INDOOR WATER EFFICIENCY BEST PRACTICES

1. Match Plumbing Standards to Colorado's WaterSense Rule (HB 19 1231)
2. Update Green Building Standards to Go Beyond State and National Standards
3. Include Indoor Water in Water Waste Provision
4. Require Retrofits for Redevelopment and/or Resale
5. Adopt Commercial Indoor Water Efficiency Standards, Especially in Tourism Based Economies

CO COLORADO WATERSENSE LAW *(PRODUCTS SOLD)* HB 19-1231

Fixture	Standard	2017	2019	2021
Public Lavatory Faucet/aerators	.5	X		
Lavatory Faucet	1.5 gpm		X	
Showerhead	2.0 gpm		X	
Flushing Urinal	.5 gpf		X	
Flushometer Valve Toilet (Commercial)	No LET			X
Tank Toilet	1.28 gpf		X	
Kitchen Faucet/Aerators (Residential)	1.8 gpm	X		
Spray Sprinkler Bodies	WaterSense			X
Water Coolers	EnergyStar			X
Commercial Dishwashers	EnergyStar			X
Commercial Steam Cookers	EnergyStar			X

Required Fixtures	Colorado Plumbing Code Standard	CO WaterSense Standard
Toilets	1.6	1.28 gpf
Showerheads	2.5	2.0 gpm
Faucets (bathroom)	2.2	1.5
Faucets (kitchen)	2.2	1.8 (temp flow of 2.2)

WATER EFFICIENT FIXTURE MARKET PENETRATION GREELEY LOWE'S		
Toilet Flush Rate (gallons per flush)	Total Number	Percent of Total Available
Single Flush Low Flow to Ultra Low Flow		
1.28 gpf	807	57.15%
1.0 – 1.1 gpf	155	23.58%
0.08 gpf	178	
Dual Flush		
1.6/1.1 gpf	32	2.2%
1.6/0.8 - 1.0 gpf	62	4.3%
Standard Flush 1.6 gpf	**178**	12.6%
Total Types Available for Sale	**1,412**	

Carbondale, CO Green Building Code

Water Conservation		
1-4	1.18	High efficiency dual flush toilets. (2 points per toilet)
		High efficiency < 1.4 gpm toilets. (1 point per toilet)
2	1.19	Low flow shower heads < 2gpm & no more than one spray head per shower. (1 point per head)
1	1.20	Hot water recirculating pump with tempature sensor/timer.
3	1.18	Energy Star® water efficient clothes washer.
46	***Sub Total***	

COMMERCIAL/INSTITUTIONAL WATER SAVING RECOMMENDATIONS

Water Conservation Ordinance

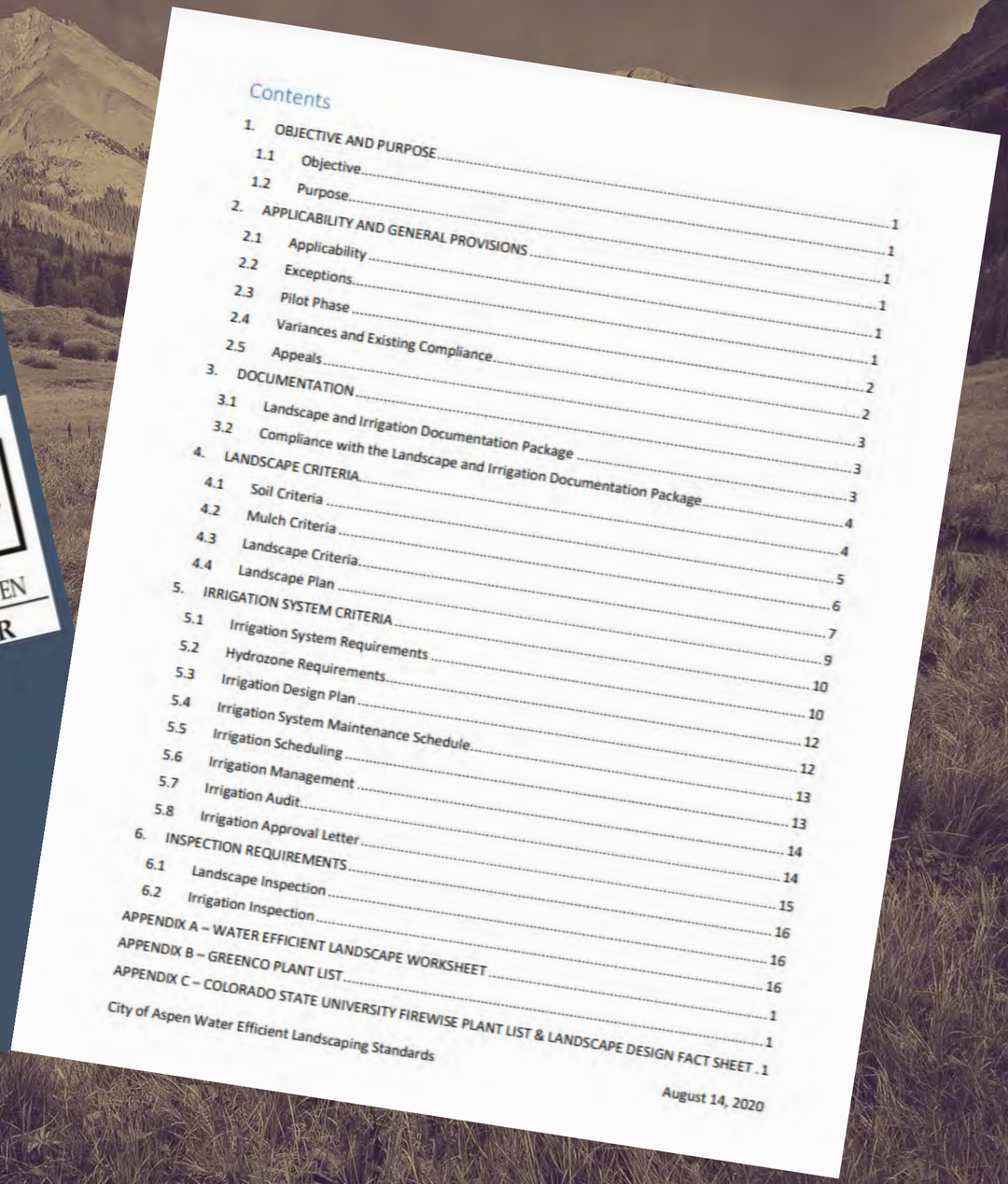
Restaurants

- EnergyStar appliances (dishwaters, ice machines, etc.)
- Low flow pre-rinse valves and spray nozzles
- Serve water on request
- Efficient fixtures
- Mandatory audits

Hotels

- Wash linens every 4 days for more than 1 might stay
- EnergyStar appliances (laundry, ice machines, dishwasher)
- Pool covers
- Recirculating water features
- Efficient cooling towers
- Efficient fixtures
- Mandatory audits

MECHANISM OPTION A | LANDSCAPE ORDINANCE



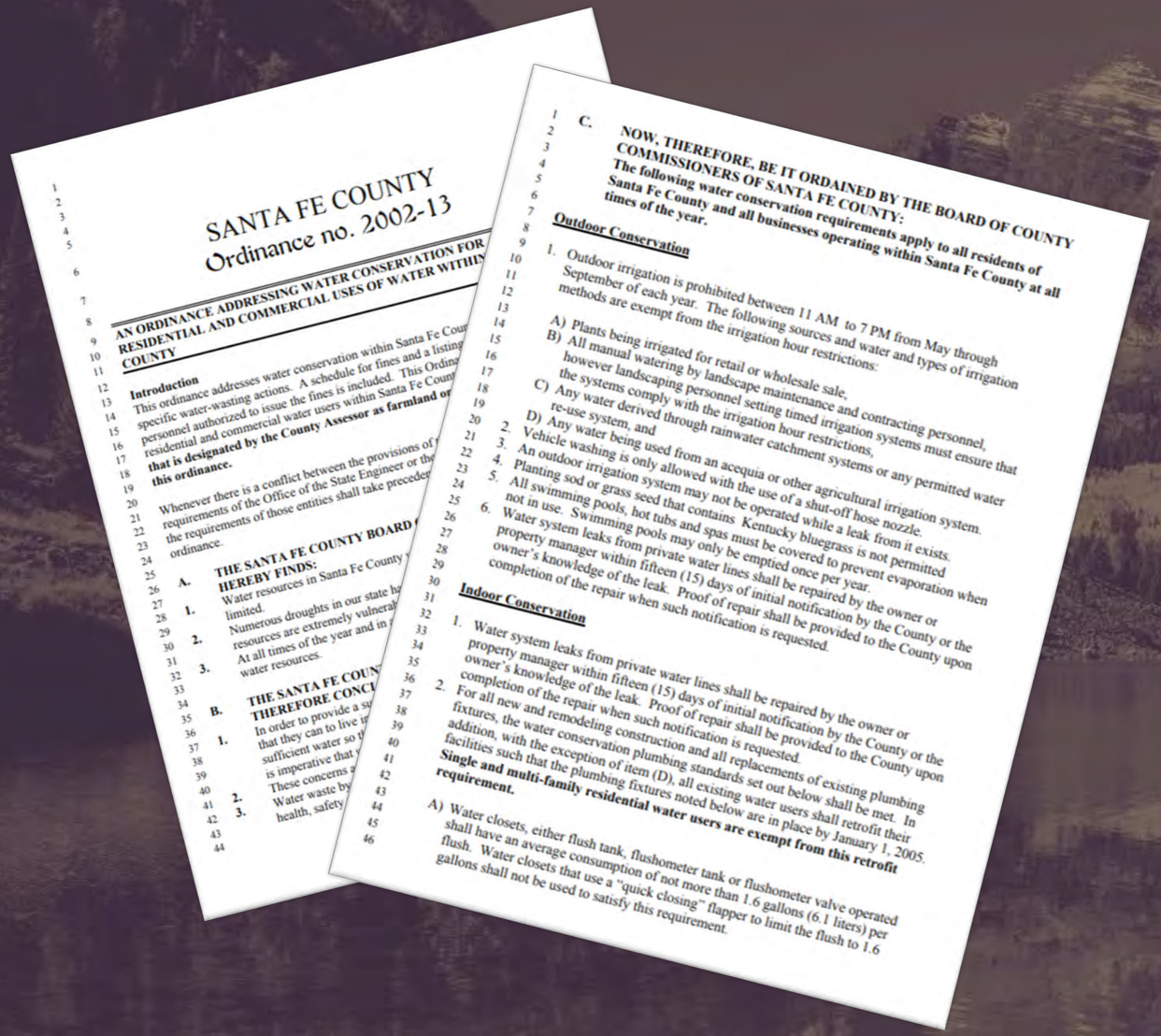
Contents

MECHANISM OPTION B | WATER EFFICIENCY TAP FEE INCENTIVE
Fountain, CO

2019 Tap Fees			
Lot Size in Square Feet	**Standard Water Acquisition Fee**	**Water Acquisition Fee with Conservation Incentive: 50% or Less Irrigated Area**	**Water Acquisition Fee with Conservation Incentive: 30% or Less Irrigated Area**
< 9,000	$4,875	$2,438	$1,024
9,001 – 13,000	$5,688	$2,844	$1,706
>13,001	$6,500	$3,250	$1,950

MECHANISM OPTION C | WATER CONSERVATION ORDINANCE

Alternative and/or Complement to a Landscape Ordinance



SANTA FE COUNTY
Ordinance no. 2002-13

AN ORDINANCE ADDRESSING WATER CONSERVATION FOR RESIDENTIAL AND COMMERCIAL USES OF WATER WITHIN COUNTY

Introduction

This ordinance addresses water conservation within Santa Fe Coun... specific water-wasting actions. A schedule for fines and a listing... personnel authorized to issue the fines is included. This Ordina... residential and commercial water users within Santa Fe Count... **that is designated by the County Assessor as farmland or... this ordinance.**

Whenever there is a conflict between the provisions of ... requirements of the Office of the State Engineer or the... the requirements of those entities shall take precedence... ordinance.

A. **THE SANTA FE COUNTY BOARD ... HEREBY FINDS:**

1. Water resources in Santa Fe County ... limited.
2. Numerous droughts in our state h... resources are extremely vulnerabl... At all times of the year and in ... water resources.

B. **THE SANTA FE COUN... THEREFORE CONCL...**

1. In order to provide a su... that they can to live t... sufficient water so t... is imperative that ... These concerns ... 2. Water waste by ... 3. health, safety ...

C. **NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF SANTA FE COUNTY:**
The following water conservation requirements apply to all residents of Santa Fe County and all businesses operating within Santa Fe County at all times of the year.

Outdoor Conservation

1. Outdoor irrigation is prohibited between 11 AM to 7 PM from May through September of each year. The following sources and water and types of irrigation methods are exempt from the irrigation hour restrictions:

A) Plants being irrigated for retail or wholesale sale,
B) All manual watering by landscape maintenance and contracting personnel, however landscaping personnel setting timed irrigation systems must ensure that the systems comply with the irrigation hour restrictions,
C) Any water derived through rainwater catchment systems or any permitted water re-use system, and
D) Any water being used from an acequia or other agricultural irrigation system.

2. Vehicle washing is only allowed with the use of a shut-off hose nozzle.
3. An outdoor irrigation system may not be operated while a leak from it exists.
4. Planting sod or grass seed that contains Kentucky bluegrass is not permitted
5. All swimming pools, hot tubs and spas must be covered to prevent evaporation when not in use. Swimming pools may only be emptied once per year.
6. Water system leaks from private water lines shall be repaired by the owner or property manager within fifteen (15) days of initial notification by the County or the owner's knowledge of the leak. Proof of repair shall be provided to the County upon completion of the repair when such notification is requested.

Indoor Conservation

1. Water system leaks from private water lines shall be repaired by the owner or property manager within fifteen (15) days of initial notification by the County or the owner's knowledge of the leak. Proof of repair shall be provided to the County upon completion of the repair when such notification is requested.
2. For all new and remodeling construction and all replacements of existing plumbing fixtures, the water conservation plumbing standards set out below shall be met. In addition, with the exception of item (D), all existing water users shall retrofit their facilities such that the plumbing fixtures noted below are in place by January 1, 2005. **Single and multi-family residential water users are exempt from this retrofit requirement.**

A) Water closets, either flush tank, flushometer tank or flushometer valve operated shall have an average consumption of not more than 1.6 gallons (6.1 liters) per flush. Water closets that use a "quick closing" flapper to limit the flush to 1.6 gallons shall not be used to satisfy this requirement.

- **TIME OF DAY/SEASON**: Outdoor irrigation is prohibited between 11 AM to 7 PM from May through September of each year.
- **WATER WASTE**: Vehicle washing is only allowed with the use of a shut-off hose nozzle.
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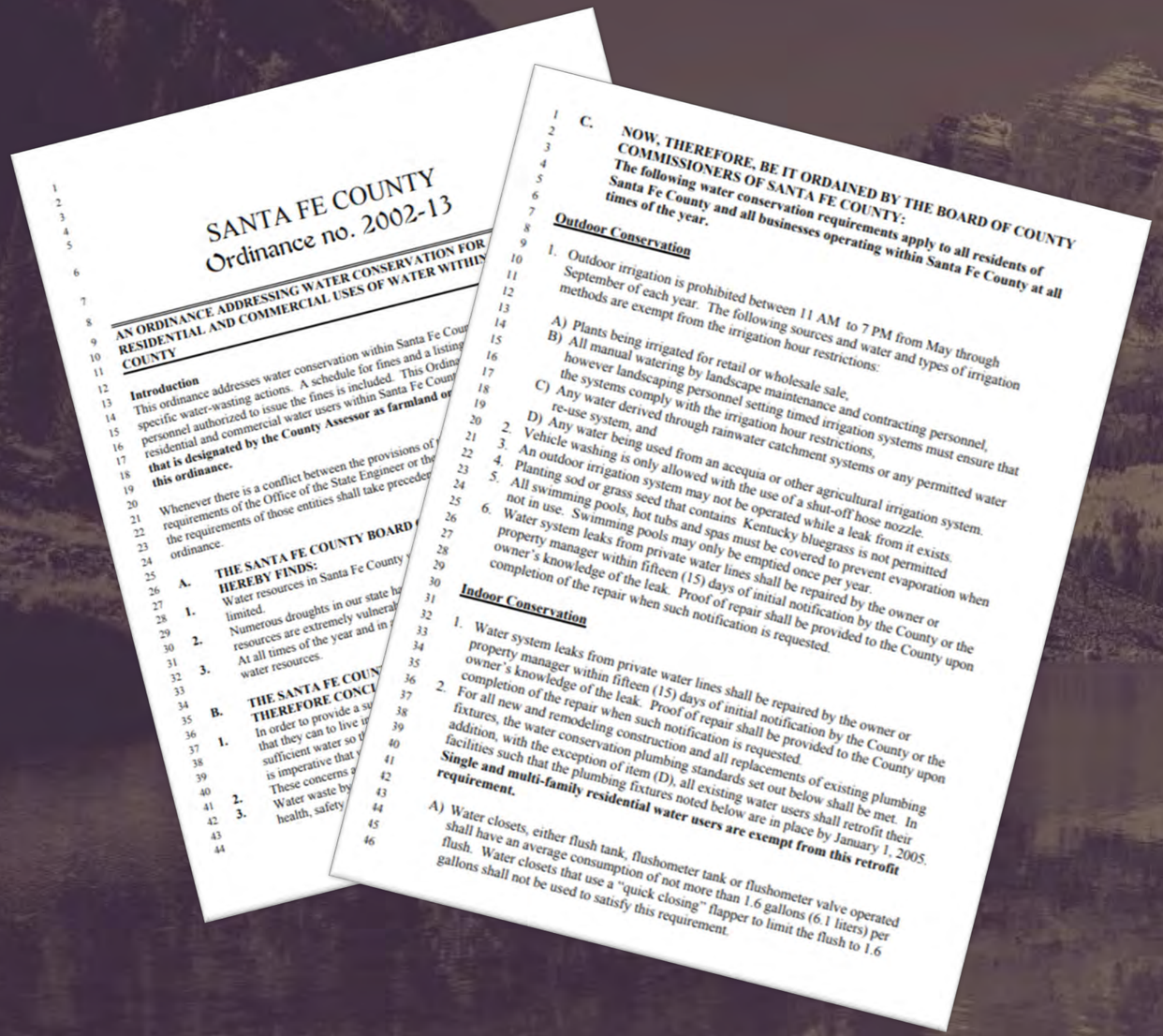
MECHANISM OPTION C | WATER CONSERVATION ORDINANCE

Alternative and/or Complement to a Landscape Ordinance



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- **TYPE OF PLANT MATERIAL**: Planting sod or grass seed that contains Kentucky bluegrass is not permitted
- **IRRIGATION**: Drip system requirements.
- **HOAs**: Must include conservation requirements in convenants and file with County.
- **WATER SUPPLY BUDGET**: Set water budget lower than SEO well standard.
- **INDOOR**: Requires water efficient plumbing fixtures.
- **METERING**: Requires self reporting on well meters.

