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***Letter #:*** 7402

***Date Received:*** 3/2/2026

***Sender Names:*** 7361: Maia G

***Emails:*** 7361: mng1109@gmail.com

***Organizations:***

***Subject:*** Maia G's Comments on the Post 2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - . 3/2/2026 Maia Goel RE: Maia G's Comments on the Post 2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Environmental Impact Statement Dear Acting Commissioner Cameron, My name is Maia Goel. I was born and raised in the mountains in Colorado, on the Colorado River. This river is so important to me, not only do I continue to return to raft, fish, tube, etc. in the river, but that was my entire childhood. I hold such fond memories and would hate to see anything happen to it or to the communities around it because it no longer exists. We need to include flexible water conservation pools to help the Basin increase its water security. We need to protect the river's health. We need to take a proactive approach to water management. And we need to honor tribal sovereignty and fulfill the federal government's legal obligations to Tribal Nations. It would be devastating to see anything happen to the river or to the people it supports. Sincerely, Maia Goel

***Letter #:*** 295

***Date Received:*** 2/17/2026

***Sender Names:*** 293: Laurie Gabriel

***Emails:*** 293: laurieegabriel@yahoo.com

***Organizations:***

***Subject:*** Federal Colorado River Planning

DOI - . I have been a resident of Southern Nevada for 15 years.In my opinion, California should NOT be allowed to take ANY water from the Colorado River. To begin with, they have hundreds of miles of coastline and can build desalination plants. (Example: San Onofre Nuclear Power Plant was torn down and that would have been the PERFECT spot for one.) Landlocked states like Nevada, doo not have that option.Secondly, they also have NO IDEA how to responsibly utilize all of the water they receive from seasonal rainstorms - they just divert it thru flood control channels and then let it flow right into the ocean. Whereas our flood control is purposeful and diverts water to Lake Mead.Finally, they have FAILED to implement any type of significant water conserving programs, such as water recycling for agriculture, which would reduce their dependence upon Colorado River water. They just keep taking more and more each year. On the flip side, Nevada has ALWAYS used LESS than their allotment of water, despite the exponential population growth in Southern Nevada. Bottom Line: No more Colorado River water to California. Period.

Respectfully,Laurie GabrielLas Vegas, NV(702) 202-0094

***Letter #:*** 353

***Date Received:*** 2/16/2026

***Sender Names:*** 351: Olivia Gagliardi

***Emails:*** 351: o.gagliardi8@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - .Dear Carly Jerla Bureau of Reclamation,To Whom It May ConcernAs a wildland firefighter and outdoor recreation enthusiast the preservation of our public lands and the resources within them are of the utmost priority to me. I have spent much time in the Grand Canyon, most recently on a 25 day trip down the river with 15 of my friends who have also been inspired and changed by their time on the Colorado River. As you float down the river, as the layers change, you cannot help but be changed yourself. You pass thriving ecosystems that support themselves, from the fish to the great blue herons and all the way up to the big horn sheep and mountain lions. You pass archeology sites vital to our nation's history. And you see the light in the souls of those around you as they connect with nature, and themselves, just a little more deeply.It is vital that we protect the Colorado River basin and its tributaries during this renegotiation process. Below are some of the necessary requests and reasons why:- Storage in Lake Powell and management and infrastructure of Glen Canyon Dam must support opportunities for High Flow Experiments in the Grand Canyon for the purposes of sediment and nutrient transport.- Infrastructure updates at Glen Canyon Dam must be prioritized in the short-term to ensure that the dam is capable of passing variable flows downstream as reservoir levels become lower and less predictable.- Conservation measures and delivery of water between the Upper and Lower Basins must balance maintaining minimum flows at all times in the Grand Canyon with allowing for flow variability across the annual hydrograph to support both the river ecosystem and river recreation opportunities.- Water delivery measures that implicate Blue Mesa and Flaming Gorge Reservoirs must consider immediate and downstream impacts to river ecosystems and recreation opportunities, and seek to provide multiple benefits whenever possible.- Impacts to river recreation opportunities on the Colorado River and the San Juan River due to changing reservoir levels must be analyzed and mitigated.- Post-2026 Operations must analyze and consider how operations will affect daily flows in the Grand Canyon and upstream river segments before a final decision is determined, not after.- Operations and agreements must provide for Tribal water rights and respect Tribal sovereignty throughout the Colorado River Basin.Please take these factors seriously into consideration during this negotiation process. Keeping the river flowing and healthy is integral to protecting the safety and welfare of the people who rely on it. We must work with what nature provides and do so together. All of the Colorado River's water users are going to feel a strain, but we cannot sacrifice these special river canyons and the ecosystem services that they provide. The generations to come will either benefit or be hurt by the decisions we make today in regards to the Colorado River. Let us make the correct decisions now for the future of our families and our country.Sincerely,Ms. Olivia Gagliardi2405 57th St  Missoula, MT 59803-3017o.gagliardi8@gmail.com

***Letter #:*** 304

***Date Received:*** 2/15/2026

***Sender Names:*** 302: John Gajda

***Emails:*** 302: john.gajda@comcast.net

***Organizations:***

***Subject:*** Comments on the Draft EIS - Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - .Thank you for your time and effort putting the Draft EIS together. The document is thorough ... so thorough that many won't (or take the time to) understand it.What ultimately matters is that people have enough water, electricity, and food to live. Without that, people will be forced to abandon areas and that will be a huge environmental catastrophe. Therefore, allocations of water need to focus on people first, then electricity, then food. The needs for recreation, endangered fish (water temperature and flow), etc. and other non-human life sustaining needs were discussed in the document need to be (much) further down the priority list.The distribution of water should be set to ensure all current users have sufficient water. Those with an abundance should not waste water and should have their supply reduced if they do so. Farms in arid environments that only exist because of Lake Meads and Lake Powell should be temporary paused until the drought has eased, at least the ones that grow high water demand crops.Regarding new development, enact legislation to require proof of a 100 year water supply without stealing or borrowing from others before the construction can begin. This has appeared too slow new housing in the Arizona desert. I don't know if other areas (Utah, Nevada, California, etc.) have such requirement.For those areas where alternate sources of water exist, use those sources first (I.e., build desalinization plants along the California coast) so that others further back have water. I noticed the Colorado River supplies Los Angeles, etc. even though the river doesn't go anywhere near there. These are areas that would greatly benefit from desalinization plants.John GajdaBuckeye, AZ

***Letter #:*** 8671

***Date Received:*** 3/3/2026

***Sender Names:*** 8590: Katia Galambos

***Emails:*** 8590: katiagalambos@gmail.com

***Organizations:***

***Subject:*** Written comments on draft EIS Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - . I am writing as a Colorado resident to express that I support new guidelines that: Include flexible water conservation pools to help the Basin increase its water security. Current water conservation programs are insufficient to address the West's water challenges. The new guidelines must include expanded water conservation pools and allow water to be saved and moved between Lake Powell and Lake Mead as needed to protect river health, stabilize the system, and support our communities in dry years. Protect river health. The Colorado River is a dynamic, living system that is under increasing stress as the Basin gets hotter and drier. The new guidelines must be adaptable, consider ecosystem impacts in reservoir operating plans, incorporate mitigation plans to help the river and our communities get through dry years, and support agreements for Colorado River Delta restoration. Take a proactive approach to water management. Management strategies with a high likelihood of deadpool shortages or loss of hydropower are not sustainable. Our communities cannot plan ahead when the river is always on the brink of a crisis and facing unplanned emergency actions. The new guidelines must promote water conservation across the Basin, and management decisions need to consider how much water is actually flowing in the river and stored across its major reservoirs. This will help provide certainty to our communities and avoid crisis management. Honor Tribal sovereignty and fulfill the federal government's legal obligations to Tribal Nations. The 30 federally recognized Tribes in the Colorado River Basin have historically been excluded from decision making and key programs on the Colorado River. Greater transparency, inclusion, and collaboration are urgently needed. Tribes hold rights to the river's water, and the federal government has a responsibility to uphold those rights and provide pathways for Tribal collaboration. Tribes must be able to engage in conservation pools and other programs, and the new guidelines must include Tribal voices and fulfill federal trust responsibility. Thank you, Katia Galambos 70 Riverdown Drive Aspen, CO 81611

***Letter #:*** 7630

***Date Received:*** 3/2/2026

***Sender Names:*** 7580: tony garcia

***Emails:*** 7580: eldragon83@att.net

***Organizations:***

***Subject:*** public comment

DOI - . The upper basin states have got to take cuts in order for us Arizonans to make it through in my opinion. Please make it known to whom it may concern. Thanks! Tony Garcia 10321 E Tahoe Ave. Mesa, AZ 85212

***Letter #:*** 3731

***Date Received:*** 2/26/2026

***Sender Names:*** 3694: Judith K. Gardiner

***Emails:*** 3694: gardiner@uic.edu

***Organizations:***

***Subject:*** protect the Colorado river

DOI - . Judith Kegan GardinerProfessor of English and of Gender and Women's Studies EmeritaDepartment of English (mc 162)University of Illinois at Chicagogardiner@uic.edu

***Letter #:*** 4668

***Date Received:*** 2/28/2026

***Sender Names:*** 4634: Karen Genest

***Emails:*** 4634: Karen.Genest@messages.fwwatch.org

***Organizations:***

***Subject:*** Protect Drinking Water – Save the Colorado River Basin

DOI - . Dear Bureau of Reclamation, The Colorado River is in crisis and management is not seriously looking at how the water is used. The Bureau needs to exert its authority to ensure the states reach a joint agreement that accepts the need for mandatory conservation measures limiting corporate water abuses. Overuse by major agribusiness and tech corporations threatens the basin and water supply for 40 million people. Plans must look to what is feasible now and for the future. Crops not suited to growing in highly arid climates need to be replaced with appropriate crops. With the threat of major collapse, any plan going forward must include stopping not only the expansion of alfalfa, mega dairies, and data centers, and a significant rollback of the cultivation of crops that consume large quantities of water and are not suited to growth in highly arid climates. With the Colorado River significantly overstretched, every environmental analysis and plan for the future must consider how the River's resources are being used. The overuse of the Colorado River by big agribusiness and technology corporations - amid already record-low water levels and drought - has serious consequences that threaten accessible drinking water for 40 million people. I urge the Bureau of Reclamation to prioritize sustainability and the needs of the 40 million people relying on the Colorado River for drinking water over corporate profit. Sincerely, Karen Genest 17311 SE 23rd Dr Vancouver, WA

***Letter #:*** 3262

***Date Received:*** 2/26/2026

***Sender Names:*** 3232: Astrid Gerjets

***Emails:*** 3232: astridgerjets@googlemail.com

***Organizations:***

***Subject:*** Fassungslos was muss noch alles verloren gehen.

DOI - . SEHR GEEHRTE DAMEN UND HERREN. ICH MOCHTE IHNEN MITTEILEN DAS NATUR UND TIERWELT GESCHUTZT WERDEN MUSS. UND WASSER RESSOURCEN ZU SCHUTZEN. SIE SIND FUR ALLE DA.WANN WACHT DER MENSCH UBERHAUPT NOCHMAL AUF DER ZUG IST JA EH SCHON ABGEFAHREN. AMEN MFGASTRID GERJETS

***Letter #:*** 287

***Date Received:*** 2/17/2026

***Sender Names:*** 285: Leslie Gertie

***Emails:*** 285: photogertie@icloud.com

***Organizations:***

***Subject:*** Colorado River Basin

DOI - .The Supply Driven Option makes the most sense.How much trouble we would have saved ourselves if they had just put in a sentence in the1922 agreement that called for making adjustments every ten years based on the actual amount of water!Leslie Gertie671 Alpine Dr.Spring Creek , NV 89815

***Letter #:*** 5355

***Date Received:*** 2/28/2026

***Sender Names:*** 5319: Dennis Ghiglieri

***Emails:*** 5319: info@greatbasinwater.org

***Organizations:***

***Subject:*** Dennis Ghiglieri Comments on Colorado River

Great Basin Water Network DOI - . RE: Post-2026 Colorado River Reservoir Operations DEISThe DEIS fails to consider mandatory conservation for the upper basins. Historical water use for the lower basin has already been substantially cut back while the upper basin seeks to divert water that does not exist.The DEIS fails to consider that Glenn Canyon Dam could - even this year - be unable to pass water into the Colorado River. This is a failure by the Bureau that is unconscionable. The jeopardy this situation creates is a national and international failure on the part of the Bureau in this DEIS. It cannot be remedied by ignoring it as this DEIS does.With the admission that 3 of its alternatives cannot be implemented (perhaps) due to legal issues, the Bureau seems to be leaning toward a "do nothing" approach which is alarming to all of us who live in the lower basin states.The Bureau needs to seriously evaluate alternatives which would by-pass Glenn Canyon and at the same time, recognize that the upper basin with its many reservoirs and out of basin diversions has greatly diminished the flow of the river.Likewise, the Bureau fails to analyze what a failure to deliver to the lower basin would actually look like and the vast economic impacts that would result in Las Vegas, Phoenix, Los Angles and Imperial Valley and Mexico. Such an economic loss would be unprecedented and would be further worsened with an ecological disaster - parks, refuges, infrastructure and all the interconnections between the environment and the economy. The DEIS fails to recognize that it is ignoring the people and economy and environment dependent on delivery of water.Thank you for considering my comments.Dennis GhiglieiIf you have any additional questions please contact me.Dennis Ghiglieri(c) Great Basin Water Network. Powered by

weForms.

***Letter #:*** 396

***Date Received:*** 2/10/2026

***Sender Names:*** 394: Jonathan Gibbs

***Emails:*** 394: jonathanrgibbs@gmail.com

***Organizations:***

***Subject:*** Comment on Post-2026 Draft EIS - Groundwater Nexus & S. 3617 Impact

DOI - . To: Bureau of Reclamation, Lower Colorado Basin RegionRe: Post-2026 Operational Guidelines Draft EIS - Comment on "Supply-Based Hybrid" Alternative & Infrastructure BaselinesFrom: Jonathan Gibbs, Stakeholder (Lower Basin Interest) Date: February 10, 2026To the Post-2026 Operations Team:I am submitting this formally to the record regarding the Draft Environmental Impact Statement (DEIS). My comment specifically addresses deficiencies in the hydrological modeling of the"Supply-Based Hybrid" alternative regarding the Verde River Basin and recent legislative developments.While the DEIS analyzes mainstem shortages, it fails to account for two critical "changed conditions" in the Central Arizona tributary systems that will drastically alter the groundwater-surface water nexus under a Supply-Based shortage regime.1. Failure to Model S. 3617 (Yavapai-Apache Water Rights Settlement): The DEIS baseline does not currently reflect the hydrological impact of S. 3617, introduced in the 119th Congress (Jan 2026). This legislation authorizes$1.039 billion for water infrastructure, specifically the Cragin-Verde Pipeline. The Final EIS must model how the "Supply-Based" shortage triggers will interact with the new diversions and recharge mandates created by this federally funded infrastructure. Treating the Verde Valley's hydrology as "status quo" is now factually incorrect.2. The "Ranegras" Precedent & Groundwater Substitution:The designation of the Ranegras Plain as an Active Management Area (AMA) on January 15, 2026, signals a state-level recognition of critical aquifer overshoot. The DEIS "Supply-Based" alternative assumes certain shortage tiers will be absorbed by groundwater substitution. The Final EIS must quantify the impact of these shortages onadjacent basins like the Verde Valley, which remain outside AMAs but are hydrologically linked to the Cragin infrastructure corridor.Request for Final EIS:I respectfully request the Final EIS include a sensitivity analysis that layers theS. 3617 infrastructure authorizations over the "Supply-Based Hybrid" shortage tiers. We must understand if federal shortages on the mainstem will cannibalize the recharge benefits intended by the settlement act in the Verde watershed.Thank you for entering this into the administrative record.Sincerely,Jonathan R. Gibbs Concerned Stakeholder & Investor, Lower Basin Regionjonathanrgibbs@gmail.com

***Letter #:*** 17

***Date Received:*** 1/19/2026

***Sender Names:*** 16: Kevin Gibson

***Emails:*** 16: kevingcpa@comcast.net

***Organizations:***

***Subject:*** Comments on Draft EIS - Colorado River Management

DOI - . Flaming Gorge Is No Longer a "Backup": Why the Colorado River Needs a New Balancing Reservoir ParadigmFor decades, Flaming Gorge Reservoir has been treated as a secondary, emergency-only asset in the Colorado River system -- a reserve to be tapped sparingly while Lake Powell and Lake Mead absorb nearly all the risk of shortage.That approach may once have made political sense. It no longer makes hydrologic, operational, or public-interest sense. The river has changed. Demand has changed. Climate has changed. The management framework has not.A system built for a river that no longer existsThe legal architecture governing the Colorado River was negotiated during an unusually wet period in the early 20th century. Those agreements assumed:*Average annual flows that are now known to be overstated*Shortages as temporary anomalies, not permanent conditions*A future in which reservoirs reliably refilledThat world is gone. The basin now faces structural aridification, not episodic drought. Yet the system continues to operate as if scarcity is a short-term deviation rather than the new baseline.Under this outdated framework, Powell and Mead function as the system's shock absorbers -- drawn down year after year to protect paper entitlements -- while Flaming Gorge, one of the largest controllable reservoirs in the basin, is largely shielded from routine balancing obligations.The fiction of "secondary" reservoirsHydrologically, the Green River contributes a substantial share of total Colorado River flow. Operationally, Flaming Gorge is a large, regulated storage facility with modern infrastructure and proven capacity to influence downstream conditions.Calling it "secondary" is not a scientific assessment. It is a legal classification -- and an increasingly untenable one.The result is a system that concentrates risk:*Powell approaches minimum power pool and intake thresholds*Mead bears the brunt of Lower Basin overuse*Flaming Gorge remains comparatively insulated until emergency releases are requiredEmergency-only management is not prudence. It is delayed decision-making.Why this approach now increases riskTreating Flaming Gorge as a reserve of last resort creates three systemic failures:1.Late interventionWater is released only when Powell is already near crisis levels, limiting effectiveness and increasing the chance of infrastructure failure.2.Unequal burden-sharingTwo reservoirs are sacrificed to protect the legal expectations of many, while a third is protected by legal inertia rather than hydrologic logic.3.False securityPreserving Flaming Gorge as a pristine reserve implies it can "save" the system -- when in reality, no single reservoir can compensate for chronic over-allocation.A balanced system does not hoard capacity upstream while downstream reservoirs fail. It distributes shortage early, proportionally, and predictably.The legal problem -- and how to fix itThe obstacle is not engineering. It is law.Existing agreements do not assign Flaming Gorge the same balancing role as Powell and Mead. But those agreements are not immutable. They have been supplemented, reinterpreted, and operationally modified many times -- often through federal action in response to crisis.A modern solution should do the same deliberately, not reactively.A proposal for legal modificationA revised federal management framework should:1. Redefine "system storage"*Amend operational definitions to treat Flaming Gorge as part of the core balancing portfolio, not an auxiliary facility.*Incorporate it into total-system storage calculations used to trigger coordinated releases.2. Establish proportional balancing obligations*Require all major federal reservoirs above a defined capacity threshold to share shortage risk based on storage percentage, not political geography.3. Replace emergency-only releases with graduated participation*Allow earlier, smaller, and more predictable drawdowns from Flaming Gorge to stabilize Powell before crisis conditions emerge.4. Preserve environmental protections -- without weaponizing them*Maintain endangered species requirements while recognizing that controlled, system-driven releases can coexist with ecological goals.*Environmental compliance should guide timing and magnitude, not preclude participation altogether.5. Anchor authority in federal responsibility*Clarify that, in a structurally depleted river, federal reservoir operations must prioritize system integrity over rigid adherence to outdated assumptions.Why the new federal plan must act nowThe post-2026 management guidelines represent perhaps the last opportunity to shift from crisis response to system

design.Incorporating Flaming Gorge as a primary balancing resource would:*Reduce catastrophic drawdown risk at Powell*Slow Mead's decline*Improve hydropower reliability*Create transparency and predictability for all basin usersMost importantly, it would align management with reality.A necessary reckoningThe choice is not between honoring the past and protecting the future. The choice is between updating old agreements responsibly or allowing them to fail under conditions they were never designed to govern.Flaming Gorge was built to serve the Colorado River system.Keeping it on the sidelines while the system falters is no longer stewardship -- it is avoidance.A river this constrained cannot afford protected reservoirs and sacrificial ones.  It requires shared responsibility, integrated management, and the courage to admit that yesterday's rules no longer fit today's river.Respectfully Submitted,Kevin D. Gibson New Castle, CO 970-412-9441

