

Augmentation's Role in Addressing Long-Term Challenges in the Colorado River Basin

A report by the 2024 Colorado River Water Leaders



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Disclaimer

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Acknowledgments

The Water Leaders Class of 2024 is grateful for the opportunity to participate in this program. The chance to network with a diverse group of professionals and experts across the Colorado River Basin is unique and unparalleled, and the connections forged here will undoubtedly foster future collaborations and help prepare us for futures working in water management.

We extend our deepest gratitude to the Water Education Foundation for its commitment to advancing education and leadership. We also express our sincere appreciation to our employers, whose encouragement and flexibility allowed us to fully engage in this experience. Their support has been vital in balancing professional responsibilities with the demands of this program. A special thanks is due to our mentors in the Colorado River Basin. Their expertise, guidance and willingness to share their insights have greatly enriched our learning journey.



2024 Colorado River Water Leaders cohort in front of Hoover Dam during the Foundation's Lower Colorado River Tour in March.

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The vision for the Colorado River Water Leaders program is to assemble a group of early to mid-career professionals to participate in a series of facilitated interactions to encourage the sharing of varying perspectives, experiences and ideas to develop a broader understanding of the Colorado River system and evaluate management challenges with fresh eyes and through collaboration.

In addition to the cohort interactions, each participant is paired with a mentor. Mentors are seasoned policymakers or senior leaders in the basin. Mentors and mentees are strategically paired to provide both parties with unique and potentially new viewpoints. The interactions include an interview and a day-long shadowing component.

The culmination of the Colorado River Water Leaders program is the development of this report, which seeks to provide Colorado River water managers and the river community with management suggestions. The focal point of this report is to look specifically at water supply augmentation options in the Colorado River Basin.

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Executive Summary

Planning for successful future management of the Colorado River must be a comprehensive and holistic effort. All scientific projections indicate that the aridification trend in the Colorado River Basin will continue and likely intensify into the future. As we look for strategies to stabilize the Colorado River system for the long-term, water augmentation must be explored as a necessary tool alongside proven strategies like conservation and voluntary water transactions. However, there has been little consistency or agreement on what augmentation is and when and to what extent it should be pursued.

This paper provides a roadmap to promote a purposeful, continuing dialogue around the deployment of water augmentation projects. It outlines ways to reduce barriers to implementation through strategies that enable consensus around goals, information sharing and funding support.

The Colorado River Water Leaders cohort recommends the following action items:

- The basin should form a Water Augmentation Community of Practice (CoP) – an inclusive group of partners that would commit to having a continuous, formal discussion around the future of augmentation in the basin. The CoP would:
 - Adopt a clear set of definitions and language around the topic.
 - Identify, assess, and coordinate viable water augmentation projects; coordinate discussions to connect water augmentation project proponents with technical and financial resources.
 - Ensure project proposals consider potential socio-economic and environmental impacts and benefits.
- The CoP would identify productive uses of time, energy and funding investments through a four-tiered project viability system developed by the Water Leaders: Proven, Launchable, Unsupported, and Shelved (PLUS).
- To support the costs needed to launch augmentation projects, the CoP would endorse a comprehensive, durable funding structure supported by a wide group of contributors. Additionally, the CoP would set up a contribution system for its participants to fund the research and development to support such projects, as well as CoP meeting activities.

Introduction and Background

Flows in the Colorado River Basin have dwindled as aridification settles into the region and use outpaces supply. As the post-2026 expiration date for system operating agreements looms closer, basin leadership must contemplate a path forward. One such path was articulated during the Water Education Foundation's 2022 Colorado River Symposium by Pat Mulroy, former general manager of the Southern Nevada Water Authority, during a pointed keynote address: "When you sit and talk about augmentation, please don't start from no," she said. "The audacious needs to be on the table."¹

Augmenting the Colorado River system with "new" water supply is not a new concept. Those efforts can be traced back to federal reports from the 1960s² and continue today.³ The basin's interest in pursuing augmentation is growing as long-term projections show declining river flows, leaving reservoir levels in a precarious condition without intervention. There is a definite appetite for exploring augmentation in some form, but it is inexplicit and inconsistent, and has occurred in fits and starts over time.

