize the location of new affordable housing to ensure that it is in flood risk free areas.</i> </div> <div data-bbox="378 709 1185 735">From the testimony of W. Craig Fugate, Former FEMA Administrator:</div> <div data-bbox="378 739 1529 798"> <p>As many of you know, I do not mince words when it comes to this topic...Time has run out for debate, action is required.</p> </div> <div data-bbox="378 802 1529 886"> <p>The stark financial reality today is that the federal government spends billions of dollars annually to deal with the effects of climate change and extreme weather while not spending nearly enough to combat future risk.</p> </div> <div data-bbox="378 890 1529 949"> <p>Some Highlights from the Findings of the U.S. Global Change Research Program Climate Science Special Report 2017:</p> </div> <div data-bbox="402 953 1529 1096"> <ul style="list-style-type: none"> • Global mean sea level (GMSL) has risen by about 7–8 inches since 1900, with about 3 of those inches occurring since 1993. • As sea levels have risen, the number of tidal floods each year...have increased 5- to 10-fold since the 1960s in several US coastal cities. Rates of increase are accelerating in over 25 Atlantic and Gulf Coast cities. Tidal flooding will continue increasing in depth, frequency, and extent this century. </div> <div data-bbox="378 1100 1529 1213"> <p>Congress should also require that to participate in the the National Flood Insurance Program (NFIP), states adopt flood hazard disclosure requirements for home sales that provide home buyers a right to know about flood history and risk before going to closure. Currently 29 states have some form of flood risk/history disclosure, 21 states have no requirements.</p> </div> <div data-bbox="378 1245 1442 1302">From the testimony of Alice C. Hill, Senior Fellow, Climate Change Policy Council on Foreign Relations:</div> <div data-bbox="378 1306 1529 1449"> <p>Natural disasters are on the rise. According to the Fourth National Climate Assessment, climate change has already brought more extreme weather and will continue to bring greater extremes in the foreseeable future. The nation will experience a range of climate impacts, including more intense storms, bigger wildfires, and greater temperature and precipitation extremes in the coming decades. Sea level rise has accelerated since the 1990s and will continue to do so in the years ahead.</p> </div> <div data-bbox="378 1453 1529 1749"> <p>The costs of weather and climate-related disasters are also rising. Between 1980 and 2018, the United States suffered 254 weather and climate-related disasters carrying a price tag of over \$1 billion each, according to the National Oceanic and Atmospheric Administration (NOAA). The total cost of these events is more than \$1.7 trillion dollars. From 1980 to 2013, the nation averaged 6.3 such billion-dollar events per year. For the years from 2013 to 2018, however, the annual average leapt to 12.6 events. In 2019, the United States has already experienced ten weather and climate-related disasters over \$1 billion each, not even counting the wildfires in California. This year is also the fifth consecutive year in which the total number of events has reached ten or more. These figures support the finding of the Fourth National Climate Assessment that the nation's efforts to prepare for climate change impacts have not yet reached the necessary scale to avoid substantial damage to the economy, environment, and human health.</p> </div> <div data-bbox="378 1753 1529 1866"> <p>According to the Government Accountability Office (GAO), between 2007 and 2013, federal appropriations for natural disasters increased 46 percent as compared to the previous six years. In just the last three years, supplemental appropriations for disasters has totaled \$183 billion. In light of the growing fiscal exposure to the federal government, the GAO has identified climate change as a "high risk" since 2013.</p> </div> <div data-bbox="378 1898 714 1923">FOR ADDITIONAL INFORMATION:</div> <div data-bbox="378 1927 1010 1984"> <p>US House Select Committee on Climate Crisis website: https://climatecrisis.house.gov/committee-activity/hearings</p> </div>
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WATER BRIEFS

“WATERS OF ARIZONA” AZ

STATE PROGRAM DEVELOPMENT

The Environmental Protection Agency (EPA) and the Department of the Army announced a new definition for the Waters of the United States (WOTUS) in the Navigable Waters Protection Rule on January 23, 2020. The new definition narrows protection under the Clean Water Act for some Arizona waterways, including stretches of drainages and ephemeral streams, which only run during or immediately following precipitation events.

The State of Arizona supports the narrower definition, but recognizes a “local control approach” at the state level will be needed to protect Arizona’s important and precious water resources. The Arizona Department of Environmental Quality (ADEQ) is actively working with stakeholders and policy makers to determine next steps and to develop an outline for a Waters of Arizona program. Legislative approval will be necessary prior to any program going into effect in Arizona.

To develop the Waters of Arizona program, ADEQ has is planning the following stakeholder meetings and Tribal Information Sessions to discuss state-level protection for Arizona surface waters:

Waters of Arizona Stakeholder Meetings — RSVP Requested for in-person

WEBINAR ALSO AVAILABLE — [HTTP://AZDEQ.GOV/WOAZ-MEETINGS](http://azdeq.gov/woaz-meetings)

- **Phoenix** | Feb. 20, 2020 - 9:00am to 12:00pm
Gateway Community College, Room IE1302 Copper Room, 108 North 40th Street
- **Tucson** | Feb. 25, 2020 - 9:00am to 12:00pm
Hotel Tucson City Center, 475 North Granada Avenue
- **Flagstaff** | Feb. 27, 2020 - 9:00am to 12:00pm
NAU Health and Learning Center, Room 2405, 824 South San Francisco Street

Waters of Arizona Tribal Information Sessions — RSVP Requested for in-person

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- **Phoenix** | Feb. 20, 2020, 1:30 – 3:30 p.m.
Gateway Community College, Conference Room IE 1200, 108 North 40th Street
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NAU Health and Learning Center, Room 2405, 824 South San Francisco Street

For info: Krista Osterberg, ADEQ, 602/ 771-4635, Osterberg.Krista@azdeq.gov

Waters of Arizona webpage at: <http://azdeq.gov/woaz>

STREAMFLOW RESTORATION WA

COMPETITIVE GRANTS

The Washington Department of Ecology (Ecology) recently announced that the application period for its streamflow restoration grants is now open. Ecology will be accepting applications until 5 p.m. on March 31. The streamflow restoration competitive grants will help state and local agencies, tribal governments, and non-profit organizations implement local plans and projects to improve streamflow and aquatic resources. Grant funding will be available statewide on a competitive basis. Ecology has published new guidance that outlines a consistent and transparent process for awarding these grants.