***Letter #:*** 14960

***Date Received:*** 12/4/2024

***Sender Names:*** 10983: Constance Giddens

***Emails:*** 10983: cgiddens@pacificcoachways.com

***Organizations:***

***Subject:*** Page 1071

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. My family and I have been enjoying house boating on Lake Powell since 1977. We have watched Page Arizona bloom into an economic powerhouse and worry about what would happen to the local economy if Lake Powell ceased to exist. I have often said that being on Lake Powell is like being in the Grand Canyon only filled with water. If it didn't exist there would not be a way for me, my children and now my grandchildren to enjoy this beautiful grand paradise. Living in California I know we reap some water benefits from the Colorado river and we in California know all too well the effects of a severe drought situation. To that end, we are very grateful for the water we receive from the reservoirs that supply our water supply and are very Post-2026 Colorado River 1071 of 4180 careful to avoid overuse of the precious water we receive. We have low flow shower heads and toilets. We have replaced our grass with synthetic grass and have our flower beds on a strict low flow schedule. Most Californians don't waste water. It has been our experience that we cannot afford to waste the precious water that we receive from the Colorado river. Please do whatever you can to save Lake Powell for the future recreational use, for the residents of Page and surrounding communities who directly benefit from the people who use the lake and for the thirsty communities who benefit from the water. Thank you. Post-2026 Colorado River

***Letter #:*** 3473

***Date Received:*** 2/26/2026

***Sender Names:*** 3442: Alan Gill

***Emails:*** 3442: 69alco@gmail.com

***Organizations:***

***Subject:*** PROTECT THE COLORADO RIVER!!!

***Letter #:*** 3322

***Date Received:*** 2/27/2026

***Sender Names:*** 3292: Chris Giunchigliani

***Emails:*** 3292: info@greatbasinwater.org

***Organizations:***

***Subject:*** Chris Giunchigliani Comments on Colorado River

Great Basin Water Network DOI - . DEIS Ignores Glen Canyon Dam's Antique PlumbingThe analysis in the DEIS fails to consider bypass, decommissioning, and other meaningful resolutions available at Glen Canyon Dam, which poses considerable concerns for water delivery and endangered species protections. We understand and respect the legal arguments for not including the One-Dam Alternative. But it is a mistake to not undertake comprehensive analysis on this matter. Keeping Lake Powell's elevations above 3550', 3525, and 3490' are not realistic scenarios for the long-term. Failure to include greater analysis on Glen Canyon Dam's river outlet works will ultimately cost us all -- imposing direct impacts on Lake Mead, Hoover Dam, other federal infrastructure, metropolitan areas, agricultural hubs, tribal resources, sensitive species, National Park Service units, U.S. Fish and Wildlife units, and other conservation areas in the Lower Basin.The document fails to consider the following:The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.If you have any additional questions please contact me.Chris Giunchigliani(c) Great Basin Water Network.
Powered by weForms.

***Letter #:*** 7412

***Date Received:*** 3/2/2026

***Sender Names:*** 7371: Harold Glick

***Emails:*** 7371: hdg1945@sbcglobal.net

***Organizations:***

***Subject:*** Reducing water usage

DOI - . Without dealing with the topic of golf courses, I suggest that no more water be allowed to be used for watering grass. No more water be allowed to be used in decorative water flowing devices. Curtail the demand of water from new housing. If it is not curtailed, all of us will suffer the consequences. Harold Glick Peoria, Az

***Letter #:*** 7536

***Date Received:*** 3/2/2026

***Sender Names:*** 7487: Valerie Glimp

***Emails:*** 7487: vglimp@gmail.com

***Organizations:***

***Subject:*** EIS regarding the Colorado River Basins management proposals

DOI - . Thank you for your hard work to address this difficult issue. There is no perfect solution. It is also clear that any one or any combination of these plans will not be sustainable over the long term. Many of my comments are to that truth. Someone must lay out that truth plainly to the people and the states. We cannot keep kicking the can down stream until we create a catastrophe. 1. Whichever plan is adopted, it must include consideration of the true hydrology situation at any given time. The Tribes and Upper Colorado River Water Basin states have kept their end of the bargain. Do not expect them to give up their water due to the poor planning and practices of the Lower Colorado River Water Basin states. 2. The Bureau of Reclamation (BoR) should stop referring to the current climate conditions as a "drought". This will help people to understand that the situation is not going to get better. The State of Colorado has wisely come to the conclusion that this is not a drought but the new normal. The decrease in available water in the Colorado River is, as you know, due to increasing aridity and decreasing precipitation. This situation will only worsen over time as climate change worsens. 3. The BoR must make it clear to the states, as they present the final plan, that The Colorado River is a finite resource that is dwindling due to decreased precipitation, increased aridity and increased usage. The BoR should inform the states now that they will not be able to meet demands for power and water forever, especially as states keep allowing unchecked growth and development in areas utilizing water and energy that come from the Colorado River. 4. The BoR (or the appropriate agency that you inform about this) must mandate that all states promote more efficient agricultural uses of water for crop irrigation. 5. The State of California needs to start taking responsibility for more of their water needs. The state borders the Pacific Ocean. They need to not only increase use of recycling waste water into potable water but also utilize desalination for some of their water. Again, if this is not your purview, please make sure the appropriate agency delineates this to the State of California. 6. Someone somewhere needs to start planning for and building alternative electricity sources to the hydro-electric facilities at Hoover and Glen Canyon dams. It is unrealistic to believe that the current facilities will be able to meet the demands of the areas utilizing these power sources as they continue with unchecked growth and development. That should be mentioned in any plan. If that is not your purview, BoR should bring it to the attention of the appropriate agency. Thank you. Valerie Glimp 47 Hollyhock Ct Eagle, CO 81631 970-328-3338

***Letter #:*** 3393

***Date Received:*** 2/26/2026

***Sender Names:*** 3362: cc goldwater

***Emails:*** 3362: ccgoldwater@gmail.com

***Organizations:***

***Subject:*** Take care of the Colorado River

DOI - . It's a natural treasure

***Letter #:*** 3177

***Date Received:*** 2/27/2026

***Sender Names:*** 3148: Linda Golley

***Emails:*** 3148: linda_golley@yahoo.com

***Organizations:***

***Subject:*** Allow for public comment on Colorado River plan

DOI - . Linda Golley 253.850.9415 landline, no text

# Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

I find myself offended by the joint statement made by the Governors of California, Arizona, and Nevada. They stated "Our future management of the Colorado River must be built on a foundation of shared contribution…" The upper basin states have made more than their contribution by taking cuts during the drought. We farm in Colorado and have several water rights with the junior water right having a priority date of 1872 and our senior water right of 1861. During the last three years we have had a 50% to 75% cut in our water usage because of limited water in the creek. That is a forced contribution because of drought. How can you say that is not a contribution?

I saw a graph that shows the water use by basin. The lower basin use includes mainstream Colorado River deliveries, evaporation and transit losses, and estimated tributary use. I am summarizing that below in MAF.

| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Lower Basin | 10.6 | 10.9 | 10.5 | 9.6 | 9.9 |
| Upper Basin | 4.8 | 3.3 | 4.0 | 4.7 | 4.4 |

When I look at the difference it is clear with the drought conditions the upper basin are forced to take a cut just as we have had to take a cut on our farm because of drought conditions. The lower basin has taken

none.  Lake Powell and Lake Mead should never have more water going out than going in except in emergencies.  If you are trying to maintain water in a bathtub you never let more water out than going in.

Storage in Lake Powell and the upper water storage facilities should never be used to maintain Lake Mead. We need all of our storage facilities to be mostly full to provide for emergency shortages.  Lower basin states should be limited.

I disagree with all of your alternatives.  You make it way too complicated.  It should be as simple as whether you are trying to fill a bath tub, maintain it, or drain it.  It should be simple and flexible.

Thomas Goodwin

Tc97goodwin@gmail.com

719-221-3020

***Letter #:*** 2591

***Date Received:*** 2/24/2026

***Sender Names:*** 2569: Susan Gottfried

***Emails:*** 2569: suepurr@lookoutnow.com

***Organizations:***

***Subject:*** Support a sustainable future for the Colorado River

DOI - . Dear Bureau of Land Mangement I encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: --Provide clarity and predictability: Continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground --Incorporate flexible, adaptive tools for conserving, storing, and managing water: New guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system --Embed environmental stewardship: The Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. --Provide for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: The 30 federally recognized Tribes in the Basin must be included in decision making. --Preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Please work for the river and all who depend on it. Sincerely, Susan Gottfried 619 Cricklewood State College, PA 16803 suepurr@lookoutnow.com

***Letter #:*** 366

***Date Received:*** 2/15/2026

***Sender Names:*** 364: Russell Grant

***Emails:*** 364: rgrant@patriot-engineering.com

***Organizations:***

***Subject:*** An idea for your consideration

DOI - . Here's an idea for you all to consider. Let me know if anyone is interested, thanks.

The Colorado River Crisis: Pathways to Abundance and Reservoir RecoveryA White PaperAuthor: Russell GrantWest Jordan, UtahFebruary 2026Executive SummaryThe Colorado River Basin faces an unprecedented crisis driven by prolonged drought, climate change, over-allocation, and a structural deficit of approximately 1.2-1.3 million acre-feet (maf) per year due to evaporation, transit losses, and demand exceeding reliable supply. As of mid-February 2026, Lake Powell stands at approximately 3,533 feet elevation (about 166-167 feet below full pool of 3,700 ft; ~6 maf storage; ~25-26% full), while Lake Mead is at approximately 1,066 feet (about 163 feet below full pool of 1,229 ft; ~34% full).The Bureau of Reclamation's Draft Environmental Impact Statement (EIS) for Post-2026 Operations, released in January 2026 with public comments due March 2, 2026, evaluates management alternatives focused on hydrology-based releases, shortage sharing, and storage coordination among the seven basin states (Arizona, California, Nevada, Colorado, New Mexico, Utah, Wyoming), tribal nations, and Mexico--but does not introduce new supply sources.The February 14, 2026, deadline for seven-state consensus passed without agreement, shifting authority toward federal imposition of operating rules. While conservation is essential and has already delivered significant short-term savings (e.g., ~3.7 maf projected by 2026 in the Lower Basin), it alone cannot achieve rapid reservoir recovery or long-term stability amid declining flows (averaging 12-13 maf/year vs. the 16.5 maf assumed in the 1922 Compact).This white paper proposes a complementary paradigm shift toward abundance through large-scale augmentation. Building on the Colorado River Abundance Act (released January 14, 2026, by the BlueRibbon Coalition), this strategy targets initial operating capability of 2 maf/year of new supply, scaling toward up to 7 maf/year full capacity. This "Replacement Water" would be classified as new supply not attributed to Compact allocations, enabling reservoir recovery without violating obligations.Authored from an Upper Basin perspective in Utah, this framework prioritizes Powell-first recovery to protect hydropower (for ~5 million users), recreation, ecological systems, and long-term growth potential (including projects such as the Lake Powell Pipeline), while maintaining Compact-compliant outflows (~7-8.23 maf/year) to the Lower Basin.A phased, federally funded initiative (leveraging the Act's $40 billion authorization for FY2026-2035, plus extensions and public-private partnerships) could deliver net gains of 1-3 maf/year initially, accelerating Lake Powell recovery by 10-30 feet per year in average hydrologic conditions (with higher potential in wetter years and lower in droughts), while stabilizing the system without mandatory deep cuts that destabilize economies and communities.IntroductionThe Colorado River sustains approximately 40 million people, major agricultural production, hydropower for millions, and ecosystems across the American Southwest and northern Mexico. The system is critically strained.The 1922 Compact allocated 16.5 maf/year based on wetter historical averages. Modern flows average 12-13 maf/year, compounded by a megadrought with ~20% reduced snowpack since 2000, increased evapotranspiration, and higher temperatures reducing runoff efficiency.This creates a structural deficit, accelerating drawdown and threatening:* Glen Canyon Dam minimum power pool (3,490 ft) and hydropower reliability.* Recreation/tourism economies (~$1.4 billion annually).* Tribal water rights, Mexico obligations, and ecosystems.Current operations under interim guidelines (expiring 2026) rely on voluntary conservation and shortage-sharing, but these manage decline rather than reverse it. The Draft EIS alternatives focus on adaptive management but highlight the need for supply augmentation.Background: The Current CrisisReservoir Status (mid-February 2026)* Lake Powell: ~3,533 ft elevation (~166-167 ft below full pool; ~6 maf storage; inflows ~52-68% of average forecasted for WY2026).* Lake Mead: ~1,066 ft elevation (~163 ft below full pool).Structural Deficit~1.2-1.3 maf/year losses (primarily Lower Basin evaporation/transit), plus hydrologic variability.GovernanceSeven-state consensus missed (Feb. 14, 2026); Reclamation advancing Draft EIS (five alternatives: No Action, coordination-focused, flexibility-based, hybrid

frameworks). Public review/comment period ends March 2, 2026.ImpactsHydropower risk, economic losses, legal escalation, rural/tribal insecurity. Upper Basin faces natural shortages; Lower Basin faces priority cuts.Challenges and Discarded Approaches1. Rigid Mandated Cuts -- Trigger economic collapse, litigation, and instability; rejected as unsustainable without new supply.2. Mega Inter-Basin Transfers (e.g., Missouri/Columbia) -- 20+ year timelines, $100B+ costs, environmental/political opposition; discarded.3. Conservation-Only -- Effective for stabilization (proven in recent programs) but too slow for recovery amid drier projections; necessary but insufficient alone.Proposed Solution: The Powell-First Abundance InitiativeA transformation strategy focused on building water abundance to complement EIS management.Core PrincipleGenerate new supply faster than losses occur, using "Replacement Water" accounting to preserve Compact integrity.FrameworkAnchored in the Colorado River Abundance Act (authorizing $40B FY2026-2035 for augmentation, P3s, streamlined permitting). Targets: Initial capability 2 maf/year; full up to 7 maf/year (net to reservoirs reduced by evaporation/losses).Core Components1.

Large-Scale Desalination Network (Primary Driver)* Sources: Seawater (Pacific/offshore), brackish groundwater, inland aquifers.* Infrastructure: Desal hubs + prioritized Upper Basin pipelines (e.g., to Green River tributaries for Powell inflow).* Energy: Renewables, nuclear, waste-heat recovery.* Brine Management: Mineral extraction, industrial reuse, advanced/zero-discharge tech.* Yield: Phased toward 2-4+ maf/year (realistic net contribution after losses).2. Basin-Wide Watershed Enhancement & Cloud Seeding (Quick Wins)* AI-optimized seeding, forest thinning, restoration.* Yield: 0.5-1+ maf/year extra runoff (10-15% snowpack boost; proven in Upper Basin programs).* Speed: 1-3 years; high cost-effectiveness.3. Mega-Reuse & Efficiency Overhaul (Demand Offset)* Direct potable reuse, urban recycling, ag precision irrigation.* Yield: 1-2 maf/year offset, freeing water for storage.4. Infrastructure Enablers* Glen Canyon Dam low-level outlet mods for flexible retention.* AI hydrology forecasting and adaptive banking.Phased Implementation* Phase 1: Stabilization (2027-2030) -- $10-20B (Act + extensions). Watershed/cloud seeding ramp-up, dam mods, reuse pilots. Net gain: ~1-2 maf/year - stabilize Powell >3,525 ft; potential +10-20 ft/year in average conditions. Integrate with EIS hybrids.* Phase 2: Acceleration (2030-2040) -- $30-60B. Full desal network + Upper Basin integration. Net surplus: ~2-4 maf/year - recovery potential 10-30+ ft/year on Powell (higher in wet years; moderated in droughts), targeting gradual climb toward 3,600+ ft by mid-2030s.Safeguards & Equity* Replacement Water accounting (no Compact disruption).* Multi-sovereign councils (states, tribes, Mexico).* Environmental protections: Brine/sediment mitigation, habitat restoration.* Upper Basin focus: Growth security (e.g., Utah), rural/tribal integration.System Resilience Model* Drought: Augmentation + conservation stabilize.* Average: Net positive storage.* Wet: Banking surplus.* Climate stress: Offsets projected losses.* Political: Reduces zero-sum conflicts.ConclusionConservation manages decline; abundance rebuilds resilience. By advancing the Colorado River Abundance Act--scaled augmentation, federal leadership, permitting reform--the basin can achieve reservoir recovery, energy/economic stability, ecological health, and sustainable growth.Upper Basin leadership, especially from Utah, must advocate for Powell-priority elements while honoring obligations. The choice: Manage indefinite decline--or build abundance. The time is now.About the AuthorRussell Grant holds a B.S. in Environmental Studies from Utah State University and an MBA from Strayer University. A resident of West Jordan, Utah, he is committed to conservation-driven development and large-scale restoration projects that balance ecological integrity, economic resilience, infrastructure stability, and resource security for rural and urban communities.

***Letter #:*** 496

***Date Received:*** 2/25/2026

***Sender Names:*** 486: Todd Gross

***Emails:*** 486: toddjgross@yahoo.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern, I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits. Specifically, the new Colorado River guidelines must: - Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems. - Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology does not support filling both Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue needlessly drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. - Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin. - Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights. Thank you for your consideration.