Thus, the Colorado River Water Leaders cohort of 2024 was tasked with creating a set of recommendations around potential augmentation actions in the basin. We looked at how to define the word augmentation; dove into a range of near-, mid- and long-term possibilities; researched feasibility, funding, equity, policy and political considerations; and considered the tradeoffs and ramifications of these potential actions.

Our work led us to understand the significance of making a commitment to actively consider augmentation in the basin along with other proven strategies, alongside reducing long-term use through water conservation measures and promoting voluntary water transactions. Augmentation is crucial for the future of the basin, but it is not a straightforward concept, and not all augmentation approaches are worthy of continued investment in time, taxpayer/ratepayer resources and political capital.

Therefore, our overarching hope is for river partners to put consistent, purposeful effort into discussing the topic, including articulating a common language around it. As it is often said in water management, you can't manage what you can't measure. We would like to add: *You can't manage what you can't define*. Up to this point, the basin has not collectively defined augmentation. We would rely on the newly formed CoP that we are proposing to take on this task. This will facilitate more effective communication, collaboration and implementation of projects among interested parties and their communities.

Being purposeful about verbiage is important not only for clarity in discussion, but also because the term 'augmentation' brings with it a fraught history of public perception issues (e.g., "toilet to tap" or outlandish proposals that defy common sense), which can hamper buy-in from communities and funding partners. Some approaches have been pursued without significant thought to community socio-economic and environmental impacts, creating lasting impacts and public mistrust.

To keep the project's scope clear while considering prior studies done on the topic and valuable feedback from leadership throughout the basin, we have opted to include cloud seeding, brackish and seawater desalination, and water recycling in our working definition of augmentation while excluding conservation measures and water transfers from this definition. We believe that conservation and water transfers are examples captured in processes that will occur parallel to augmentation.

Managing the Colorado River Basin requires flexibility and adaptability. Having a framework in place for continuous dialogue opportunities would help facilitate nimble responses when they are needed – particularly since augmentation often requires exorbitant lead time for planning and funding.

Additionally, viable options for stretching a water supply in one community can look vastly different than viable options for another community. Equity considerations should play into how, where, and when certain augmentation actions are contemplated, and existing unmet needs should be considered along with future growth and environmental and socio-economic impacts. With so many factors playing into the deployment of any single augmentation project, keeping the conversation going is necessary. Leadership in the basin must commit to that.

The importance of developing a clear vision around water supply augmentation strategies in the Colorado River Basin cannot be overstated. By investing meaningful energy into a dialogue around augmentation, the basin can better address water scarcity and enhance resilience. This will support the efforts of Colorado River Basin partners to responsibly manage the river system into the future – not only safeguarding the ecological health and economic vitality of the region, but also serving as a model for other arid regions facing similar challenges worldwide.

Recommendation 1: Create a Community of Practice (CoP)

A Community of Practice (CoP) should be developed, beginning with an inclusive group of Colorado River Basin partners, to adopt an overarching strategic framework to identify, assess and coordinate viable water augmentation approaches and projects.

Ensuring a sustainable water supply in a highly variable, overallocated system like the Colorado River Basin will require substantial investments in a suite of strategies to address supply-demand imbalances. Augmentation, alongside water conservation and transfers, will be essential in ensuring reliable water supplies in the region. However, like any significant endeavor, augmentation projects involve trade-offs for communities, economies and ecosystems. Further, the cost of developing augmentation projects is beyond the capacity of many single communities in the basin.

Given the cost, complexity and potential controversies around augmentation efforts, we recommend forming a Water Augmentation Community of Practice (CoP) – an inclusive group of Colorado River Basin partners (e.g., federal/state water agencies, municipal utilities, Native American Tribes, and non-governmental organizations). The CoP would provide an open forum to develop a strategic framework to identify, assess and coordinate viable augmentation projects. The CoP would also coordinate discussions from a diverse range of Colorado River partners to connect augmentation project proponents with technical and financial resources and promote the consideration of socio-economic and environmental impacts and benefits.