In January 2019, Ecology selected 16 projects in 11 watersheds from a statewide pool of applicants. In total, approximately \$20 million was awarded. The program began when the Legislature passed the Streamflow Restoration law in January 2018 that helps restore streamflows to levels necessary to support robust, healthy, and sustainable salmon populations while providing water for homes in rural Washington. The law was in response to the *Hirst* decision, a 2016 Washington State Supreme Court decision that limited a landowner’s ability to get a building permit for a new home when the proposed source of water was a permit-exempt well. The law clarifies how counties issue building permits for homes that use a permit-exempt well for a water source. The law directs local planning groups to develop watershed plans that offset impacts from new domestic permit-exempt wells and achieve a net ecological benefit within the watershed. For additional information on *Hirst*, see Christensen, *TWR* #153 (11/15/16); Moon, *TWR* #153 (11/15/16); Water Briefs, *TWR* #168 (2/15/18); and Pitre, *TWR* #169 (3/15/18).

The Legislature appropriated \$300 million over the course of 15 years to help with implementation of projects that improve streamflow. The funds are available statewide. The law is codified as Chapter 90.94 RCW.

For info: Ecology website: <https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration>

WATER BRIEFS

GRAZING DAMAGE NM/AZ
LAWSUIT AGAINST FEDS

The Center for Biological Diversity (Center) sued the Trump administration on January 13, 2020, for failing to prevent livestock from damaging southwestern rivers and streams. *Center for Biological Diversity v. USFS and USFWS*, Case No. 4:20-cv-00020-DCB (1/13/20). The waterways are home to numerous endangered and threatened species: southwestern willow flycatchers; yellow-billed cuckoos; Gila chub; loach minnow and spikedace fish; Chiricahua leopard frogs; and narrow-headed and northern Mexican garter snakes. The lawsuit, filed in US District Court in Tucson, alleges that the US Forest Service (USFS) and US Fish and Wildlife Service (USFWS) are violating the Endangered Species Act by allowing cows to trample rivers and streams on more than 30 grazing allotments in the upper Gila River watershed on Arizona's Apache-Sitgreaves National Forest and the Gila National Forest in New Mexico.

The rivers covered by the suit include the Gila, San Francisco, Tularosa, and Blue rivers. In the Center's 1998 legal settlement with that organization, the USFS agreed to prohibit domestic livestock grazing from hundreds of miles of southwestern streamside habitats while it conducted a long-overdue consultation with USFWS on the impacts of grazing on threatened and endangered species.

"Scientific study of the impacts of livestock grazing on aquatic and riparian habitats in the Southwest is extensive and universally shows severe and lasting negative impacts such that near complete exclusion of cattle is widely accepted as an essential cornerstone for preserving stream health, water quality and quantity, and endangered species habitat within grazed areas." *Complaint* at 2 (available at: www.biologicaldiversity.org/programs/public_land/grazing/pdfs/Upper-Gila-USFS-grazing-allotments-sec-7-complaint-2020_01_13.pdf).

The Center's Complaint asserts that USFS and USFWS excluded cattle from streambeds to meet their ESA obligations:

For two decades, the Agencies have

committed to the exclusion of cattle from riparian areas — typically through fencing — as a foundation for meeting their obligations under the Endangered Species Act to ensure that USFS's grazing authorizations do not jeopardize the continued existence of endangered species, or result in the destruction or adverse modification of their designated critical habitat. Specifically, in carrying out their consultation duties pursuant to section 7 of the ESA for the individual grazing allotment authorizations challenged in this action, the Agencies have determined that the effects of domestic livestock grazing are not likely to adversely impact endangered species dependent on aquatic and riparian habitat based largely on commitments to exclude this streamside habitat from cattle and to have USFS regularly monitor riparian areas to ensure that the fencing exclusions remain intact and effective.

Id.

In 2017, 2018, and 2019, the Center conducted its own on-the-ground assessments to see if livestock were present within the riparian areas in questions. "These assessments documented that the purported fencing exclusions were frequently in disrepair or simply nonexistent, resulting in widespread unauthorized cattle presence with associated damage to riparian areas and occupied or suitable endangered species habitat." *Id.* at 3. The Center provided its assessment to USFS.

The Center (Plaintiff) provided a Notice of its Intent (NOI) to file the lawsuit pursuant to the citizen suit provision of the ESA, 16 U.S.C. § 1540(g), by letter to USFS and USFWS dated July 17, 2019. Plaintiff maintains that the USFS' response doesn't resolve the ESA violations alleged in Plaintiff's NOI. The Center's lawsuit "seeks declaratory and injunctive relief to enforce the ESA's requirements with respect to USFS agency actions authorizing grazing on the specific allotments discussed..." including the award of reasonable attorney's fees and costs associated with the action. *Id.* at 4. **For info:** Brian Segee, Center, 805/ 750-8852 or bsegee@biologicaldiversity.org

WATER-SHARING CO
REGIONAL PARTNERSHIP

The WISE Partnership, an innovative water-sharing partnership between Denver Water, Aurora Water, and water utilities that serve the south metro area, recently brought home a "Community Water Champion Award" from WateReuse, a national organization that advances the use of recycled water. WISE is short for Water Infrastructure and Supply Efficiency.

The WISE partnership works by recapturing water after it's used by Denver and Aurora Water customers, treating it and sharing supplies when available with South Metro WISE partners. Under the agreement, Denver and Aurora Water agree to provide a minimum of 72,250 acre-feet (or 23.5 billion gallons) of treated water to South Metro WISE members every ten years — enough water to meet the needs of 289,000 homes over a decade. The backbone of the WISE agreement is the Prairie Waters treatment system, owned by Aurora Water and operational since 2010.

Prairie Waters uses natural filtering processes, a 34-mile pipeline, and state-of-the-art technology to capture, pump and purify water from the lower South Platte River near Brighton and send it back to customers. "After customers use water in their homes, Prairie Waters lets us recapture it and treat it over and over again," said Joe Stibrich, water resources policy manager at Aurora Water. Aurora Water built the Prairie Waters system in response to the 2002 drought and to supplement its mountain supplies to meet water demand for the city's growing population. By selling water to South Metro WISE members, Aurora Water receives additional revenue to stabilize rates and offset Prairie Waters' construction and operating expenses. Denver Water is connected to WISE and Prairie Waters infrastructure and can use water for its own customers if needed. As a result of the Colorado River Cooperative Agreement, a surcharge on WISE water sales also goes to the Colorado River District to support river enhancement programs on the West Slope. For more information on Prairie Waters, see Darling, *TWR* #98 (4/15/12).