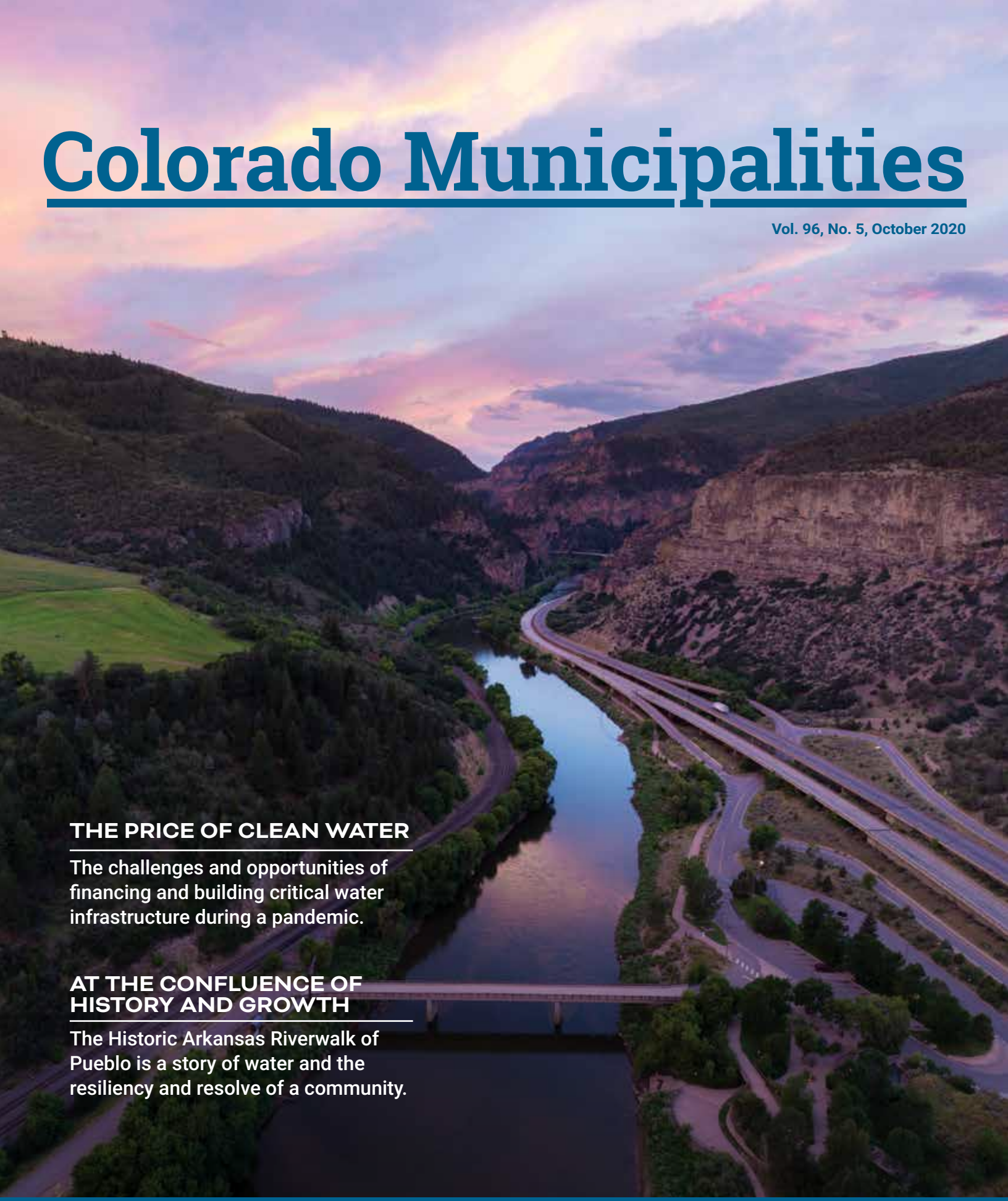
QUESTIONS

WHAT WILL YOU DO TO MAKE COLORADO WATER SMART?

What did you take away from today’s workshop?

Colorado Municipalities

Vol. 96, No. 5, October 2020



THE PRICE OF CLEAN WATER

The challenges and opportunities of financing and building critical water infrastructure during a pandemic.

AT THE CONFLUENCE OF HISTORY AND GROWTH

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>
> Laura Leary, Human Resources Director at Douglas County Government

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COLORADO MUNICIPALITIES
Sarah Werner, editor
Leslie Hough, designer
Mark Vanderbrook, circulation

MISSION
Colorado Municipalities is published to inform, educate, and advise appointed and elected municipal officials about new programs, services, trends, and information to help them perform their jobs and better serve their citizens and communities.

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COLORADO MUNICIPAL LEAGUE OBJECTIVES
The Colorado Municipal League is a nonprofit association organized and operated by Colorado municipalities to provide support services to member cities and towns. The League has two main objectives: 1) to represent cities and towns collectively in matters before the state and federal government; and 2) to provide a wide range of information services to help municipal officials manage their governments.

Colorado Municipalities

Volume 96, Number 5

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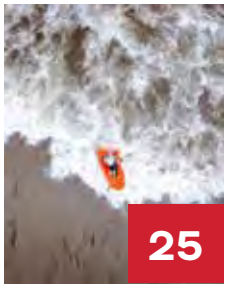

FEATURES

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Leslie Hough	Publication and Design Specialist	09/11/2020 11:31:00 AM

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ABOUT SOME OF OUR CONTRIBUTORS

LETTERS TO THE EDITOR

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Lucas Bare has lived in Salida since 2012 and has served on the FIBArk Board of Directors for three years. In his free time, he likes mountain biking on the trails around Salida or taking family raft trips down the Arkansas River.

Kaitlyn Beekman is an environmental protection specialist with the Colorado Department of Public Health and Environment in the Water Quality Control Division. She serves as the department liaison to the CoWARN network and helps water and wastewater utilities prepare for and respond to emergency situations. Kaitlyn holds a bachelor's degree in environmental studies and political science and is working towards a master's degree in communication.

Laura Belanger is a senior water resources engineer and policy advisor with Western Resource Advocates, a non-profit conservation organization with a mission to protect the west's land, air and water to ensure that vibrant communities exist in balance with nature. Laura works closely and collaboratively with partner organizations, water providers, and state and federal agencies to develop water supply solutions that meet municipal, industrial, and agricultural needs, while protecting healthy stream flows.

Andrew Bliss is the communications and outreach coordinator for the City of Westminster's Public Works and Utilities Department. He is responsible for the strategic marketing and communication of the city's water/wastewater-related programs and projects, including rate/fee messaging, water conservation and efficiency programs, utility customer assistance programs and capital projects. He lives in the Front Range foothills and is passionate about educating water and wastewater customers.

Jessica Brody is vice chair of the Colorado Water Conservation Board. Since August 2018, Jessica has served as general counsel of Denver Water. Before joining Denver Water, she served as the lead environmental attorney for the City and County of Denver (2013-2016), and then as an assistant director in the Denver City Attorney's Office (2016-2018).

Heather Brooks has 25 years of municipal experience that includes seven municipalities in three different states. She has served as city manager for the City of Alamosa since June 2013. Heather is an ICMA-credentialed manager with a B.S. in Business Administration from the University of Northern Colorado and a Master in Public Administration from the University of Kansas. Over the course of her career, Heather has worked with multiple stakeholders and community partners to address a diverse spectrum of community projects, priorities, and issues.

Lynn Clark is currently the executive director of the Historic Arkansas Riverwalk of Pueblo (HARP). She previously served HARP as the director of development and public relations and as the assistant director. Lynn has led the grant writing efforts, researching and writing successful government grant applications such as EDA and DOLA, private foundation grants and corporate gifts to support the planning, design, construction, and capital improvements for HARP. Lynn graduated from Ramapo College of New Jersey with B.S. in Business Administration.

Tom Edwards serves as the mayor pro tem for the Town of Gypsum. After moving to Gypsum in 1995 from Pasadena, Calif, Edwards was appointed to fill a vacancy on the town council in 1998. He has since been re-elected six times, and has served 22 years on council to date. Edwards has also served as a Vail Mountain host since 1997, as an Eagle Valley Land Trust Board member emeritus since 2000, and on the Eagle County Open Space Advisory Board since its inception in 2002.

Michelle Francis is the development manager for the Historic Arkansas Riverwalk of Pueblo and is responsible for fundraising activities, administrative coordination, communication and outreach. Her previous experience is in sales and sales management in California, Colorado and Utah. She has an MBA from the University of Southern California and a B.A. from the University of Paris, France.

Clay Gorman spent 25 years teaching special needs children before retiring. He started working as the town treasurer in Fleming five years ago. He enjoys the Town of Fleming - a great place to work with a top-notch staff.

Celene Hawkins was appointed to the Colorado Water Conservation Board in 2017 and currently serves as chair of the Board. She is the Western Colorado Water Project director/Colorado River Tribal Water Project manager at The Nature Conservancy, where she coordinates and implements collaborative, multi-purpose and environmental water projects in western Colorado and leads The Nature Conservancy's tribal nation engagement throughout the Colorado River Basin.

Greg Hobbs, a senior water judge for the Colorado Courts, served as a justice of the Colorado Supreme Court from May 1, 1996 to Aug. 31, 2015. As a distinguished jurist in residence, he co-directs the Environmental and Natural Resources Program at the University of Denver's Sturm College of Law. With a history degree from the University of Notre Dame (1966) and law degree from the University of California, Berkeley (1971), his law practice emphasized water, environmental, land use and transportation. Books include *In Praise of Fair Colorado The Practice of Poetry, History and Judging* (Bradford 2004); *Colorado Mother of Rivers, Water Poems* (Colorado Foundation for Water Education (2005); *The Public's Water Resource, Articles on Water Law, History, and Culture, Second Edition* (CLE of the Colorado Bar Association 2010); *Living the Four Corners, Colorado Centennial State at the Headwaters* (CLE of the Colorado Bar Association 2010); *Into The Grand* (CLE of the Colorado Bar Association 2012); and *Confluence, The Story of Greeley Water* (City of Greeley 2020) (co-authored with Michael E. Welsh).

Rachael Kuroiwa is the manager of communications - infrastructure for the City of Arvada.

Keith McLaughlin was the former finance director of the Colorado Water Resources & Power Development Authority and as of Feb. 1, 2020 was named its next executive director. Keith has been with the Authority for more than 20 years and is responsible for managing five water-related infrastructure programs that account for 725 loans (and growing) and over $2.75 billion in water infrastructure projects to Colorado municipalities and special districts.

Mark Murphy manages communications for Colorado Springs Utilities, providing electricity, natural gas, water and wastewater services to customers in the Pikes Peak region for nearly 100 years. He is a graduate of Colorado State University and accredited in public relations (APR), Public Relations Society of America.

Jayla Poppleton is the executive director at Water Education Colorado, the state's leading organization for informing and engaging Coloradans on water issues. Prior to becoming E.D., Jayla oversaw Water Education Colorado's full suite of print and digital content programming. For nine years she was the editor for *Headwaters Magazine*, Water Education Colorado's flagship publication. She has written extensively on all things water, and it continues to be the subject she is most passionate about. Jayla serves on the Advisory Council for the One World One Water Center at Metro State University. She holds a bachelor's degree in technical journalism with a specialization in natural resources management from Colorado State University. She lives in Denver with her husband and three sons and enjoys traveling and recreating in Colorado's great outdoors—especially in, on or around water.

Mike 'Diesel' Post moved to Chaffee County 20 years ago to be a raft guide. He has since been a teacher, high school principal and is now the director of parks and recreation for the City of Salida. Diesel now spends his time sharing his love of Salida and its vast palette of recreational opportunity and open space with his family and community.

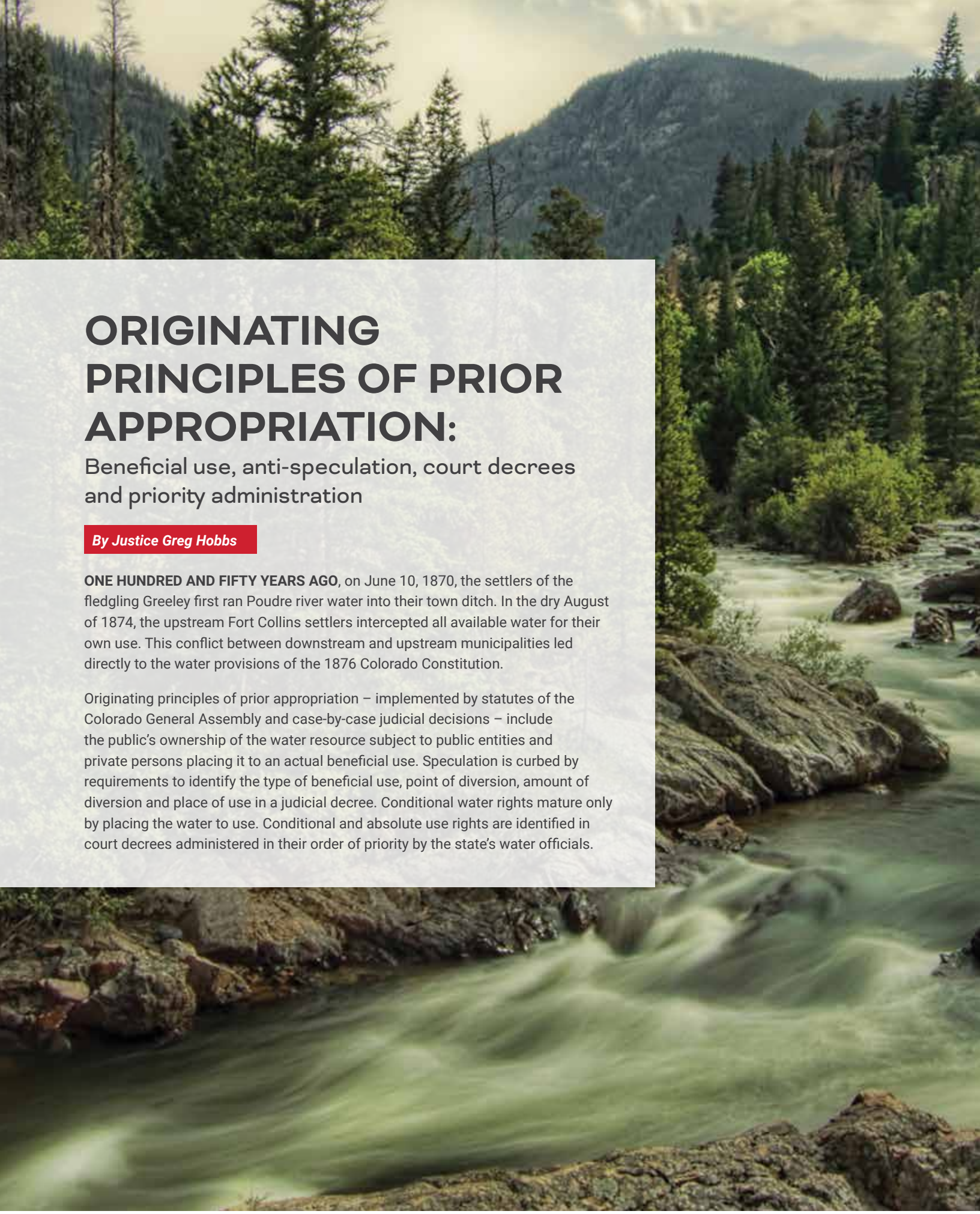
Charlotte Roehm is the deputy director for water planning at Western Resource Advocates. She stems from a scientific and policy background, with particular expertise in water resources. Charlotte oversees the water conservation and efficiency, and water and land use planning integration program at WRA. Her particular focus is on encouraging communities to adopt conservation-oriented programs and policies to help advance urban water security across our western states.

Steve Snyder oversees the executive communications function at Denver Water. He works closely with the utility's senior management on speaking engagements and other public outreach. He also manages Denver Water's speakers' bureau, providing informational and educational presentations about the utility, as well as other water challenges. Prior to joining Denver Water, Steve held senior communication positions in the public, private and non-profit sectors, including Denver International Airport, Frontier Airlines and Saint Joseph Hospital. Steve also worked for 10 years as a television news journalist.

Travis Thompson is the communications manager at Denver Water, a role that centers around Denver Water's unique news site, TAP. As managing editor for the news site, he oversees the wide variety of articles, videos and graphics that are produced by an amazing team of storytellers. The engaging, creative and timely pieces ultimately set the foundation for Denver Water's external and internal communication strategies. Thompson also oversees the social and traditional media relations efforts at Denver Water, as well as internal communications. Before coming to Denver Water, Travis worked in the Communications and Marketing Department at Denver International Airport.

Greta VandeBrake is the training coordinator and executive assistant at Colorado Rural Water Association. CRWA's mission is to provide professional training, technical assistance, and political representation to rural and small communities as they endeavor to maintain industry standards, meet regulatory deadlines, and attain multilevel certifications of their water and wastewater systems operators.

Christy Wiseman is the Land Use and Water Planner for the Community Development Office within DOLA's Division of Local Government. As part of this role, she works with the Babbitt Center for Land and Water Policy to manage the Colorado Water and Land Use Planning Alliance. Previously, she was a long range land use planner for Boulder County. She holds a B.S. degree in Environmental Geography from Ohio University and a Master of City and Regional Planning degree from Ohio State University. Christy uses she/her pronouns.



ORIGINATING PRINCIPLES OF PRIOR APPROPRIATION:

Beneficial use, anti-speculation, court decrees and priority administration

By Justice Greg Hobbs

ONE HUNDRED AND FIFTY YEARS AGO, on June 10, 1870, the settlers of the fledgling Greeley first ran Poudre river water into their town ditch. In the dry August of 1874, the upstream Fort Collins settlers intercepted all available water for their own use. This conflict between downstream and upstream municipalities led directly to the water provisions of the 1876 Colorado Constitution.

Originating principles of prior appropriation – implemented by statutes of the Colorado General Assembly and case-by-case judicial decisions – include the public's ownership of the water resource subject to public entities and private persons placing it to an actual beneficial use. Speculation is curbed by requirements to identify the type of beneficial use, point of diversion, amount of diversion and place of use in a judicial decree. Conditional water rights mature only by placing the water to use. Conditional and absolute use rights are identified in court decrees administered in their order of priority by the state's water officials.