Community of Practice benefits

A community of practice (CoP) is typically defined as a group of people who share a common concern, set of problems or interest in a topic.⁴ CoPs come together to fulfill both individual and collective goals. CoPs often share best practices and knowledge to advance a professional practice. In the water sector, CoPs can take many forms, including integrated water resources management processes like the Yakima Basin Integrated Plan⁵ or regional water planning processes in states like Colorado, California and New Mexico. Well-known Colorado River Basin processes like the Salinity Control Forum and Glen Canyon Dam Adaptive Management Program Work Group also function as CoPs. A Water Augmentation CoP should be a place to propose, incubate, refine and move forward basin-wide augmentation concepts and proposals.

The benefits of these collaborative processes are well-documented and have a track record of success in moving projects from concept to implementation. For example, the Yakima Basin Integrated Plan used a formal collaborative process to identify actions and activities, including water augmentation projects, to address various climate and water challenges facing the watershed. The resulting plan secured significant public and private funds to advance multi-benefit water projects. This success was primarily due to the collaborative nature and trust-building of the CoP process. Another example is the Grand County Learning by Doing Cooperative Effort.⁶ This involved a collaborative process that allowed several northern Colorado trans-basin water projects to move forward while providing a venue for local input on how best to mitigate the environmental and recreational impacts and securing the resources to do so.

Additionally, collaborative group discussions and decisions can provide those in leadership with a level of political cover by distributing responsibility, enhancing legitimacy and offering a buffer against criticism, making it easier for them to justify supporting difficult but necessary choices.

Establishment, objectives and outcomes

A CoP focusing on the advancement of viable water augmentation strategies within the Colorado River Basin could provide many of the benefits outlined above. They could include a forum for interested parties to provide input on how to minimize negative socio-economic and environmental impacts and how to maximize community benefits while sharing knowledge on technical and financial assistance. Additional objectives of a CoP should be developing a framework to coordinate the continued growth of viable water augmentation projects (discussed in Recommendation 2) and further evaluating public financial resources for project implementation (addressed in Recommendation 3).

To achieve tangible results, the water augmentation CoP should have a formal charter or other agreement (e.g., memorandum of understanding or intergovernmental agreement) outlining its purpose, objectives, scope and other processes and practices. Ideally, the CoP would be convened by a well-respected entity or entities in the Colorado River Basin such as the Colorado River Water Users Association, the Bureau of Reclamation, an institute of higher education or a consortium of basin states. Regardless of the entity, we recommend that the water augmentation CoP include all basin interests, including Tribal and environmental partners, and ensure dedicated financial and technical support for Tribal, rural and other underserved communities in advancing viable water augmentation strategies. Finally, it will be essential to underscore that the CoP should not be regulatory nor duplicate regulatory processes in place to evaluate the impacts of individual water augmentation projects (e.g., NEPA).

Recommendation 2: Utilize a framework to guide discussions

The CoP should utilize a framework that guides the discussion of viable augmentation projects, while continuing to encourage necessary parallel processes.

Over fifty years of research, testimony and deliberation have gone into the topic of augmenting the Colorado River Basin.⁷ In that time, many augmentation ideas have been presented to varying degrees of viability. Our recommendation is that the CoP adopt a common framework that helps communities focus potential augmentation projects toward those that are more streamlined and viable. We recommend continuing to use the *2012 Colorado River Basin Supply and Demand Study (2012 Basin Study)*⁸ as a technical foundation to develop a framework, as it was one of the most collaborative efforts to date.

The *2012 Basin Study* was completed by the Bureau of Reclamation with collaboration from interested parties from across the basin and water use sectors. It analyzed an extensive list of options to address supply and demand imbalances in the basin. The report assembled a list of projects and outcomes into “study portfolios” that attempted to balance quantitative metrics like cost with qualitative assessments like permitting feasibility. To keep within the scope of this paper, we focused on projects the *2012 Basin Study* deemed as options to “increase supply.” For example, we categorize conservation practices as options to reduce demand and practices such as water transfers, exchanges and banking as options to modify operations, thus excluding them as augmentation projects for this framework. While these are crucial tools in addressing the supply and demand imbalances in the basin, they operate as parallel processes to augmentation.