WATER BRIEFS

Full implementation of the WISE water deliveries to all ten South Metro partners were phased-in in 2017. WISE not only provides a way for Denver and Aurora to reuse water supplies, it also creates a dependable supply for ten water providers that serve the south metro region. That more dependable supply, in turn, reduces pressure to pull more water from the Colorado River, conserves dwindling groundwater supplies south of Denver and diminishes the need for metro area utilities to buy agricultural water in the South Platte River Basin, which can lead to drying up farmland if the water is diverted to the utilities' use.

The unusual nature of the WISE project may have helped it capture the national award. WISE leverages the power of a regionwide partnership to make it all work. WaterReuse described the award this way: "This innovative regional partnership for a sustainable water future will reduce groundwater reliance and bolster renewable water supplies to the South Metro area, while maximizing existing water assets belonging to Aurora and Denver Water."

WISE works by pulling water that Denver and Aurora have a legal right to reuse from the South Platte River near Brighton. That water is then pumped via pipeline back upstream to Aurora for a series of treatment steps before distribution to project partners. The project's benefits accrue this way:

- Denver Water develops a new water supply by being able to use Aurora's Prairie Waters system and a new revenue stream by selling unused water to the south metro area water providers
- Aurora Water benefits by selling unused water and putting unused treatment and pipeline capacity to use while receiving revenue that helps keep its water rates down
- The South Metro Water Supply Authority receives a permanent renewable water supply, helping to reduce its reliance on nonrenewable groundwater.

For info: Denver Water WISE website: www.denverwater.org/your-water/water-supply-and-planning/wise

DRUGS IN HEADWATERS US PHARMACEUTICAL RESIDUES

Pharmaceutical residues in streams are a "nationwide environmental concern" that extends into the headwaters of urban and more isolated streams, according to a US Geological Survey (USGS) study published on January 30th. Most investigations of medicines in rivers come from urban areas, where wastewater treatment plants are a common discharge source. Human-use pharmaceuticals in urban streams link aquatic-ecosystem health to human health. Pharmaceutical mixtures have been widely reported in larger streams due to historical emphasis on wastewater-treatment plant (WWTP) sources, with limited investigation of pharmaceutical exposures and potential effects in smaller headwater streams.

In this study, published in the journal PLOS, federal scientists looked farther upstream. Between 2014 and 2017, they tested 308 streams that were less than 10 meters wide and 1 meter deep. They looked for 111 pharmaceutical compounds in 308 headwater streams in four regions across the US and found them frequently. Simultaneous exposures to multiple pharmaceutical compounds (pharmaceutical mixtures) were observed in 91% of streams. The most common compounds detected were nicotine, caffeine, and metformin, a type-II diabetes drug. *Multi-Region Assessment of Pharmaceutical Exposures and Predicted Effects in USA Wadeable Urban-Gradient Streams*, Paul M. Bradley, et al. (Jan. 30, 2020).

Many of the pharmaceuticals were detected in areas without a wastewater treatment plant discharge, affirming conclusions from earlier research that there are other contamination pathways — septic tanks, sewage overflows, stormwater runoff — beside centralized treatment plants. "Cumulative detections and concentrations correlated to urban land use and presence/absence of permitted WWTP discharges, but pharmaceutical mixtures also were common in the 75% of sampled streams without WWTP. Cumulative exposure-activity ratios (EAR) indicated widespread transient exposures with high probability of molecular effects to

vertebrates. Considering the potential individual and interactive effects of the detected pharmaceuticals and the recognized analytical underestimation of the pharmaceutical-contaminant ...space, these results demonstrate a nation-wide environmental concern and the need for watershed-scale mitigation of in-stream pharmaceutical contamination." *Study Abstract*.

For info: PLOS website at: <https://doi.org/10.1371/journal.pone.0228214>

GROUNDWATER USE CA SUSTAINABILITY PLANS

Critically over-drafted groundwater basins in California needed to submit groundwater sustainability plans to the state by January 31, 2020 that outline how the basins will reach sustainability over the next 20 years. Local agencies representing 19 of the state's most stressed groundwater basins were required to submit plans to the state detailing how they will manage their basins to achieve sustainability by 2040. Several plans were submitted early and were posted online on January 31, starting a public comment period which closes on April 15, 2020. The remaining plans will be posted online in the coming weeks for a 75-day public comment period.

As noted by the California Department of Water Resources (DWR), overpumping of groundwater has led to a variety of negative effects including reduced groundwater levels, seawater intrusion, and degraded water quality. It has also led to subsidence, which causes damage to critical water infrastructure. In some cases, years of overpumping have left entire California communities and farms without safe and reliable local water supplies.

California's Sustainable Groundwater Management Act (SGMA), signed into law in 2014, requires locally led Groundwater Sustainability Agencies (GSAs) to develop the groundwater sustainability plans outlining actions and implementation measures to halt overdraft and bring groundwater basins into sustainable conditions. High- and medium-priority basins have until 2022 to submit plans and are required to reach sustainability by 2042. SGMA allows

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for more than one GSP to be prepared for a single basin as long as the GSAs demonstrate the plans work together through a coordination agreement.

GSAs are submitting plans to DWR, the lead state agency providing compliance and regulatory oversight. The State Water Resources Control Board can intervene in basins when local management of groundwater is not successful. “The premise of SGMA is that local agencies are best suited to craft plans to sustainably manage groundwater basins,” said Joaquin Esquivel, Chair of the State Water Resources Control Board. “If the state finds a groundwater plan is unlikely to achieve sustainability, the Water Board will temporarily step in to work with the local agency and DWR to bring the basin back into compliance.”

Once a plan is submitted, DWR has 20 days to post it on the website, at which point the plans are open to public comment for 75 days. GSAs will begin implementing their plans immediately after they adopt them. SGMA directs DWR to evaluate and assess all plans to determine whether each plan is adequate, based on best available science and information, and whether implementation of the plan is likely to achieve the groundwater basin’s sustainability goal. More information about the plan submittal and review process and the significance of managing groundwater for long-term sustainability is contained on DWR’s website (see below).