Owners of water rights may sell or lease their rights to others for different uses at different locations, so long as this does not cause injury to other water rights. This process typically requires determining the measure of the water right's actual historical beneficial consumptive use over a representative period. Year in-year out, the amount of water available for use within our state varies according to weather and climatic conditions; the terms of nine interstate water sharing compacts to which Colorado is a party; and two equitable apportionment decisions of the United States Supreme Court (Laramie and North Platte rivers). The Utes and the federal government also possess reserved water rights for use within Colorado.

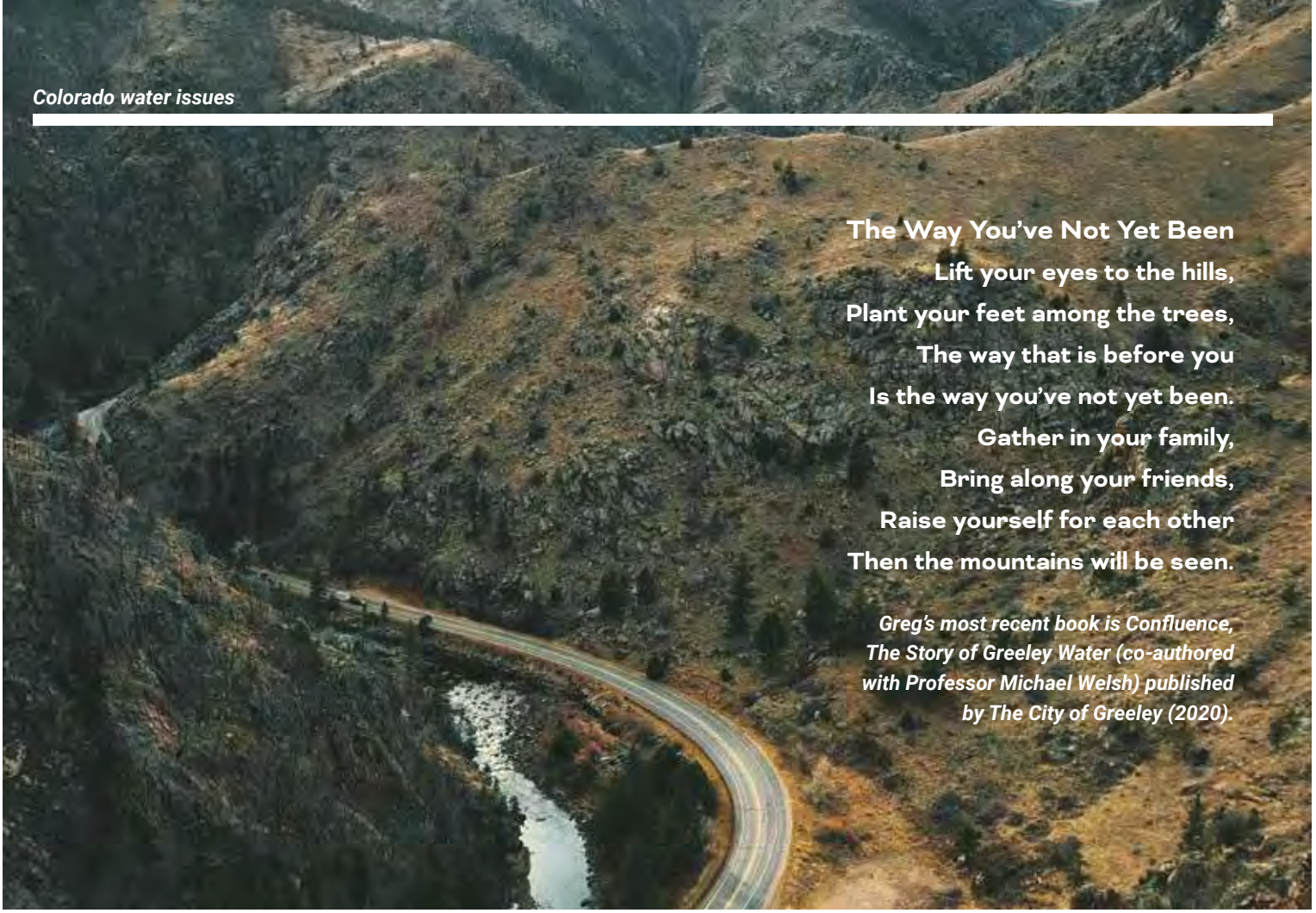
INSTREAM FLOW LAW PROTECTS STREAMS AND LAKES

Colorado's instream flow laws, enacted by the Colorado General Assembly starting in 1973, allow the Colorado Water Conservation Board (CWCB) to appropriate flow and lake level water rights in the name of the people to preserve and improve the natural environment. The CWCB may also accept the voluntary lease or long-term dedication of more senior water rights, subject to conditions to prevent injury to other water rights. The instream flow program is already protecting more than 9,599 miles of stream and 482 natural lake levels throughout Colorado. The Board maintains an ongoing process of public comment, scientific assessment of need, and then adjudicates these water rights in water court.

In its 2020 session, the General Assembly authorized the use of augmentation plans within specified stream reaches to protect and improve the natural environment to a reasonable degree (HB 1037). It also enhanced the instream flow loan program (HB 1157) and gave the state engineer clear authority to identify and protect water use practices that preceded the CWCB's instream flow appropriation (HB 1159).

THE FUTURE OF COLORADO WATER

The anticipated doubling of our population by 2060 calls for a high degree of cooperative problem-solving. The water supply infrastructure of our state is built upon the premise that we share a scarce and precious water resource. As municipalities acquire shares in mutual ditch companies with senior water rights, they become partners with farming and ranching families who live



The Way You've Not Yet Been

Lift your eyes to the hills,
Plant your feet among the trees,
The way that is before you
Is the way you've not yet been.
Gather in your family,
Bring along your friends,
Raise yourself for each other
Then the mountains will be seen.

Greg's most recent book is Confluence, The Story of Greeley Water (co-authored with Professor Michael Welsh) published by The City of Greeley (2020).

along these backbone arteries. Colorado has become a leader in fostering conservation easements. The look and feel of Colorado will turn on alliances between land owners and environmental groups interested in protecting these properties into the future.

Reservoirs are indispensable water features throughout Colorado. Particularly in times of drought, they serve downstream water users. The Colorado Water Trust is active in financing the use of reservoir water for instream flow augmentation. Every year, owners of western slope reservoirs meet with the Bureau of Reclamation to coordinate their operations to aid the endangered native fishes and assist Colorado River Compact compliance.

The Colorado Water Conservation Board has commenced a participatory investigative study into a voluntary, compensated, temporary program of demand management that can provide water for a Lake Powell storage pool, averting Lower Basin/ Upper Basin conflict over compact compliance. Eastern slope municipalities have a huge stake in these discussions because importation of western slope water is a mainstay of the eastern slope's economy. Front Range municipalities are leading the way in reducing per capita water consumption in the residential and commercial sectors. The very high price of buying and changing eastern slope irrigation water rights to municipal use is propelling conservation measures.

Predictions for the future? More hot and dry weather in each of Colorado's river basins is very likely to occur. Collaborative measures will evolve from the roundtable process the General Assembly started in 2005 through the Water For The Twenty-First Century Act. Colorado's Water Plan is evolving and will continue to do so. Courts will make water case decisions. The state engineer will enforce the judicial decrees. Rooted in the 1876 Constitution, the map of the future is no less than a map of the whole of Colorado – plains, valleys, mountains, mesas, canyons, all its peoples, all its creatures. Water supply entities, urban and rural, will look to the full range of their populations. They will adopt equity principles to guide water service to all communities.

When we nurture our singing and working rivers, we celebrate the greater community in which we live. Pools, riffles, runs, meanders, cover, insects, fish, water clean enough to serve agriculture, domestic drinking water, recreation, and fisheries – this picture of a restored western river is becoming for us a basic lesson in western civics. Simple truths, water and the sun, that all is worn away and taken up again, for blessed rain to send.

The Town of Gypsum takes its water seriously

Tom Edwards, Gypsum mayor pro tem

Photo by Todd Winslow Pierce

GYPSUM'S RECENT ELECTION has shown that residents have an interest in protecting water-related amenities. The Gypsum Town Council has always proactively managed the town's water portfolio to ensure that adequate water supplies are provided for future growth. The council, guided by the principle of good stewardship, has used town water as a source to provide renewable energy. Following are three examples that demonstrate these statements and illustrate the depth of Gypsum's regard for water.

SWEETWATER LAKE

What would compel Gypsum residents to vote 859 to 253 to donate $80,000 of their tax dollars to a project that isn't even in their town, let alone in their county?

It began with a request from the Eagle Valley Land Trust for a donation of $100,000 to support "Save the Lake," a campaign to conserve the privately-owned 488 acre Sweetwater Lake and Resort by putting it under permanent protection as part of the White River National Forest. Though located in a neighboring county, the only vehicular access to Sweetwater Lake is from the Colorado River Road in Eagle County, near Gypsum. This means that all of the people who drive to the lake travel through Eagle County, a large percentage of those being residents of Gypsum and the surrounding area.

When the request for donation was made, the Gypsum Town Council, feeling that this was a great amenity for the area, agreed to approve $20,000, but decided if more was to be donated that the residents of Gypsum should have a say. With an upcoming municipal election scheduled in 2020, it was decided to add the question of funding the remaining $80,000 for the voters to decide. The overwhelming voter support shows that their feeling about the lake as an amenity for the town is much the same as that expressed by the council.

Sweetwater Lake was recently purchased by The Conservation Fund, an interim step, prior to turning it over to the United States Forest Service (USFS). With this purchase, the threat of development has been removed and plans to reopen the lake, restaurant and cabins on a small section of the property will once again provide public access and recreation for locals and visitors alike. The foresight of the community will provide fishing, boating, camping, hiking, horseback riding, outfitting and beautiful scenic vistas for all to enjoy now and in years to come.

LEDE RESERVOIR

For many years, the town has had its eye on providing a water storage source that would deliver relief for the community in drier years and possibly provide increased in-stream flows for Gypsum Creek when runoff subsides. Historically, the town's water supply was dependent on seasonal Gypsum Creek flows to supplement production from the Mosher Spring.

In 2005, Gypsum purchased the privately-owned LEDE Reservoir (original owners Lundgren, Erickson, Doll and Engstrom), a 431-acre-foot reservoir that was dammed in the 30's and enlarged in the 40's. The reservoir is 18.5 miles south of Gypsum at the headwaters of Gypsum Creek. In 2008, the town embarked on a project to improve the reservoir so that it would comply with updated Colorado dam safety requirements as well as increase the storage capacity to 947 acre-feet.

In 2013, after five years of design and permitting through the USFS, Army Corps of Engineers, Colorado Parks and Wildlife, Colorado State Engineer's Office, Colorado Water Conservation Board, Colorado Department of Health and Environment and Eagle County (you get why it took five years), the project to replace the 44-foot-high dam with the new 65-foot-high dam finally got underway.

The completion of the $5.2 million dam allowed the process of filling and testing to begin in 2017. The current effort is to complete the filling and establish a LEDE Reservoir Campground (also requiring extensive permitting) so it will not only provide needed water storage for the Town of Gypsum, but also provide recreational opportunities for residents and visitors alike.

MOSHER HYDROPOWER GENERATION

This project started as a gleam in the council's eye in about 2010. That gleam was the idea of using the water from the Mosher Spring, located 8.5 miles south and well above the elevation of the town water plant, to provide hydropower for the town.

Photo by Todd Winslow Pierce

Town of Gypsum

When it was determined that the water line from the spring to the treatment plant needed to be replaced, the opportunity to include hydropower as an additional benefit only seemed logical. In 2018, the pipeline was replaced and in 2019, an additional $635,000 was used to construct the hydroelectric component. In 2020, the town started earning about $5,000 per month from the electricity generated by the hydropower plant, making it a profitable venture that covers the loan payments and provides additional revenue to support the town.

Water to Gypsum is a lifeline. Water is an asset to our recreational community, provides us with domestic, industrial and irrigation needs and provides clean energy to our local electric utility. The town's investment in water-related projects has been substantial and clearly shows how important water is to both our council and our residents. We all know how important water is, but it is gratifying and encouraging to see the community overwhelmingly support water amenities and take its water seriously.

Photo by Todd Winslow Pierce

AT THE CONFLUENCE OF HISTORY AND GROWTH

Lynn Clark, Historic Arkansas Riverwalk of Pueblo executive director and Michelle Francis, Historic Arkansas Riverwalk of Pueblo development manager

THE HISTORIC ARKANSAS RIVERWALK OF PUEBLO is a story of water and the resiliency and resolve of a community. From its earliest days, Pueblo has benefitted from its proximity to the confluence of the Arkansas River and Fountain Creek and the abundance of water in the area. This was one of the reasons that a steel mill established itself here in the 1880s. The mill was so significant that it became the primary employer in Pueblo, effectively establishing a single-industry town.

Despite the abundance of water, it hasn't always been an easy story. In 1921, a massive flood led to great devastation and the decision to relocate the Arkansas River flow behind a levee south of the downtown area to protect the city from future flood events. Later in the 1980s, recession hit the town. The steel mill, which had previously employed over 5,600 people, experienced massive layoffs and was reduced to just about 1,600 employees. The shift happened quickly and by 1982, Pueblo's unemployment approached 20%, causing some to wonder if Pueblo would become a ghost town.

TURNING POINT

The City of Pueblo realized they needed economic assistance and contacted the Economic Development Administration (EDA). The EDA funded an Economic Dislocation Study that resulted in a strategy for redevelopment, which included economic diversification, beautification projects and rebranding Pueblo as a recreation and tourism destination. The study was a turning point for the City of Pueblo and thus commenced a massive urban revitalization effort.

Concerned residents, government entities, and businesses came together to change the direction of Pueblo's future. The grand vision began in 1991, when the coalition conceived of a river walk through downtown Pueblo modeled after the famous River Walk in San Antonio, Texas. Both Pueblo and San Antonio had tragic flood events in 1921 that impacted life and property in their communities, and after visiting San Antonio, the Pueblo group realized that returning the river to the historic path through the downtown core could create vital economic activity.

In 1993, the City of Pueblo created the HARP Commission and charged this group with the responsibility to design, fund, and construct this multiple-phase, city-owned project.

The main objectives for the Riverwalk project included:

- Pulling Pueblo out of its economic slump
- The revitalization and beautification of downtown
- Overcoming the single-industry focus, and
- Repositioning Pueblo as a tourist and recreation destination

In November 1995, the residents of Pueblo passed a 20-year, $12.85 million bond issue to build the basic infrastructure of the Riverwalk. Subsequent years saw an additional $20 million in investments and projects in the Riverwalk, which established the groundwork for over $100 million in additional investments and improvements in the downtown area. Ground-breaking for construction took place on Sept. 27, 1996.

A PHASED APPROACH

The Riverwalk was officially dedicated and opened to the public on Oct. 6, 2000. Upon completion of Phases I & II of the project, the City of Pueblo dissolved the HARP Commission and a new entity, the HARP Authority, was formed through an intergovernmental agreement between the City of Pueblo, Pueblo County, Pueblo Board of Water Works, Pueblo Urban Renewal Authority, and the Pueblo Conservancy District. The HARP Authority is responsible for the promotion, management, supervision, operation, development, and maintenance of the Riverwalk.

Construction of the Riverwalk was such a tremendous undertaking that it was impossible to fund and complete in one step. From the beginning, the strategy was to build it in phases, seeking funding for each major project, digging, completing, developing, and then moving to the next phase. With each incremental step, the local community, the investment community, and government organizations could see and experience the benefits brought about by this new development and realize the value generated.

Some of the phases have included the building of Lake Elizabeth and surrounding residential space, a channel lined with restaurants, retail, office space and hotels, and a natural area. The most recently-completed project includes a large community space for entertainment and other gatherings as well as an inviting link to the newly-expanded Convention Center.

Development has included horticultural projects, sculptures, murals, and fountains, as well as various play structures and fitness areas. In 2013, to celebrate Pueblo's connection to Zebulon Pike, an education center and a world class collection of bronze art was installed depicting animals observed during the 1806 expedition of Zebulon Pike. In Pike's journal, he described his camp as being located near the confluence of the Arkansas and Fountain Rivers, and the Riverwalk made a perfect backdrop to display this art and tell this story.

Funding provided by a 2016 ballot issue approved by Pueblo County residents will make available $8.7 million for design and construction of the Gateway Center Boathouse and the eastward extension of the Riverwalk channel. The design portion of this project will be complete in the fall of 2020 and we anticipate construction in 2021. This eastward extension positions the channel per the Master Plan, so that future phases would take the Riverwalk channel to the east under Interstate 25.

Funding is currently being sought for the Western Expansion Plan, which would unify property adjacent to the west end of the Riverwalk. This property consists of shallow cooling ponds from a decommissioned coal burning power plant, warehouses, and other industrial-type businesses. Redevelopment of this area and the existing adjoining properties would open space for additional Riverwalk recreation activities and commercial development sites.

THE IMPACT

By developing a downtown Riverwalk district, Pueblo has seen a significant shift in business development, transitioning from being almost exclusively a steel town to more diverse manufacturing and office jobs. Our local visitor's bureau data tells us that since the Riverwalk has been created, we have increased visits from Colorado residents and surrounding states. As a result, this has brought in and supported new businesses such as restaurants, hotels, and retail shops. Property tax data indicates the Riverwalk area has higher property values and boasts some of the most valuable real estate in Pueblo County. Our hospitals and other large employers use the Riverwalk as a recruitment tool to attract new employees and their families. This project has created a new level of quality of life for residents and is consistently the place of choice to bring friends and family. The Riverwalk is an anchor to the Colorado Certified Creative District, as designated by Colorado Creative Industries. The success of each development phase has made the project eligible for new funding opportunities.

The Riverwalk attracts over 500,000 visitors annually from Colorado and bordering states. It creates business activity for downtown Pueblo by marketing public and private events that are as diverse as the community itself: from outdoor movies, July 4 fireworks, concerts, and locally sponsored events to weddings, company gatherings, and non-profit fundraisers. It is where multiple generations come together to connect.
Excursion boats, gondola rides and pedal boats are available to the public throughout the warm-weather season and can also be reserved for private tours. Musicians and other creative industry partners have organized performances of dance, music and theater at the Riverwalk.

Success is measured by the local businesses reporting increased foot traffic through their doors when events and activities are programmed on the Riverwalk. For example, live music and a farmer's market on a Thursday evening increases one restaurant's business by 60%. The beauty and activity of today's Riverwalk is a stark contrast to the downtown district that previously consisted of parking lots, stormwater runoff ditches and utility cooling ponds. This is our community's front door and it has the curb appeal to bring more business to that door. It is the jewel and centerpiece for Pueblo's downtown revitalization efforts and is known as Pueblo's Happy Place.