Augmentation viability depends on multiple factors tied to technical, financial, legal, environmental, institutional and political realities. The communities participating in and impacted by the potential augmentation projects must ultimately determine the viability of projects based on their local circumstances. To more accurately scope the range of possible augmentation projects and use a common language and framework, we recommend participating communities categorize projects according to their deemed viability into four tiers: **Proven, Launchable, Unsupported and Shelved (PLUS)**. This tier structure is intended to be a starting place – iterative and capable of responding to evolving circumstances, such as changes in technology, finances, constituent support or energy requirements.

PLUS tier structure:

- **“Proven”** projects can produce quantifiable and reliable volumes of water across large and small scales. It can help decrease risk in basin-wide water supplies, while scoring favorably among the other evaluation metrics. These tend to be more palatable technologies for the chosen location and have effective mitigation strategies for impacted communities. These projects likely have already been implemented in the real world and likely have support from funding mechanisms currently in place by the federal government (e.g., Title XVI, Large-Scale Augmentation project funding and WaterSMART funding).⁹ An example of a “Proven” project is the Claude “Bud” Lewis Carlsbad Desalination Plant in Carlsbad, California.¹⁰
- **“Launchable”** projects are emerging technologies in the pilot phase. Projects in this tier have promising results in research studies and are worth a trial investment in real-world application. An example of a “Launchable” project is stormwater reuse.¹¹

- **“Unsupported”** projects are feasible on paper but should not be immediately pursued. Projects in the “Unsupported” tier are technologically viable and volumetrically quantifiable but are not worth pursuing because the burdens (e.g., cost, environmental impact, public perception, etc.) are too extreme to be palatable in the participating communities within the implementation window of the next ten years. An example of an “Unsupported” project is large-scale importation from the Mississippi River.¹²
- **“Shelved”** projects should not be pursued. They are too outlandish to continue researching and investing in and ultimately take resources from more realistic augmentation projects. An example of a “Shelved” project is towing icebergs long distances to coastal cities, which faces severe physical and engineering challenges regarding providing an adequate water supply.¹³

Generally, we recommend that the CoP devote significant time only to **Proven** or **Launchable** projects. Pursuing projects in **Unsupported** or **Shelved** tiers may not be the best use of limited resources given the need to address supply-demand imbalances within the next ten years.

We developed framework metrics to assess viable projects across six broad categories: Technical and Engineering, Financial, Legal/Permitting, Environmental, Economic, and Social and Political (Table 1). We propose these metrics serve as a starting point for the CoP to discuss high-level project details and explore impacts, benefits and potential hurdles.

To help facilitate discussion, we recommend the CoP and participating communities adopt a common, yet flexible, scoring system for the framework metrics to guide decision-making and respect each community's unique needs. This scoring system is not meant to be authoritative or prescriptive in nature, but to help lead meaningful discussions.

The CoP should adopt a scoring system with both quantitative and qualitative metrics to effectively rank criteria.¹⁴ The use of a scoring system would provide a transparent process for the CoP and participating communities to rate the merit of individual projects and connect projects with the highest needs and benefits across the basin to financial resources.

Table 1: Augmentation Framework Metrics

<i>Technical and Engineering</i>	<i>Financial</i>	<i>Legal / Permitting</i>	<i>Environmental</i>	<i>Economic</i>	<i>Social and Political</i>
<ul style="list-style-type: none"> • Produced volume per year • Location (project and delivery) • Energy availability/ demand/ consumption • Lifespan of project • Construction duration • Infrastructure components 	<ul style="list-style-type: none"> • Cost per unit volume (\$/AF) • Construction costs • Operation & Maintenance • Sources and availability of funding 	<ul style="list-style-type: none"> • Water rights and policy complexity • Land use and planning complexity • Environmental assessment complexity • Permitting complexity 	<ul style="list-style-type: none"> • Quality • Emissions • Streamflow • Biological resources • Cultural resources • Tribal cultural resources • Hazards and hazardous materials • Noise • Transportation 	<ul style="list-style-type: none"> • Price of water for end water user • Impact to present worth of resource • Local effect to economy • Temporary job creation • Permanent job creation 	<ul style="list-style-type: none"> • Equity • Level of community Support • Level of political support • Level of partner support • Population and housing

Recommendation 3: Establish dedicated funding sources

The CoP should establish a basin-wide, multi-stream financial structure to fund implementation of, research and development of, and dialogue about augmentation projects.