Groundwater accounts for about 40% of the state’s water use in a normal year and up to 60% during dry years. Groundwater is the only water supply for approximately a third of California residents, and many municipal, agricultural, and disadvantaged communities rely on groundwater for all of their water supply needs.

For info: SGMA Portal at: <https://sgma.water.ca.gov/portal/gsp/all>

POLITICAL TURBULENCE US CLIMATE FIRES

On January 15, the World Economic Forum released “*The Global Risks Report 2020*” (Report), warning of geopolitical turbulence and severe threats to the world’s climate. The

Global Risks Report is part of the Global Risks Initiative, which brings stakeholders together to develop sustainable, integrated solutions to the world’s most pressing challenges.

The Report finds that economic and political polarization will rise this year, as collaboration between world leaders, businesses and policy-makers is needed more than ever to stop severe threats to our climate, environment, public health, and technology systems. This points to a clear need for a multi-stakeholder approach to mitigating risk at a time when the world cannot wait for the fog of geopolitical disorder to lift. The Report forecasts a year of increased domestic and international divisions and economic slowdown. Geopolitical turbulence is propelling us towards an “unsettled” unilateral world of great power rivalries at a time when business and government leaders must focus urgently on working together to tackle shared risks.

Over 750 global experts and decision-makers were asked to rank their biggest concerns in terms of likelihood and impact and 78% said they expect “economic confrontations” and “domestic political polarization” to rise in 2020. This would prove catastrophic, particularly for addressing urgent challenges like the climate crisis, biodiversity loss, and record species decline.

The press release for the Report provided the following bullet points:

- Severe threats to our climate account for all of the Report’s top long-term risks, with “economic confrontations” and “domestic political polarization” recognized as significant short-term risks in 2020.
- It warns that geopolitical turbulence and the retreat from multilateralism threatens everyone’s ability to tackle shared, critical global risks.
- Without urgent attention to repairing societal divisions and driving sustainable economic growth, leaders cannot systemically address threats like the climate or biodiversity crises.

For the first time in the survey’s 10-year outlook, the top five global risks in terms of likelihood are all environmental. The report sounds the alarm on:

- Extreme weather events with major damage to property, infrastructure and loss of human life;
- Failure of climate-change mitigation and adaptation by governments and businesses;
- Human-made environmental damage and disasters, including environmental crime, such as oil spills, and radioactive contamination;
- Major biodiversity loss and ecosystem collapse (terrestrial or marine) with irreversible consequences for the environment, resulting in severely depleted resources for humankind as well as industries; and
- Major natural disasters such as earthquakes, tsunamis, volcanic eruptions, and geomagnetic storms.

For info: World Economic Forum Report available at: www.weforum.org/press/2020/01/burning-planet-climate-fires-and-political-flame-wars-rage

GROUNDWATER LOSS US UNSUSTAINABLE USE

A new study of a research team from the University of Illinois at Urbana-Champaign deals with the long-term risks posed to global agricultural supply chains from reliance on unsustainable groundwater use. Published online January 10 in the journal *Water Resources Research*, *Groundwater Depletion Embedded in Domestic Transfers and International Exports of the United States*, by Sajani Gumidyala, et al., examines the increased reliance on groundwater for food security.

The study’s Abstract highlights the importance of the issue of sustainability. “The United States plays a key role in global food security by producing and exporting agricultural products. Groundwater irrigation is increasingly important in agricultural production, nearly tripling since records began in 1950. Increased reliance on groundwater and prolonged unsustainable pumping of aquifers has led to groundwater depletion in many areas. In this study, we ask: How much groundwater depletion is embedded in the domestic transfers and international agricultural exports of the United States? How much do domestic and international agricultural

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commodity fluxes rely on unsustainable groundwater use?”

The Abstract explains the methodology utilized and their basic findings concerning domestic transfers and international exports. “To address these questions we quantify the amount of nonrenewable groundwater that is incorporated into agricultural commodities produced in the U.S. and transferred both within the country and exported internationally. We find that 26.3 km³ of nonrenewable groundwater was transferred domestically in 2002 and 2.7 km³ was sent abroad. In 2012, 34.8 km³ was transferred domestically and 3.7 km³ was exported. This indicates an increase of 32% in domestic transfers and 38% in international exports. In 2002, we find that 1,491,126 kilotonnes (340 billion USD) of agricultural products reliant on nonrenewable groundwater were domestically transferred, while 119,048 kilotonnes (47 billion USD) were exported. In 2012, the mass transfer of agricultural goods reliant on unsustainable groundwater decreased, but their value in national and international supply chains increased by 54% and 31%, respectively. Our results underscore the importance of the long-term risks posed to global agricultural supply chains from reliance on unsustainable groundwater use.”

For info: Study available at: <https://doi.org/10.1029/2019WR024986>

“BASIN SWEEPS”**AZ****GROUNDWATER LEVELS**

The Arizona Department of Water Resources (ADWR) is continuing “basin sweeps” to collect groundwater level measurements. Beginning the week of February 10, and continuing for several months, ADWR field services staff will be making an extensive effort to measure water levels in wells in the Tucson and Santa Cruz Active Management Areas and Cienega Creek and San Rafael Basins. (See Water Briefs, *TWR* #190 (Dec. 15, 2019) regarding a “basin sweep” in the Lower Gila and Gila Bend Basins).

ADWR staff will attempt to measure water levels at hundreds of wells in these AMAs and basins. This survey of wells — or “basin sweep,” as it is known — will be the first such

basin survey of the area since 2016. The data collected will be used for several purposes, including: analysis of water-level trends; groundwater modeling; water-level change maps; hydrologic reports; and water resource planning and management. The general area covered by this basin sweep is the southern portion of the state and extends from the US – Mexico border to north of Tucson. **For info:** Shauna Evans, 602/ 771-8079, smevans@azwater.gov or <https://new.azwater.gov/>

MUNI DROUGHT RESPONSE US IRRIGATION RESTRICTIONS

On January 23, the Alliance for Water Efficiency released a major new research study on municipal drought response and water demand. *The Use and Effectiveness of Municipal Irrigation Restrictions During Drought* study explores how drought response measures have been implemented and how water demand reductions have been achieved across different water suppliers in different states. “The results confirm the effectiveness and importance of irrigation restrictions during a drought,” said Mary Ann Dickinson, President and CEO of the Alliance for Water Efficiency. “The research shows that when necessary and with proper implementation, substantial demand reductions can be achieved by communities working together during a drought.”