Said Pueblo councilmember and CML Executive Board member Larry Atencio, **"The importance of water for the evolution of a city has never been more stark than the importance of water for Pueblo. Recreation and economic development stem from the abundance of water that Pueblo can draw from the Pueblo Reservoir, the world class Kayak course on the Arkansas River and the Riverwalk are invaluable to the recreational possibilities that Pueblo can offer, but the abundance of water that is drawing industries to Pueblo is life changing for a city."**

INVALUABLE WATER

Any undertaking of this magnitude requires buy-in from local constituents and government support. In the midst of recession and considerable devastation, Pueblo was able to use the water to redefine itself as a beautiful place to visit, a downtown in which to locate, and a region of diverse business and community activity.

The impact and benefit of having an urban waterfront attraction is in some ways immeasurable. But looking back at where Pueblo was headed in the 1980s and where it is going today clearly illustrates that the Riverwalk is a crucial component of Pueblo's future and an invaluable undertaking.

Blanca Vista Pond

WATER EDUCATION COLORADO

Another drought year highlights urgency for Colorado municipalities to boost resiliency

By Jayla Poppleton, Water Education Colorado executive director

AS THE DOG DAYS OF SUMMER 2020 CONTINUE, Colorado has become increasingly hot, dry and dusty.

According to the U.S. Drought Monitor, as of Aug. 11, 94% of the state — home to 4.2 million Coloradans—was classified as being in moderate to extreme drought, with the remaining 6% considered "abnormally dry."

Back in June, Gov. Jared Polis activated the state's drought task force to help monitor conditions and coordinate assistance efforts, as more than 80% of Colorado's counties at that time were already facing some measure of drought.

Reporting on that action on July 1 for Water Education Colorado's Fresh Water News, Editor Jerd Smith wrote,

"This resurgence of drought marks the fourth time since 2000 that the state has become dangerously dry. The first major drought happened in 2002, then 2012-2013, 2018 and now 2020. Officials said it's a worrisome sign that what's known as the multi-decadal drought pattern choking the American West and major rivers, such as the Colorado, is showing no signs of easing."

Already accustomed to year-to-year weather variability, Colorado is no stranger to drought, yet the trend toward increasing frequency and severity of drought, attributed to climate change, is troubling, with impacts to farms, municipalities, river recreation, and aquatic and riparian ecosystems alike.

Windy conditions, coupled with low humidity, have also proven ripe for wildfire across drought-stricken landscapes.

In Spring 2019, Water Education Colorado published an issue of *Headwaters Magazine* dedicated to exploring the topic of climate change. For his article "Finding water in a warming world," Nelson Harvey interviewed Jeff Lukas, climate change researcher at the Western Water Assessment and lead author of the 2014 report Climate Change in Colorado. The report documented an average annual temperature increase in Colorado of about two degrees Fahrenheit over the previous 30 years and projected warming up to 6.5 degrees by 2050 under a "high-emissions scenario" for greenhouse gases. That warming is leading to alarming changes in Colorado hydrology: reduced spring snowpack, lower streamflows, and earlier runoff.

"More precipitation is falling as rain, compounded by increases in sublimation—where snow exposed to sunlight transforms directly from a solid to a vapor," Harvey reported, quoting Lukas: "We're getting less snowpack out of our precipitation."

Municipalities have many reasons—the risk of wildfire among them — to be thinking about drought and climate change. Unpredictable yields from snowpack and earlier runoff affect water storage — and therefore water supplies. Couple that with the increase in demand from thirsty landscapes, and the supply-demand imbalance could force utilities to make increasingly difficult decisions around water use restrictions during drought periods.

Considering year-to-year drought recurrence highlights the critical importance of building long-term resilience. Better to take proactive measures to reduce water use community-wide, build in system redundancies, and encourage water-smart growth through land use planning, fee-based incentives, and other tools.

We highlighted examples of how communities are building resilience to drought and climate change in the *Headwaters* Spring 2019 issue, where Julia Rentsch reported the article "What makes a climate-smart community?"

Rentsch cited demand-side management as a key strategy, alongside increasing preparedness for extreme events projected to become more frequent under climate change, like flooding and wildfire. She shined the spotlight on several communities leading the way on climate resilience and adaptation, including the City of Westminster and the Town of Lyons, each with its own strategies.

"With a population of about 112,000, [Westminster] has made a name for itself with its integration of land use and water management,"

wrote Rentsch. This integration began with Westminster's 2004 Comprehensive Plan, the first time the city worked to match up its land use and water supply, and included the development of progressive tap fee and rate fee designs.

From Rentsch's article: "Proposed developments can be rejected if they are projected to need more water than the city can accommodate," says Andrew Spurgin, principal planner for the city. Tap fees for Westminster are calculated separately. Indoor fees factor in the size of the meter and a water fee proportionate to the customer's projected water use. In addition to being charged based on surface area, irrigation connections include high charges for water-intensive plants and discounts for low water use landscapes. Irrigators using reclaimed water get a roughly 20 percent discount compared to those using potable water. These actions are yielding "significant water savings," according to Sarah Borgers, Westminster's water resources and quality manager.

In Lyons, efforts are focused more on building for flood resilience. Rentsch reported on the town's Long-Term Recovery Action Plan, which residents began to develop just three months after the devastating September 2013 flood: "The plan aimed to

Photo by Kyle Miller/Wyoming Interagency Hotshots.
"In June 2018, firefighters battled the 416 Fire north of Durango, Colo."

boost resilience in the event of future floods by building new erosion infrastructure, making improvements to slow stormwater runoff throughout the watershed, working to establish an intentional floodplain with gentler slope along the river's re-engineered banks, and replanting native vegetation."

As seen this summer, drought increases the risk of damaging wildfires that can threaten municipal water infrastructure, even causing wholesale interruptions in service. This not only highlights the importance of diversifying a water system, but also the value of municipal water providers investing in their watersheds to minimize the risk of catastrophic fire.

In response to the 2012 Waldo Canyon Fire, for example, Colorado Springs Utilities is working in partnership with the U.S. Forest Service and Colorado State Forest Service to treat thousands of acres in the White River and Pike-San Isabel National Forests. In a second phase of the project, the utility is investing $7.5 million over a five-year period. The money will be matched by the CSFS and USFS for a total of $15 million toward forest thinning, prescribed fire, and other projects that ultimately help protect the city's water supply.

In addition to improving resiliency, cities can also make their own commitments to reducing emissions to combat climate change's impacts on the magnitude and frequency of drought, flooding and wildfire.

Coloradans are adapting to and working to mitigate climate changes as it manifests itself in the state's waters, impacting all sectors. Photo by Matt Burt

Transportation, for instance, is Colorado's second-largest source of greenhouse gas emissions, Harvey reported in the *Headwaters* Spring 2019 issue. And those emissions could be reduced by "helping local governments encourage compact, dense and transit-oriented new developments designed to reduce resident's vehicle miles traveled."

Municipalities can also encourage zero-emissions vehicle use by constructing electric vehicle (EV) charging stations. Through the Charge Ahead program, the Regional Air Quality Council (RAQC) and Colorado Energy Office (CEO) have teamed up to provide grants covering up to 80% of the cost for public or private entities.

Even as we hope that the coming winter will bring a reprieve from this year's drought conditions, we can—and must—continue to adapt and assume a hotter future for Colorado will mean changes in how we interact with water.

FOR MORE INFORMATION:

U.S. Drought Monitor: *Colorado droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CO*

Water Education Colorado *Headwaters Magazine* Spring 2019: "What Will a Hotter Future Mean for Colorado?" *www.wateredco.org/publications-and-radio/headwaters-magazine/spring-2019-what-will-a-hotter-future-mean-for-water*

Water Education Colorado Webinar Oct. 2019 (co-hosted by CML): "Guidance for Incorporating Land Use Practices into Water Efficiency Plans" *www.wateredco.org/programs-events/webinars*

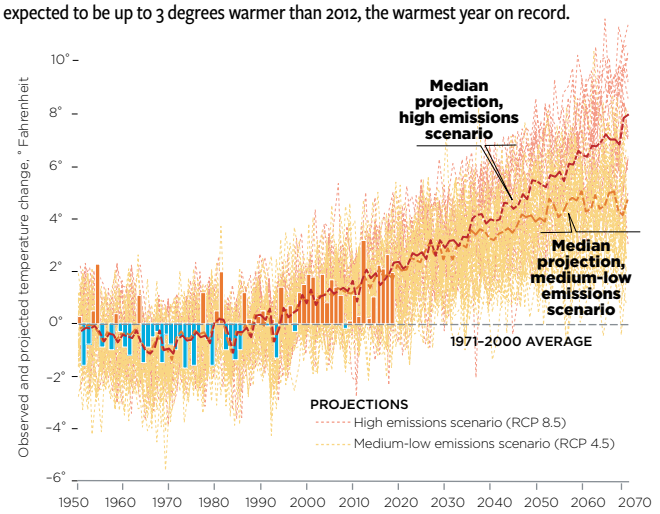
Western Water Assessment: *Tools and Resources wwa.colorado.edu/resources*

ABOUT WATER EDUCATION COLORADO

Water Education Colorado's mission is to ensure Coloradans are informed on water issues and equipped to make decisions that guide our state to a sustainable water future. WEco is a nonpartisan, non-profit organization dedicated to offering quality, engaging water reporting, informational resources, and educational and leadership programming for a wide variety of audiences. Access our resources at *wateredco.org.*

Observed and Projected Colorado Average Annual Temperatures, 1950–2070

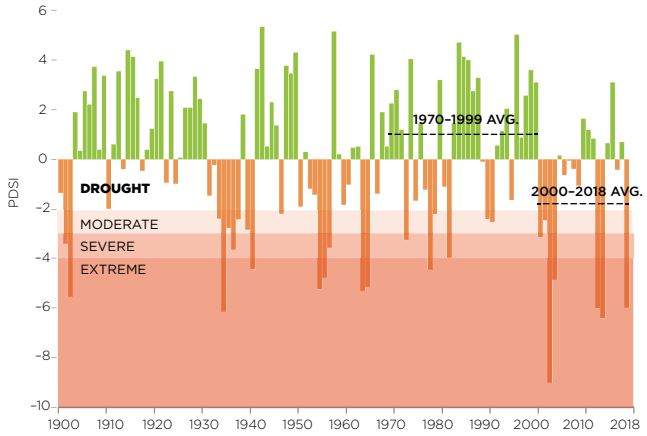
Observed temperatures through 2018 (bars) reveal that Colorado's climate has warmed about 2 degrees over the past 30 years. Projected temperatures through 2070 from 36 global climate models under a medium-low emissions scenario and a high emissions scenario all show further substantial warming. By 2050, a "normal" year in Colorado is expected to be up to 3 degrees warmer than 2012, the warmest year on record.



Source: Adapted and updated from Lukas et al., Climate Change in Colorado, 2014 Observed data: NOAA NCEI; http://www.ncdc.noaa.gov/cag/; Model data: https://gdo-dcp.ucllnl.org

Colorado July Palmer Drought Severity Index (PDSI), 1900–2018

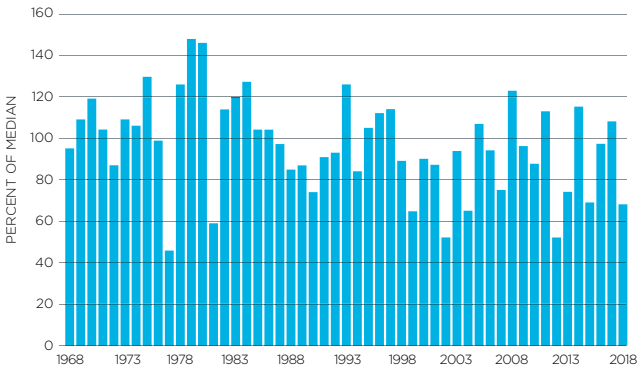
The Palmer Drought Severity Index uses temperature and precipitation data to estimate relative dryness and quantify long-term drought. The 1970–1999 average was +0.9, or wetter than normal, while the 2000-2018 average is –1.7, or drier than normal.



Source: Adapted and updated from Lukas et al., Climate Change in Colorado, 2014; Data: NOAA NCEI; http://www.ncdc.noaa.gov/cag/

Colorado April 1 Snow-Water Equivalent, 1968–2018

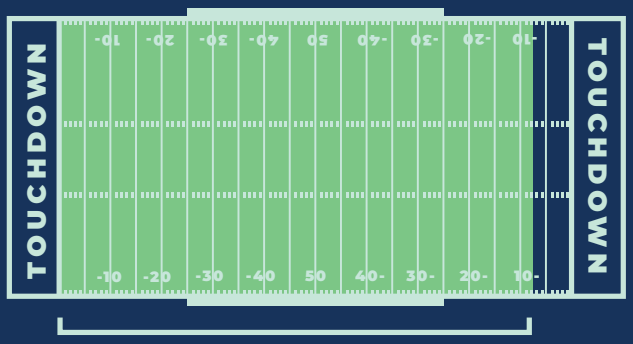
There is an apparent long-term declining trend in spring snowpack; in the 21 years from 1998 to 2018, 16 years were below the long-term median.



Source: NRCS Colorado Snow Survey, https://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/

Graphics courtesy Water Education Colorado

Research Corner: Water facts



One acre-foot= 43,560 cubic feet= 325,851 gallons

325,851 GALLONS
Covers approximately
1 acre of land 1 foot deep

325,851 GALLONS
Serves the needs of
2 families of 4-5 people for one year

Approximately
80% of the population resides east of the Divide

Approximately
80% of Colorado's water falls west of the Continental Divide

13.7 million acre-feet
average streamflow originating annually in Colorado via precipitation

19 states served by Colorado's major rivers (And Mexico!)

39% of water originating in **Colorado consumed within the state**

89% of water consumed by **Colorado used by agriculture**

Source: Colorado State University. Water Use. *https://www.waterknowledge.colostate.edu/water-management-administration/water-uses/.*

1,450 miles
length of
Colorado River

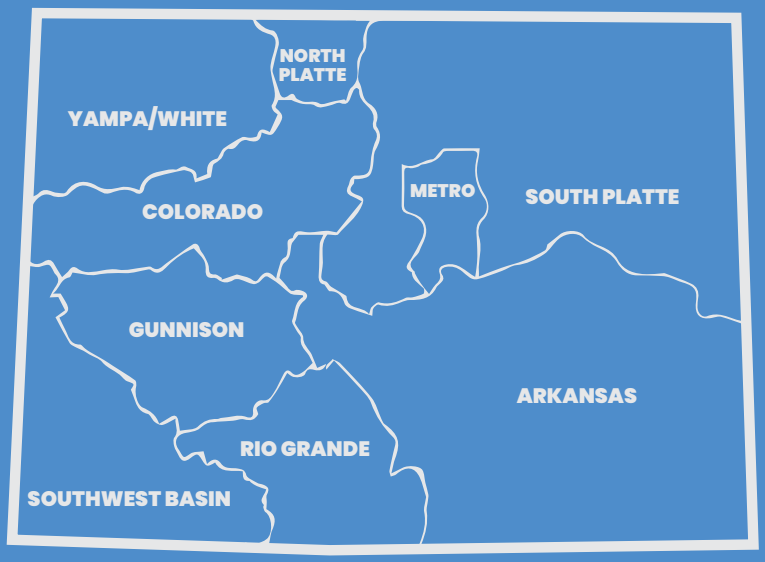
30 million
people served by the
Colorado River

Source: U.S. Geological Survey. Colorado River Basin Focus Area Study. *https://www.usgs.gov/mission-areas/water-resources/science/colorado-river-basin-focus-area-study?qt-science_center_objects=0#qt-science_center_objects.*

$6,358,939
estimated distribution to **Water Implementation Cash Fund in FY20-21 from Sports Betting Fund**

Source: Colorado Legislative Council Staff. HB 19-1327 Final Fiscal Note. *https://leg.colorado.gov/sites/default/files/documents/2019A/bills/fn/2019a_hb1327_f1.pdf.*

COLORADO RIVER BASINS



2015: Colorado's Water Plan written

9 interstate compacts governing Colorado water

560,000 acre-feet: potential water shortfall Colorado could face in 2050 without action

Source: Colorado's Water Plan (2015). *https://www.colorado.gov/pacific/cowaterplan/plan.*

MANAGING MODERN STRESSES ON THE COLORADO RIVER MAY REQUIRE NEW TOOLS

Celene Hawkins, Colorado Water Conservation Board chair
Jessica Brody, Colorado Water Conservation Board vice chair

HOW DO WE MANAGE AND PROTECT one of the west's most important water resources – the Colorado River – looking toward a future that will likely be hotter, drier, and more variable? Can we, as a state, come together to manage our use of this water—critical to our agriculture, recreation, tribal nations, and urban communities on both sides of the Continental Divide—in a manner that is equitable and enables all communities to flourish? The Colorado Water Conservation Board has spent the last year exploring these questions with stakeholders from across the state in the hope of avoiding a future compact call, which could have severe impacts within Colorado.

The Colorado River System supplies water to over 40 million people throughout the basin, including the Colorado municipalities of Durango, Grand Junction, Kremmling, Glenwood Springs, and Denver. It irrigates 5.5 million acres of farmland and provides water to 29 tribal nations. Seven states rely on the river's supply, including Colorado, New Mexico, Utah, and Wyoming (Upper Division states); and Arizona, California, and Nevada (Lower Division states). Seventy percent of the flows of this invaluable resource originate within Colorado. The Colorado River also supplies water to Mexico under the terms of an international treaty.

The Colorado River Basin has seen significant reductions in streamflow in recent years attributed to increasing concentrations of greenhouse gases and other human effects on the changing climate. The impact of a drier, warmer climate on our natural resources will likely continue and worsen in the future. According to a report released recently by the Western Water Assessment, there may be a 10-20% decrease in runoff in the Colorado River Basin through the 21st century, compared to historical hydrology. Managing this important resource wisely for future generations in light of these circumstances is an important and challenging task.

The Colorado River Basin states that, along with the federal government, own and manage major storage reservoirs have a rich history of litigation, legislation, and cooperation that has resulted in a complex body of law referred to as the "Law of the River," which allocates the use of water among the states and Mexico and establishes operating rules for the federal reservoirs. Colorado has played a key role throughout these negotiations, including through its position on the Upper Colorado River Commission (UCRC), which is comprised of governor-appointed representatives from each Upper Division state. Colorado will continue to provide strong leadership as we face drought and changing hydrologic conditions in the Colorado River Basin and as the basin states develop new strategies for conserving and managing use of this critical water supply.