Colorado River Basin water users and partners are looking to augmentation projects to ensure water supply reliability and support growing demands. New and expanded water infrastructure projects will be expensive to build, operate and maintain, and require long lead times. Given the scale of need and limited resources of some basin states, Tribes and other partners, an all-hands approach to durable funding, including federal funds, will be needed to get these critical projects off the ground.

We recommend that the CoP collaborate with basin users and partners to develop a comprehensive structure for durable funding to support the research, development and implementation of augmentation projects, while simultaneously advancing parallel activities that ensure water supply reliability to meet growing demands for all that rely on the river. Additional considerations must be taken to ensure reliable financing and capacity for projects that support disadvantaged communities and Tribes. Separately, the CoP will need to be funded by its members to sustain its activities, such as regular meetings, knowledge sharing and coordination efforts to continue the dialogue on augmentation in the basin.

A variety of funding streams

Augmentation projects will likely require a variety of funding mechanisms, including federal, state and local government programs, as well as investments from the private sector and non-governmental organizations (NGOs). Federal funding will be a key piece of any comprehensive funding structure developed by the CoP. Thanks to the collective efforts of basin partners in recent years, funding packages such as the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) were passed with support for basin augmentation projects, as well as parallel processes to support conservation and ecosystem restoration. However, the basin is at risk of a significant federal funding gap when existing funding authorizations expire, which could occur as soon as 2026. Demand for federal funding to support augmentation projects will continue in the foreseeable future, particularly those needed to support post-2026 river operations¹⁵ and underserved communities and Tribes with water access and augmentation needs.

The risk of a federal funding gap can be reduced by extending the duration of existing authorizations that support augmentation.¹⁶ Capitalizing on the basin's significant economic and political influence¹⁷ and consistent with federal appropriations law, the CoP should work with basin users to seek additional federal funding with an extended duration to keep the momentum around augmentation projects in the basin. There are precedents for congressional authorizations for an indefinite period without fiscal-year limitation to support basin objectives, such as the Lower Colorado River Multi-Species Conservation Program.¹⁸

The basin could seek a post-2026 legislative package that includes support for a portfolio of augmentation projects for a duration that matches the term of the legislative package. The CoP's federal funding package proposal should also continue and expand congressionally authorized incentives for projects that address unmet needs to disadvantaged communities and Tribal communities or provide an ecological benefit. This could include reduced cost-share ratios or removal of the cost-share requirement for projects that meet specific eligibility benchmarks.¹⁹ An endorsement by such a broad interest group as a CoP would help an augmentation project gain traction in Congress or in other funding pursuits.

Supporting implementation of augmentation projects does not stop at financing their development; it also includes identifying a funding source for operations and maintenance (O&M). This critical component of large infrastructure projects becomes more complicated with multiple investors and beneficiaries. As an information-sharing forum, the CoP should help members explore the options for addressing O&M costs and facilitate discussion on O&M responsibility early in the process. Here are a few examples of how O&M responsibility and costs have been addressed for existing augmentation activities:

- Claude “Bud” Lewis Carlsbad Desalination Plant:²⁰ Public-private partnership between the San Diego County Water Authority and Channelside (formerly Poseidon Resources LP). O&M costs were negotiated by the parties upfront and are adjusted for inflation. O&M implementation responsibility and costs above the negotiated fixed price were assigned to Channelside, and payment of the negotiated fixed O&M costs was assigned to San Diego region ratepayers.
- Colorado River Basin Weather Modification Program:²¹ O&M activities are supported by a mix of funding from the upper and lower basins, both of which benefit from the weather modification activities. The lower basin’s share of O&M costs for activities such as maintaining silver iodide generators are pulled from the lower basin’s contribution to the program.