Key findings from the study include:

- Case study participants in California and Texas successfully reduced annual demand by 18-30% and peak monthly demand by 20-42% through a combination of mandatory demand management measures.
- Within this study, voluntary conservation did not generate statistically significant savings (i.e., estimated savings are indistinguishable from zero).
- Messaging and enforcement are viewed as best practices and essential components of a successful drought response.
- Water Shortage Contingency Plans should include all of these components: messaging, enforcement, irrigation day-of-week and/or time-of-day restrictions, drought surcharges,

and implementation strategies.

- To be effective, Water Shortage Contingency Plans need codified rulemaking to include provisions that are enforceable on non-compliant customers.

“There are many substantive findings in this report that water utilities will want to learn,” said Dickinson. “This is the largest study to date of municipal drought response in America in terms of scope and breadth.”

For info: Alliance for Water Efficiency www.allianceforwaterefficiency.org/news (Jan 23rd)

PFAS – TRI**US****EPA EXPANDS REPORTING LIST**

EPA has added 160 PFAS chemicals to the Toxics Release Inventory (TRI), the federal government’s system for industrial facilities to report hazardous emissions to air, land, and water. Adding PFAS to the inventory was required in a law that Congress passed last year.

Section 7321 of the National Defense Authorization Act for Fiscal Year 2020 (P.L. 116-92) (NDAA) added certain Per- and Polyfluoroalkyl Substances (PFAS) to the Toxics Release Inventory (TRI) list. These chemicals are subject to TRI reporting requirements for Reporting Year 2020, with TRI reporting forms due by July 1, 2021.

For info: EPA/TRI website: www.epa.gov/toxics-release-inventory-tri-program

WILDFIRES IMPACT**WEST****WATER SUPPLIES**

Wildfires are a natural part of many ecosystems, but recently these fires have become more severe, burning more acres and causing destruction in the western parts of the US. These wildfires destroy trees, vegetation, wildlife, and infrastructure. The fires have taken a toll in human life, but also in the health of those exposed to the smoke. EPA has been exploring the impacts of both short-term and long-term exposure to wildfire smoke on human health. More recently, EPA researchers have begun to look at a less understood area of research — the impact of these fires on our water supply, the natural resource we depend on for drinking, irrigation, fishing, and recreation.

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Just as wildfires impact air quality, they can also affect the quantity and quality of water available. Water supplies can be adversely affected during the active burning of a wildfire and for years afterwards. During active burning, ash and contaminants associated with ash settle on streams, lakes, and water reservoirs. Vegetation that holds soil in place and retains water is burned away. In the aftermath of a large wildfire, rainstorms flush vast quantities of ash, sediment, nutrients, and contaminants into streams, rivers, and downstream reservoirs. The absence of vegetation in the watershed can create conditions conducive to erosion and even flooding, and naturally occurring and anthropogenic substances can impact drinking water quality, discolor recreational waters, and may potentially contribute to harmful algal blooms.

Due to the unpredictable nature of wildfires, drinking-water utilities face a considerable challenge to develop plans and strategies for managing floods and treating polluted water. Information and tools are needed to help water storage and treatment managers better prepare for wildfire impacts.

Research conducted by Dr. Mussie Beyene, an EPA postdoctoral researcher working with EPA ecologist Dr. Scott Leibowitz, has examined pre- and post-wildfire data on streams in the western US to understand how wildfires change the daily flow of sediment and water in streams. One of the reasons he focused on the western states is because 65% of freshwater supply in the region originates from forested watersheds, which, depending on conditions, can be highly susceptible to forest fires. “How do wildfires change the amount of water and sediment flowing into a stream?” asks Beyene. “If you are a municipal water supply manager, you are most concerned with changes in the magnitude, frequency and timing of extreme water discharge and sediment — what are the highest and lowest amounts of water and sediment that flow into a stream after a wildfire — because your water treatment plants and your water storage systems may not be built to accommodate them.”

Beyene found that there is a possible increase in stream water

discharge following a wildfire. For streams in the northwest, this can be followed by fewer episodes of very low water levels. In contrast, for streams in the southwest, the increase in discharge is followed by more episodes of very high water levels. Additionally, the timing of peak flood events shifted towards late winter-early spring for regions that receive the majority of their water from winter snowpack. In terms of water quality, Beyene also found a significant increase in the amount of suspended sediments in streams after a wildfire event.

Beyene’s research is just one aspect of EPA’s larger investigation into the impact of wildfires on water resources. Researchers are working to determine whether pollutants, like mercury and lead left over from the 20th century mining boom and other old industries, more easily find their way into water after wildfires. They are also exploring ways to protect water quality from wildfires through watershed management. Information generated from these studies will be used to protect the quality of our water supplies and the essential benefits they provide.

For info: EPA Science Matters website: www.epa.gov/sciencematters/wildfires-how-do-they-affect-our-water-supplies

WATER SUPPLY RULE**US****PROPOSED RULE WITHDRAWN**

The Hon. R.D. James, Assistant Secretary of the Army for Civil Works, on January 21st directed the US Army Corps of Engineers to withdraw the “Use of U.S. Army Corps of Engineers Reservoir Projects for Domestic, Municipal & Industrial Water Supply,” also known as the Water Supply Rule.

In 2016, the Department of the Army issued a notice of proposed rulemaking for the Water Supply Rule that sought to clarify the Corps’ policies governing the use of its reservoir projects for domestic, municipal and industrial water supply by defining key terms under the Flood Control Act of 1944 and the Water Supply Act of 1958 in order to account for court decisions, legislative provisions and other developments related to the exercise of these authorities. However, due to

several issues raised by states, tribes, and other stakeholders concerning inconsistent pricing methodologies, reallocation approval levels, agreement approval levels, and difficulty getting real estate instruments, Mr. James instructed the Corps in September 2019 to refrain from issuing a final rule for a minimum of six months in order to allow for additional coordination with states, tribes, and other stakeholders.