One key strategy is the concept of Demand Management, brought to life by the 2019 Drought Contingency Plan (DCP), a suite of agreements among the Colorado River Basin States and Department of the Interior – and approved by Congress – designed to provide additional security to the Colorado River system in light of the changing hydrologic conditions. Pursuant to the DCP, the Lower Division States have agreed to take specific cuts to their water deliveries under certain conditions—and those cuts are occurring today in Arizona, Nevada, and Mexico. In contrast, the Upper Basin DCP allows the Upper Division States to explore, develop, and consider new management tools to reduce our water use, if needed and if such approaches are feasible.

Specifically, the Demand Management Storage Agreement authorizes the Upper Division states to set up a program that would enable them to create a savings account of water to be used in the future to help maintain compliance with compact obligations. As envisioned, water users in the Upper Division states would be given the option to reduce water consumption over a temporary period and would be compensated in return. That conserved water would be stored in federal reservoirs for release at the discretion of the UCRC for compact compliance purposes. If not for the Demand Management Storage Agreement, any water conserved would likely flow to the Lower Division states under existing legal and operational requirements.

Two questions commonly arise relating to Demand Management: Why are we talking about it? And is it feasible?

The "why" question points directly to the Upper Division states' obligations under the 1922 Colorado River Compact. This requires the Upper Division states to refrain from depleting the flow of the Colorado River below 75,000,000 acre-feet over a ten-year period, on a rolling basis. The Upper Division states have always met their Compact obligations, but the hydrologic trend and modeling points to a drier, hotter future. If the Upper Division states fall out of compliance with this obligation, that would create uncertainty, and potentially severe curtailments of our water supply, for everyone who depends on the river, including cities, farms, recreational economies, and the health of the river itself. The Colorado River Basin states would likely face years of litigation in the U.S. Supreme Court. Municipal drinking water supplies could be put at risk, as would irrigation water supplies. The additional risk to water supplies could invite increased oversight and involvement of the federal government in our water management decisions. Despite all of the uncertainties, we know a few things about what would likely happen: water users would face mandatory reductions in use; they would not be compensated for doing so; and the impacts of Compact administration would reach all four corners of Colorado.

Demand Management, in concept, provides us an opportunity to better control our own water future if we, as Coloradans, work together. We have the opportunity to choose how we reduce our water use now—in ways that are shared, equitable, and minimize adverse impacts to our communities and to our Colorado way of life—to avoid having potentially drastic, unplanned, and devastating cuts imposed upon us in the future.

This leads to the second question: is Demand Management a feasible tool for achieving these goals? This is yet to be determined. The CWCB recently wrapped up the first stage of Colorado's feasibility investigation. Stakeholders, water

experts, tribal nation representatives, and many others from all corners of Colorado came together to help the CWCB Board identify some of the big questions that need to be considered in this investigation. Some important themes and outstanding questions have arisen:

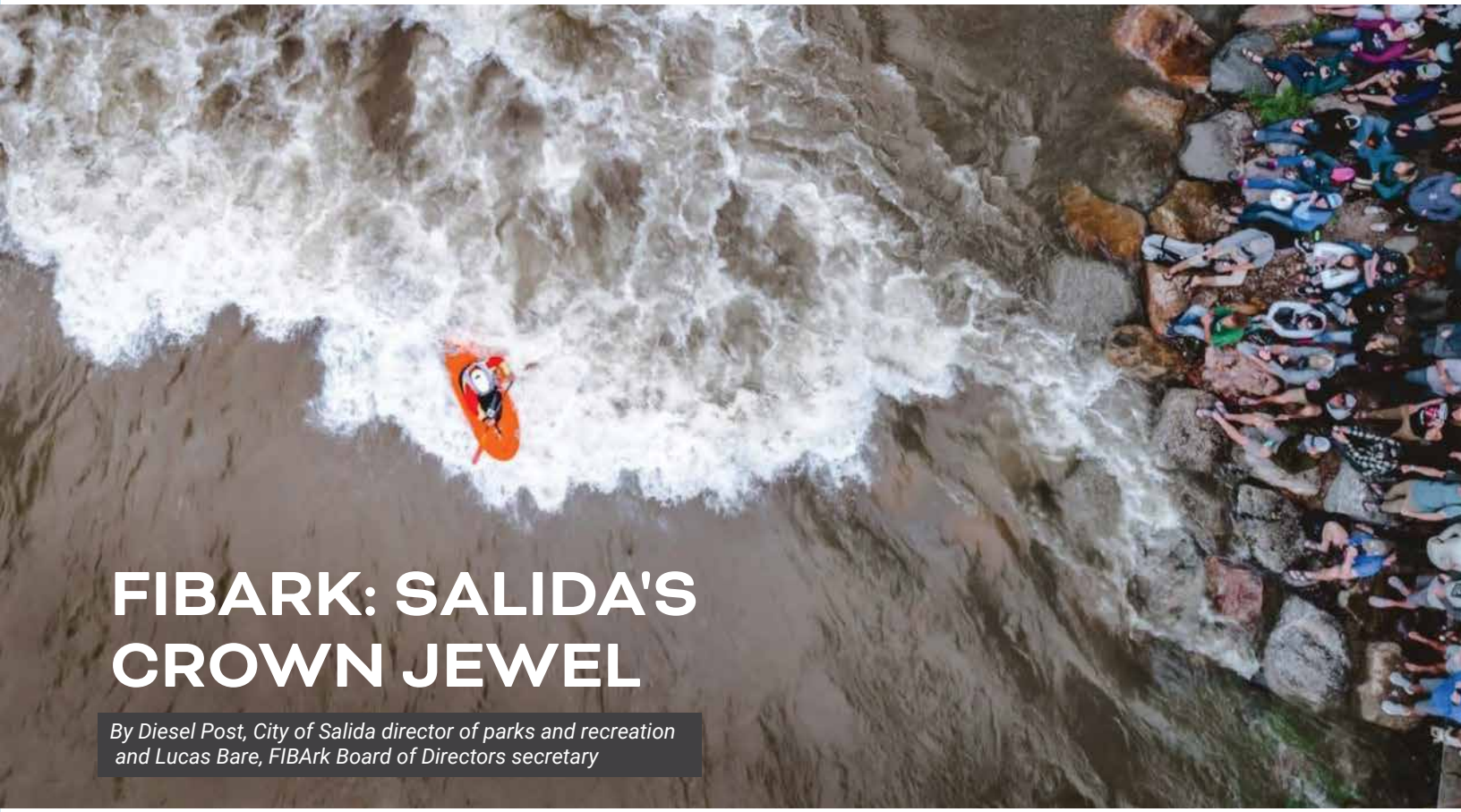
How will we secure funding for such a large-scale program? How do we ensure that all Colorado River water users are treated equitably, to the extent possible, in the process? What steps may be taken to ensure agricultural and community viability if a program is developed? Are there mechanisms to avoid potential unintended consequences? And how do we track the water conserved, while also creating a program that is not too burdensome to administer and easy for participants to navigate?

As we move forward in considering how to analyze these important issues, we must take a collaborative approach that considers all perspectives and voices. The CWCB Board has some important discussions ahead, and we encourage anyone interested to get involved. Visit CWCB's website ***cwcb.colorado.gov*** to read the progress report on Colorado's feasibility investigation and to find information on upcoming events.

As we have witnessed over the past year, open and honest dialogue with Coloradans from across Colorado, who bring their unique perspectives and ideas, is critical to identifying issues and concerns, and also developing strategies and solutions best suited to Colorado. Join us in this process.

As we move forward with our own feasibility investigation, the other Upper Division states are also in the midst of their own investigations, and are considering the issues within the context of their own unique state perspectives and issues. All of the Upper Division states must agree to pursue Demand Management for a program to proceed.

We view the Demand Management Feasibility Investigation as part of a broad, holistic approach of developing tools that will make Colorado and the Colorado River resilient to the challenges we face. We must give full and thorough consideration to all potential tools, including Demand Management, that could help us ensure Colorado's resiliency for future generations. Colorado has long been known for both its creativity and its leadership in addressing the most pressing water and natural resource management challenges, and we are rising together as a state to address this critical challenge.



FIBARK: SALIDA'S CROWN JEWEL

By Diesel Post, City of Salida director of parks and recreation and Lucas Bare, FIBArk Board of Directors secretary

FIBARK IS AMERICA'S LONGEST-STANDING WHITEWATER FESTIVAL and a crown jewel in the City of Salida, nestled in the Upper Arkansas River Valley. In recent years, FIBArk has drawn as many as 30,000 people to this town of 6,000 in mid-June during the all-important high-water season. It is a celebration of the Arkansas River and what it means to the City of Salida and the river community there.

FIBArk ("First in Boating on the Arkansas") started in 1949 when some early whitewater enthusiasts raced their wood-and-fabric boats from Salida 57 miles downriver to Cañon City.

The Downriver Race, as it came to be known, has evolved through the years, but has been held every year since and remains the capstone of the festival. The festival has grown from a single boat race into a city-wide celebration with something for everyone, including whitewater boat races, running and mountain biking races, a crazy river dog competition, a carnival, food and music, art exhibitors, and the iconic Hooligan Race. The Hooligan Race involves adventurous souls navigating home-made (and often very creative!) watercrafts through the Salida whitewater park between the riverbanks packed with hollering spectators.

Salida and FIBArk have evolved together over the last 72 years, Salida from a railroad-industrial center to a vibrant outdoor tourism and arts community and FIBArk from a single boat race to a city-wide festival celebrating the river that is so important to the community. FIBArk isn't just an annual festival though, it is also a non-profit organization dedicated to paddle sports education in the Salida community. Proceeds from the festival support programs like "Kids in Kayaks" to help nurture a love of paddle sports and the river in the community's youth.

The partnership between the City of Salida and FIBArk is as strong today as ever. When holding the FIBArk festival over its traditional June dates wasn't possible due to COVID precautions, FIBArk and the city worked together to ensure that the 72nd FIBArk festival, including the historic Downriver Race, was held the first weekend of August.

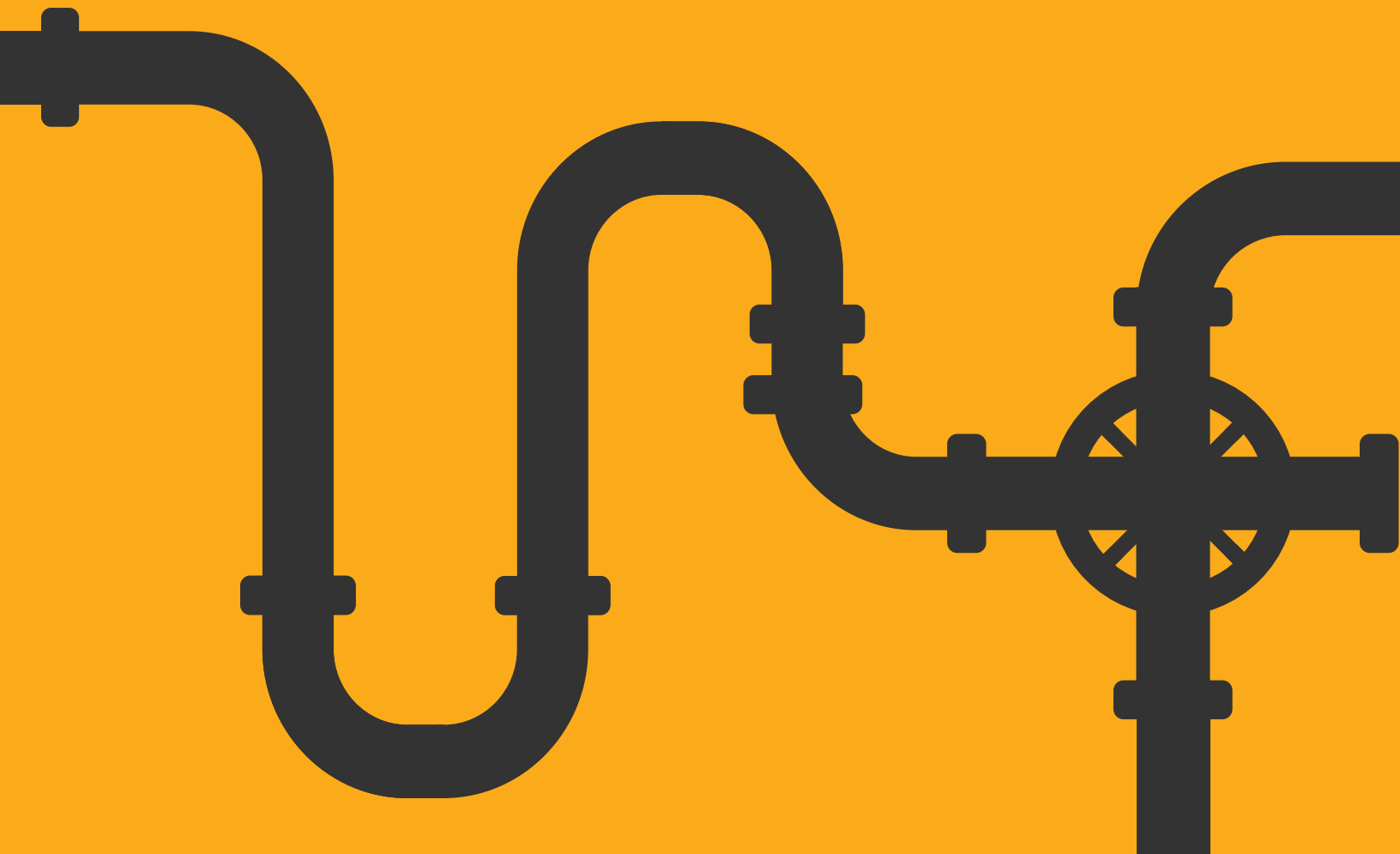
FIBArk remains the longest standing whitewater festival in the United States, and Salida grows with those drawn to the Arkansas River and the community here that recognizes its importance and that isn't afraid to "go with the flow."

HOW THE TOWN OF FLEMING REPLACED THEIR SEWER SYSTEM *(AND YOU CAN, TOO)*

By Clay Gorman, Town of Fleming treasurer

The Town of Fleming is a community of 200 homes and around 400 people, if you count the bunnies, with an abundance of retirees and few businesses. The town needed new sewer lagoons because the old lagoons were declared to be in a flood plain and were leaking to ground water. They were old bentonite-lined ponds and some seepage was expected and found. The council was informed by the Colorado Department of Public Health and Environment (CDPHE) that something needed to be done. Our gravity-fed ponds would no longer be considered useable and are in an existing flood plain. The town needed to build three new ponds above the flood plain, along with a pumping station and make repairs to a blockage under Highway 6 and in one alley.

The council looked for an engineering firm that was easy to work with, reputable, and understood the needs of the community. The firm hired to design and administer the project put the cost of the project at somewhere around $3 million. This cost included engineering, construction, a residential project representative, the land purchase needed for the new lagoons, legal and administrative costs, and other services needed for the project. They also let the council know that there were three possible funding agencies that could assist with the project. The three funding agencies are the United States Department of Agriculture (USDA) through grants and loans, Colorado Rural Water through loans, and the Department of Local Affairs (DOLA) through a grant.



All three agencies are staffed by friendly, competent individuals who did their best to assist the town with the project. The USDA, through its Rural Development program, provided a pre-planning grant that covered 75% of the cost to help the town with the total project cost and to determine the scope of the new system. Once the pre-planning was done, town council had to determine how to fund the project.

Once the engineering firm was chosen, CDPHE granted Fleming an engineering grant of $130,000. The other towns in Colorado that faced the same problem usually chose one loan funder, either the USDA or Colorado Rural Water, and tried to acquire an Energy and Mineral Impact Grant from DOLA. The town council determined that using all three agencies would be optimal. The USDA offered a 30% grant and 70% loan for their part of the financing. The original loan was set at 2.125%, but with the drop in the prime interest rate, the final financing was at 1.65%, and the loan is for 40 years, with monthly payments. They required that the loan amount be spent before the grant funds could be used. Fleming used the USDA loan and grant package for $1.281 million of the project.

The USDA is an outstanding organization to work with and as helpful as they could possibly be. Their staff made sure that things were done correctly and held the engineering firm and contractor accountable. The USDA also proved quite flexible. While in the engineering process, the town's sewer line under the highway collapsed. The USDA allowed the town to add the cost of moving the sewage across the highway to their loan. Without this help, Fleming would have been lost. The cost of the bypass sewer pumping came to a little over $131,000, a price Fleming could hardly afford. The USDA required an outside bank to fund the original loan until the entire loan funds were spent and then sent the full amount to the town to repay the outside bank to pay off the loan. This flooded the bank with $897,000 in cash, a large amount for a small bank to have assets to cover.

Colorado Rural Water contributed $732,781 to the project. Because Fleming was considered disadvantaged, they charged a 0% interest rate for their funding. I have been told that has changed to 1% for future projects in disadvantaged communities. Their loan is a 30-year loan paid biannually. There is a slight possibility of loan forgiveness each year. This also has been a great organization to work with. The people in the organization are very bright and work well with the towns they work for.

The third funding agency is DOLA, through its Energy and Mineral Impact Grant. DOLA required an extensive application and a presentation. Their representative was very helpful and made sure that the application was filled out properly and the town's representative was ready to present to their committee. The grants are awarded quarterly, and the presentation will take place before the quarter award. The town applied for the grant twice. The first application was denied because the town wasn't quite ready for its construction phase. The second request was successful. Fleming's representative traveled to Cortez for its seven-minute presentation. The long trip was worth it, and the town was presented with a grant for one million dollars. The stipulation was that DOLA would fund one dollar for every two dollars spent on construction.

Small towns have advantages and disadvantages. Fleming had built up a good-sized financial reserve and to keep paying the contractor, it used some of its reserves. The funding from the three agencies is not instantaneous and vigilance in doing the paperwork and paying attention to detail is important. Once a request is made to an agency, there can be a two- to four-week lag time before reimbursement is made. This can be difficult for some contractors and the town used its reserves to help with payments.

Each funding agency requires the most recent budget from the town, as well as a profit and loss statement. These are used to determine whether the town can make payments and how much of the financing should be in the form of grants and loans. They also require the audit statement for the last year and the audit statements for each year they carry the loan. The size of the project will determine the actual type and amount of insurance the town needs to carry

The town needed to match some funds for the project. This doesn't need to be a substantial amount, but one dollar won't be enough. Fleming proposed a matching fund of $20,000 for the project.

It is easy to underestimate the costs the project will incur. Be sure to discuss increasing the amount that will be needed to complete the project with the engineering firm. It would not be a good thing to run out of funds before the project is completed and then have to scramble for more funding.