***Letter #:*** 741

***Date Received:*** 2/26/2026

***Sender Names:*** 731: Teresa Gryder

***Emails:*** 731: t.a.gryder@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, Thanks for the opportunity to comment. It may be tempted to sacrifice recreational use in light of the many pressures on the Colorado River system. I am writing to emphasize that these recreational uses provide a significant value to the citizens of this great nation. People who run the river will appreciate its value, and work to protect its many values over the generations to come. Sacrificing healthy rivers and people's ability to access them is a shortcut favoring short-term business profits, not a solution for the people. I ask that Post-2026 Operations prioritize these actions: - Determine usable daily flows in the Grand Canyon and upstream river segments BEFORE a final decision is determined. - Keep sufficient water in Lake Powell (and Glen Canyon Dam management to support) to support occasional High Flow Experiments in Grand Canyon. These high flows dredge sand up out of the riverbottom and onto the banks, supporting a healthy riparian environment. - Glen Canyon Dam must allow the passage of variable flows even when the reservoir is low. - Minimum flows in Grand Canyon must be maintained at all times, while also allowing flow variability. - Water delivery measures in the Blue Mesa and Flaming Gorge Reservoirs must consider both river ecosystems and recreation opportunities near the dams and downstream. - River recreation opportunities on the Colorado and San Juan Rivers must be studied and supported. - Tribal water rights and sovereignty must be respected by all operations and agreements in the Colorado River Basin. Sincerely, Dr. Teresa Gryder 3830 SW Nevada Ct Portland, OR 97219-1513 t.a.gryder@gmail.com

***Letter #:*** 3229

***Date Received:*** 2/27/2026

***Sender Names:*** 3199: Cynthia Gulick

***Emails:*** 3199: cynthiagulick@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern,I am a Family Practice physician who's practiced 35 years of primary care and I am writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits.Specifically, the new Colorado River guidelines must:- Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems.- Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology does not support filling both Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue needlessly drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. - Acknowledge the spectacular re-emerging Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin.- Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights. Thank you for your consideration.Dr. Cynthia Gulick----------This email and any attachments are confidential and may be legally protected. It is intended solely for the addressee. Access to this email by anyone else, unless expressly approved by the sender or an authorized addressee, is unauthorized. If you are not the intended recipient, any disclosure, copying, distribution, or any action omitted or taken in reliance on it, is prohibited and may be unlawful. If you believe that you have received this email in error, please notify the sender by reply email, permanently delete this email and any attachments, and destroy all copies.

***Letter #:*** 289

***Date Received:*** 2/17/2026

***Sender Names:*** 287: John Gunn

***Emails:*** 287: jgunn10075@aol.com

***Organizations:***

***Subject:*** John Gunn ... public comment ... Draft EIS for Colorado River Mngmt.

DOI - . Greetings, please add my comments to the public comments regarding the above referenced plan.https://www.usbr.gov/ColoradoRiverBasin/post2026/index.htmlCR Post-2026 Operations | Bureau of Reclamation Re: Colorado river allocationsI submit these comments as a retired natural resource manager with 30+ years experience in the southwest US. I do not see that any of the proposed alternatives will address the fundamental issue:Firstly, I reject the overarching paradigm that previous laws, rules & agreements based on historic estimates of volume and use, forever define and confine the limits and options of a different time and need. Much like slavery that was once legal and subsequently became a crime, water law too can & must change as our society evolves & changes. Water in its several forms; vapor, snow, ice, etc must be redefined as a national resource, critical to modern society. The idea that states and especially, individuals have a "right" to a limited national resource is outdated and must be discarded. This critical national resource should be allocated on the basis of need, primarily to serve the citizenry and the natural environment. Any commercial endeavors must be secondary to this primary purpose.What environmental justice is there where public agencies and media outlets are currently terrifying millions of urban dwellers that they may run out of drinking water, or lose access to winter vegetables, so that a basket of landowners can continue to flood irrigate farm fields producing alfalfa & cotton for export ? Crops that are also grown elsewhere in America often with the ambient rainfall.We Americans love to babble about equality. How many homeowners equal the interests of 1 farmer ? If a public resource (water) is limited, doesnt it make sense to balance those interests ? I assert we would have full reservoirs and water flowing on thru to the delta if we simply stopped subsidizing alfalfa and cotton growing in the desert ? Problem solved.What sense is there where a water user must use all, or risk losing "their water rights", if they dont dump "their" water on fallow fields? These anachronisms from the past are no longer facilitating modern society.Some other concepts that come to mind include;Assuming the Phx & Avra valley groundwater basins are still declining, what sense is there in dumping the expensive (to pump and transport, then buy back from the reservations !) CAP water into the ground, only to be pumped up again, when it could simply be treated and used while already at the surface elevation as delivered ?What evidence exists, that leads us to treat these GW basins as discrete units, closed to lateral flow when we know the whole state tilts towards Yuma ?Consider how much our Phx and Tucson air quality would improve if most of the current agricultural lands were retired to natural vegetation, perhaps irrigated quarterly. The wildlife would flourish, the summer "haboobs" and daily particulate counts would plummet, the annual pileups on our interstates would largely cease. Life would be better.If our alfalfa farmers manage to win the race to the bottom of the wells, we need to include desalination in the near future for urban residents of Nv. Cal. and Az.I support creative conservation strategies such as solar panel shade structures over canals, cloud seeding research, waste-water re-purposing (but not for human consumption), rain-water harvesting, etc. None of these strategies will allow for large scale warm season production of water guzzling alfalfa & cotton however. Any management scenario that does not address agricultural overuse is unlikely to succeed. I appreciate this opportunity to comment.

***Letter #:*** 2253

***Date Received:*** 2/25/2026

***Sender Names:*** 2235: Lars Haarr

***Emails:*** 2235: larskhaarr@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement As an avid outdoor enthusiast and birdwatcher, I have watched in dismay as the Colorado River basin has become increasingly under threat. I am also a Grand Canyon River Guide, and our industry relies on a consistent flow of water to be released from the Glen Canyon Dam. Partial reductions in water usage will not be enough to save the ecosystem downstream of Reservoir Powell. Not only are thousands of jobs at stake, but the long-term viability of endangered species and the landscape as a whole as well. As such, I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Sincerely, Lars Haarr 3511 N Schevene Blvd Flagstaff, AZ 860042170 larskhaarr@gmail.com

***Letter #:*** 7206

***Date Received:*** 3/1/2026

***Sender Names:*** 7169: Don Hack

***Emails:*** 7169: don.hack@outlook.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . Bureau of Reclamation, Regarding public comment on the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead EIS.This Draft Needs to be improved in the following areas: Analyze and plan for the river-level bypass of Glen Canyon Dam.Addressing the continued possibility of lack of downstream flow is imperative.This is needed to ensure Glen Canyon's ecological restorationIt allows operational flexibility. Stop the bleeding.Require each state to reduce use of the Colorado River water and stop diversions.The states do not seem to be able to do this themselves, they need help - give it to them. Evaluate the upside of the Glen Canyon as a resource.Tourism could be a very strong plus to the Glen Canyon area. Evaluate a "Fill Mead First" option.It is a reasonable approach to review this option based on twenty years of water supply decline and no clear end in sight.

Regards,Don Hack

***Letter #:*** 7576

***Date Received:*** 3/2/2026

***Sender Names:*** 7527: Helmuth Hack

***Emails:*** 7527: helmuth.hack@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . Hello Ladies and Gentlemen; I am from Maricopa County, Arizona. I have lived here since 1993. Prior to this, I lived in the San Fernando Valley, California. Of course I will be cheering for Arizona to get the water they need. The climate is much better for agriculture, and the state has seen better usage of water. Arizona is seeing a big increase in computer chips being manufactured and this needs to be protected for national security. The Taiwan chip company has moved many operations here; our automakers gets most if not all their chips from there. We know the complex issue between Taiwan and China. I do have a suggestion to mitigate the issue. If Arizona could get funding for a desalination plant in Yuma County, it could serve the needs for California, Mexico and Yuma County Arizona where we have most of our agriculture. The pipeline would go through Mexico to Gulf of California. I am sure Mexico would give us an easement for the pipelines. A power plant to run the facilities would also be desirable. Sincerely, Helmuth Hack Youngtown, Arizona

***Letter #:*** 1436

***Date Received:*** 2/24/2026

***Sender Names:*** 1425: James Hadcroft

***Emails:*** 1425: jamzac@hotmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement James K. Hadcroft here. Please become part of the solution. I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Sincerely, James Hadcroft 356 Gifford St Falmouth, MA 025402912 jamzac@hotmail.com

***Letter #:*** 4050

***Date Received:*** 2/27/2026

***Sender Names:*** 4005: John Hadder

***Emails:*** 4005: info@greatbasinwater.org

***Organizations:***

***Subject:*** John Hadder Comments on Colorado River

Great Basin Water Network DOI - . The DEIS Avoids A Hard Look At Cumulative ImpactsThe document fails to consider the following:The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.Three Alternatives Do Not Likely Comply With The Law Of The River. Programmatic Review Is Necessary And So Is Congressional ActionIn Appendix C, the DEIS implies that modeling justifying three of the proposals "may not be implementable" because potential non-compliance with "laws, contracts, agreements, and other authorities that are part of the Colorado River legal and contractual framework referred to as Law of the River." That is a reference to the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternative. Without any deal in place among the states or congressional action, a Record of Decision supporting those alternatives poses legal challenges that may be insurmountable.Therefore, according to the DEIS, the No Action Alternative and Basic Coordination Alternative are among the only options that could avoid a legal challenge after a Record of Decision.Those options pose some of the worst outcomes for Lakes Powell and Mead. We believe that no course of action as put forth in the DEIS is a sufficient means of stabilizing the system under the current Law of the River framework. This is troubling considering Reclamation is predicting some of the most dire reservoir elevations ever in the coming two years.Reclamation should undertake a programmatic review as the states continue negotiating. This year's low flows will inevitably get people back to the negotiating table in a meaningful way. Congress will act when the reservoirs are in crisis. We have seen congressional, bi-partisan action multiple times in the past seven years. When Congress is ready, enlist the National Academy of Sciences to undertake a programmatic review in partnership with the Department of Interior, Reclamation and other cooperating agencies. This document is not the beginning of the end. We believe it is merely the end of the beginning.The DEIS Fails To Consider Impacts On Irretrievable Resources By Sanctioning The Repurposing Of Water ResourcesThe DEIS offers multiple alternatives that impose varying levels of cuts in the Lower Basin and no meaningful cuts in the Upper Basin. Some alternatives mention the possibility of Upper Basin "conservation" but those offerings do not describe who, what, where and when. There is nothing steadfast for cuts in the Upper Basin.The DEIS also showcases a modified version of the 2016 Upper Basin Depletion Schedule that still assumes considerable new uses of water in the Upper Basin in the coming decades. Because of the limited resources available, there's no doubting that cuts imposed on the Lower Basin will be repurposed by the Upper Basin. That repurposing defeats the intent of this analysis. Once that water is re-appropriated by Upper Basin regulators, waters with established beneficial uses will not return to where those uses were first proven in the Lower Basin. This is highly suspect.Furthermore, we question how Reclamation can execute its recognized authority to force a curtailment in one basin but not even questioning how development of new appropriations in another part of the basin will impact the whole system and those who had to undertake curtailment. Upper Basin reservoirs

***Letter #:*** 17984

***Date Received:*** 12/4/2024

***Sender Names:*** 11008: Laura R. Haider

***Emails:*** 11008: lauragreen.rosenberger@gmail.com

***Organizations:***

***Subject:*** Page 009

I care about the people in the Tribal Nations & Mexicans. who live near the river. We should not cause them any more hardships. Also, don't allow toxic waste dumps near the Colorado River. Some model dump liners leak. Sometimes dust blows off. Some dumps emit smoke from spontaneous combustion. Also, decrease pesticide and nitrogen application to land. More water flow is needed to dilute this pollution. The ongoing mega-drought demands bold, science-based action to protect the Colorado River system for future generations. We need a strong approach that provides an actionable framework for safeguarding critical infrastructure, protecting endangered species and the Grand Canyon, maintaining ecosystem function, and ensuring climate resilience. None of these proposed alternatives fully address the impacts that will result from a dead pool situation. This is a serious omission that Reclamation needs to address in the Final EIS. We also urge the Bureau to use its considerable influence with the States to expand greater conservation efforts. There is less water now to use than there was, and there will be even less in the future. We need to adapt a new way of thinking, using a lot less water and rethinking how "beneficial use" is defined. I urge you to adopt a science- based, climate-resilient approach that: -Requires significantly stronger conservation across all sectors -Ensures equitable and implementable shortage sharing -Protects the Grand Canyon and endangered species -Maintains ecosystem function throughout the basin -Fully respects Tribal sovereignty and senior water rights -Reexamines outdated assumptions about "beneficial use" in a hotter, drier future The Colorado River is in crisis, and the decisions you make now will determine whether this river system can survive for future generations.

***Letter #:*** 8709

***Date Received:*** 3/3/2026

***Sender Names:*** 8626: Bruce Hale

***Emails:*** 8626: brucehale.bah@gmail.com

***Organizations:***

***Subject:*** Colorado River Management Plan EIS

DOI - . TWIMC: First, some info from where I speak: I presently live in a 55+ community near Tucson (in the AZ Tucson Active Management Area) served by groundwater. Residents in my community pay property taxes for the construction of the Central Arizona Project and a CAGRD tariff to recharge CAP water in the Tucson AMA on our behalf. I am retired, but my work career was related to water quality, the final 33 years of which were spent with Denver Water where I supported lawyers, engineers, planners, and operations and customer relations staff with water quality information. During these years, I learned a lot about where Denver's water comes from, and participated in Denver's ground breaking projects to maximize the use of water coming from the Colorado R. Basin through reuse, augmented storage, conservation, etc. From a short stint at USGS and through Denver Water watershed partnerships, I learned the technical aspects of measuring water flow. Coming to Arizona, I quickly discovered that residents in my community had no idea (coming to AZ from across the country) where our water supply came from, the legal framework under which our community's water utility was created, etc. I resolved to create a course for residents that explained the role of different levels of government and then how that regulation manifested in actual infrastructure, operations, and rates. To do this, I had to learn about the relationship between groundwater and surface water (most of my professional experience) in Arizona. I have attended Univ of Arizona's Water Resources Research Center's conferences, talked with professionals at Salt River Project, CAP, Tucson Water, Phoenix Water, and have attended local workshops presented by AZWater (I remain an AWWA member) for the 10+ years I have lived in AZ. I subscribe to various media which help my understanding of the forces that are underlying water supply issues in AZ and the Colorado Basin. My class has been well received the 3 times I have presented it. I understand the draft Colorado River Basin Management Plan EIS has five alternatives, including one for no action. As one might expect, I am sympathetic to both the Colorado and Arizona points of view, though they represent opposing positions during negotiations. I agree with Arizona that no stated option is suitable, and that whatever approach is chosen, it should highlight "supply" over absolute delivery volume targets. Further, there is no getting around the structural deficit in the Colorado River Compact, another supply issue. In my opinion, the designers of the Compact created an imperfect approach through incomplete knowledge, approximately 30years of watershed flows measurements made while the science of flow measurement was in its infancy. If the document were designed today, we would acknowledge that the Basin's yield is highly variable, and though delivery volume targets provide a degree of certainty, we know from experience that these targets come from the world of legal water rights rather than the real world of water supply. We would further acknowledge that the reservoirs not yet built in the 1920s represent a water loss; the sum of water feeding the system is not the sum of water available from the system. Nevertheless, the designers and subsequent law apportioned water based upon literal volumes rather than fractions of a larger, highly variable, supply pie. Bluntly stated, I feel the Bureau should deliver no more water than exists in the pie and the pie should be apportioned to states and Mexico, fractionally, as stated in the law of the river. I propose that a piece should be added to the pie accounting for water losses in reservoirs throughout the basin. The size of the pie can be calculated annually based on the average supply for the last 30 years, the same logic as used in the original Compact, only with the advantage of modern water flow measurement technology. The number would change slightly from year to year, but not a dramatic change such as with the Drought Contingency Plan, providing a degree of certainty. This approach makes no state a winner or loser, and all share their fraction of the pain equally. What about those with senior water rights? In some years there will be more water available than the running 30-year average, but those with senior water rights will have to share with the system in order to exercise them, similar to what Arizona calls "the cut to the aquifer" when doing groundwater augmentation and recovery. This would help keep reservoirs at a level where every year doesn't become an emergency and power generation is more reliable. Nevertheless, there will be emergency years and a drought contingency-like plan needs to be in place. Lastly, there will be pain converting from an absolute volume-based system to a fractional supply-based system and as in the past, those who are losing

water they felt was guaranteed will want to be compensated for not exercising their right. I suggest phasing in the new system over the course of a decade, closing the gap between the new paradigm and the old by 10% each year. Those willing to close the gap by 20% in a given year could be compensated for half of that. This bold approach will definitely be challenged in court. I would hope a court would understand the desire to place the needs of the Basin as a whole over the wants of those not willing to share the pain. I am sure the Colorado Basin can have a lively economy and still use less water, but something bold needs to start this change. I suggest the Bureau convert from an absolute volume-based delivery system to one based on supply-side realities using a 30-year running supply average, and the same fractional allocation for each state and Mexico as currently designed into the law of the river. Respectfully, Bruce Hale brucehale.bah@gmail.com

***Letter #:*** 7555

***Date Received:*** 3/2/2026

***Sender Names:*** 7506: jill harmer

***Emails:*** 7506: jharmer245@gmail.com

***Organizations:***

***Subject:*** Please protect the water in the Colorado river. humans  cannot live without water.

DOI - .

are subject to the "apportionments" among the two basins, seven states and Mexico (See Colorado River Storage Project Act, Pub. L. No. 84-485, SS 4, 70 Stat. 107 (1956)). Reclamation has a great deal of say in how certain rights are managed in the system. But how can regulators sequester the differences between the starting and end points of a highly connected system where some users have established decades worth of use? This gray area is at the heart of the ongoing conflict among the seven states, and we request more information on this in the FEIS.We fear that it is an unacceptable practice to allow the Upper Basin to repurpose water from Lower Basin in the name of state-led permitting efforts in Colorado, New Mexico, Utah and Wyoming. Further declines in the system will challenge Reclamation's mission to protect infrastructure, ecosystems, and communities. It means less water making its way through the southernly reaches of the system in the majority of years if current trends continue. Every state needs a curtailment plan on the Colorado River. This DEIS fails to compel the Upper Basin States to meaningfully consider how they will act to protect federal assets and resources.Finally, this could also bring about conflict over tribal water rights in the Upper and Lower Basins -- especially where settlements have been established. There must be consideration of reducing, at a 1-for-1 rate, junior non-tribal use for those senior tribal rights that have not yet been put to use. How Reclamation would undertake this matter in the Upper and Lower Basin must included in any FEIS. Also, there must be consideration of how Reclamation would prevent new Upper Basin appropriations put forth by non-native water users from using, in a de facto sense, settled and adjudicated rights of Lower Basin tribes.DEIS Ignores Glen Canyon Dam's Antique PlumbingThe analysis in the DEIS fails to consider bypass, decommissioning, and other meaningful resolutions available at Glen Canyon Dam, which poses considerable concerns for water delivery and endangered species protections. We understand and respect the legal arguments for not including the One-Dam Alternative. But it is a mistake to not undertake comprehensive analysis on this matter. Keeping Lake Powell's elevations above 3550', 3525, and 3490' are not realistic scenarios for the long-term. Failure to include greater analysis on Glen Canyon Dam's river outlet works will ultimately cost us all -- imposing direct impacts on Lake Mead, Hoover Dam, other federal infrastructure, metropolitan areas, agricultural hubs, tribal resources, sensitive species, National Park Service units, U.S. Fish and Wildlife units, and other conservation areas in the Lower Basin.The DEIS' Purpose-And-Need Is Too Narrow And Segments Requisite ReviewsReclamation, admittedly so in its Purpose and Need statement, recognizes the grave uncertainties we face if conditions do not improve on the river system. Reclamation also recognizes the direct connections the DEIS makes with upstream infrastructure associated with the Colorado River Storage Project units and in Lower Basin units at Parker Dam, Davis Dam, Imperial Dam, and Palo Verde. The DEIS would benefit from greater analyses in the technical appendices dealing with directly related impacts at the dams during low-flow periods. The same can be said for analyzing impacts at all Colorado River Storage Project facilities in low-flow periods too. They will be essential for propping up Lakes Powell and Mead. What will operations look like if CRSP and Lower Basin Infrastructure are only operating collectively at 10-20 percent of normal? What can we expect? To say that management at Mead and Powell are not directly connected to that management is implausible.If you have any additional questions please contact me.John Hadder(c) Great Basin Water Network.
Powered by weForms.