The Corps’ January 21st press release set out what’s next. “Upon withdrawal of the Water Supply Rule, the Army will consider how best to address water supply issues in order to address stakeholder concerns by simplifying, clarifying and streamlining provisions and processes to achieve better consistency and address long-standing policy issues.”

James Ogsbury, the Executive Director of the Western Governors’ Association (WGA) sent a letter to James on January 23rd supporting the decision to withdraw the proposed Water Supply Rule. WGA’s letter pointed out the “deficiencies” with the proposed rule: “The proposed rule, which was launched under the prior Administration, threatened to interfere with states’ primary authority to manage and allocate water resources within their boundaries. In addition, the Corps promulgated the rule without genuine consultation with state officials and without properly acknowledging the various federalism implications the proposed rule would have had if finalized.”

WGA highlighted its viewpoint on the proposal going forward. “States have a vital role in the implementation of several Corps programs, due to states’ inherent and sovereign authority over water resources, as well as their statutory role as co-regulators under the federal Clean Water Act. Western Governors applaud the Administration for its withdrawal of this proposed rule and look forward to continuing to work with you to strengthen state-federal partnerships and to ensure that all Corps reservoirs are operated in compliance with state and federal law.”

For info: WGA website at: <https://westgov.org/>; Corps website at: www.army.mil/article/231866/us_army_withdraws_water_supply_rule

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CEQ PROPOSES NEPA CHANGES

In early January, the US President's Council on Environmental Quality (CEQ) announced rulemaking to "modernize" National Environmental Policy Act (NEPA) regulations (see Federal Register, January 10, 2020).

Excerpts from CEQ's Fact Sheet:

CEQ's proposed rule would modernize and clarify [NEPA] to facilitate more efficient, effective, and timely NEPA reviews by simplifying and clarifying regulatory requirements, codifying certain case law and CEQ guidance, updating the regulations to reflect current technologies and agency practices, eliminating obsolete provisions, and improving the format and readability of the regulations. The proposed rule seeks to reduce unnecessary paperwork and delays.

Overview of Key Elements of the Proposed Rule:

- **Modernize, Simplify and Accelerate the NEPA Process** to establish presumptive time limits of two years for completion of environmental impact statements (EISs) and one year for completion of environmental assessments (EAs)
 - Require joint schedules, a single EIS, and a single record of decision (ROD), for EISs involving multiple agencies
 - Strengthen the role of the lead agency and require senior agency officials to timely resolve disputes to avoid delays
 - Promote use of modern technologies for information sharing and public outreach
 - **Clarify Terms, Application and Scope of NEPA Review** to provide direction regarding the threshold consideration of whether NEPA applies to a particular action
 - Require earlier solicitation of input from the public
 - Require comments to be specific and timely
 - Require agencies to summarize alternatives, analyses, and information submitted by commenters and to certify consideration of submitted information in the ROD
 - Simplify the definition of environmental "effects" and clarify that effects must be reasonably foreseeable and have a reasonably close causal relationship
 - State that analysis of cumulative effects is not required under NEPA
 - Clarify that "major Federal action" does not include non-discretionary decisions and non-Federal projects (those with minimal Federal funding or involvement)
 - Clarify that "reasonable alternatives" requiring consideration must be technically and economically feasible
 - **Enhance Coordination with States, Tribes, and Localities** to reduce duplication by facilitating use of documents required by other statutes or prepared by State, Tribal, and local agencies to comply with NEPA
 - Ensure appropriate consultation with affected Tribal governments...and eliminate current regulations that limit Tribal interest to reservations
 - **Reduce Unnecessary Burdens, Delays** to facilitate use of efficient reviews (categorical exclusions (CEs), environmental assessments)
 - Allow agencies to establish procedures for adopting other agencies' CEs
 - Allow applicants/contractors to assume a greater role in preparing EISs under the supervision of an agency
- CEQ requests that public comment be submitted on or before March 10, 2020. See www.regulations.gov/ — Docket ID No. CEQ-2019-0003.
- For info:** CEQ-NEPA website: www.whitehouse.gov/ceq/nepa-modernization

NEPA CONCERNS

EXCERPTS ANALYSIS BY KATHLEEN REST

EXECUTIVE DIRECTOR, UNION OF CONCERNED SCIENTISTS (UCS)

President Trump launched one of his most destructive assaults yet on our nation's environmental and public safeguards. He proposed fundamental changes in how the federal government implements our nation's bedrock environmental law — the National Environment Policy Act, or NEPA.

NEPA requires federal agencies to assess environmental impacts before issuing permits for major infrastructure and construction projects, such as highways, roads, bridges, mines, and pipelines, as well as for oil and gas drilling operations and other federal actions. It also requires a process to give the public a voice in decision making, including consideration of alternatives. A noble cause and process that has served our nation and our communities well for decades, it ensures transparency, informed decision making, and a public voice. Without NEPA, an agency has no obligation to consider and inform the public of other ways of accomplishing the project goals; there is no other general requirement to consider alternative configurations of a federal action.

Some of the most egregious proposed revisions would:

- Redefine what constitutes a "major federal action," thus narrowing the scope of what projects require environmental review.
- Eliminate the requirement to evaluate cumulative effects, and collapse the distinction between direct and indirect effects.
- Allow companies to conduct their own environmental review (under supervision of an agency).
- Set arbitrary timelines and page limits for environmental impact assessments.
- Hamper the ability for communities to engage meaningfully with the NEPA process.

This so-called streamlining and clarification is a blatant effort to limit consideration of climate change impacts, including both potential increases in greenhouse gas emissions and exposure and vulnerability to climate impacts, such as sea level rise. Both are some of the most significant cumulative impacts of environmental decisions. ("Cumulative"— the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions.)

The world's scientists have spoken clearly on both the present and future state of our climate. Only the Trump administration, with its antipathy to all things climate and its complicity with the fossil fuel industry, can willfully ignore the harm to communities unfolding before our eyes.

The proposal also collapses the distinction between direct and indirect effects. Direct being effects "caused by the action and occur at the same time and place" and indirect being effects "caused by the action and are later in time or farther removed in distance, but are still reasonable foreseeable." These changes are no simple tweaks to language. Their implications are dire.