Finally, keep a log of all communications with all agencies. The log for the Town of Fleming ran to more than 120 typed pages, but having it to look back on was very valuable. Projects like this are necessary as the infrastructure of towns grow older. Don't be afraid to take your case to the voters of the town. If you have communicated regularly and clearly the project details and progress, as it's made, they will surprise you with their support.

Good luck!

CLOSING RURAL WATER'S GENERATION GAP

By Greta VandeBrake, Colorado Rural Water Association training coordinator and executive assistant

IN RECENT YEARS, the Water and Wastewater industry in America has been confronted with an uncomfortable truth: At least one third of operators are eligible for retirement in the next decade with the National Rural Water Association (NRWA) estimating an expected retirement rate of up to 50% of current operators within that timeframe. With such a steep retirement rate only a few years away, many systems are looking into how to diversify their workforce and bring new faces into the field.

Rural systems in particular are struggling with the increased need for new members of the workforce offset by the difficulty in drawing people away from larger cities into their smaller towns.

The culture of a rural system is unique, and requires operators not only be adaptable to a variety of scenarios, but also to be able to take on a greater variety of tasks related to their plants, often operating alone or as part of a very small crew. Add to

that limited resources both financially and physically and the plight of rural systems is thrown into a very harsh light. Yet the need does not decrease. How do we draw people to these towns? And once they are there, how do we get them to stay?

Colorado Rural Water Association (CRWA) Board President Allen Coyne suggests that the best way to find someone committed to serving your community is to "grow your own," a task that CRWA is uniquely prepared to help systems accomplish through training and support. Someone who has grown up in a rural area or has connections to a small town will be more likely to be committed to that community and grow to be part of it.

The tradeoff is that an operator who assumes such a large amount of responsibility must be given ownership of their work. Whether or not this new generation of operators comes from within the communities, they are providing a unique benefit to a rural system of giving the system the opportunity to train them on the exact equipment they need to use and the processes that have worked best for the community while bringing a fresh perspective and new ideas to the table. Colorado Certified Water Professionals (CCWP) Director Larisa Oringdulph put it plainly;

"New people challenge the notion of 'this is how we have always done it.' This helps systems rethink policies and procedures, and this helps systems innovate and grow."

Starting a new operator, especially a less experienced one, in a rural area can seem like a financial burden to the system. There are up-front costs to consider, such as training and potentially certification exams. With most rural systems being far removed from popular training and testing centers, most of which are located on the front range, our industry has had to adapt to how we train and certify all new operators. Nothing has shown us this need as deeply as the COVID-19 outbreak. When Colorado shut down, operators were forced to seek out new avenues such as online courses and webinars to secure their training. As companies including CRWA adapted, rural communities found that they had more options available to them in their own homes then they had previously had within driving distance.

These new options from CRWA not only made learning more accessible in rural areas, but also dramatically increased the number and frequency of classes being offered, allowing for more diverse learning for all categories of operators. Likewise, operator certification and recertification had already evolved into a primarily online process through the CCWP. The chaos of the pandemic has pushed an industry which traditionally evolves at a slower rate to push forward into a brave new world of technological advances and at-home certification testing. While these advancements serve the whole state during the COVID-19 crisis, it is the rural communities that stand to gain the most by being connected to a network of operators, services, and resources that were previously too far away.

All of these factors have created an environment within Colorado's water and wastewater industry where candid conversations about rural system needs, operators being given ownership over their work, and technological advances in training, testing and resources, mean that we are uniquely poised to close the generational gap, which is threatening to cripple our workforce. The rural communities that are served by Colorado's smallest and most remote systems stand to benefit the most by bringing in or "growing" new operators who can learn the traditions that have best served the community, while bringing new innovations and fresh perspectives to propel their community forward. CRWA is excited to lend our services to rural systems taking on this mission. These new operators benefit from working in one of the most secure industries in America and learning skills that can be used in a multitude of different fields, most of which are represented in these rural communities. The communicable traits of the water and wastewater industry, coupled with available mentorship of a generation of life-long operators, are the perfect foundation on which to build rural America's new generation of adaptable, competent water and wastewater professionals in Colorado.

COWARN CONNECTS WATER AND WASTEWATER UTILITIES TO ENSURE SERVICE CONTINUITY

Kaitlyn Beekman, Colorado Department of Public Health and Environment Water Quality Control Division environmental protection specialist

Water and wastewater systems provide our communities with a life-sustaining resource that is of vital importance to maintaining public health, sanitation, and safety. When water and wastewater services are interrupted for extended periods of time, a community's well-being quickly deteriorates.

The Colorado Water/Wastewater Agency Response Network (CoWARN) is a mutual aid organization that works to help water and wastewater utilities restore or maintain service in challenging situations to protect the communities they serve. CoWARN connects water and wastewater utilities to each other and facilitates the sharing of resources, such as labor and equipment, between utilities that need assistance and utilities that can offer assistance.

The idea for an intrastate mutual aid network came from the American Water Works Association in March 2006. Events such as 9/11, the 1994 Northridge earthquake, the 1997 Red River flood, and Hurricane Katrina identified a critical need for water and wastewater utilities to engage in intrastate mutual aid and assistance programs because:

- Water and wastewater utilities require specialized resources to sustain operations
- Critical infrastructure (such as hospitals, business operations, etc.) relies on water and wastewater services
- Support from utilities can be implemented faster than state and federal support
- Large events can impact entire regions, thus requiring the need for assistance from utilities outside of that impacted area

CoWARN has more than 220 members in Colorado and has served an integral role in emergency response for almost a decade. CoWARN members have helped each other respond to situations as extreme as the 2013 floods to situations as localized as a water system needing help with leak detection. Any entity that provides water or wastewater services is eligible to sign the mutual aid agreement and join CoWARN. From there, CoWARN members can "activate CoWARN" by sending out an email blast to the membership requesting any type of assistance they may need. Other CoWARN members will receive this email, determine if they are able to assist, and will contact and coordinate with the requesting entity directly. Joining the organization is free and if an entity receives assistance from another member, there are reimbursement policies outlined in the mutual aid agreement.

Joining CoWARN is a great step for any community to improve their emergency preparedness and response procedures. While CoWARN should not take the place of a robust emergency response plan, it is one avenue in which a community can improve their resiliency efforts. For more information, visit ***cowarn.org***.

PERSISTENT DROUGHT MAKES WATER A BALANCING ACT

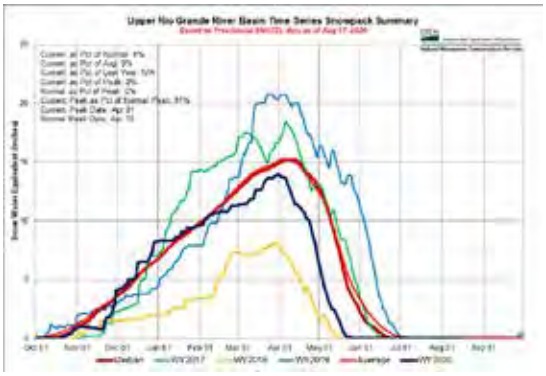
By Heather Brooks, Alamosa city manager

Photo by Visit Alamosa

Alamosa sits in the middle of Colorado's San Luis Valley, an alpine desert in south-central Colorado. It is always dry. Alamosa's average annual precipitation hovers right around seven inches. People live and thrive in the San Luis Valley because of the snowfall accumulating in the San Juan Mountains to the west (with Wolf Creek Ski Area consistently recording the highest natural snowpack in the state) and the 14,000 foot peaks of the Sangre de Cristo Mountains to the east. That mountain snowpack provides the lifeblood of the valley, flowing down the Rio Grande and the Conejos River out of the San Juans, Trinchera Creek out of the Sangre de Cristos, and countless other streams and creeks, to support the cities and towns, and the rich agricultural tradition of the Valley.

As the old timers know, *Sin agua no hay vida.*

But lately the snowpack has been unreliable. On the Rio Grande, 2017 and 2019 were good years, but 2020's peak was only 91% of the average, and 2018 was not much better than the driest years on record. It is a time of persistent drought.



The San Luis Valley is about the size of Connecticut, extending 125 miles long and 65 miles wide with an altitude of over 7,000 feet. It is home to six counties and 22 communities. With a population of just over 9,000, Alamosa serves as a hub for services, education, and shopping for the rural valley of approximately 50,000 residents. Alamosa residents enjoy over 24 miles of trails and a growing focus on river recreation along the Rio Grande, which flows along the north edge of the city.

Given the natural beauty and historical significance of the San Luis Valley, tourism greatly contributes to the economy. Destinations include Great Sand Dunes National Park, Rio Grande National Forest, San Luis State Wildlife Area, Alamosa National Wildlife Refuge, Monte Vista National Wildlife Refuge, and Baca National Wildlife Refuge. Recreational activities and wildlife habitat depend on the limited water supply, but agriculture is the economic engine for the San Luis Valley and is directly connected to every other economic sector.

Ongoing, severe drought and years of ground water development have depleted the aquifers sustained by the snowmelt, which in turn sustain the economy of the valley. Alamosa draws its water supply from the deep confined aquifer, which is replenished by the snowmelt, but the basin is over-appropriated, which has meant that communities and farmers have had to come together to figure out a means of reducing water usage and ensuring the sustainability of the valley. Farmers are making self-imposed cuts to irrigated land to meet groundwater management plans managed by groundwater management subdistricts of the Rio Grande Water Conservation District, the Conejos Water Conservancy District, and the Trinchera Water Conservancy District.

Photo by Visit Alamosa

Recognizing that the agricultural engine for the valley lies outside our city boundaries, the City of Alamosa has become much more aggressive with water conservation in order to preserve the limited resource for agriculture while at the same time being able to sustain the municipal wells on which the city relies. The city has followed the lead of many communities in Colorado with water conservation education, water restrictions/schedules, and tiered water usage rates that become more expensive on a per gallon rate the more water is used. The city's Water Smarts Committee has identified key public areas where xeriscape is more appropriate and rebate programs for fixtures. These measures have at times been controversial, but by and large Alamosa's citizens have acknowledged that we must live within our means in an alpine desert.

In order to continue to pump its wells, the city must figure out how to meet requirements for ensuring no injury to other water users contained in the rules governing withdrawals of groundwater promulgated by the state engineer in 2015 and recently approved by the water court. Deep and reliable wells like Alamosa's impact a relatively small amount of water, but over a very large extent. State groundwater models account for the fact that surface streams throughout the valley are impacted by pumping the city's wells, even while certain segments of the Rio Grande see an increase in surface flows from return of the city's treated effluent. Where the city has had to acquire senior water rights to replace stream depletions, it has looked to do so in a way that will not adversely affect the surrounding agricultural productivity that sustains the city's very existence.

With an eye toward two goals, the city acquired a 1,300-acre ranch lying just north of town back in the 90's. The goals were water rights and a source of dirt and gravel for a U.S. Army Corps of Engineers project to rebuild the dike on the Rio Grande as it passes through Alamosa. The Alamosa Ranch, as it is now called, is leased to a private rancher for his cattle operations. An important third use has arisen: open space and recreation. The ranch is home to walking, running and biking trails and a disc golf and archery range. The borrow pond from which material for the dike was taken is now the Blanca Vista Pond – a recreational centerpiece with GOCO-funded improvements, such as youth fishing piers and hand-launch boat ramp to serve the increasing small boat and paddle board recreation enthusiasts who have discovered it as an escape from summer's heat. The Alamosa Ranch figures into the city's proposed well augmentation as a source of water to meet post-pumping depletions. The city hopes to keep it in agricultural production and as a recreational and open space asset in perpetuity, drying it up only if the city itself dries up and blows away.

The city has had to acquire water rights on farther-flung streams as well, and has similarly tried to do that in a way to keep the surrounding agricultural community thriving. The city partnered with the Rio Grande Headwaters Land Trust ("RiGHT") to work with Cactus Hill Farms along the Alamosa River to develop a lease intended to allow the city to replace depletions on the Alamosa River by diverting 5-10% of the farm's irrigation water back to the river, and Cactus Hill to move the unirrigated acres around the farm, keeping their land healthy and productive. As Allen Law, executive director of RiGHT, stated, "Everyone involved brought so much creativity and energy to secure a balanced water future for the people of Alamosa, farmers and ranchers in Conejos County, and the Alamosa River. I hope that this project will serve as an inspiration and model for other land trusts, landowners, and water agencies as we continue to make progress on the goal to provide alternatives to agricultural 'buy-and-dry' in Colorado's Water Plan."

Persistent drought is a challenge throughout Colorado and the intermountain west. Finding ways to address drought that balance the needs of agriculture, wildlife and growing municipal populations will only become more difficult as the climate continues to change. Alamosa hopes to continue to pursue creative and synergistic solutions to preserve the way of life its residents cherish.

A SECURE WATER FUTURE FOR COLORADO

Laura Belanger, Western Resource Advocates senior water resources engineer and policy advisor and Charlotte Roehm, Western Resource Advocates deputy director for water planning

BY MID-SUMMER, 100% OF COLORADO WAS EXPERIENCING DROUGHT with 60% of the state experiencing "severe" to "exceptional" drought. Projections indicate our climate is becoming warmer and drier, reducing snowpack, pushing spring runoff earlier, and threatening the health of rivers. At the same time, Colorado has one of the fastest growing populations in the nation. This puts pressure on municipal water supplies and rivers – many of which are already diverted in large part for municipal, industrial, and agricultural uses.

Coloradans cherish our waterways, which provide clean drinking water, unparalleled recreation, and important wildlife habitat; support farms and ranches and thousands of jobs; and contribute billions of dollars to our economy. We can invest in our communities' long-term water security while keeping rivers healthy and supporting our economy, but we'll need to think differently than we have in the past and pursue smart water solutions.

In our semi-arid state, forward-thinking planning is necessary to align shrinking water supplies with growing demand. There is very little to no "new" water available to be developed, so efficient water use and creative new water supply alternatives must be pursued. Western Resource Advocates is a conservation organization that works hand-in-hand with municipalities to help them effectively meet their water supply needs.

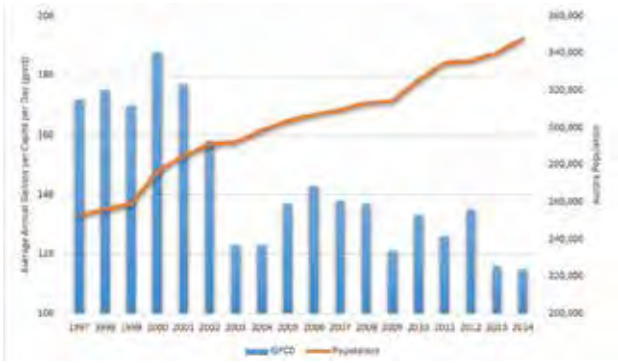
A SUSTAINABLE WATER SUPPLY PORTFOLIO

Communities can take a number of actions to ensure they have sufficient and sustainable water supplies now and into the future. Community leaders can work with their water utility, planning department, and other staff to develop a water supply portfolio that is right for them. This article provides several potential solutions and resources to help jump-start conversations in your community.

WATER CONSERVATION

Water conservation, minimizing water waste and increasing efficiency, is often the least expensive and easiest option. Many resources are available to assist communities in evaluating their current water use and potential conservation opportunities. We provide several in the "Learn More" sidebar at the end of this article.

On average, about half of municipal water in Colorado is used indoors and half is used outdoors. Every new development provides an opportunity to boost conservation, as it is much easier, more efficient, and more cost effective to build new developments smart from the start. While indoor fixtures and appliances can be replaced with water-efficient models relatively easily, retrofitting outdoor landscaping and irrigation is a bigger undertaking, so it is important to get right from the beginning. Developing a strong conservation plan and a culture of efficiency as soon as possible will decrease the water a community needs long into the future.



A strong and innovative conservation program, implemented in earnest after the 2002 drought, has allowed the City of Aurora to significantly decrease per person water use as their population grows. Water efficiency is a key strategy to ensuring the city has sufficient water supplies into the future.

Source: City of Aurora. Note that the city is currently updating their Integrated Water Management Plan and will have updated data available when that is completed in 2022.

INTEGRATED WATER AND LAND USE PLANNING

Large and small communities alike can help ensure efficient water use by integrating water and land use planning. Integrated planning can occur through comprehensive plans, water master plans, zoning and landscape codes, and development review processes. See the water and land use article in this issue for several Colorado examples of communities integrating water and land use planning.

WATER REUSE

Recycling water by capturing, treating, and reusing it is an important way for communities to stretch water supplies to meet more demands. Colorado law establishes the types of water that can be reused, so communities must first determine whether reuse is a possibility. A few examples of water that can typically be reused are transmountain water imported from another watershed and non-tributary groundwater not hydrologically connected to streams. Water can be recycled for non-potable uses, such as outdoor irrigation and industrial processes, and potable use. Recycling water for drinking involves further treating wastewater using state-of-the-art technology and often blending it


Photo by Resource Central

with other water supplies. The result is a safe, sustainable new water supply. Castle Rock, which plans to provide about one-third of its water supply from recycled water, is a good example. On a smaller scale, Kremmling uses recycled water for irrigation at its cemetery and town square, and plans to expand to another park and a sports complex.

City of Fountain Residential Lot Tap Fees (per city ordinance No.1626)

		Water Acquistion fee with conservation incentive	
Lot size square footage (ft^2)	Standard water acquistion fee	Irrigated area <50%	Irrigated area <30%
<9,000	$4,875	$2,438	$1,024
9,001 - 13,000	$5,688	$2,844	$1,706
>13,001	$6,500	$3,250	$1,950

Source: City of Fountain 2018 Water Efficiency Plan
fountaincolorado.org/common/pages/DisplayFile.aspx?itemId=13102526


Photo by Resource Central


Photo by Resource Central

DEVELOPER FEES OR WATER REQUIREMENTS

Communities typically charge tap fees or require developers to provide water supplies for new developments. Developers can be required to provide communities with water rights, including those secured in land purchases. Communities can also reward new water-efficient developments with lower fees or water requirements. A new idea is to let developers pay for retrofits to existing development to offset their water requirements with any water savings generated.

VOLUNTARY WATER SHARING WITH AGRICULTURE

Previously, Colorado communities often secured water by buying agricultural water rights and changing them to municipal uses. This practice is referred to as “buy and dry”. While this still occurs, it can have detrimental impacts on our communities, especially

when done on a large scale. Voluntary water sharing agreements, called alternative agricultural water transfer mechanisms, or ATMs, often are preferred because they avoid the harm caused by buy and dry purchases. ATMs can provide agricultural water for municipalities on an as-needed basis, for example during dry years, while keeping farms and ranches irrigated and producing. Because agreements are voluntary, they are only entered into when they are a win-win for everyone involved.