March 1, 2026

Bureau of Reclamation
Attn: BCOO-1000
P.O. Box 61470
Boulder City NV 89006

Via email: crbpost2026@usbr.gov

Re: Public Comment on the Draft Environmental Impact Statement released January 2026 and entitled *Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead* (DEIS)

For distributing water use reductions in the Lower Basin, the DEIS alternatives present a choice between pro rata and legal priority. A compromise that may spread the reductions more fairly and that may lessen the threat of legal challenges would be to distribute reductions equal to reservoir evaporation losses and transit losses – thought to be 1.3 to 1.5 million acre-feet per year – on a pro rata basis, and to distribute additional reductions on a priority basis.

For the pro rata reductions, do not call them shortages. Instead, call these **a distribution of previously unattributed consumptive use**, or something to that effect. Make these reductions permanent regardless of reservoir elevations.

The Gila River Indian Community, in their proposal dated March 29, 2024, presented this same general idea on page 6.

Increases in evaporation losses that result from building a reservoir are human consumptive uses. Accounting for this consumptive use up front would decrease what Reclamation calls shortages.

This accounting could also make some alternatives more viable. For example, the Supply Driven Alternative's limit of 2.1 million acre-feet per year in shortages is not sufficient. However, if Reclamation first applied the evaporation consumptive use on a pro rata basis, then the 2.1 in shortages would have a better chance of being sufficient.

Thank you,
Paul Harms

***Letter #:*** 3498

***Date Received:*** 2/26/2026

***Sender Names:*** 3466: David Harris

***Emails:*** 3466: open7oceans@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . Conservation, not desecration, please.Thank you.David HarrisVentura, California

***Letter #:*** 3683

***Date Received:*** 2/26/2026

***Sender Names:*** 3646: David Harrison

***Emails:*** 3646: harrirad@yahoo.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern:I am writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose, as it ignores options that would provide operational flexibility and environmental benefits. Specifically, the new Colorado River guidelines must assess river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility. By preventing water from flowing downstream the dam has become a liability. Failing to study river-level bypass unnecessarily limits options for the river and its users. A "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell, should be studied. The reality is that both Lake Mead and Lake Powell cannot be filled with the water available. Analyzing different one-reservoir options would benefit the ecosystems and management of the entire Basin. In the years since Lake Powell reservoir has declined, there has been a reemergence or riparian ecosystems, cultural sites, and new recreation opportunities as well as natural wonders such as Cathedral in the Desert and Gregory Natural Bridge. These resources must be given equal value to other resources across the Basin. There should be a moratorium on new water diversions, with the exception of those tribes with senior water rights.

Thank you for your consideration.David Harrison, MD585 Washington St SSalem, OR 97302

***Letter #:*** 1551

***Date Received:*** 2/26/2026

***Sender Names:*** 1540: Joshua Harrison

***Emails:*** 1540: joshua.grant.harrison@everyactioncustom.com

***Organizations:***

***Subject:*** Lake Powell and Lake Mead DEIS comments

DOI - . Dear Carly Jerla Bureau of Reclamation, The Grand Canyon is one of the most amazing chunks of America. Please work to keep it that way. There won't be enough water to go around in the near future, until we start building desalination plants. Balancing the stresses on the river will be hard. The number one priority cannot be the needs of today, as much as that hurts. We have to have a system that works day in and day out for decades and decades. That means some hard compromise will need to be made. I don't have the answers, but I don't want the needs of today to subvert a long-term view, that is not what we would do with our personal finances and it isn't what we should do with water and our great natural resources. Sincerely, Dr. Joshua Harrison 1713 Steele St Laramie, WY 82070-4748 joshua.grant.harrison@gmail.com

***Letter #:*** 1007

***Date Received:*** 2/19/2026

***Sender Names:*** 997: Jim Hart

***Emails:*** 997: jehart17@outlook.com

***Organizations:***

***Subject:*** Colorado River water allocation

DOI - . First, full disclosure, I live in Southern Arizona and am a beneficiary of the CAP water.Here's my input:As well explained in Cadillac Desert by Marc Reisner, the water was overallocated from Day 1. This issue should never have been allowed to fester this long.I have read that the three lower basin states take 6-7 million acre feet per year, and that 12 million is lost to evaporation. Can't the canals be covered?About 70% of Arizona's water is used for agriculture. I don't understand why we grow cotton and cattle feed using scarce water. Beef and cotton can be sourced elsewhere.Same goes for all the water used to grow almonds in California. I read in the Wall Street Journal that it takes 9 gallons of water to grow one almond.Whatever reductions are imposed should be implemented over the course of a few years.Data centers, chip fabricators and other new high water users should pay a premium for their water.Jim Hart

***Letter #:*** 5522

***Date Received:*** 2/28/2026

***Sender Names:*** 5486: Chad Hartley

***Emails:*** 5486: chad.hartley.och@gmail.com

***Organizations:***

***Subject:*** Lake Powell preservation

DOI - . Dear Bureau of Reclamation Officials,As a resident of Phoenix, Arizona, deeply concerned about the ongoing water crisis in the Colorado River Basin, I urge you to prioritize strategies that allow Lake Powell to refill to sustainable levels. The reservoir's critically low levels threaten hydropower generation, recreational opportunities, and water security for millions across the Southwest. By implementing adaptive management practices outlined in the Post-2026 Operational Guidelines, such as flexible release schedules and enhanced conservation measures, we can protect this vital resource. It is imperative that all decisions reflect the interconnected needs of the basin states, ensuring equitable contributions to prevent further depletion while fostering recovery.To support this goal, I strongly advocate for California to intensify its efforts in water retention and alternative supply development. This includes accelerating the construction of additional reservoirs like the Sites Reservoir to capture more Sierra Nevada snowpack runoff and seasonal rainfall, potentially offsetting reliance on Colorado River allocations. Furthermore, expanding desalination plants along the coast could add millions of acre-feet to the state's supply, reducing demand on shared river resources. These initiatives, combined with advanced groundwater recharge and stormwater capture programs, would enable California to manage its water more independently, alleviating pressure on Lake Powell and benefiting downstream states like Arizona.Finally, true progress requires collective action from all basin states to reduce overall water usage. Arizona has already made significant cuts through agreements like the Drought Contingency Plan, and similar commitments must be enforced across Nevada, Utah, Colorado, New Mexico, and Wyoming. I encourage the Bureau to facilitate interstate collaborations, enforce conservation targets, and invest in innovative technologies to ensure a resilient future. Thank you for considering this input during the public comment period for the Draft Environmental Impact Statement--your leadership is crucial in safeguarding our shared water heritageThank youChad Hartley928.830.0092OwnerValvoline Instant Oil Change

***Letter #:*** 3406

***Date Received:*** 2/26/2026

***Sender Names:*** 3375: Jonathan Hartman

***Emails:*** 3375: doctorjonny1@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposal before issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. -- Dr. Jonathan B. Hartman

***Letter #:*** 6549

***Date Received:*** 3/1/2026

***Sender Names:*** 6521: Chris Hassert

***Emails:*** 6521: city7ch@yahoo.com

***Organizations:***

***Subject:*** Draft EIS Stakeholder Comments

DOI - . Trying to solve the Colorado River crisis while still believing the river system produces over 17 million acre-feet (MAF) of runoff per year is fundamentally flawed. The original basin state allocations were derived from hydrology in the early 1900's which were abnormally wet when examining records that span not only decades but centuries. Will this hydrology ever reoccur? Probably, but no one knows if it will happen in thirty years or five hundred. Only God knows. What we do know is that the long-term average runoff from the Colorado River watershed is a number much lower than the 16.5 MAF established last century. If the Bureau's approach is to ignore that reality, then they're left with irrational choices. The most evident irrational choice offered in the Draft EIS is to presume that the structural deficit can be solved not by looking at the size of the whole pie, but by largely cutting out a slice of the pie called Arizona. That's the lazy and irresponsible approach to reduce the demand on the River but at the same time, a highly effective way to tank Arizona's economy with unavoidable ripple effects across the national economy. If the strategy is to operationally keep the allocation pie chart fixed forever at 16.5 MAF minus the majority of flow in Arizona's CAP system along with other lower Basin cuts, this will irreparably harm Arizona's economy but won't solve the larger dilemma of the worsening structural deficit. Rather, this strategy will merely slow it down, and only slightly. The Colorado River system is currently experiencing a three to four MAF deficit every year. Drying up Arizona's CAP will only address a quarter of that, and the Draft EIS fails to spread out the required sacrifices amongst ALL Basin States as Lakes Mead and Powell careen toward Deadpool. At a time when the Federal Government is so focused on staking its claim in outside interests like Greenland, it's hard to believe that it would be so willing to decimate the State of Arizona environmentally and economically. This is the state where Allied Forces pilots from around the world came to train in WW2 and from that, a vital defense industry grew. Since then, so many important other industries have developed and flourished here in Arizona which rely on water.If the EIS takes an accurate and honest view, it would recognize that sudden cuts to Arizona's CAP system at 50% or greater would introduce a demand cut shock that for many water providers cannot be operationally mitigated. Water providers in Arizona have planned for shortages for years and have backup supplies such as stored groundwater. However, many well fields are not sized to bridge supply gaps left by sizable reductions in surface water supply, at least not in a long-term, sustainable way. Without a gradual process to absorb cuts by increasing conservation and expanding groundwater well fields, customers will not be able to adjust their behavior fast enough to avoid severe system imbalances. Drastic and sudden surface water cuts will potentially lead to overdrafting water distribution systems which could de-pressurize pipelines. If parts of water providers' distribution systems lose pressure, contaminants can enter the system and public health put at risk. The Final EIS needs to recognize these and other environmental and economic ramifications. It also needs to understand that unless a more comprehensive strategy is developed that includes sacrifices by all Basin States, then the River system is destined to crash. Christopher Hassert, PE (Retired)City of Mesa, Water Resources Director (2021 - Feb. 2026)Scottsdale Water, Director of Planning & Engineering (2008 - 2017)

***Letter #:*** 133

***Date Received:*** 1/30/2026

***Sender Names:*** 130: Stephen Hauptfuhr

***Emails:*** 130: stephen.hauptfuhr.52334@advocate-mail.com

***Organizations:***

***Subject:*** I Support the Colorado River Abundance Act

Message from DOI - . Bureau of Reclamation, I have been going to Lake
Powell since the 70's as a kid with my family. It has been an enormous part of my understanding of how important access to free recreational land is for everyones health and well being. I am writing today, to encourage you to support the Colorado River Abundance Act. This is crucial legislation is the only serious, long term solution to water issues in the west, which will continue to keep Lake Powell .and other areas open.. Water is becoming more scarce and continuing to reduce water consumption and uses will only last so long. I am worried about critical infrastructure such as Lake Powell and Lake Mead that not only are economic drivers for local economies but provide power and recreation to millions of people. The Colorado River Abundance Act would prioritize desalination and other infrastructure solutions capable of generating millions of acre-feet of water. This legislation would strengthen America's leadership in water innovation, support agriculture, and provide viable solutions to declining water levels in our reservoirs and rivers while continuing to meet water delivery requirements for Colorado River Basin states and Mexico.I believe you should support the Colorado River Abundance Act and help advance durable, forward-looking water solutions that benefit both current and future generations before it is too late.Sincerely, Stephen Hauptfuhr

1900 Taft AveLos Angeles, CA 90068(323) 717-7815 busterandghost@gmail.com

***Letter #:*** 10651

***Date Received:*** 12/4/2024

***Sender Names:*** 10448: Ashlyn Hawkins

***Emails:*** 10448: ashlynwhawkins@gmail.com

***Organizations:***

***Subject:*** Page 1801

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. I support selecting the post-2026 operational alternative that maintains higher storage levels in Lake Powell. Lake Powell is more than a reservoir, it is a vital recreation destination that has been part of family traditions for generations. Boating, fishing, and time spent on the water create lasting memories and connect families to the outdoors. When lake levels decline too far, access, safety, and the overall visitor experience are significantly reduced. Post-2026 Colorado River 1801 of 5176 The economic impact is also substantial. Page, Arizona relies heavily on tourism tied directly to Lake Powell. Sustained low water levels would harm small businesses, jobs, and local families who depend on a healthy recreation economy. Maintaining adequate elevations also protects hydropower generation at Glen Canyon Dam and provides stability for the broader Colorado River system. Please choose the alternative that prioritizes keeping Lake Powell at stable, functional levels for recreation, community sustainability, and long-term system reliability. Thank you for considering my comment. Post-2026 Colorado River

***Letter #:*** 3927

***Date Received:*** 2/26/2026

***Sender Names:*** 3885: l hayes

***Emails:*** 3885: lhayes1125@yahoo.com

***Organizations:***

***Subject:*** Colorado River

DOI - . We the people are deserving of clean accessibility to our water supply. Water is life .

Respectfully , Laura Hayes Sent from Yahoo Mail for iPhone

***Letter #:*** 3353

***Date Received:*** 2/26/2026

***Sender Names:*** 3322: hdpatashnick

***Emails:*** 3322: hdpatashnick@gmail.com

***Organizations:***

***Subject:*** Protect the Colorado River

DOI - . The Colorado River is already holding far less water than in the past, with much not even reaching the end of it. Protect it. Do not take further water from it or redirect any more of it. In fact, reduce the amount already being sucked out. This is a natural resource. Relish it, keep it from being used up and manipulated further. This is your charge.D Patashnick

***Letter #:*** 7410

***Date Received:*** 3/2/2026

***Sender Names:*** 7369: Kevin Hearle

***Emails:*** 7369: khearle@astound.net

***Organizations:***

***Subject:*** Colorado River

DOI - . Proper management of the vital but increasingly limited resources of the Colorado River requires following the science in order to maintain sustainable ecosystems and engaging with the indigenous peoples of the Colorado watershed. Sincerely, Kevin Hearle, Ph.D. Sent from my iPhone

***Letter #:*** 9150

***Date Received:*** 12/4/2024

***Sender Names:*** 9084: Michael Heaton

***Emails:*** 9084: mike@csheaton.com

***Organizations:***

***Subject:*** Page 0244

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. I have going to this lake since I was born as an infant with my parents. I am now 45 years old and this lake is my home away from home. My safe place and somewhere I truly cherish. I met my wife almost twenty years ago at this lake. We now own a rental home in Page, Az and support the town and its residents whole heartedly. We regularly take our two boys to the lake and have taken numerous family members to enjoy this heavenly place. I am proud to represent Lake Powell and its community of fine people. I also understand the importance of this water to my daily life and my son's future in the Southwest. This water is our lifeline for the southwest and should be treated accordingly for the future of civilization in the southwest. In my opinion this Post-2026 Colorado River 244 of 5176 lake should be kept at or below 100% due to the uncertainty of fluctuations in climate conditions. This should be treated as savings and should be the number one concern and priority of the lake. Recreation is the next most important priority after the water is prioritized to its absolute fullest. With today's advancements in water storage, water desalination and water regulation we can once again start saving water in this great water savings bank that was created so many years ago. Thanks for you time in reading my message. Please make this a priority for the future of our children. God bless. Post-2026 Colorado River

***Letter #:*** 3141

***Date Received:*** 2/27/2026

***Sender Names:*** 3112: Dorsie Hecht

***Emails:*** 3112: dorsieny@yahoo.com

***Organizations:***

***Subject:*** Colorado River

DOI - . What a shame to learn that water is a subject of little importance to those making legislation.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. Increased the supply by wise and thoughtful policies.Thank youD. Hecht 330 e 30NYC Sent from Yahoo Mail for iPhone

***Letter #:*** 3976

***Date Received:*** 2/26/2026

***Sender Names:*** 3930: janet heinle

***Emails:*** 3930: janetheinle@yahoo.com

***Organizations:***

***Subject:*** Please protect the Colorado River

DOI - . Protect the Colorado River -- Not Lock In More Water ScarcityJanet Heinle

***Letter #:*** 3379

***Date Received:*** 2/26/2026

***Sender Names:*** 3348: ELYSSE HELLER

***Emails:*** 3348: vampyre2391@gmail.com

***Organizations:***

***Subject:*** environment.

DOI - . Protect the Colorado river. ALL living things need water!

***Letter #:*** 3561

***Date Received:*** 2/27/2026

***Sender Names:*** 3528: Renata Hennell

***Emails:*** 3528: hennellr@gmail.com

***Organizations:***

***Subject:*** Colorado water protecting

DOI - .