Research and development

The purpose of the CoP is to support and advance water augmentation projects within the Colorado River Basin, and that means increasing the viability of projects that may not be in the **Proven** or **Launchable** tiers.²² As part of the comprehensive funding structure developed by the CoP, an interest-bearing cost-share account should be established in which all partners, including federal entities, contribute to advancing research and development (R&D) initiatives.²³ By having a dedicated funding source for R&D, the CoP can continuously explore new and innovative water augmentation approaches, pilot cutting-edge technologies and develop solutions tailored to the unique challenges of the basin. This focus on R&D is crucial for adapting to the dynamic conditions of the region, such as changing climate patterns, evolving regulatory frameworks and shifting water demand. Supporting innovation also ensures that the CoP remains at the forefront of water management strategies, continuously improving and updating practices to enhance water security in the basin, while gathering community input early in the development process.

Funds from the CoP water augmentation R&D fund could supplement other water augmentation R&D funding sources, such as the Bureau of Reclamation’s Desalination and Water Purification Research Program grants.

Funding CoP activities

The CoP will need money to sustain its activities. A second interest-bearing cost-share account should be established in which CoP partners contribute to maintaining the organization’s core functions. This includes organizing regular meetings, facilitating workshops, facilitating technical assistance and capacity building, enabling continuous knowledge sharing, and supporting collaborative decision-making. One of the key benefits of the proposed cost-share model is that it encourages all partners to have a financial stake in the success of the group. By collecting contributions from state agencies, Tribes, local communities, NGOs and federal entities, the model fosters a sense of shared responsibility and accountability. This “skin in the game” approach not only strengthens commitment but also ensures that all partners are actively engaged in the CoP’s activities and decisions. The inclusive funding model will

build trust and strengthen relationships among stakeholders, laying the groundwork for more effective collaboration and coordinated action across the Colorado River Basin.

Conclusion

Century-old decisions that divided the waters of the Colorado River have resulted in an overallocated and burdensome situation for municipalities, Tribes, farmers, and other water users in the western United States.²⁴ Aridification in the basin, coupled with projected population growth, means that water demands cannot be met with conservation or water management schemes alone. To sustain life in many vulnerable pockets of the West, augmentation projects will be needed to supplement the Colorado River that now supplies drinking water to 40 million people and irrigates more than 4 million acres.

Meeting future water demands will logically occur in the most cost-efficient manner, making it likely that every last drop of water will be squeezed through conservation efforts before most augmentation projects are built. When conservation is no longer enough, the stakes will be at an all-time high. We recommend that building a framework through a Community of Practice *now* is essential to discuss, critique, incubate and promote future necessary augmentation projects.

Water interests in the basin have repeatedly shown they can solve problems through collaboration and consensus-building with no-man-left-behind policies. The Salinity Control Forum provides opportunities for collaborative and inclusive solutions to water quality, and the Glen Canyon Dam Adaptive Management Program brings people together to protect biological and other resources in the Grand Canyon. Templates for these resource-focused Communities of Practice already exist, and we suggest a new group discuss, critique, incubate and promote augmentation projects, small and wide, to the benefit of the entire basin.

Water is the most dividing resource in the west United States, so initiatives such as an augmentation Community of Practice that bring basin partners together can bring temperaments down and push us towards altruistic solutions that make life possible for future generations.