SMART WATER STORAGE

Water storage allows communities to store water -- whether it's from snowpack, conservation, reuse, or ATMs -- for later use. Storage can have significant negative impacts on streams, so it must be designed properly. On-channel dams are rarely pursued today because they inundate streams, block fish passage, and disrupt natural processes necessary to maintain healthy streams. Better options include off-channel sites, aquifer storage, old gravel pits, and expanding existing reservoirs in ways that don't harm streams. If storage is being used for new water rights, it will often rely on capturing peak runoff streamflows, which may be the only water not already used by others. Peak flows are critical to stream and riparian health, stream channel maintenance, and businesses relying on outdoor river recreation. Prior to diverting new streamflows, communities should first work to integrate high levels of water conservation, reuse, and water sharing agreements into their portfolio. Communities should also evaluate possible climate change impacts on water supplies when considering new storage.

REGIONAL PROJECTS AND RESILIENCY

By sharing water supplies, infrastructure, and costs, regional projects can increase flexibility, provide multiple benefits, and help communities optimize supplies by working together. An example of a well-established regional project is the water collection, storage, and delivery infrastructure that the Northern Colorado Water Conservancy District (Northern Water) operates and maintains jointly with the U.S. Bureau of Reclamation. The project provides water to more than 1 million people and 615,000 irrigated acres in northeastern Colorado. Northern Water has expanded its focus to include water efficiency and other programs. Another example is the Water Infrastructure and Supply Efficiency (WISE) Partnership developed by Aurora Water, Denver Water, and the South Metro Water Supply Authority, which combines available, but highly variable, excess infrastructure capacity and water supplies to create a new reliable supply for all three communities. Additionally, the South Platte Regional Opportunities Water Group (SPROWG) is evaluating if unused reusable return flows and undeveloped river flows could be incorporated into a regional water supply and infrastructure project to benefit municipal, industrial, agricultural, recreational, and environmental needs.

TAKING ACTION

A reliable water supply is critical for Colorado communities, families, and businesses. While developing strong water conservation programs and sustainable supplies takes time and effort, resources are available to assist and help fund planning and implementation. Communities with fewer resources can save money and time by learning about best practices and existing programs and projects from other communities. Associations like Waterwise Colorado or WateReuse Colorado can help communities avoid reinventing the wheel. For resources, check out the "Learn More" list below. By pursuing smart water solutions, we can help ensure we have sufficient water in Colorado for vibrant and growing communities, productive ranching and farming, a healthy environment, and a strong recreation economy.

Learn More

Colorado's Water Plan: *https://cwcb.colorado.gov/colorado-water-plan*

Colorado Water Conservation Board (CWCB) information on supply planning, land use and water planning, urban water efficiency, ATMs, storage, reuse, and more: *https://cwcb.colorado.gov/focus-areas/supply*

CWCB grants and loans overview: *https://cwcb.colorado.gov/loans-grants*

Colorado Waterwise: *https://coloradowaterwise.org/*

WaterReuse Colorado: *https://watereuse.org/sections/watereuse-colorado/*

Resource Central irrigation inspections, turf removal, landscape waterwise plants, indoor water use consultations, and more: *https://resourcecentral.org/*

Western Resource Advocates' (WRA) database of sustainable water management policies and programs: *https://westernresourceadvocates.org/state-water-policy-program-database/*

WRA's Land Use and Water Efficiency Guidebook: *https://westernresourceadvocates.org/land-use-planning-for-water-efficiency/*

WRA's Guide to Developing Conservation Oriented Water System Development Charges: *https://westernresourceadvocates.org/wp-content/uploads/2018/07/WRA_Guide-to-Conservation-Oriented-SDCs_web.pdf*

WATER AND LAND USE: COLORADO COMMUNITIES WORKING TO BRING THEM TOGETHER

By Christy Wiseman, Colorado Department of Local Affairs' Division of Local Government land use and water planner

Picture by Chaz Baculi of the Babbitt Center for Land and Water Policy presents a StoryMap about the Colorado River Basin at the March 4, 2020 Colorado Water and Land Use Planning Alliance meeting.

Contributions by Desi Santerre, Colorado Department of Local Affairs' Division of Local Government water and wastewater program manager; John Berggren, Western Resource Advocates water policy analyst; Liesel Hans, Fort Collins Utilities' interim deputy director; and Waverly Klaw, Sonoran Institute director of resilient communities and watersheds

Water is life. Colorado communities know this at a deep level. We also know that natural hazards of this region - particularly drought, wildfire, and flooding - are exacerbated by the dual forces of climate change and population growth. Growing water demand is being managed in an environment of diminishing supplies.

For the past several years, the state has engaged in numerous water policy and planning efforts. In particular, the Department of Local Affairs (DOLA) and the Colorado Water Conservation Board (CWCB) have collaborated to encourage water and land use integration. This is because land use patterns have an incredible impact on water demand. Building densities, fixture and appliance choices, landscape plantings, irrigation technology, and other design elements influence per capita water demand in ways often beyond the control of individual residents' water use behaviors. As these development decisions are repeated, they create water demand that is 'built in' to the community, demand that municipal utilities may be obligated to serve regardless of how expensive it is. The best way to approach water conservation at the community scale is in the planning stage. This is why the 2015 Colorado Water Plan sets a measurable objective that by 2025, "75% of Coloradans will live in communities that have incorporated water-saving actions into land use planning."

One major outcome of working toward this goal is the Colorado Water and Land Use Planning Alliance, formed in 2017. The Alliance is a non-formal multi-stakeholder group of representatives from state agencies, local governments, universities, advocacy organizations, research organizations, and others who come together quarterly to coordinate to develop resources, provide technical assistance, and track progress on water and land use integration across Colorado and in the Colorado River Basin.

A few months ago, CWCB launched an update to the Water Plan

(expected to be finalized in 2022). The Water Plan's new goals and objectives are yet to be shaped by public process, but there's no reason for communities to wait. Colorado's municipalities are making great strides to integrate water into their land use planning processes. The rest of the article features resources available to assist with this work, in addition to examples of recent projects. Feel free to reach out to DOLA's land use and water planner at any time for more guidance or information at *cdola.colorado.gov*.

RESOURCES:

- Join the next Colorado Water and Land Use Planning Alliance quarterly meeting to engage in a peer exchange and to hear about available resources (e.g., funding, technical assistance, education). Contact Christy Wiseman at *christy.wiseman@state.co.us* for more information.
- *Incorporating Water into Comprehensive Planning* - Babbitt Center for Land and Water Policy (February 2020). This free guidebook details how land use planners in the seven Colorado River Basin states can effectively integrate a variety of water topics into their comprehensive plans.
- *Water Savings Resource Guide and Model Provisions for the Colorado Headwaters Region* - Northwest Colorado Council of Governments (NWCCOG)'s Water Quality/Quantity Committee (May 2020). This free resource explores regulatory tools available to enhance resilient and sustainable water resource management with a focus on Pitkin, Eagle, Summit, Grand, Gunnison, and Routt Counties.
- *Growing Water Smart Metrics: Tracking the Integration of Water and Land Use Planning* - Sonoran Institute (June 2020). This free guidebook, authored by Brendle Group on behalf of the Alliance, describes 10 progress metrics and 14 impact metrics to help your town or city determine how you are doing on integrating water and land use.
- Sonoran Institute, with support from a CWCB grant, is seeking two Colorado communities that are interested in receiving one-on-one guidance and technical assistance in selecting and calculating your own set of water and land use integration metrics. Contact *climateresilience@sonoraninstitute.org* for more information.
- *Growing Water Smart: The Water-Land Use Nexus Guidebook* (Version 4) - Sonoran Institute (August 2020). This free, seminal resource is used by communities that are accepted into the Growing Water Smart workshops.
- Sonoran Institute will soon be accepting applications to the Spring 2021 Growing Water Smart workshop. Participating teams will spend much of their time defining their water resilience goals and a path to attain them. Contact *climateresilience@sonoraninstitute.org* for more information.
- Have questions about drinking water or wastewater infrastructure? Desi Santerre is the Department of Local Affairs' water and wastewater program manager. In conjunction with the DOLA regional managers, she helps to coordinate state and federal funding for water and wastewater infrastructure projects. She can also assist with analysis of system needs and priorities, capital improvement plans, intergovernmental agreements, and more. Contact Desi at *desiree.santerre@state.co.us* or your DOLA regional manager for more information.

COMMUNITY PROJECT EXAMPLES:

Since the first Growing Water Smart workshop in 2017, Sonoran Institute has assisted 10 Colorado communities to further integrate water and land use planning. For example, the City of Evans is utilizing technical assistance to draft a water element in their comprehensive plan update. The Town of Rico was able to design and carry out a series of community meetings to build consensus on priorities and strategies for addressing water and wastewater infrastructure needs. The Town of Pagosa Springs partnered with Archuleta County to establish consensus around population growth projections for the town and region that could be used by jurisdictions and water providers to adequately plan for growth and manage water resources. Here is a brief description of the impact this technical assistance has had in the City of Fort Collins.

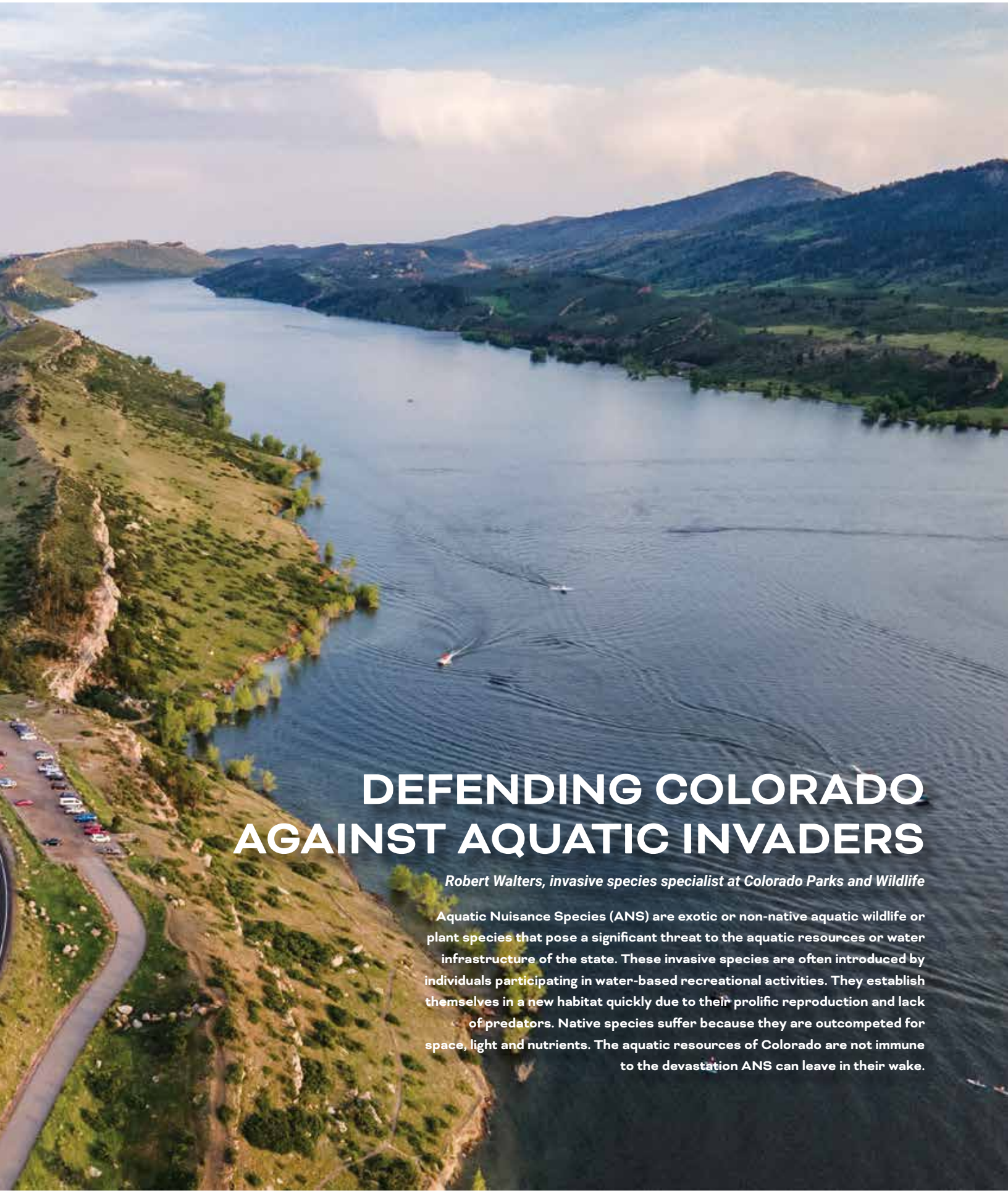
Fort Collins, in partnership with Sonoran Institute and the North Front Range Metropolitan Planning Organization (NFRMPO), worked to align conservation and efficiency planning and practices between the municipal utility and multiple water providers that serve Fort Collins residents. The project focused on identifying opportunities to understand, manage, and reduce water demand in Fort Collins' Growth Management Area. The project also integrated a metric on household water consumption into the comprehensive plan's Land Use Scenarios Forecast. Planning staff have participated in the water utility's new commercial-scale landscape transformation programs, which are designed to help reduce water use by transforming unused turf areas to low-water native or xeric landscapes. Staff from the planning world and the water world now work together to review and discuss new landscape plans and jointly meet with the applicants. Residents were previously confused with how to formally apply to change their landscape through the city's minor amendment process and had been hearing conflicting messages.

In early 2020, the Towns of Frederick and Severance began collaborating with Western Resource Advocates (WRA) and WaterNow Alliance (WNA) to identify ways to better integrate their water and land use planning. Like many of their peer communities along the Front Range, Frederick and Severance are small but growing communities where water has become a

prominent issue facing staff and elected officials. Not only are existing water supplies limited, but acquiring additional water has become increasingly expensive. There has been a growing recognition that integrating these two processes is essential for water efficient growth. This integration can take many forms, from high-level planning documents to post-occupancy enforcement.

TOWN OF FREDERICK: Frederick has seen significant growth in recent years. Along with that growth have come concerns about how much water is being used in new development, especially development in the commercial sector. Existing landscape regulations had a minimum 20% landscaped area requirement, which included requirements for turf. Accordingly, Frederick planning staff were concerned with the amount of turf that was being installed on new commercial lots, especially in areas that would not receive foot traffic or other uses. In partnership with WRA and WNA, and eventually with Element Water Consulting, Frederick took a close look at how to update landscape regulations to reduce the amount of unused irrigated turf being installed in new commercial developments. It was important for the town that these new updates not come at the expense of the town's existing aesthetics, but rather further capture Frederick's small-town feel in a more water efficient manner.

TOWN OF SEVERANCE: Also concerned about water demands as their community continues to grow, Severance planning staff wanted to find ways to include water efficiency into their ongoing dialogue about that growth. Severance is currently in the process of updating their comprehensive plan and applied to WNA's Project Accelerator to solicit support for incorporating water into that update. WNA and WRA have been working with planning staff, public works staff, local elected officials, and other stakeholders to identify water-related priorities, goals, and opportunities that could be included in the updated comprehensive plan. Once completed, the comprehensive plan will have identified ways that water, including water efficiency, can be considered and prioritized in land use planning processes throughout the town.



DEFENDING COLORADO AGAINST AQUATIC INVADERS

Robert Walters, invasive species specialist at Colorado Parks and Wildlife

Aquatic Nuisance Species (ANS) are exotic or non-native aquatic wildlife or plant species that pose a significant threat to the aquatic resources or water infrastructure of the state. These invasive species are often introduced by individuals participating in water-based recreational activities. They establish themselves in a new habitat quickly due to their prolific reproduction and lack of predators. Native species suffer because they are outcompeted for space, light and nutrients. The aquatic resources of Colorado are not immune to the devastation ANS can leave in their wake.

Colorado Parks and Wildlife (CPW) has designated 14 species as aquatic nuisance species. Those designated as ANS are prohibited to be possessed, imported, exported, shipped, transported, released, planted, placed or released within the state of Colorado. Only two animal species and three plant species of the 14 identified are known to be present in Colorado, while one additional species is considered "suspect." The remaining species are not known to be in Colorado at this time, but are considered prohibited due to the considerable risk they pose if they were to become established.

The three plant species that are currently known to Colorado are Water hyacinth, Brazilian Egeria, and Eurasian watermilfoil. Though these plant species are distinct, their impacts are similar. Aquatic invasive plants share the common thread that all invasive species do — prolific reproduction and outcompeting native species. Propagation is achieved for aquatic plants by the process of fragmentation. Fragmentation is when a small piece of the plant breaks off, either through natural or unnatural causes (e.g. water-based recreation). These small pieces of plants can expand existing populations and lead to new infestations. These three species also grow rapidly, forming dense monotypic stands that prevent native plants from thriving. The associated effects ripple throughout the water body. The natural food sources for fish, waterfowl and insects become displaced. Water quality is affected due to reduced water circulation and lower levels of dissolved oxygen, which increases water temperature and pH. A dense enough stand has the potential to slow or even stop the flow of water for municipal, agricultural and industrial supply.

The animal species that are currently known to Colorado's waters are the New Zealand mudsnail and the Rusty crayfish. Green Mountain Reservoir near Kremmling is considered "suspect" for the presence of Quagga mussels. These species share the traits of prolific reproduction, outcompeting native species and are easily transportable by human recreation.

The New Zealand mudsnail is an invasive mollusk from New Zealand. Ranging in size from a grain of sand to 1/8 of an inch in length, they often travel between water bodies on the bottoms of shoes, on the paws of wildlife and domestic animals, and any other recreational equipment that comes in contact with the shoreline. This species is able to survive for up to 50 days out of water on a damp surface, which is more than enough time for this species to be transported to new waters. Interestingly, the New Zealand mudsnails found in Colorado are all female and reproduce asexually. This means that it only takes one to start up a whole new population. Their thick concentration in the benthic area of the water disrupts the diet of native aquatic species. Worse still, the health of Colorado fish are affected because they are typically unable to digest the snail and offer little nutritional value.

The Rusty crayfish is native to the Ohio River Basin. This invasive crayfish is much larger and more aggressive than our native crustaceans. They disrupt the food web by feeding upon small fish, insects and fish eggs. They also eat aquatic vegetation beds that are critical for fish spawning, providing cover for prey fish and wildlife food. Due to their aggressive nature, they are not a good fish food themselves. Fortunately, while this species is present in Colorado, it is not very widespread. It is currently only known in four locations, three of which are in Routt County near Steamboat Springs.