***Letter #:*** 5564

***Date Received:*** 2/28/2026

***Sender Names:*** 5528: Barry Herbert

***Emails:*** 5528: barryherbert11@hotmail.com

***Organizations:***

***Subject:*** Protecting Lake Powell for Water Security, Recreation, and Wildlife Habitat

DOI - . To whom it may concern, I am writing to express my strong support for the continued protection and thoughtful management of Lake Powell and its critical role in the future of the Southwest. Lake Powell is far more than a reservoir. Formed by Glen Canyon Dam on the Colorado River, it serves as a vital water storage system for millions of people across the Southwest. As our region continues to grow, maintaining adequate water reserves is essential for municipalities, agriculture, energy production, and long-term drought resilience. Lake Powell functions as a strategic safeguard, helping stabilize water deliveries and protect communities from severe shortages during prolonged dry cycles. Beyond water security, Lake Powell is also a cornerstone of recreation and economic activity. Families, anglers, boaters, and outdoor enthusiasts from across the country depend on the lake for access to safe, affordable recreation. Tourism tied to the lake supports small businesses, local jobs, and entire surrounding communities whose economies rely heavily on visitation. Equally important is Lake Powell's role as habitat. The reservoir and its surrounding shoreline provide refuge for numerous fish species, migratory birds, and desert wildlife. Healthy water levels contribute to ecosystem stability and biodiversity in a region already facing significant environmental stress. As policymakers evaluate the future of water infrastructure in the Southwest, I respectfully urge you to recognize Lake Powell's multifaceted importance -- as a water reserve for a growing population, as an economic engine for local communities, and as a habitat supporting diverse species. Thank you for your leadership and for considering the long-term needs of both people and the environment in this region. Sincerely, Barry Herbert 10626 e kinetic dr Mesa, AZ 85212 480-793-1388 Barryherbert11@hotmail.com Sent from my iPhone

***Letter #:*** 9836

***Date Received:*** 12/4/2024

***Sender Names:*** 9645: Clark Heringer

***Emails:*** 9645: utahpoolguy@gmail.com

***Organizations:***

***Subject:*** Page 0965

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. Have you been to Lake Powell? I'm sure you know people, or have neighbors or family and friends who love Lake Powell. I'd really like to see the water level get back to 3,666 where it was in the mid 1990's. The lake and high-water levels are really the best use of the land for recreation, which also generates 10's of millions of dollars in to the Utah and Arizona economy from visitors each year. There are my other canyons and areas in southern Utah can be, and are used for hiking and exploring. Lake Powell has been a staple recreational area for millions of families for 4 decades. My first trip to Lake Powell was when I was 2 days out of the hospital from being born. It is a heaven on earth to me and my family. The higher and highest Post-2026 Colorado River 965 of 5176 water levels are the most optimum for being able to see more of the canyons and better appreciate all that the canyons have to offer. For example, Moqui canyon with the big sand hill is no longer reachable, which was a staple attraction to my family and hundreds of thousands of others. La Gorce Arch is something that was most viewed and enjoyed by boat. Halls Creek Bay is not usable anymore as it was, with higher water levels. The Escalante & San Juan River arms are not able to be fully enjoyed as in years past. . . I could go on and on. The cut through's around Antelope Point, the cut through between Bullfrog and Halls bay(s) aren't able to be used at the current and lower water levels than 3,588. The cut-through between Bullfrog and Halls is only able to be used at 3,666. Bottom line: The canyons are enjoyed by most people at higher water levels. Please put the legislation in place to keep the water level at a minimum of 3,588 Post-2026 Colorado River

***Letter #:*** 9837

***Date Received:*** 12/4/2024

***Sender Names:*** 9646: Julene Heringer

***Emails:*** 9646: julene06@msn.com

***Organizations:***

***Subject:*** Page 0967

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. Have you been to Lake Powell? I'm sure you know people, or have neighbors or family and friends who love Lake Powell. I'd really like to see the water level get back to 3,666 where it was in the mid 1990's. The lake and high-water levels are really the best use of the land for recreation, which also generates 10's of millions of dollars in to the Utah and Arizona economy from visitors each year. There are my other canyons and areas in southern Utah can be, and are used for hiking and exploring. Lake Powell has been a staple recreational area for millions of families for 4 decades. My first trip to Lake Powell was when I was 2 days out of the hospital from being born. It is a heaven on earth to me and my family. The higher and highest Post-2026 Colorado River 967 of 5176 water levels are the most optimum for being able to see more of the canyons and better appreciate all that the canyons have to offer. For example, Moqui canyon with the big sand hill is no longer reachable, which was a staple attraction to my family and hundreds of thousands of others. La Gorce Arch is something that was most viewed and enjoyed by boat. Halls Creek Bay is not usable anymore as it was, with higher water levels. The Escalante & San Juan River arms are not able to be fully enjoyed as in years past. . . I could go on and on. The cut through's around Antelope Point, the cut through between Bullfrog and Halls bay(s) aren't able to be used at the current and lower water levels than 3,588. The cut-through between Bullfrog and Halls is only able to be used at 3,666. Bottom line: The canyons are enjoyed by most people at higher water levels. Please put the legislation in place to keep the water level at a minimum of 3,588 Post-2026 Colorado River

***Letter #:*** 226

***Date Received:*** 1/29/2026

***Sender Names:*** 227: Daniel Herrera

***Emails:*** Not Provided

***Organizations:***

***Subject:*** CR DEIS Public Meeting Comments

In the Bureau's coordination and consultation with the tribes, has there been a consensus on which alternative distribution method works the best for said tribes? While many tribes have PPRs for their water allotment, is there anything being done in terms of infrastructure to be able to deliver this water to these communities that tend to have, poor infrastructure and maybe not the funds available to take out said water? And the second one is, when and where will these, questions be available?

***Letter #:*** 480

***Date Received:*** 2/24/2026

***Sender Names:*** 470: Suzanne Herrick

***Emails:*** 470: suzanne@fedorukinc.com

***Organizations:***

***Subject:*** Make it a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement Dear Sir or Madam, I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground. This is especially important! - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system. - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Please remember the river and its vital importance. Kindly, Suzanne Herrick Jackson, Wy Sincerely, Suzanne Herrick PO Box 6291 Jackson, WY 830026291 suzanne@fedorukinc.com

***Letter #:*** 733

***Date Received:*** 2/25/2026

***Sender Names:*** 723: April Herron

***Emails:*** 723: lirpasd@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement I am personally affected by the health of the Colorado River, as are millions of others. I want to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Please don't take shortcuts. Put in the work needed to create a plan that serves the river and all of its constituencies. Sincerely, April Herron 765 W 26th St UNIT 303 San Pedro, CA 90731 lirpasd@gmail.com

***Letter #:*** 3706

***Date Received:*** 2/26/2026

***Sender Names:*** 3669: Iko Hibbs

***Emails:*** 3669: ikuko@live.com

***Organizations:***

***Subject:*** Urgent Comment: Strengthening the Post-2026 Colorado River Basin Draft EIS

DOI - . Dear Bureau of Reclamation,The Colorado River is at a breaking point, and incremental measures are no longer viable. The Basin needs a management framework that confronts the accelerating impacts of climate-driven water scarcity and protects clean water, communities, and ecosystems before irreversible damage occurs. The Bureau now faces a critical moment to act decisively and address the full scale of this crisis.I strongly urge the Bureau of Reclamation to substantially strengthen the Post-2026 Colorado River Basin Draft EIS so it reflects the urgency of the situation and implements meaningful, enforceable solutions. Any revised proposal must be released for public review and comment before a final decision is made, ensuring transparency and accountability in a process that will shape the future of the entire Basin.The Colorado River is already overallocated and rapidly shrinking. Continuing to divide a diminishing supply without real reductions in demand will only deepen the crisis. Long-term stability requires firm, enforceable cuts, genuine Tribal consultation, and a commitment to sustainability that matches the severity of the challenges ahead.Sincerely,Ikuko HibbsCrown Point, Indiana

***Letter #:*** 404

***Date Received:*** 2/18/2026

***Sender Names:*** 399: Burton Hilton

***Emails:*** 399: burtonhilton@hotmail.com

***Organizations:***

***Subject:*** Colorado River Comment

DOI - . Greetings,Thank you for the opportunity to comment on the Colorado River. This is clearly a hugely important resource for the entire western US that needs changes undertaken. I feel that the only state that has undertaken significant and drastic (but smart) conservation efforts of this important resource is Nevada. Unless and until other states take action like Nevada has, there should be no reduction in water to Nevada, who already receives virtually nothing compared to other states. The Compact needs to be a living document that changes to population and environmental conditions. There doesn't seem to be any question that the river is over appropriated and reductions need to be made, but other states have not taken the efforts to do this, with California being the biggest abuser of this. Efficient use of water for people and crops is paramount and the states that have already taken these efforts should not be punished.Thank you,Burton HiltonEly, NV

***Letter #:*** 2817

***Date Received:*** 2/24/2026

***Sender Names:*** 2792: Bruce Hlodnicki

***Emails:*** 2792: bjh55@sbcglobal.net

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement I expect the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to make a sustainable future for the Colorado River. We need new, long-term guidelines that: - These guidelines must be clear and predictable: Continuing management by addressing one crisis after another is risky and costly. New guidelines must advance and emphasize conservation and respond to conditions on the ground - Include flexible tools that can be adapted to conserve and preserve. Store water reserves, and managing that water carefully. The new guidelines must be more flexibility in how water is stored and moved to protect and stabilize this system - Emphasize environmental stewardship: The Colorado River is more than a river. New guidelines must address the entire environment and its resident wildlife as well as the river itself. - Provides for meaningful yet voluntary Tribal participation. Recognize Tribal sovereignty and self-determination: All of the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and keep cooperating with Mexico--as an equal sovereign nation! Sincerely, Bruce Hlodnicki 6235 Lawrence Dr Indianapolis, IN 462261030 bjh55@sbcglobal.net

***Letter #:*** 4412

***Date Received:*** 2/28/2026

***Sender Names:*** 4379: Bruce Hlodnicki

***Emails:*** 4379: Bruce.Hlodnicki@messages.fwwatch.org

***Organizations:***

***Subject:*** Protect Drinking Water – Save the Colorado River Basin

DOI - . Dear Bureau of Reclamation, The Colorado River is suffering a crisis. The future management alternatives for the Colorado River have not addressed how its water is used. The Bureau must use its authority to push the Basin states to reach a joint agreement that is binding. Water conservation must be mandatory including conservation measures limiting corporate water abuses. Overuse of the water by major agribusiness and tech corporations threatens to drain too much of the basin and its water supply needed for the 40 million people living there. Considering this major threat to the River, any plan going forward must include an immediate halt to the expansion of alfalfa, mega dairies, and data centers, and a significant rollback of the cultivation of crops that consume huge quantities of water and are not suited for growth in highly arid climates of the Western States. The vast majority of water from the Colorado River is used by big agribusiness, primarily for growing alfalfa, a feedstock for cattle on factory farms. Across all seven Basin states, alfalfa farms consumed an estimated 2.1 trillion gallons of water in 2025, enough to supply the Basin's 40 million people with water for nearly 3 and a half years. Mega dairies, which produce significant pollution and threaten drinking water, consumed 82 billion gallons of water in 2022 across the Basin states (excluding Wyoming, for which no data were available). These agricultural uses are not practical or efficient. Basin states applied 2.6 acre feet of water/acre - 70% higher than the US average - for crops poorly suited to arid climates. Finally, big technology companies across the Basin states are deploying water-hungry data centers with little regulation or regard for impacts on water resources. With the Colorado River significantly overstretched, every environmental analysis and plan for the future must consider how the River's resources are being used. The overuse of the Colorado River by big agribusiness and technology corporations - amid already record-low water levels and drought - has serious consequences that threaten accessible drinking water for 40 million people. I urge the Bureau of Reclamation to prioritize sustainability and the needs of the 40 million people relying on the Colorado River for drinking water over corporate profit. Sincerely, Bruce Hlodnicki 6235 Lawrence Dr Indianapolis, IN

***Letter #:*** 7314

***Date Received:*** 3/2/2026

***Sender Names:*** 7274: Cerissa Hoglander

***Emails:*** 7274: Cerissa.Hoglander.1115075664@p2a.co

***Organizations:***

***Subject:*** Comments on the Post-2026 Colorado River Guidelines

DOI - . To the U.S. Bureau of Reclamation: I am emailing to ask the Bureau of Reclamation to take urgent steps in safeguarding the Colorado River and the communities and ecosystems that call it home, and to take necessary action in improving the river's conditions for generations to come. The many water uses reflected by the many straws in the Colorado River Basin must be adjusted to meet an updated balance that reflects the current century's drought conditions and lack of water resources, and must include equitable assurances for local Tribes and local environments. Commitments made over a century ago are no longer attainable. The current rules governing the Colorado River Basin expire at the end of this year, and we have seen them be notably ineffective at protecting the water levels at Lakes Powell and Mead which now run catastrophically low and threaten the Grand Canyon corridor. These rules also fall terribly short of safeguarding the ecological, spiritual, and cultural values of the River and the resources that communities depend on. The urgent steps that must be prioritized include directing and funding a Glen Canyon Dam Adaptive Management Program and an associated comprehensive study of dam infrastructure. Adequate flows must continue to be released from the dam to protect Grand Canyon. As the comprehensive study and adaptive management planning are underway, the Bureau should uphold the Grand Canyon Protection Act of 1992, should maintain Lake Powell water levels above 3,540 feet to facilitate high flow experiments, safeguard Grand Canyon habitats, and limit non-native fish passage. The Bureau should also commit to cool water releases beyond next year and/or keep Lake Powell at 3,570 feet to further limit non-native fish reproduction. Urgent action and improved management is needed to adapt to the ongoing drought in the Colorado River Basin. This management must prioritize the needs of communities that have lived in the region since time immemorial, and wildlife and ecosystems that wholly and entirely rely on functioning river habitat. Sincerely, Cerissa Hoglander

***Letter #:*** 4049

***Date Received:*** 2/27/2026

***Sender Names:*** 4004: Sascha Horowitz

***Emails:*** 4004: info@greatbasinwater.org

***Organizations:***

***Subject:*** Sascha Horowitz Comments on Colorado River

Great Basin Water Network DOI - . DEIS ignores available
science and anticipated outcomes by failing to complete full review of all known environmental factors. Groundwater is an integral part of our entire water system, and removing it affects the entire watershed. We are responsible for managing our desert to support life, starting with what is already here. Pumping out more water and sacrificing our ecosystem for unsustainable growth is not acceptable management. Any actions taken in the Colorado River Basin need to take the entire basin into account. Including existing downstream communities, tribal land needs, ecosystem sustenance, springs and underground flow patterns, and seasonal tributaries whose vegetation depends on groundwater levels between storms. It is not acceptable to bypass available monitoring opportunities or ignore known risks in the name of short-cutting review processes. Our groundwater is not replaceable in our lifetime, and needs to be cared for as a precious community resource (not siphoned off for development profit). We need attention and resources given to repairing Glen Canyon Dam structural problems and boosting water conservation and cooperation along our river. We do NOT need faster review processes encouraging careless individual profiteering at the expense of our existing Colorado River communities. Artificially segmenting our river is not in keeping with current scientific view of river ecosystems. All parts of the river shed must address conservation needs, curtail growth and reduce water demand, and must share the responsibility for both their usage and it's downstream effects. All the way to the sea. In a way that our grandchildren can look back on as best-effort in keeping with the urgency of our situation. Not business-as-usual, not 1 group twisting legal loopholes to grab water from another. And certainly not allowing new water users in 1 community to take priority over senior users in another! Please keep working on improved alternatives until you come up with 1 that honestly addresses the river watershed as a single whole community and tasks its members with working together toward a single shared goal of not running out of water, destroying our ecosystem, or failing to complete needed maintenance/restoration activities. This is Reclamations job; individual stakeholders must cooperate and not expect to be given priority over the needs of the River itself!If you have any additional questions please contact me.Sascha Horowitz(c) Great Basin Water Network. Powered by

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BUREAU OF RECLAMATION

# Evaporation from Lake Powell: In-situ Monitoring between 2018 and 2021

**Technical Memorandum No. ENV-2023-007**
**Upper Colorado Basin Region**




**U.S. Department of the Interior** **September 2022**

## Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cover photo of Lake Powell and floating platform by Daniel Broman (2018).

# Evaporation from Lake Powell: In-situ Monitoring between 2018 and 2021

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# Executive Summary

This report presents hydrometeorological observations and estimates of reservoir evaporation from two monitoring locations at Lake Powell from November 2018 to December 2021. We compare evaporation estimates from two independent methods, aerodynamic mass transfer and eddy covariance, to provide updated reservoir evaporation estimates based on best available science and methodologies. The main objectives of this study are to:

- collect over water micrometeorological and water temperature data to estimate evaporation rates
- perform side-by-side comparisons of evaporation rates from eddy covariance and aerodynamic mass transfer techniques
- calibrate bulk mass transfer coefficient used in aerodynamic computations using eddy covariance estimates
- compare point evaporation estimates with estimates developed using gridded weather data
- investigate remotely sensed surface temperature and modeled climate datasets for better understanding and accounting of spatial and temporal variability in evaporation

These objectives are accomplished through in-situ hydrometeorological data collection using floating observation platforms as well as intensive data processing and intercomparison with gridded climate datasets, remote sensing observations, and previous estimates.

Monthly comparisons with previously reported evaporation estimates, including gross evaporation coefficients (Reclamation 1986), floating evaporation pan estimates (Reclamation 2021), and reference evapotranspiration, show significant differences in evaporation timing and magnitude relative to evaporation estimates produced by this study. Eddy covariance and aerodynamic evaporation estimates calculated in the current study are consistently lower and show more pronounced peak evaporation timing than previously reported evaporation values from Lake Powell. In addition to presenting results, this report highlights the differences and limitations of each method, makes recommendations for continued data collection, and outlines opportunities for operational monitoring with advanced climate and remote sensing datasets.

Aerodynamic mass transfer evaporation estimates were highly correlated with eddy covariance evaporation estimates at both monitoring locations but were consistently biased low at monthly and annual timesteps. Bias is likely related to seasonal patterns of wind speed, temperature, vapor pressure deficit, and near surface atmospheric stability. Calibration of the aerodynamic mass transfer coefficient using eddy covariance estimates show similar seasonal patterns at both

sites identifying potential limitations with the application of Monin-Obukhov Similarity Theory in this study. Both methods capture reservoir heat storage impacts that shift peak evaporation timing to the late summer and fall relative to shallower systems and the annual solar energy cycle. Correction of eddy covariance evaporation estimates for wave-induced platform motion showed larger impacts at short timescales (sub-hourly to daily), however, longer-term evaporation totals (monthly to annual) were less impacted.

In-situ measurements of surface water skin temperature compare well with coincident lake surface temperature observations from Landsat 8 (average r-squared of 0.95 and bias of 7%). Comparisons of in-situ climate data with estimates from the National Weather Service Real-Time Mesoscale Analysis (RTMA) data product show good correlation and limited bias. Comparison of eddy covariance estimates with preliminary estimates from OpenET's Priestley-Taylor Jet Propulsion Laboratory (PTJPL) remote sensing model highlight the need to consider uncertainty in both forcing data and the scaling of instantaneous evaporation estimates derived at the time of satellite overpass to daily total estimates. Despite uncertainty in remote sensing model estimates, results demonstrate the potential for combination approaches based on gridded climate data and remote sensing to account for spatial differences related to climate and water temperature variability which may, in turn, lead to improved estimates of total reservoir evaporation. Future work will focus on model refinement and validation using in-situ observations collected during this study.