References

1. “Keynote Address: Saving a Drying River: Can We Muster the Needed Resolve & Courage?” in *On the Edge of the Next 100 Years - Symposium Proceedings* (Water Education Foundation, 2022).
2. *Pacific Southwest Water Plan*; by Secretary of the Interior, Stewart L. Udall (United States Department of the Interior, 1964).
3. “Lower Basin Alternative for the Post-2026 Coordinated Operation of the Colorado River Basin,” March 6, 2024, Colorado River Basin States Representatives of Arizona, California, and Nevada, and “Gila River Indian Community’s Comments on Lower Basin Alternative and Upper Basin Alternative and Request for Reclamation to Model a Proposal That Uses Assumptions That Differ from the Two Basin States’ Proposals,” March 29, 2024, Gila River Indian Community.
4. Wenger, Etienne. Communities of Practice: A Brief Introduction. https://www.ohr.wisc.edu/cop/articles/communities_practice_intro_wenger.pdf.
5. Yakima Basin Integrated Plan. <https://yakimabasinintegratedplan.org/>.
6. Grand County Learning By Doing - Managing Aquatic Resources in Colorado. <https://www.grandcountylearningbydoing.org/>.
7. Many studies have been completed over time regarding these topics, including: Pacific Southwest Water Plan (1964) pg. 9-10; Water Supplies of the Colorado River (1965) pg. 7-8; Lower Colorado Region Comprehensive Framework Study (1971) pg. 148; Upper Colorado Region Comprehensive Framework Study (1971) pg. 94 & pg. 103; California Region Comprehensive Framework Study (1972) pg. 103; Westwide Study Report on Critical Water Problems Facing the Eleven Western States (1975) pg. 170-171; Colorado River Basin Water Problems: How to Reduce the Impact (1979) pg. 22-23; Colorado River Basin Study: Report to the Western Water Policy Review Advisory Commission (1997) pg. 25; Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability (2007) pg. 170–171; Study of Long-Term Augmentation Options for the Water Supply of the Colorado River System (2008) pg. 1; Colorado River Basin Study (2012) pg. SR-79; Moving Forward Effort (2015) pg. 2-3; Status of WaterSMART Program Funding Opportunities (2024); and Pazouki, P., Teshnizi, E. S., Bertone, E., Helfer, F., & Stewart, R. A. Multi-criteria decision making for a holistic assessment of sustainable alternatives in SWRO desalination: A case study. *Desalination*, 544, 116127.
8. U.S. Department of the Interior, Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study (2012).
9. United States Bureau of Reclamation (2024). *WaterSMART Water Recycling and Desalination Programs*. On file with authors.
10. San Diego County Water Authority. “Seawater Desalination” Carlsbad Plant. <https://www.sdcwa.org/your-water/local-water-supplies/seawater-desalination/>; <https://www.sdcwa.org/wp-content/uploads/2020/11/desal-carlsbad-fs.pdf>
11. WateReuse Association. “Stormwater Reuse.” *WateReuse Association*, watreuse.org/educate/types-of-reuse/stormwater-reuse.

12. Miller, Brittney J., Cedar Rapids Gazette. "Pumping Mississippi River Water West: Solution or Dream?" *AP News*, 2 Feb. 2023.
13. Evan Lubofsky. "Can Icebergs Be Towed to Water-Starved Cities?" *Oceanus - The Journal of Our Ocean Planet*, 6 Jan. 2021.
14. *Supra* 8, and Pazouki, P., Teshnizi, E. S., Bertone, E., Helfer, F., & Stewart, R. A. (2022). Multi-criteria decision making for a holistic assessment of sustainable alternatives in SWRO desalination: A case study. *Desalination*, 544, 116127.
15. *Supra* 3.
16. See, for example, H.R. 7990 - Large-Scale Water Recycling Reauthorization and Investment Act of 2024, of the 118th Congress, sponsored by Representative Grace Napolitano (D-CA), which would increase funding and extend the authorization for Reclamation's large-scale water recycling and reuse grant program for an additional six years.
17. Senators from Utah and New Mexico are set to lead the Senate Energy and Natural Resources Committee in the 119th Congress, alongside leadership from Arizona and other basin state representatives in the House Committee on Natural Resources. In the House, a Colorado River Caucus was established to focus on bipartisan discussions and collaboration in response to drought conditions along the Colorado River; an informal, bipartisan caucus has also been convening in the Senate.
18. Omnibus Public Land Management Act of 2009, Pub. L. No. 111-11,123 Stat. 1329.
19. See, for example, H.R.4356 of the 118th Congress, sponsored by Representative Melanie Stansbury (D-NM), to reduce or waive the non-federal cost share for Tribes applying for Bureau of Reclamation WaterSMART grants.
20. *Supra* 10. Correspondence with program participants on file with authors.
21. *Weather Modification Program*, Colorado River Board of California, State of California. <https://crb.ca.gov/programs/weather-modification-program/> Correspondence with program participants on file with authors.
22. See Table 1, p. 12.
23. There are multiple examples of cost-share funding contribution accounts in the basin, including the Colorado River Basin Salinity Control Program and Lower Colorado River Multi-Species Conservation Program.
24. Fleck, J.; Udall, B. *Managing Colorado River Risk*. *Science* 2021, 372, 885.



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