Rolling back and weakening requirements for environmental reviews will impact communities across the nation for years to come. Rushing infrastructure projects that prioritize short-term industry gains over longer term health, safety, and environmental protections is short-sighted and unfair to communities on the front lines of construction projects that will impact their air, water, land, living patterns, and ultimately our climate.

For info: UCS website: <https://blog.ucsusa.org/adrienne-hollis/conversation-with-the-nepa-ninja>

February 16-21 CA

Ocean Sciences Meeting 2020, San Diego. San Diego Convention Center. Presented by American Geophysical Union, Assoc. for the Sciences of Limnology and Oceanography and The Oceanography Society. For info: www2.agu.org/ocean-sciences-meeting

February 18 WEB

Enforcement and Compliance History Online (ECHO) Webinar, 1:30 - 2:30 pm EST. Presented by EPA; Register at: <https://echo.epa.gov/help/training/upcoming>. For info: <https://echo.epa.gov>

February 18 WEB

Creating the Water Workforce of the Future Webinar, 1:30 - 3:00 pm EST. Presented by EPA; Register at: https://rosstrategic.zoom.us/webinar/register/WN_nmP88dVfR8KiSolR00aDVw. For info: Office of Wastewater Management - www.epa.gov/npdes

February 20 WEB

SGMA and Groundwater Rights: To Adjudicate or Not to Adjudicate Webinar, 10:00 - 11:00 am PST. Presented by Best Best & Krieger. For info: www.bbklaw.com/news-events/webinars/sortBy=upcoming

February 20 OR

2020 Water Justice Speaker Series: Impacts on Historically Marginalized and Rural Communities - Environmental Finance and the Green Climate Fund, Portland. Portland State University: SB1-170, 1025 SW Mill Street, 4:00 - 5:00 pm. For info: Melissa Haefner, PSU, 503/ 725-2497 or www.oregonwaterstories.com

February 20 CA

Navigable Waters Protection Rule - Regulatory Program Workshop, Sacramento. HQ of the Sacramento District, 9 - 11 am. Registration Required by Feb. 14 & Limited to 75. More info on Rule at: <https://www.epa.gov/>. For info: Email Registration to: CESPK-REGULATORY-INFO@usace.army.mil

February 20-21 NV

Family Farm Alliance 2020 Annual Meeting & Conference, Reno. Eldorado Resort & Casino. For info: www.familyfarmalliance.org

February 24-28 UT

Rural Water Association of Utah Annual Conference, St. George. The Dixie Center. For info: www.rwau.net/events/2020-annual-conference

February 25-27 DC

Association of California Water Agencies' Annual Washington DC Conference, Washington. St. Regis Hotel. For info: www.acwa.com/events/

February 25-27 WA

2020 Annual Rural Water Conference & Tradeshow, Yakima. Yakima Convention Center. Evergreen Rural Water of Washington Annual Event. For info: www.erwow.org/Conferences/2020AnnualConference/Attendees.aspx

February 25-28 CA

WEF/AWWA Water Utility Management Conference - Latest Approaches, Practices, Processes, Garden Grove. Hyatt Regency. Presented by World Environment Federation / American Water Works Assoc. For info: www.awwa.org/Events-Education/Events-Calendar

February 26 CA

Water & Environmental Law Program Speaker Series: Mark Arax, Water Journalist & Author, Sacramento. McGeorge School of Law. Presented by Water & Environmental Program. For info: Jennifer Harder at jharder@pacific.edu

February 26 WEB

WOTUS 2020: Will We Ever Have Clarity? Webinar, Presented by the American BAR Association. For info: www.americanbar.org/events

February 27 OR

2020 Water Justice Speaker Series: Impacts on Historically Marginalized and Rural Communities - GIS, Spatial Thinking, and Environmental Justice, Portland. Portland State University: SB1-170, 1025 SW Mill Street, 4:00 - 5:00 pm. For info: Melissa Haefner, PSU, 503/ 725-2497 or www.oregonwaterstories.com

February 27-28 TX

Texas Wetlands Conference, Houston. JW Marriott by the Galleria. For info: CLE Int'l, 800/ 873-7130, live@cle.com or www.cle.com

February 27-28 CA

Environmental & Land Use Issues in Cannabis & Industrial Hemp Conference, Oakland. Oakland Marriott City Center. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

March 2-3 NC

Invasive Zebra and Quagga Mussels Mitigation Training Course, Charlotte. Hilton Garden Inn. For info: www.euci.com/event_post/0320-mussel-mitigation/

March 2-3 CO

Special Institute for Young Natural Resources Lawyers & Landmen, Denver. The Oxford Hotel. Presented by Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org/conferences

March 2-3 TX

North American Shale Water Management 2020: Reducing the Cost of Water Recycling & Use (Exhibition & Conference), Houston. Aloft Houston Katy. For info: www.shale-water-management.com/?join=VR

March 2-4 TX

Public-Private Partnership Conference & Expo, Dallas. Sheraton Dallas Hotel. For info: <https://thep3conference.com>

March 2-6 CA

2020 NPDES Permit Writers' Course, Sacramento. State Water Resources Control Board, 1011 I Street, 2nd Floor - Klamath Room. Presented by EPA Water Permits Division. For info: www.epa.gov/npdes/npdes-permit-writers-course

March 3-4 MT

Montana Water Summit: At the Confluence of Land & Water, Helena. Delta Hotels Helena Colonial. Presented by the Montana Department of Natural Resources & Conservation. For info: <http://dnrc.mt.gov/divisions/water>

March 4 CA

2020 Kern County Water Summit, Bakersfield. Mechanics Bank Arena, 7 am - 2 pm. Presented by Water Association of Kern County. For info: www.wakc.com

March 5 OR

Immerse 2020 - A Benefit for The Freshwater Trust, Portland. Redd on Salmon Street, 831 SE Salmon Street; 5:30 - 9 pm. For info: www.thefreshwatertrust.org

March 5 OR

2020 Water Justice Speaker Series: Impacts on Historically Marginalized and Rural Communities - Lessons Learned as the Environmental Justice Community Liaison at USEPA, Portland. Portland State University: SB1-170, 1025 SW Mill Street, 4:00 - 5:00 pm. For info: Melissa Haefner, PSU, 503/ 725-2497 or www.oregonwaterstories.com

March 5-6 MT

Real Estate & Land Use Law Seminar, Missoula. DoubleTree by Hilton Missoula Edgewater. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