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# List of Abbreviations

CFEP – Collison Floating Evaporation Pan
CNR4 – 4 Component Net Radiometer
CS225 – Campbell Scientific temperature string
DRI – Desert Research Institute
EC – Eddy Covariance
ETo – Grass Reference Evapotranspiration
ET –Evapotranspiration
IMU – Inertial Momentum Unit
IRGASON – Infrared Gas Analyzer (IRGA) and 3D Sonic (SON) anemometer
IRT – Infrared Thermometer
LEM – Lake Evaporation Model
LST – Land Surface Temperature
MAE – Mean Absolute Error
MI – Multiple Imputation
MICE – Multivariate Imputation by Chained Equations
MOST – Monin-Obukhov Similarity Theory
MST – Mountain Standard Time
NLDAS – North American Land Data Assimilation System
pmm – Predictive Mean Matching
PTJPL – Priestley-Taylor Jet Propulsion Laboratory
RH – Relative Humidity
RMSE – Root Mean Square Error
S&T – Science and Technology
UCRB – Upper Colorado River Basin
VPD – Vapor Pressure Difference

# 1 Introduction

## 1.1 Background

The Colorado River begins at the Continental Divide in the Rocky Mountains of Colorado, drains parts of seven different US states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) and Mexico, and discharges into the Gulf of California (Christensen et al. 2004; Reclamation 2011). Nearly 40 million people living in those seven US states rely on the Colorado River and its tributaries for some or all municipal water needs (Reclamation 2021). Lake Powell, the second largest reservoir by capacity in the US, is formed by the flooding of Glen Canyon along the Arizona/Utah border by Glen Canyon Dam and acts to separate the Upper and Lower Basins (Figure 1). At full capacity, Lake Powell extends nearly 322 km (200 miles; USGS 2022) upstream of the dam.

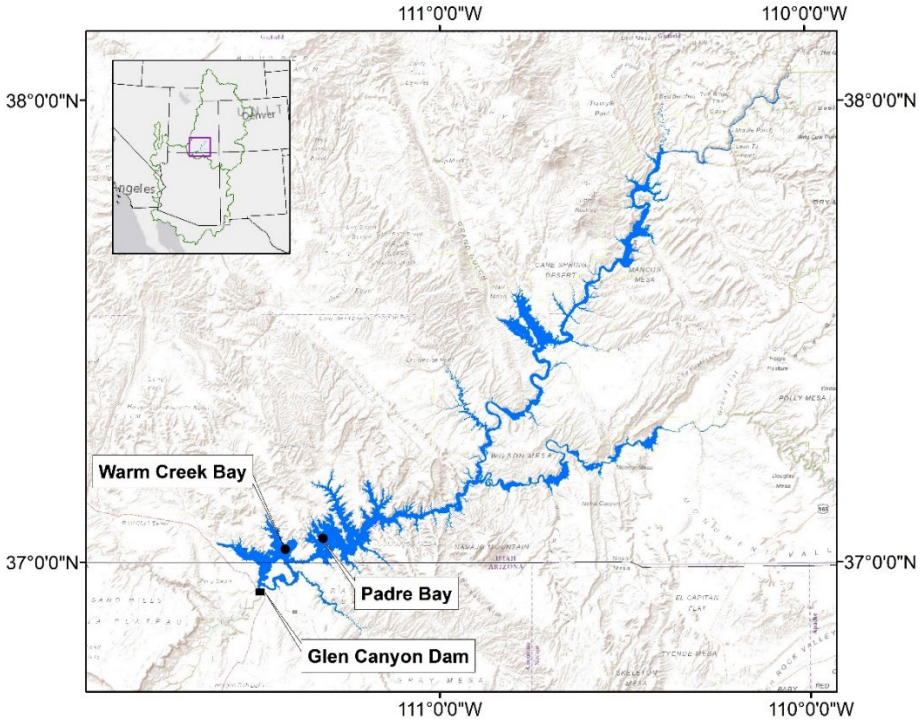



**Figure 1—Map of Lake Powell, Glen Canyon Dam, and two floating platforms used to support updated evaporation estimates. Inset shows the location of the study area (purple rectangle) and Upper and Lower Colorado Basins (green polygons).**

The National Park Service and the Bureau of Reclamation (Reclamation) manage the lands surrounding Lake Powell (USGS 2022). Climate in the region is described as arid. Maximum air temperatures often reach 37.7°C in summer months and less than 0°C in winter months. Typically, less than 254 mm (10 in) of precipitation fall each year. Streamflow into the reservoir is largely the result of snowmelt, which accumulates throughout the winter as snowpack in high-elevation regions of the Rocky Mountains (Reclamation 2021). While water levels have varied substantially throughout history (e.g., Figure 2 of USGS 2022), recent record-breaking minimums (Figure 2) have stressed hydropower generation and water deliveries. Improving estimates of water losses at Lake Powell is critically important now, as water managers across the seven basin states are making emergency releases to support water levels at Lake Powell and enacting drought contingency plans to manage the scarce resources available.

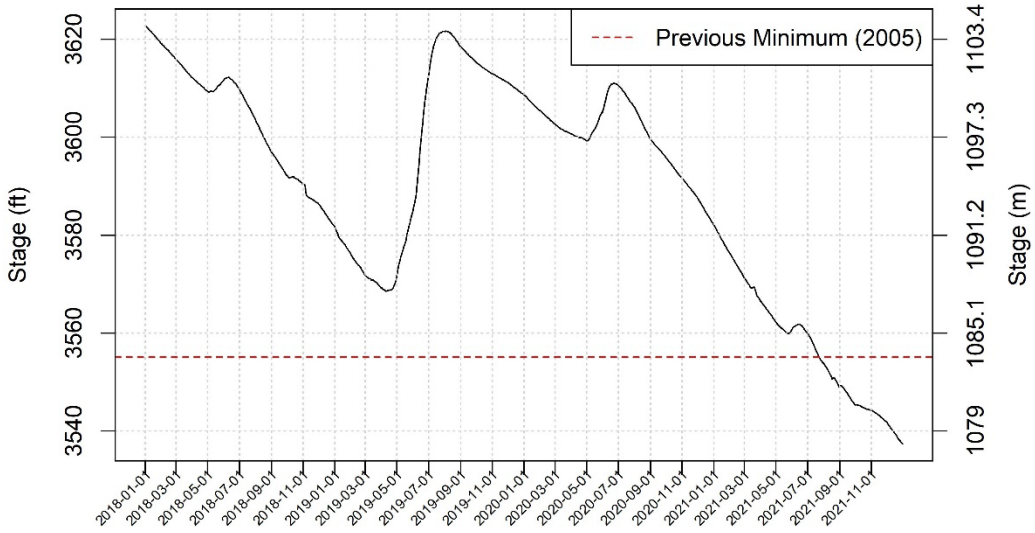



**Figure 2—Time series of daily stage at Lake Powell between January 1, 2018, and December 31, 2021.**

Modeling reservoirs and river systems throughout the Colorado River Basin is crucial for operations and planning activities. Reclamation employs three different RiverWare™ models to simulate conditions at short (up to 24 months), medium (up to 60 months), and long (multiple decades) time scales. The three RiverWare™ models use static monthly evaporation estimates for Lake Powell that are based on a report published by the Reclamation's Upper Colorado Basin Regional Office in the late 1980s (Reclamation 1986). Those estimates, which equal an annual loss of 1743.71 mm (68.65 in or 5.72 ft), are based on the mass transfer approach, where the transfer coefficient is a function of (static) fetch length.

While estimates from Reclamation (1986) are used to support operational modeling efforts, alternative estimates exist. For example, La Rue (1925) estimated evaporation to be 1520 mm/yr (5 ft/yr). Clayton (2004, 2008) estimated evaporation from Lake Powell to be 1760 mm/yr (5.77 ft/yr). Huntington et al. (2015) estimated the mean annual 1950-1999 evaporation to be 1610 mm/yr (5.5 ft/yr). Myers (2013) conducted a water balance simulation and noted that reservoir evaporation and seepage losses were highly dependent on stage and surface area, and larger losses and changes in partitioning between evaporation and seepage could affect downstream allocations. Myers (2013) concluded that lowering reservoir storage could reduce evaporation and recover seepage losses up to 14.8 billion $m^3$ per year.

While alternative evaporation estimates exist for Lake Powell, none is based on the eddy covariance approach, and none estimate evaporative losses across the reservoir surface. Thus, the purpose of the current study is to develop updated estimates of evaporation from Lake Powell using research-grade technologies, while validating state-of-the-art gridded meteorological datasets and remote sensing techniques with in-situ observations recorded over water. The primary objectives are to:

- collect over-water micrometeorological and weather data to estimate evaporation rates via the eddy covariance (EC) and aerodynamic methods
- perform side-by-side comparisons of evaporation rates from the two measurement techniques (i.e., EC and aerodynamic)
- calibrate the bulk mass transfer coefficient used in aerodynamic computations
- compare point evaporation estimates with estimates developed using gridded weather data
- integrate remotely sensed surface temperature and modeled meteorological datasets for better understanding and accounting of spatial and temporal variability in evaporation

We accomplish the listed objectives by analyzing high frequency hydrometeorological observations recorded at two different locations on Lake Powell (see point callouts in Figure 3) between November 2018 and December 2021 and comparing over-water observations with estimates retrieved from gridded weather and remotely sensed datasets. While the focus of the current study is on observations recorded between 2018 and 2021, data collection at the two sites continues through the present. Observations and evaporation estimates based on data recorded after December 2021 will be summarized in a separate document.

## 1.2 Site Locations

To account for spatial variability in near-surface weather, in-water processes, and evaporation across Lake Powell, we are collecting over-water observations using instrumentation installed on two different floating platforms. One platform is located in Padre Bay, while the second platform is located in Warm Creek Bay (Figure 3). These two locations were selected to minimize fetch contributions from surrounding land and are representative of a significant portion of lake surface area (i.e., large, deep bays versus narrow slot canyons). The two platforms are set up with identical instrumentation (see Section 1.3 and Figure 4).

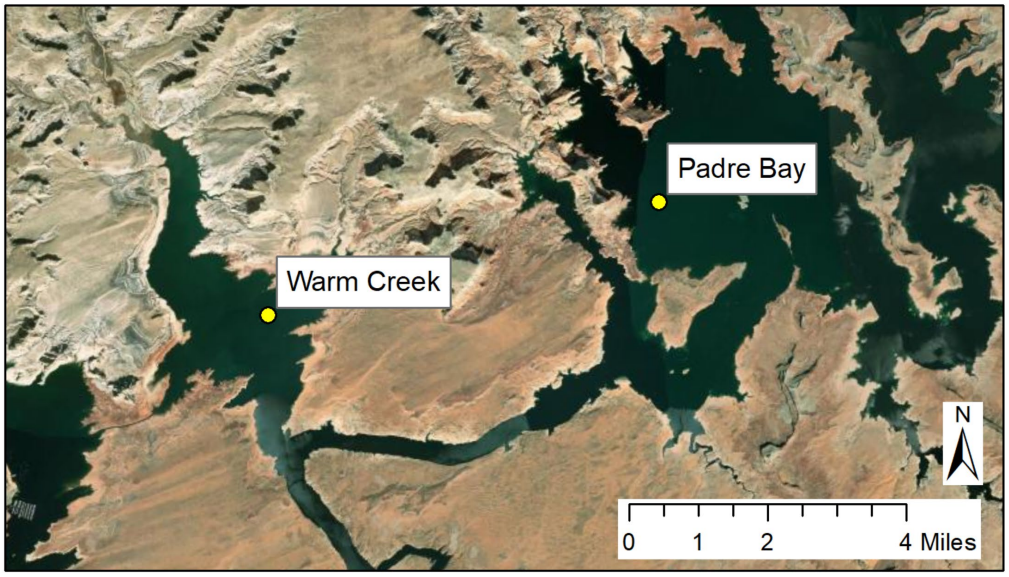



**Figure 3—Location of Padre Bay and Warm Creek Bay monitoring platforms. Basemap satellite image valid November 17, 2018.**

## 1.3 Instrumentation

The platforms deployed at Padre Bay and Warm Creek Bay (Figure 4) measure 2.4 m by 6 m (width by length). Each one is rigged with a counterweight anchor system that allows for vertical movement with reservoir stage changes, while limiting platform drift and rotation (yaw). Platforms include a suite of meteorological and water sensors for monitoring lake and atmosphere conditions. Instruments monitor air and water temperature, relative humidity, wind speed and direction, barometric pressure, and incoming and outgoing shortwave and longwave radiation (Table 1.1). In addition, each site is equipped with an all-in-one measuring device known as an IRGASON, which uses an infrared gas analyzer (IRGA) co-located with a three-dimensional (3D) sonic (SON)

anemometer to collect high-frequency (10-Hz or 10 measurements per second) atmospheric moisture and wind observations in support of the EC method. The other sensors generally support the aerodynamic method. Each platform is also outfitted with an inertial measurement unit (IMU) for monitoring IRGASON sensor head orientation and 3D accelerations related to platform motion. Data were collected remotely in near-real time via communication with on-board cellular modems. All EC and IMU observations were measured and recorded at a frequency of 10 Hz. Non-eddy covariance meteorological data were measured at a 10-second sampling rate and averaged to 30 minutes (i.e., 30-minute average based on 10-second samples). Water temperature profile data were measured at a 10-second sampling rate and recorded at 10-minute averages (i.e., 10-minute average based on 10-second samples).




**Figure 4—Photo of instruments installed on platform floating in Padre Bay. The Warm Creek Bay platform is nearly identical.**

**Table 1.1—List of instruments installed at Padre Bay and Warm Creek Bay.**

| Sensor | Model | Vender | Method | Description | Sampling Rate | Recording Rate |
|---|---|---|---|---|---|---|
| Data Logger | CR6 | Campbell Scientific | EC | Data acquisition for eddy covariance system | 10 Hz | - |
| Co-Located Gas Analyzer and Sonic Anemometer | IRGASON | Campbell Scientific | EC | 3D wind speed and magnitude; Water vapor content | 10 Hz | 10 Hz |
| Air Temperture | 107 Probe | Campbell Scientific | EC | Eddy Covariance Air Temperature | 10 second | 30 min average |
| Inertial Motion Unit | 3DM-GX5-25 | LORD Microstrain | EC | EC Motion Correction | 10 Hz | 10 Hz |
| Rain Gauge | TE525WS-L | Campbell Scientific | EC; Ancillary analysis | EC QAQC | Pulse Count | 30 min total |
| Barometer | CS106 | Campbell Scientific | EC | Barometric pressure monitoring | 10 second | 30 min average |
| Data Logger | CR1000 | Campbell Scientific | Aerodynamic | Data acquisition for meteorological and temperature sensors | 10 second | - |
| Air Temp/RH | HMP155 | Campbell Scientific | Aerodynamic | Air temp and RH monitoring | 10 second | 30 min average |
| Infrared Thermometer (IRT) | SI-111; SI-131 | Campbell Scientific | Aerodynamic | Skin temperature monitoring at air/water interface | 10 second | 30 min average |
| Anemometer | Wind Monitor Marine Version (5106-10) | RM Young | Aerodynamic | 2-m Wind speed and direction | 10 second | 30 min average |
| 4-component Radiometer/Pyrgeometer | CNR4 | Kipp and Zonen | Aerodynamic, EC | 4-component Radiometer; IRT LWin correction; EC Gap-filling | 10 second | 30 min average |
| Water Temperature Profile | CS225 | Campbell Scientific | Ancillary analysis; | Measurement depths (m): 0.5, 1, 2, 4, 6, 8, 10, 12.5, 15, 20 | 10 second | 10 min average |

### 1.3.1 Sensor Outages

Sensor performance and data collection were relatively steady throughout the three-year study period considering the harsh environment and remote nature of the collection sites. However, some data outages and sensor malfunctions related to data collection/transmission, sensor failure, and power supply issues did occur during the study period. Table 1.2 summarizes major outages resulting in data gaps longer than 48-hours. Planned outages related to sensor calibration and configuration typically lasted less than 48 hours and are not included in this summary. Details on outages associated with specific variables are further described in sections 1.3.1.1 and 1.3.1.2.

**Table 1.2—List of major sensor outages.**

| Station | Date Range | Outage Description |
|---|---|---|
| **Padre Bay** | Dec-2018 | Memory Card Failure; Miscellaneous EC Data Outages |
| | Nov-2018 to Mar-2019 | IRT Programming Error |
| | Sept-2019 to Feb-2020 | Temperature String Failure |
| | Jan-2021 to Nov-2021 | Temperature String Failure |
| **Warm Creek Bay** | Dec-2018 | Memory Card Failure; Miscellaneous EC Data Outages |
| | Nov-2018 to Mar-2019 | IRT Programming Error |
| | Jun-2020 to Jul-2020 | Temperature String Failure |
| | Aug-2020 to Oct-2020 | Intermittent CNR4 Outages |
| | Nov-2021 to Dec-2021 | Temperature String Failure |

Multiple outages of the CS225 temperature string occurred throughout the study. Initial CS225 sensor spacing configurations utilized 20-m cables with 10 measurement nodes located at 0.5, 1, 2, 4, 6, 8, 10, 12.5, 15, 20 m below the water surface. During June 2020, the Warm Creek CS225 sensor suffered a complete failure and was replaced with a reserve cable in July 2020. The replacement cable was manufactured with a different sensor spacing than the original cable and included measurement nodes at 0.5, 5.5, 8, 10.5, 12.5, 14.5, 16.5, 18.5, 19.5, 20 m below the water surface. Future analyses that depend on these data will interpolate the improperly spaced observations to the initial spacing.

#### *1.3.1.1 Skin Temperature Measurements*

Skin temperature measurements are used to compute the saturated specific humidity at the water surface ($q_{sat}$), a necessary variable for the aerodynamic method. Continuous, accurate measurements of water surface skin temperature are difficult to obtain due to variable wave action (i.e., non-uniform surface) and contamination of the sensor view path by debris, such as dirt, spider webs, and insect nests (Reclamation 2021). The IRT sensor lens was cleaned as often as possible; however, service trips were limited to quarterly and biannual time

periods due to the remote nature of the sites and travel limitations. Identification of "bad" IRT data was further complicated by the fact that water surface skin temperature can be very similar to air temperature readings obtained when obstructions such as spider webs were present. All IRT skin temperature observations were compared to water temperature observations from the four-component radiometer outgoing pyrgeometer and readings from the 0.5-m water temperature measurement node. In general, IRT values generally agreed with surface temperature estimates based on outgoing longwave measurements throughout the three-year study period, tracking both seasonal and annual variability, as well as reservoir heat storage effects (Padre Bay: $R^2$=0.94, slope through zero=1.04; Warm Creek: $R^2$=0.97, slope through zero=1.04; comparison statistics based on all available 30-minute surface temperature data). However, issues related to platform interference in the outgoing longwave data were noted during data review and postprocessing (refer to section 1.3.1.2 for additional details).

The IRT sensor at Padre Bay was replaced with a narrower view path model (Apogee Model SI-131; 14° field of view) part way through the study due to failure of the initial sensor (Apogee Model SI-111; 22° field of view). Use of the narrow path sensor added additional noise to the skin temperature readings relative to the wider field of view model due to the decreased integration area and sensor sensitivity differences. All aerodynamic estimates were performed using 30-minute average IRT values in an effort to smooth shorter-term noise related to sensor differences. Comparison of IRT-based skin temperature measurements with surface water temperature based on outgoing longwave measurements were consistent at both study sites despite IRT view path differences.