All that said, the potential impacts of the Rusty crayfish and the New Zealand mudsnail pale in comparison to Zebra and Quagga mussels. These non-native bivalves were originally transported to the United States on transoceanic shipping vessels destined for the Great Lakes region in the late 1980s. Since that time, Zebra and Quagga mussels have spread across the country. Their successful invasion is due to their ability to adhere to surfaces and of course, their prolific reproduction. They attach to solid surfaces with spider-web-like appendages called byssal threads. These byssal threads make them extremely difficult to remove, which can have devastating impacts on water infrastructure and support easy transit aboard boats between water bodies. Moreover, a single female mussel can produce up to a million juveniles in a given spawn! Like all invasive species, Zebra and Quagga mussel populations grow quickly, outcompete native populations and affect their external environment. This species is unique from the rest mentioned because it is a filter feeder. As such, they clear the natural plankton from the water. Plankton are the foundation of the aquatic food chain and their removal from the system has significant impact on the higher species, including beloved sport fish. In addition to ecological impacts, invasive mussels can cause significant damage to water-based infrastructure such as hydroelectric facilities and municipal water distribution systems. This can cost infrastructure owners millions




of dollars to mitigate. These costs are ultimately passed on to those consuming the water and electricity. Fortunately, there has never been an established population of invasive mussels detected in Colorado. Their infestations in other states have left billions of dollars in devastating impacts in their wake.

Though the threat of invasion by aquatic nuisance species is very real, all is not lost! CPW and its many partners have taken a proactive approach to defending Colorado's aquatic resources. CPW's Invasive Species Program consists of three primary components: early detection, watercraft inspection and decontamination, and education. Early detection is achieved through sampling and monitoring of over 500 waters in the state. Prevention is the best medicine when it comes to ANS because it is extremely difficult, if not impossible to eradicate these species once they become established. Since ANS cannot transport themselves, the primary method of spread is through water-based recreation, primarily watercraft. Since 2008, CPW and its many partners have implemented one of the most effective watercraft inspection and decontamination programs in the nation! CPW and its partners conduct almost 500,000 watercraft inspections annually at more than 70 locations. CPW continues to drastically reduce the potential spread of these aquatic invaders!

The work that CPW does is nothing without public awareness and cooperation. CPW takes advantage of every opportunity to inform Colorado residents about the potential impacts to the aquatic ecology, recreational opportunities and the economy ANS can cause. We are lucky to live in a state whose residents have true admiration for its natural resources and take initiative to understand their role in the natural environment. CPW thanks all residents for their help to stop the spread of aquatic nuisance species by ensuring that their watercraft, apparel and equipment is cleaned, drained and dried between each and every use. It takes all of us to preserve the Colorado waters we love.

SAVING OUR RESERVOIRS FROM INVADING "CLING-ONS"

By Travis Thompson, communications manager and Steve Snyder, executive Communications function at Denver Water

Vigilant boat inspections keep destructive mussels from causing millions in damages to our water infrastructure.

Like a page out of a science fiction novel, a wave of aquatic invaders are discretely slipping into reservoirs, hiding on boats and hitchhiking from one infected waterway to attack the next.

The main culprits are two varieties of freshwater shellfish, the zebra and quagga mussel, considered to be aquatic nuisance species. Since the late 1980s, when these mussels were discovered in the Great Lakes region, these intruders have spread to more than 35 states, mostly by boat, which can easily transport these aquatic hitchhikers.

"It just takes a few microscopic larvae entering the reservoir, or adults attached to a boat, and before you know it these mussels can overtake dams, valves and pipes, causing millions of dollars of damage to critical drinking water infrastructure," said Brandon Ransom, Denver Water's manager of recreation.

Denver Water opens four reservoirs to motorized boating around Memorial Day every year and has been inspecting the waterways for the invaders since 2008, and the work has paid off. No adult mussels have ever been found in Colorado. Pueblo Reservoir tested positive for zebra mussel larvae in 2007 and quagga mussel larvae in 2008. There has not been a detection in Pueblo for five years, and the reservoir has been removed from the Colorado Parks and Wildlife's "known positive waters" list.

Since 2008, Denver Water has paid about $200,000 a year to help fund the inspections at Antero, Williams Fork and Eleven Mile Canyon reservoirs.

At Dillon Reservoir, one of the more popular recreation destinations in the state, Denver Water pays $70,000 a year for the two marinas to perform the inspections. In 2019, Dillon and Frisco Bay marinas performed more than 1,600 total inspections for aquatic nuisance species.

So, how do you keep these invaders off your boat?

Colorado Parks and Wildlife has a simple strategy for all boaters to follow each time they exit a body of water: Clean, drain and dry. More information on this process is available at *cpw.state.co.us/thingstodo/Pages/BoatWatercraftCleaning.aspx*

As an added safeguard, new regulations passed in January 2017 require boaters to remove aquatic plants and water drain plugs before leaving a parking area after being on the water. It is now against the law to transport a boat and trailer over land with drain plugs in place or vegetation attached to the vessel. Boaters who don't comply with this rule can be ticketed.

"We want people to come to these boating reservoirs for a fun day on the water," said Ransom. "We just ask that visitors remain mindful of how critical these waterways are to Denver Water's drinking water system and continue to be responsible stewards of these facilities."

If you're planning on boating on any of Colorado's 200 lakes and reservoirs this year, check out all of the aquatic nuisance species regulations on the Colorado Parks and Wildlife website at *cpw.state.co.us/thingstodo/Pages/BoatInspection.aspx*

BOAT INSPECTIONS KEY TO KEEPING THE ARVADA/BLUNN RESERVOIR FREE OF INVASIVE SPECIES

By Rachael Kuroiwa, City of Arvada manager of communications - infrastructure

THE ARVADA/BLUNN RESERVOIR, tucked at the base of the foothills, on Arvada's western edge, is a treasured recreational area for boating enthusiasts and anglers. It is also an important source of raw water for the city, especially during peak summer demand.

Since 2016, the City of Arvada's boat inspection protocol at the Arvada/Blunn Reservoir has conformed to State of Colorado regulations. These regulations require a state standard for all boat inspections called a single system - single message. Thanks to the support of the Colorado Parks and Wildlife, Arvada is proud to be one of the 73 state inspection sites located throughout Colorado.

Boat inspections are an integral part of maintaining a healthy ecosystem in Arvada's water system by preventing the introduction of invasive species into the water. Invasive species not only harm the ecosystem, they cause damage to infrastructure such as water delivery systems and irrigation lines. With recent identification of zebra mussels in another lake in Colorado, the importance of thorough inspections has come into sharper focus for the city.

Boat inspections at Arvada/Blunn Reservoir are conducted by a staff of volunteer rangers. There are 64 active rangers in 2020 who work three-hour shifts. While public health considerations necessitated some operational changes this year, the rangers completed an online training program for boat inspections. At the conclusion of the training, each ranger demonstrated their mastery of inspections through a mock inspection.

Rangers guide boaters through a set of inspection procedures before they can access the reservoir. The most important rule for managing invasive species is that all boats entering the reservoir must be clean, drained and dry. Invasive species can live for several days in wet conditions. Clean, drained and dry helps ensure that larvae are dead before boats enter new bodies of water.

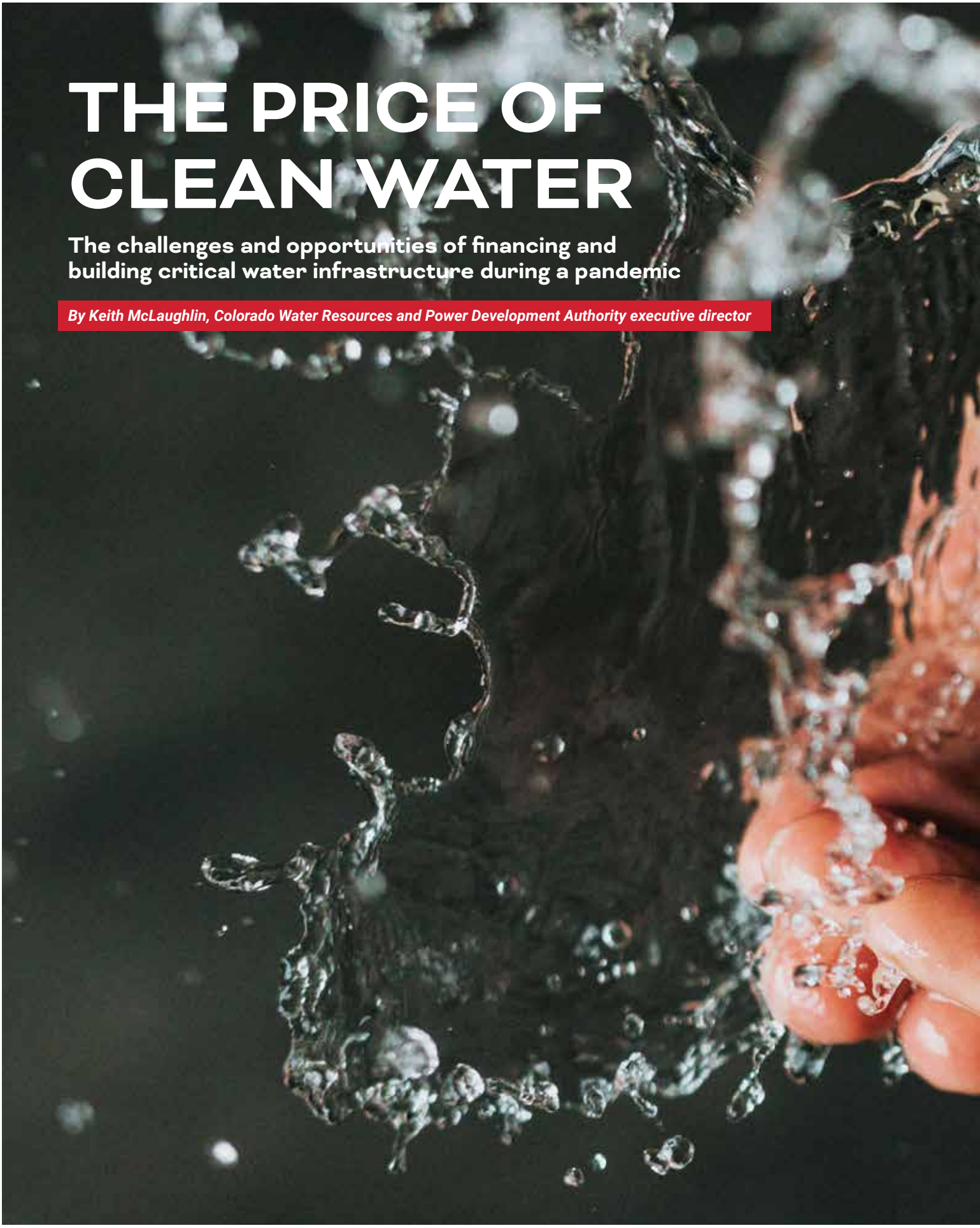
A statewide system of green seal tags and exit receipts helps inspectors track and manage where boats have been and give boaters some options to make their inspections faster. Boats entering with an Arvada green seal or another lake's green seal and a matching clean, drained and dry exit receipt are allowed to enter the reservoir with a quick inspection. Boats with a green seal and a matching clean, drained and dry exit receipt from a contaminated lake may enter the reservoir only upon passing a full boat inspection. Boats entering the reservoir with no seal on the boat need a full boat inspection before launching in the reservoir. Upon exit, all boats have a clean, drained and dry exit inspection and receive a new green seal tag and exit receipt.

These procedures take a little extra time at the entrance gate, but they are critical for maintaining the healthy ecosystem in the Arvada/Blunn Reservoir.

THE PRICE OF CLEAN WATER

The challenges and opportunities of financing and building critical water infrastructure during a pandemic

By Keith McLaughlin, Colorado Water Resources and Power Development Authority executive director



In March 2020, as a result of mounting coronavirus fears, Colorado stores came under siege by a growing tsunami of panicked buyers. As the hand sanitizer and other cleaning products dwindled from our stores (and began stockpiling in our basements, storerooms, and crawlspaces), many of us in the water industry scratched our heads, as cases of bottled water were swept up amidst the hoarding. The state's ever-diligent water providers persevered and delivered Colorado's cities and towns a continuous, reliable, and safe supply of potable water. There was very little to no disruption of drinking water service across the state due to COVID-19, and to date, there have been no cases of coronavirus transmission through any public water system. While cooler, thirst quenched heads prevailed, and Colorado's bottled water shortage abated, water providers continue to face a deluge of challenges as they attempt to finance and build their critical infrastructure projects. This article outlines challenges and opportunities municipal water and sewage disposal providers face as they try to fund the construction necessary to meet the burgeoning needs across Colorado.

A GROWING POPULOUS

Downtown Denver has quieted since the coronavirus pandemic began, with many office workers continuing to work from home. However, as anyone traveling the metro area during the rush hours can attest, there is no shortage of construction hats and fluorescent vests making their way in and out of Denver. This population growth is not limited to Denver and can be seen up and down the I-25 corridor and along I-70. The U.S. Census Bureau estimates the Centennial State has added nearly 730,000 people since 2010, making Colorado the fourth fastest growing state by percentage. This population boom, coupled with Colorado's ongoing drought, has made the financing and construction of critical water projects particularly problematic. Project sponsors have indicated the increased costs of constructing water and sewer projects over the last decade have been dramatic. It hasn't been uncommon to see water and sewer projects come in 50% higher the original engineering estimates. In some cases, final construction expenses doubled.

Financing these ever-increasing water infrastructure projects is particularly problematic for smaller systems that don't have a large population base to spread these escalating costs across. While the water industry is likely just beginning to feel the impacts of the pandemic, Public Health Order 1024 deemed Colorado's construction industry a "critical business," which thankfully kept essential water and sewer infrastructure projects under construction. Depending on the pandemic's length and severity, Colorado's population growth could slow, potentially creating some much-needed relief and additional time to finance, expand, and or build future critical water projects.

WATER NEEDS CONTINUE TO OUTSTRIP DEMAND

The State's Revolving Funds (SRF), administered by the Colorado Water Resources and Power Development Authority (Authority), Water Quality Control Division (WQCD), and the Department of Local Affairs (DOLA), track water and sewer project needs through its annual survey and eligibility list. The eligibility list currently includes 688 water and sewer projects totaling over $20.2 billion. The majority of these projects will require funding over the next five years. The Colorado SRF eligibility lists have tracked water and wastewater projects for over 25 years, and the lists have consistently doubled, in terms of total project costs, every seven years. Additionally, the eligibility list does not include the $20 billion in water supply projects identified in the Colorado Water Plan. Although healthy, the current loan capacity in the SRF programs can only support financing $70-$120 million a year.

HEALTHY WATERS

Healthy, clean water is a part of the very fabric of Colorado life. Clean water provides jobs, recreation, and feeds our farms and livestock. To keep Colorado waters in healthy condition, water and sewer providers must expand their treatment capacity to meet the growing list of emerging containments like nutrients, per- and polyfluoroalkyl (PFAS) substances, and lead and copper. In some cases, older treatment plants must be mothballed to make way for more extensive and sophisticated treatment facilities that can meet current regulations or the growing list of contaminants. Plant expansions, upgrades, and new facilities often, if not always, require additional capital financing.

ECONOMIC DOWNTURN

While the length and ultimate severity of the current economic downturn is uncertain, it has created both challenges and opportunities for communities that construct and finance water projects. The economic slowdown has further stressed water and sewer service providers who generally operate on thin margins. Most of these providers have issued long-term debt that requires they meet certain annual financial covenants. These covenants can come under pressure as customers struggle to pay bills as a result of Colorado's growing unemployment rate, which according to the Bureau of Labor Statistics, has risen to 10.5% in June 2020 from 2.5% in January 2020.

Kirk Russell, CWCB's finance section chief, anticipates the potential need to utilize CWCB's restructure policy under its Water Project Loan Program. According to Mr. Russell, "COVID-19's impact on our municipal and agricultural borrowers is tough to predict. I am concerned that the financial stresses created by COVID-19 will be compounded by the potential for prolonged drought. While we have not received any requests to restructure debt due to the economic impacts of COVID-19, we believe there remains a strong possibility."

INTEREST RATES AT ALL-TIME HISTORIC LOWS

To suggest that interest rates are currently low is akin to saying that antibacterial wipe and hand sanitizer sales have risen in the last six months. Global investors have poured money into the relative safety of U.S. treasuries and municipal bonds, driving interest rates down to absolute historic lows. For example, in the late spring of 2020, the Authority's Assistant Finance Director Wes Williams led a group of water and wastewater providers in an innovative, yet complex bond issuance that resulted in rates of 1.28% and 1.60% for 20-year and 30-year loan terms, respectively. Mr. Williams is still in awe of the ultra-low interest rates. "Prior to our spring bond issue, I would have been thrilled to see rates inside of 2%. I am still in shock that we issued debt at 1.28%, the lowest rates ever recorded in the Authority's 30 years of debt issuance, and our borrowers couldn't be more elated."

According to former town manager and current DOLA Regional Manager Chris LaMay, Colorado cities and towns are making tough choices with regards to any debt financing, regardless of today's low rates. "We are advising communities to prioritize critical infrastructure projects. Given these uncertain times and revenues, many plans for non-essential projects have already been shelved." While interest rates remain at uber-attractive levels, many questions remain. Do water and sewer service providers have the financial and political wherewithal to capitalize? What if Colorado consumers continue to demand more and more from their water supplies and suppliers? Will growth slow or pause enough to provide relief to water and sewer facilities, without putting a stranglehold on the state's economy?

IS FINANCIAL ASSISTANCE ON THE WAY?

Water infrastructure assistance may be headed to Colorado in the form of a federal stimulus bill (perhaps a Recovery Act II). However, most policy watchers believe national infrastructure funding will not be forthcoming until after the November elections. Infrastructure funding has historically drawn praise, and support, from both sides of the political aisle. In 2009, the American Recovery and Reinvestment Act (ARRA) successfully dispersed approximately $830 billion to infrastructure, education, health, and renewable energy. ARRA provided a much-needed shot in America's economic arm and helped lead the country out of the 2007-2009 great recession. Under ARRA, Colorado received and successfully issued approximately $62.4 million in water and sewer loan and grant funding to 36 different cities, towns, and special districts across the state, and all within a record 24 months.

Nationally, groups including the American Water Works Association, Council of Infrastructure Financing Authorities, National Water Resources Association, and others continue to lobby Congress in support of new federal water stimulus funding. Closer to home, Colorado Concern, a non-partisan group of business and community leaders, has put together a comprehensive report named "Together We Build" *(coloradoconcern.com/hot-topics/together-we-build/)* that delivers a robust case for infrastructure funding across Colorado.

While any federal infrastructure funding is uncertain, I would encourage municipal leaders to reach out to their congressional delegates, and to any of the organizations mentioned above to see how they may support Colorado water infrastructure funding.

Now, what to do with the leaning tower of toilet paper stacked in the garage?