March 5-8 OR

Public Interest Environmental Law Conference - PIELC: "Move: Migration on a Changing Planet", Eugene. University of Oregon. Presented by Land Air Water (LAW) Student Environmental Law Society. For info: <http://pielc.org/>

March 6 WA

Winter Waters Celebration, Spokane. Patsy Clark Mansion, 2208 W. 2nd Avenue. Presented by the Center for Environmental Law & Policy and the Sierra Club-WA State. For info: <https://winterwaters2020.bpt.me/>

March 10 WY

Update on GIS Data Model Implementation Study & Water Supply Index - Water Forum, Cheyenne. Water Development Office, 6920 Yellowtail Road, 10 am - Noon. Presented by Wyoming State Engineer's Office. For info: Jeff Cowley, WSEO, 307/ 777-7641, jeff.cowley@wyo.gov or <https://sites.google.com/a/wyo.gov/seo/interstate-streams/water-forum>

March 11 WA

Managing Stormwater in Washington Conference, Tacoma. Greater Tacoma Convention Center. Northwest Environmental Business Council Event. For info: <https://washingtonstormwater.com>

March 11 OR

Superfund 2020: 25th Annual Conference on Environmental Contamination & Cleanup, Portland. World Trade Center Two. Sponsored by Environmental Law Program at Lewis & Clark Law School. For info: Environmental Law Education Center: www.elecenter.com

March 11 OR

EPA Portland Harbor Public Forum, Portland. Portland State University's Native American Student and Community Center, 710 SW Jackson Street. DEQ & CAG Support. For info: <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=1002155>

March 11-12 Chile

2nd International Investment Conference & Exhibition Desalination Latin America, Santiago. Intercontinental Santiago Hotel. Presented by Desalination Latin America. For info: <https://desalinationlatinamerica.com/>; email: events@yostockcapital.com

March 12 WA

Managing Stormwater in Washington Conference - 12th Annual, Tacoma. Tacoma Convention Center. Presented by Northwest Environmental Business Council. For info: washingtonstormwater.com

March 12 CA

Association of California Water Agencies' Legislative Symposium, Sacramento. Sutter Club. For info: www.acwa.com/events/



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CALENDAR

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March 12 **OR**

2020 Water Justice Speaker Series: Impacts on Historically Marginalized and Rural Communities - Oregon Water Futures: Stories by Rural Communities of Color, Portland. Portland State University: SB1-170, 1025 SW Mill Street, 4:00 - 5:00 pm. For info: Melissa Haefner, PSU, 503/725-2497 or www.oregonwaterstories.com

March 12-13 **AZ**

Law of the Colorado River Conference, Scottsdale. Hilton Hotel. For info: CLE Int'l, 800/ 873-7130, live@cle.com or www.cle.com

March 16 **AZ**

Membrane Technology Conference, Phoenix. Phoenix Convention Center. Presented by American Water Works Assoc. For info: www.awwa.org/Events-Education/Events-Calendar

March 16 **UT**

Utah Water Law & Policy Seminar, St. George. The Dixie Center. For info: <https://conference.usu.edu/uwuw/Law.cfm>

March 17 **ID**

PFAS Workshop, Boise. Grove Hotel. Presented by Northwest Environmental Business Council. For info: <https://nebc.regfox.com/pfas-workshop-boise-march-19-2020>

March 19-20 **OR**

Shoreline Regulation, Permitting & Development Seminar, Seaside. Seaside Civic & Convention Center. For info: The Seminar Group, 800/574-4852, info@theseminargroup.net or www.theseminargroup.net

March 20-21 **OR**

Pacific Northwest Ground Water Exposition, Portland. Red Lion Hotel. Presented by Pacific Northwest Ground Water Assoc. For info: pnwgwa.org

March 20-23 **CO**

Drought and Water Shortage Preparedness Training, Denver. EUCI Conference Center. For info: www.euci.com/events/

March 23-25 **TX**

Ten Across Water Summit: The Responsibility of Knowing, Houston. Asia Society Texas Center & Houston Museum of Natural Science. Presented by HARC (Houston Advanced Research Center). For info: [www.10xwatersummit.com/?ct=\(EMAIL_CAMPAIGN_JAN_NEWS\)](http://www.10xwatersummit.com/?ct=(EMAIL_CAMPAIGN_JAN_NEWS))

March 23-26 **IL**

Watercon Conference, Springfield. Crowne Plaza Springfield. For info: www.isawwa.org/mpage/2015conf00

March 24-26 **CA**

Water Innovation Week 2020: The Next Decade, San Francisco. Multiple Venues. Presented by Imagine H2O. For info: www.imagineh2o.org/wi2020

March 24-26 **CA**

16th Annual Western Boot Camp on Environmental Law, San Francisco. Covington & Burling LLP, 415 Mission Street, Ste. 5400. Presented by Environmental Law Institute; Registration Required by 2/28. For info: www.eli.org/boot-camp/western-bootcamp-environmental-law

March 27 **AZ**

Water at the Crossroads: The Next 40 Years: WRRRC Annual Conference 2020, Phoenix. Black Canyon Conference Center, 9440 N. 25th Avenue. Presented by the Water Resources Research Center. For info: <https://wrrc.arizona.edu/wrrc-conference-2020>

March 27-29 **TX**

Cattle Raisers Convention & Expo, Fort Worth. Fort Worth Convention Center. Presented by the Texas & Southwestern Cattle Raisers Assoc. For info: <http://cattleraisersconvention.com/>

March 29-April 1 **MN**

Sustainable Water Management Conference, Minneapolis. Hyatt Regency. Presented by American Water Works Assoc. For info: www.awwa.org/Events-Education/Events-Calendar

March 30-April 3 **VA**

WSWC/ICWP/NWSA Washington, DC Roundtable * WSWC Spring (192nd) Meeting * WSWC/WestFAST Forum, Arlington. DoubleTree Hotel Crystal City. Presented by the Western States Water Council, Interstate Council on Water Policy & the National Water Supply Alliance. For info: www.westernstateswater.org/upcoming-meetings/ or www.icwp.org

March 31-April 3 **TX**

Texas Water 2020: Exhibition & Conference, Fort Worth. Fort Worth Convention Center. For info: www.txwater.org