#### *1.3.1.2 Outgoing Shortwave and Longwave Measurements*

Deployment of the four-component radiometer utilized an aluminum pipe boom extended out over the water surface approximately 1.83 m at a height of 1.5 m to measure both incoming and outgoing shortwave and longwave radiation. A bias in outgoing longwave data was discovered during review and during comparison with data collected by the IRT and 0.5-m water temperature node. We found this bias when comparing estimated skin temperature based on measured outgoing longwave radiation with IRT-based skin temperatures and water temperature measured at the 0.5 m node. Measurement differences varied with season, time of day (driven by solar radiation), and warming and cooling of the observation platform. This bias in outgoing observations was due to the wide view angle (approximately 150°) of the four-component radiometer and inclusion of the platform within the outgoing observations. Bias assessment and correction of outgoing longwave and shortwave measurements will be explored during future comparisons.

During March 2021, the four-component radiometer was extended further beyond the platform to 3.7 m from the platform edge to reduce the influence of the floating platform on outgoing observations. Water temperature estimates based on the outgoing longwave data collected after the boom extension show better agreement with temperature observations collected using the IRT (Padre Bay: $R^2$=0.95, slope through zero=1.03; Warm Creek: $R^2$=0.99, slope through zero=1.02; comparison statistics based on 30-minutes surface temperature data collected after March 2021). Despite the boom extension, influence of the platform remains unavoidable and is present to some extent in all outgoing radiation observations. To avoid biases related to the platform interface, only incoming radiation (i.e., shortwave and longwave) data were utilized during gap filling routines.

## 1.4 Water Levels

Throughout the study period, reservoir water levels varied drastically and even dropped below historical minimums (Figure 2). During initial deployment in November 2018, Padre Bay and Warm Creek Bay platforms were located in water that was approximately 43 m and 36 m deep, respectively. However, in December 2021, water levels at Lake Powell reached an all-time low level. Thus, the Padre Bay and Warm Creek Bay platforms in December 2021 were located in approximately 28 m and 21.3 m of water, respectively. Changes in water depth can influence evaporation rates through changes in heat stored within the water column. In addition, changes in reservoir depth also impact the distance between the floating platforms and the shoreline (Figure 5). This distance is particularly important when characterizing the flux footprint of the EC method. We considered water levels and distance from shore in flux footprints at both locations (see section 2.1.3).

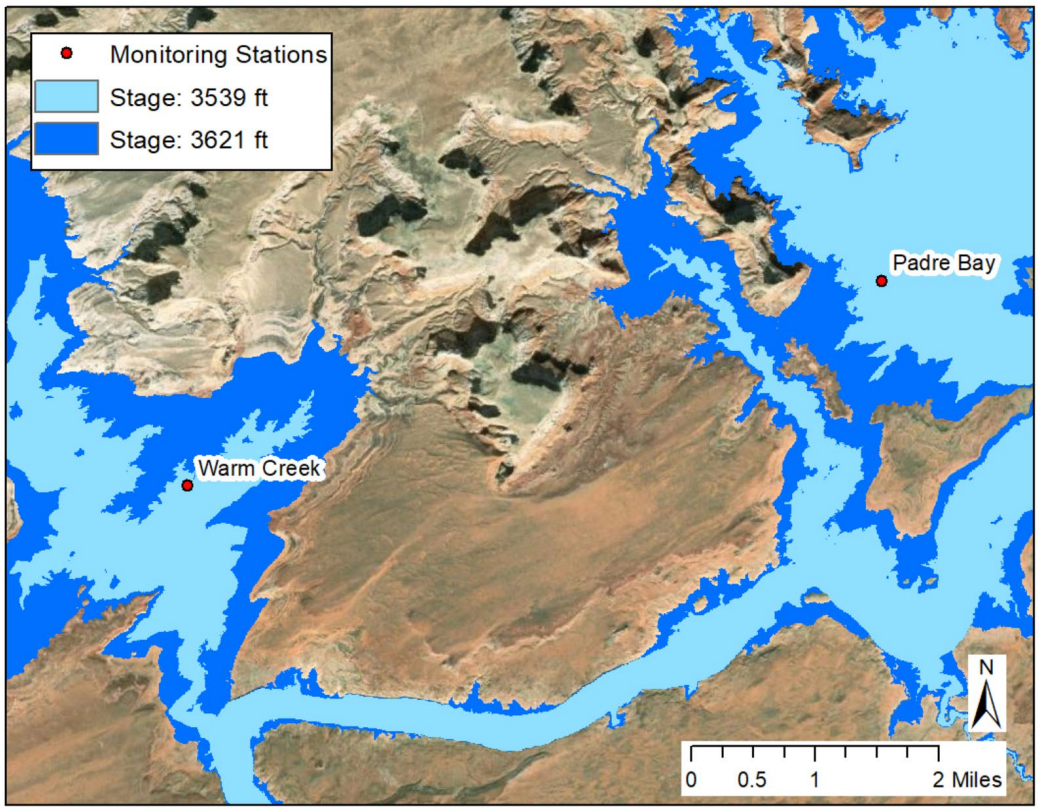



**Figure 5—Spatial extent of water surface area at two discrete stage values based on bathymetry data obtained from Andrews et al. (2018). The maximum stage during this study was observed on August 3, 2019, while the minimum stage (at the time of this report) was observed on December 18, 2021. The land surface surrounding the water body is depicted by the satellite imagery base map.**

## 1.5 Report Notes

Team members from the Desert Research Institute, Technical Service Center, and Page Field Office deployed the two floating platforms on November 7, 2018. The last batch of data analyzed for this report was retrieved on December 16, 2021. This is the primary study period included in the current study. Daily gap-filled estimates on November 7, 2018, and December 16, 2021, represent partial totals, along with monthly sums from November 2018 and December 2021. All variables are presented in International Standard of Units (SI), except for evaporation, which is shown graphically in SI units and in tabular form in SI and imperial units. We use the terms “evaporation estimates” and “evaporation totals” interchangeably, largely because all methods represent estimates.

The current study is organized as follows. In-situ methods used to develop evaporation estimates are summarized in chapter 2. Alternative evaporation estimates used for comparison's sake are summarized in chapter 3. Chapter 4 includes study results, with an emphasis on daily, monthly, and annual time scales. Finally, chapter 5 discusses study limitations, while chapter 6 summarizes the current report and next steps. Supporting methodological details, additional analyses, and high-frequency (e.g., 30-min) data are available in appendices.

# 2 Study Methods

A primary objective of the current study was to estimate evaporation from Lake Powell using two in-situ methods commonly discussed in the literature, specifically the EC and aerodynamic mass transfer methods. In this chapter, we discuss the details of each method as applied in the current study. We also discuss the methods used to estimate the flux source area and gap fill in-situ evaporation estimates.

## 2.1 Eddy Covariance

Turbulent airflow, also referred to as eddies, transfers energy and mass between the Earth's surface and the overlying atmosphere through turbulent exchange processes. The EC method is considered the most direct and defensible approach to quantify turbulent exchange, including water vapor and other trace gases (Baldocchi et al. 1988). Evaporation (i.e., positive latent heat flux) occurs when the concentration of water vapor in upward moving eddies exceeds the concentration of water vapor in downward moving eddies. Fluxes are measured by computing the covariance of a scalar (e.g., water vapor) and vertical wind speed. Following Baldocchi et al. (1988) and others, the water vapor flux density is calculated as the covariance of vertical wind speed and water vapor density, where both terms are instantaneous deviations from the time average. The latent heat flux can then be expressed as

$$LE = L_v \overline{w' q_v'}, \quad (1)$$

where $L_v$ is the latent heat of vaporization, $w'$ is the vertical component of wind speed, and $q_v'$ is water vapor density. The prime symbols represent deviations from a time mean while the overbar denotes a time mean. To adequately measure these deviations, the EC method requires high-frequency observations of vertical wind speed and water vapor, typically on the order of 10 measurements per second (i.e., 10 Hz). These high-frequency observations must be post-processed and analyzed to develop useful estimates of evaporation. To efficiently process the large amount of 10-Hz data recorded at both sites we developed a workflow

shown in Figure 6. Additional details on these steps are provided in the sections below.




**Figure 6—Schematic of workflow used to process 10 Hz eddy covariance data.**

### 2.1.1 Platform Motion

The IRGASONs installed at Padre Bay and Warm Creek Bay are mounted to floating platforms. As a result, the 3D wind measurements recorded by the sonic anemometers were influenced by atmospheric motion in addition to platform motion induced from waves. To account for the additional motion of the platform, we installed an IMU with each IRGASON to record platform accelerations at the same rate as the IRGASON measurements (i.e., 10 Hz). We applied the methods of Miller et al. (2008) to remove platform motions from the observed 3D wind speed components at Padre Bay and Warm Creek Bay. Accounting for motion in the 3D wind field resulted in two sets of 10 Hz data files. The first set of data files included 3D wind speeds that were corrected for platform motion. The second set of data files included 3D wind speeds that were uncorrected (i.e., recorded observations). Maintaining two sets of data files allowed us to examine impacts of platform motion on evaporation totals. All results in the body of the report represent motion-corrected evaporation estimates unless otherwise stated.

### 2.1.2 EasyFlux PC

The EasyFlux PC® software package (Campbell, 2017) was used to process 10-Hz measurements using both corrected and uncorrected wind speeds. We applied standard filtering options and data corrections (described below) from EasyFlux PC to the 10-Hz observations to produce 30-minute average estimates. The EasyFlux PC software removed wind speed and water vapor observations when there were non-zero sonic diagnostic flags and non-zero gas analyzer diagnostics reported, respectively (Campbell Scientific, 2022). Implausible water vapor observations were also removed via a de-spiking algorithm. More specifically, 10-Hz observations were de-spiked using the method of Vickers and Mahrt (1997), with the maximum consecutive outlier threshold set to 3, the plausibility range set to 3.5, and the accepted spike percentage set to 1%. We applied the double coordinate rotation of Tanner and Thurtell (1969) to winds recorded by the sonic anemometer (for both motion-corrected and motion-uncorrected winds). Low-pass filtering effects were corrected by applying spectral methods of Massman (2000, 2001). Finally, we corrected for density variations using the methods of Webb et al. (1980).

### 2.1.3 Source Area of Flux

Turbulent flux measurements are representative of some geographic area (i.e., spatial domain) upstream of the measurement location. This geographic area is sometimes referred to as the source area, fetch, or flux footprint, and depends on factors such as measurement height, surface roughness, and atmospheric stability. In this section, we present two footprint analyses; the first footprint analysis is based on output from the Campbell Scientific software, EasyFlux PC, and is based on a combination of the Kljun (Kljun et al. 2015) and Kormann and Meixner (Kormann and Meixner, 2001) models. The second footprint analysis is based on a 2D implementation of the Kljun et al. (2004) model (Kljun et al., 2015). The remaining sections describe these results.

#### *2.1.3.1 Point Footprint*

During each averaging period considered in EasyFlux PC (i.e., 30-minute window), the software computed an upwind flux distance (i.e., distance upwind of sensor contributing to estimated flux) using the Kljun et al. (2004) model. According to Kljun et al. (2015), flux footprint models describe the spatial extent and orientation of the surface area that contributes to a turbulent flux measurement at a specific point in time under certain atmospheric conditions and specified surface characteristics. For reservoir evaporation, a flux footprint describes the distance upwind of the EC equipment contributing to the flux. These models have become a standard analysis metric in many studies.

According to the EasyFlux PC manual (Campbell Scientific, 2020), the Kljun flux footprint model is used at every time step when appropriate conditions are met. If the appropriate conditions are not met, the Kormann and Meixner (2001) flux footprint model was used. Output from EasyFlux PC indicated which flux footprint model was used at each timestep (0=Kljun, 1=Kormann and Meixner). According to output from Padre Bay, the Kormann and Meixner model was used approximately 74% of the time during the study period. At Warm Creek Bay, the Kormann and Meixner model was used approximately 72% of the study period.

Results in Figure 7 show the distribution of upwind distances that contributed to a given fraction of the estimated evaporative flux based on 30-minute data recorded at each platform. At Padre Bay, the median upwind distance that contributed to 90% of the evaporative flux was 191 m. The median upwind distance that contributed to 90% of the evaporative flux at Warm Creek Bay was slightly lower at 135 m. Differences in upwind distances contributing to the total flux at each platform may have differed due to differences in wind conditions between the locations. These flux footprints are notably smaller than flux footprints cited in other EC studies (e.g., Blanken et al. 2012). While this was an intentional aspect of the study design (to limit flux contamination by surrounding land), there may be implications for the representativeness of these evaporative estimates across the remainder of the reservoir.

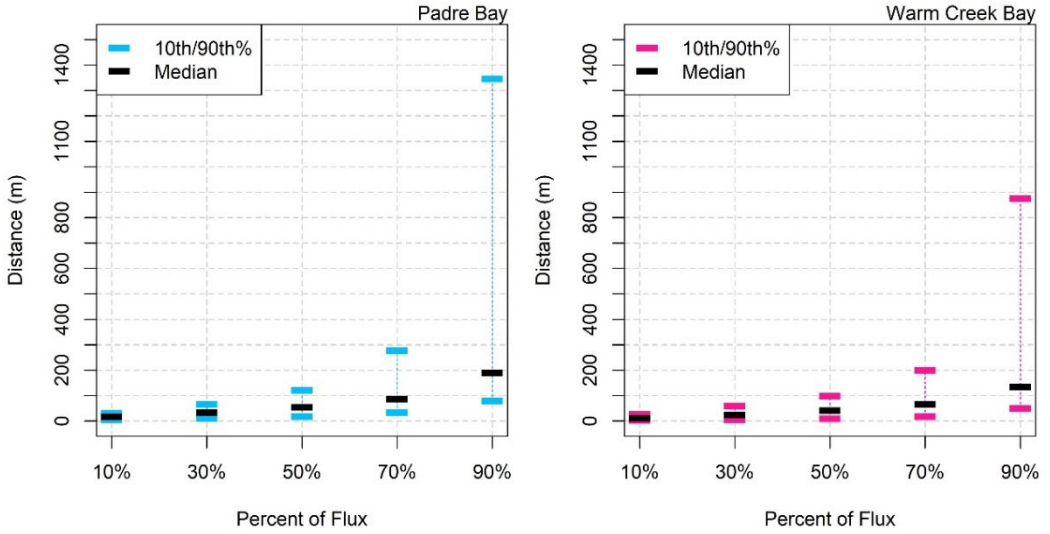



**Figure 7—Upstream distance (m) contributing to each percentage of total flux valid at (left) Padre Bay and (right) Warm Creek Bay during the study period.**

### *2.1.3.2 Spatial Footprint*

Land contamination (flux values that originate from land surface and not water surface) within the flux source area is a concern for evaporation estimates at Lake Powell due to the relatively close distance to land, and water levels that varied throughout the year and have reached record low levels near the end of the study period (see section 1.4 on reservoir water levels). To avoid land contamination in EC evaporation estimates, we implemented the 2D physically based Kljun et al. (2015) flux footprint prediction model to estimate upwind source areas. Half-hourly footprint predictions were compared against daily estimates of land and water surface coverage over a domain centered around each platform. The location of the shoreline within each domain was adjusted based on daily water level measurements and bathymetry data obtained from Andrews et al. (2018). Daily water level information was used to develop land versus water masks based on lake digital elevation model (DEM) information. Final daily land mask layers were resampled to the flux footprint resolution using bilinear interpolation.

The Kljun et al. (2015) model used half-hourly variables including wind speed and direction, friction velocity, standard deviation of lateral wind velocity, and Monin-Obukhov length computed by EasyFlux PC. Other input parameters were estimated or assumed: planetary boundary layer height was assumed to be 2000 m and zero-plane displacement and roughness length were assumed to be 0 m due to the relatively smooth open water surface. The boundary layer height assumption was reasonable for unstable conditions, though sensitivity tests (not shown) indicated that the Kljun et al. (2015) model was insensitive to this parameter likely due to the relatively low wind-measurement heights. We also assumed that

small increases in roughness length and zero-plane displacement due to waves would have small impacts on the flux footprints. Lastly, we used a 3-m discretized 1200-m square grid for the footprint estimation and clipped the final footprints to only include the top 90% of pixels or 90% of the source area.

After intersecting half-hourly footprints with daily land exposure, we found that neither location recorded a significant contribution to the flux footprint originating over land (see Table 2.1). Small levels of contamination (fraction of 0.01 or less) were found but were rare. We tested using different fractional thresholds such as 0.05 or 0.0 (not shown). Annual evaporation totals were minimally affected by the change. As a result, we decided to use a strict threshold where 30-min values impacted by any amount of land contamination (i.e., fraction > 0.0) were removed and gap filled. At Padre Bay, we removed 40 30-min observations. At Warm Creek Bay, we removed 287 30-min observations, most of which occurred in the second half of 2021 when water levels were at record lows.

**Table 2.1—Number of 30-minute evaporation rates impacted by land contamination. There are 52,128 possible 30-minute observations over the full period of record.**

| Fraction of Land Contamination | Number of 30-Minute Observations | |
|---|---|---|
| | Padre Bay | Warm Creek Bay |
| **0.10** | 0 | 2 |
| **0.05** | 0 | 11 |
| **0.01** | 19 | 89 |
| **>0.0** | 40 | 287 |

### 2.1.4 Additional EC Quality Control

Additional processing of 30-minute data was required after running observations through EasyFlux PC. We removed 30-minute average evaporation estimates during periods of precipitation. Specifically, if tipping buckets at Padre Bay or Warm Creek Bay recorded precipitation greater than 0 mm, the corresponding 30-minute average evaporation total was removed. We also removed evaporation estimates during periods when the wind measurements were impacted by the presence of the IRGASON. This impact occurred when the horizontal wind direction was ±10° from behind the IRGASON instrument (Campbell Scientific, 2020). At Padre Bay, the back of the IRGASON was oriented to 337º. Thus, evaporation observations from times when the wind direction was from 327° to 347°, were set to missing. Similarly, at Warm Creek Bay, the back of the IRGASON was oriented to 324°. During wind directions of 314° to 334°, evaporation estimates were set to missing. Finally, we manually removed evaporation estimates during periods of time when the water vapor signal strength was below 0.7 at each station separately. The measures were applied to 30-minute data in addition to the default measures in EasyFlux PC and the flux footprint

criteria discussed above. We retained all other evaporation values. The number of data gaps at each site for each method is summarized in section 2.3.

## 2.2 Aerodynamic Mass-Transfer Method

In addition to the EC method, we applied an aerodynamic mass transfer approach to over-water meteorological and surface water temperature observations to estimate evaporation. The aerodynamic approach is based on Dalton's Law, where the evaporative flux is driven by the difference in vapor pressure between the saturated water surface and the air above. The general form of the aerodynamic equation is

$$E = \rho_{mair} C_E u (q_{sat} - q_2), \quad (2)$$

where $E$ is evaporation (mm $t_{step}^{-1}$), $\rho_{mair}$ is the density of moist air (kg m$^{-3}$), $C_E$ is the bulk transfer coefficient, $u$ is the windspeed at 2 m (m s$^{-1}$), $q_2$ is the specific humidity at 2 m about the surface (kg kg$^{-1}$), and $q_{sat}$ is the saturated specific humidity at the water surface. $C_E$ values were based on Monin-Obukhov Similarity Theory (MOST) following equations developed by Brutsaert (1982). A detailed description of the aerodynamic method and MOST equations applied during this study can be found in Appendix 1.

The aerodynamic bulk mass transfer method offers an operational and cost-effective method for estimating reservoir evaporation when more direct estimates (e.g., eddy covariance) are difficult to obtain or are unavailable (Brutsaert, 2005; Quinn, 1979). Air temperature, relative humidity, barometric pressure, and windspeed were measured at 2 m above the water surface. Surface water temperature (i.e., "skin temperature") was measured using an infrared thermometer (IRT) boomed out and angled away from the measurement platform at the water surface. Corrections of IRT skin temperatures observations for the emissivity of water and impacts of incoming longwave radiation were performed according to methods outlined by Apogee Instruments (see Appendix 1 for detailed description of skin temperature corrections). IRT temperature estimates were computed assuming a constant water emissivity of 0.97 (Mohseni 1999; Lenters 2005). All aerodynamic meteorological and water temperature measurements were taken using a 10-second sampling rate and averaged to 30-minute values. Gap filling procedures for all 30-minute meteorological data is described below in section 2.3.

### 2.2.1 Manual Quality Control

All 30-minute observations used to support the aerodynamic method were manually reviewed and filtered during post-processing to remove data spikes, flat lines, and obvious out-of-range values related to sensor failures or electronic shortages. In general, bad values were assessed relative to observations taken before and after the suspect value as well as comparison to redundant measurement made by other sensors (e.g., propeller anemometer windspeed versus sonic anemometer windspeed or HMP-155 relative humidity versus IRGASON water vapor content). Additional screening was done to remove observations impacted by maintenance trips. Post-processing was completed using custom python-based plotting. All gap-filling procedures and evaporation calculations for the aerodynamic method were performed on the cleaned datasets. The number of data gaps at each site for each method is summarized in section 2.3.

## 2.3 Gap Filling

Gaps in high-frequency evaporation data occur for a number of reasons including system maintenance, power failures, equipment malfunctions, animal disturbances, weather events, and quality control measures (e.g., land contamination from wind direction, among others). Missing data can make it difficult to estimate seasonal or annual evaporation totals, establish relationships with climatic variables, and validate alternative modeling approaches (Hui et al., 2004). Consequently, most studies utilize some type of gap-filling algorithm to replace missing observations. Common approaches for gap filling evaporation data include mean replacement (i.e., using an average of observed values), interpolation and extrapolation, and regression analysis (i.e., predicting a missing value using a regression equation developed between said variable and other variables), among others (Hui et al. 2004). Although multiple methods exist, no standard method has been widely accepted (Alavi et al., 2006). The percent of missing values at each location for each method is shown in Table 2.2.

**Table 2.2—Percent of 30-minute evaporation time series (N=52,128) set to missing.**

| Location | Method | Percent Missing 30-Min Evaporation Values |
|---|---|---|
| Padre Bay | EC Motion Uncorrected | 15% |
| | EC Motion Corrected | 15% |
| | Aerodynamic | 12% |
| Warm Creek Bay | EC Motion Uncorrected | 18% |
| | EC Motion Corrected | 18% |
| | Aerodynamic | 13% |

In this study, data gaps in 30-minute latent heat flux estimated by the EC method and aerodynamic method were filled using the multiple imputation method (MI). MI is a general-purpose Monte Carlo technique that fills missing observations in a dataset while leaving observed values unchanged (Rubin 1987, 1996). There are three primary steps in MI: imputation, analysis, and pooling. During the imputation step, missing observations are replaced by sampling from distributions generated with the non-missing observations. This happens n times, representing n individual time series. Next, each of the n complete datasets is analyzed using normal statistical methods. Finally, in the pooling phase, results from the n complete datasets are combined to account for uncertainty in the imputed time series (Hui et al., 2004).

The MI method has been used in many studies to fill gaps in EC observations. For example, Hui et al. (2004) filled missing observations of net ecosystem carbon exchange, latent heat flux, and sensible heat flux recorded at three different FluxNet (fluxnet.org) sites using MI. Their results showed that annual estimates of net ecosystem exchange, latent heat flux, and sensible heat based on MI were comparable to other common imputation methods. Xue et al. (2012) filled missing evapotranspiration observations recorded over a larch forest in eastern Siberia between 2003 and 2006 using a Bayesian version of MI. Solar radiation, wind speed, relative humidity, and soil water content were used as predictors. Yonemura et al. (2017) used MI methods to fill missing carbon dioxide fluxes observed over paddy fields during a single fallow season. One suggested benefit of MI in filling EC gaps is the ability to retain noise in the data, which many traditional gap filling methods do not do (Aubinet et al. 2012).

We implemented a version of MI based on the Multiple Imputation Chained Equations (MICE) algorithm from van Buuren and Groothuis-Oudshoorn (2011) available through the R package, MICE. The specific univariate imputation model used to fill 30-minute average latent heat fluxes was predictive mean matching (pmm; Little 1988), one of the many imputation models built into MICE. The pmm method is a semi-parametric imputation approach, similar to the regression method that fills each missing value by randomly sampling an observed value whose regression-predicted value is closest to the regression-predicted value for the missing value from the simulated regression model (Heitjan and Little 1991; Schenker and Taylor 1996). According to van Buuren (2021), pmm imputations are restricted to observed values, and the method can preserve non-linear relations even if the structural part of the imputation model is wrong. van Buuren (2021) called pmm a good method overall. Each new round of imputation uses data points filled during the previous round of imputation (if one exists) to update relationships among variables.

Published studies have implemented a variety of predictor variables, suggesting that there is not a single set of “correct” predictors. van Buuren (2021), and

citations within, recommended using all available information to produce imputations that have minimal bias and maximal certainty. Thus, the number of predictors should be as large as possible. As a result, we included air temperature, air pressure, air density, water vapor density, rotated u-, v-, and w-components of the wind, wind direction, wind speed, skin temperature, incoming longwave radiation, and incoming shortwave radiation in the gap filling routine applied to EC data. We included air temperature, air pressure, relative humidity, wind speed, wind direction, skin temperature from the IRT sensor, incoming longwave radiation, and incoming shortwave radiation in the gap filling routine applied to aerodynamic data. We included skin temperature recorded from the CNR4 sensor to help fill long data gaps (i.e., gaps longer than two days) when the IRT sensor was down. Additional testing (not shown) indicated that adding the CNR4 skin temperature data as a predictor to the aerodynamic gap filling routine did not influence monthly and annual evaporation totals. We did not use evaporation estimates from one method as a predictor in the gap filling routine of the other method such that the two in-situ methods were completely independent. Default settings in the MICE algorithm result in five imputed time series that have zero missing observations. We averaged all five together to yield a single time series of evaporation for each location and method (where non-gap filled values remain unchanged).

Impacts of the gap-filling procedure on 30-minute and daily evaporation rates from the EC and aerodynamic methods are shown in Appendix 2. All evaporation results presented in the body of the report represent gap-filled estimates unless otherwise specified.

# 3 Additional Evaporation Estimates

We compare in-situ evaporation estimates with estimates from alternative sources that have historical context or relevance to other Reclamation projects. We include evaporation coefficients used to support modeling in the Colorado River Basin, evapotranspiration from a hypothetical grass surface, and estimates of evaporation from a floating pan located on Lake Powell that was funded through Reclamation's Science and Technology (S&T) Program. Additional details about each method are discussed below.

## 3.1 Gross Evaporation Coefficients

Reclamation employs three different RiverWare™ models to support planning and operations decision making in the Colorado River Basin. The models, which vary as a function of outlook duration, must represent the physical system, along with the legal constraints associated with water law in the basin. The three models simulate the movement and storage of water through river reaches, reservoirs, canals, and other infrastructure, while also accounting for water withdrawals, gains, and losses (Payton et al. 2020). The models are run at a monthly timestep, where Lake Powell evaporation rates are set to the static, monthly values shown in Figure 8 and described in Reclamation (1986). In this static dataset, peak evaporation rates always occur during July, with August and September second and third, respectively.

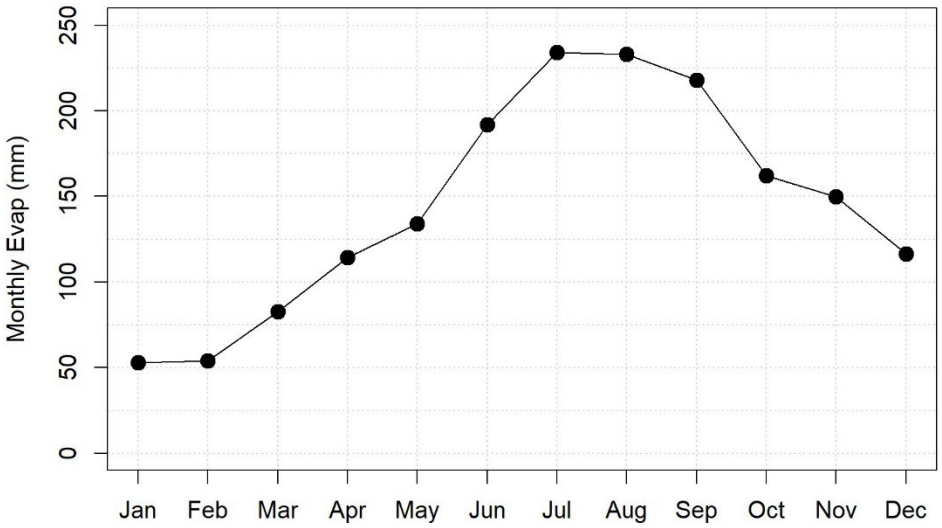



**Figure 8—Lake Powell average monthly evaporation (mm) used in three models to simulate the Colorado River Basin system (Clayton 2008).**

Because monthly evaporation rates applied to the surface area of Lake Powell are chosen to be constant, inter-annual variability in evaporation rate (i.e., year-to-year variations) is assumed to be zero. The annual evaporation rate is always 1744 mm (68.65 in or 5.72 ft). Volumetric losses of evaporation, however, do vary as a function of reservoir surface area, and in that sense some interannual variability in total evaporation is captured.

This dataset is often referred to as “coefficients” in historical reports, though the term “totals” is likely more appropriate. We retain the naming convention of this dataset in the current report to remain consistent with other historical documentation.

## 3.2 ASCE Reference Evapotranspiration

To demonstrate the influence of heat storage and differences between land and open-water evaporative flux, we calculated daily grass reference evapotranspiration (ETo) using the standardized Penman-Monteith equation of the American Society of Civil Engineers (ASCE-PM; ASCE-EWRI, 2005), which does not explicitly account for the effects of heat storage in the water column. ETo represents evapotranspiration from a clipped grass under well-watered and ideal conditions and is commonly used as a benchmark reference for evaporation and evapotranspiration estimates throughout the world. ASCE ETo is the preferred method for estimating agricultural crop and landscape water use. Comparison of ASCE ETo with open-water estimates from this study provides a basis to assess the influence of heat storage processes and understand historical and future responses to variable weather, climate, and atmospheric evaporative demand.

The daily ASCE-PM ETo equation was forced with in-situ measurements of air temperature, relative humidity, incoming shortwave radiation, and wind speed recorded at each platform separately. All calculations were performed with the Python RefET library. The Python RefET library was validated against the Ref-ET Software developed by the University of Idaho (Allen, 1992). Missing daily data were gap filled using the MI approach described above, where predictor variables include the same list of variables used to force the ETo equation. A full data logger outage occurred at Warm Creek Bay between November 3 and November 21, 2021. Rather than gap filling this period with no available predictor data, we simply replaced missing values of ETo at Warm Creek Bay with ETo estimates from Padre Bay.

## 3.3 Collison Floating Evaporation Pan

Reclamation's S&T Program funded a multi-year study (project ID 8119) to deploy a Collison Floating Evaporation Pan (CFEP) on Lake Powell between 2018 and 2020 (Reclamation, 2021). The floating pan consists of an interior evaporation pan 0.61 m (2 feet) deep and 2.44 m (8 feet) in diameter surrounded by reservoir water and a vertical outer wave guard that is 0.61 m (2 feet) deep and 6.1 m (20 feet) in diameter (Reclamation 2021). Figure 9 shows an image of the CFEP at Warm Creek Bay, which has been attached to this floating platform throughout the entire study period. A series of instruments are attached to the outer wave guard, and a cell modem allows for remote, real-time access of data. See Reclamation (2021) for the full list of observed variables.



**Figure 9—Collison Floating Evaporation Pan attached to the floating platform in Warm Creek Bay. Figure from Reclamation (2021).**

We compared CFEP evaporation estimates to EC and aerodynamic estimates at the Warm Creek Bay site between May 7, 2019, and April 30, 2020, when all methods include valid data. Since the CFEP study was funded through a different mechanism (e.g., a proposal selected for funding in the Science and Technology Program), the study was completed independently of the current study, and the data are presented without further discussion. See Collison (2019) for addition details on the CFEP method and Reclamation (2021) for additional information on the CFEP instruments and results specific to Lake Powell.

# 4 Study Results

The results section is organized as follows. First, we present in-situ evaporation estimates at daily, monthly, and annual time scales from the two locations. We compare in-situ estimates to estimates from the various alternative methods. Evaporation estimates at the 30-minute time scale are shown in Appendix 2. Next, we show results from two different method used to calibrate the mass transfer coefficient employed in the aerodynamic method. Finally, we present evaporation estimates from gridded meteorological and remote sensing applications.

## 4.1 In-Situ Evaporation Estimates

### 4.1.1 Daily Time Scale

Figure 10 shows daily evaporation estimates from Padre Bay and Warm Creek Bay based on the EC method. The time series of daily totals from both locations show a clear seasonal cycle with minimum values observed during late winter and early spring (e.g., February and March) and relative maximum values observed during late summer and early fall (e.g., August and September) at both locations. Daily totals from the EC method range from near 0 to almost 16 mm at both locations. The correlation (also referred to as r) between the two EC time series is 0.91. Daily differences between the two locations range from approximately -5.5 mm to +5.5 mm (Padre Bay minus Warm Creek Bay; middle panel of Figure 10), where the average daily total evaporation is 3.6 mm and 3.2 mm at Padre Bay and Warm Creek Bay, respectively, over the study period. The bottom panel of Figure 10 summarizes daily differences computed as a percentage of daily Padre Bay totals by month of year (statistics for each month are computed separately over the full study period) via a box and whisker plot. Results in this panel indicate that median daily percent differences between the two locations peak during the cool season, specifically November through January, with a peak median monthly difference of 22%. Small differences in average daily totals between the two locations grow with increasing duration such that the average monthly evaporation total over the study period is 107 mm and 96 mm at Padre Bay and Warm Creek Bay, respectively.

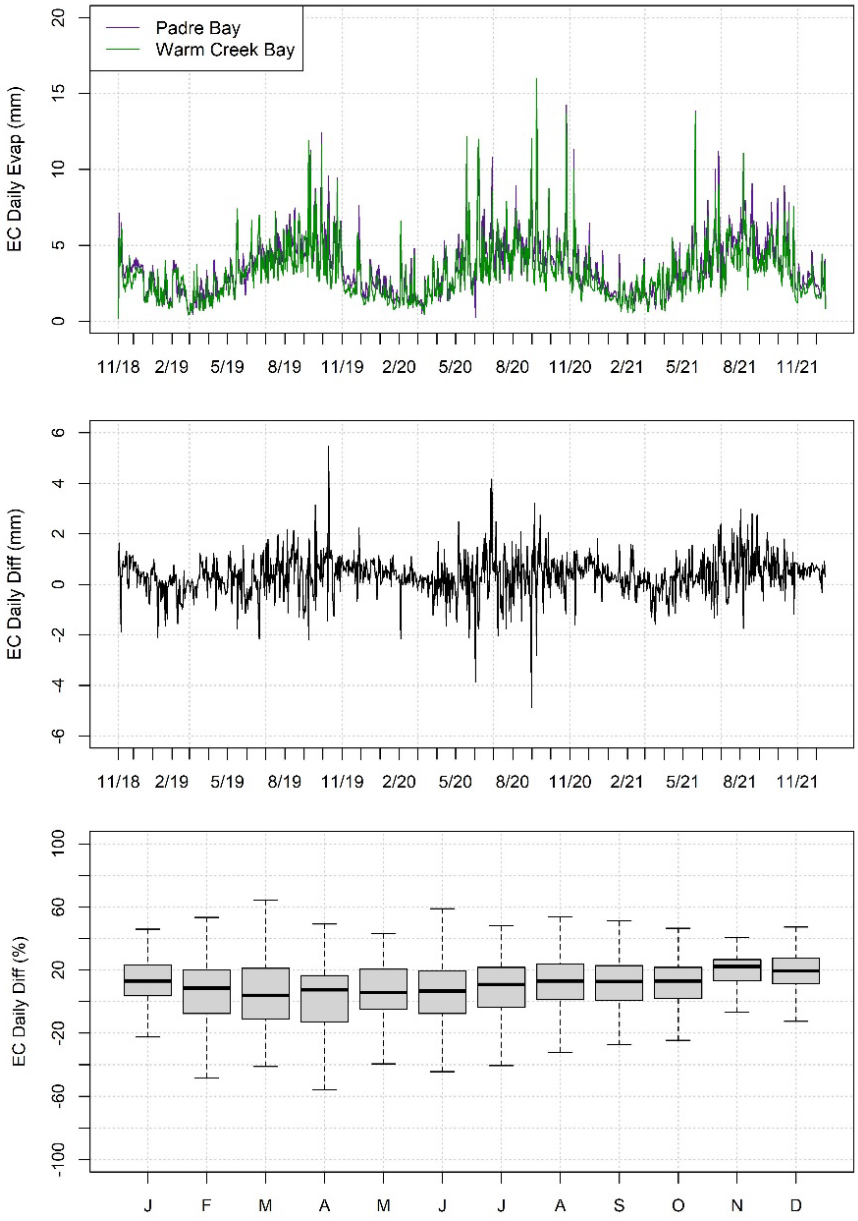



**Figure 10—(top) Time series of daily EC evaporation totals (mm) at Padre Bay and Warm Creek Bay. (middle) Time series of daily EC totals from Padre Bay minus daily EC totals from Warm Creek Bay (mm). (bottom) Box and whisker plot of daily differences between Padre Bay and Warm Creek Bay expressed as a percent of daily totals at Padre Bay for each month of year over the full study period. Thick horizontal lines represent the monthly median. Boxes extend to the 25$^{th}$ and 75$^{th}$ percentiles. Whiskers extend to 1.5 times the interquartile range.**

Daily aerodynamic evaporation time series from the two floating platforms are shown in Figure 11. As with EC estimates, we see that these time series are characterized by a strong seasonal cycle with daily maximums during the warm season and minimums during the cool season. The correlation between the two aerodynamic time series is 0.91. Absolute differences between the time series (middle panel of Figure 11) are similar in magnitude to differences observed with the EC method, namely -4 to +3.5 mm per day. Monthly median percent differences between the aerodynamic time series (bottom panel of Figure 11) are largest between October and February and exceed 30%. Thus, differences between the two sites are larger with the aerodynamic approach than EC approach.

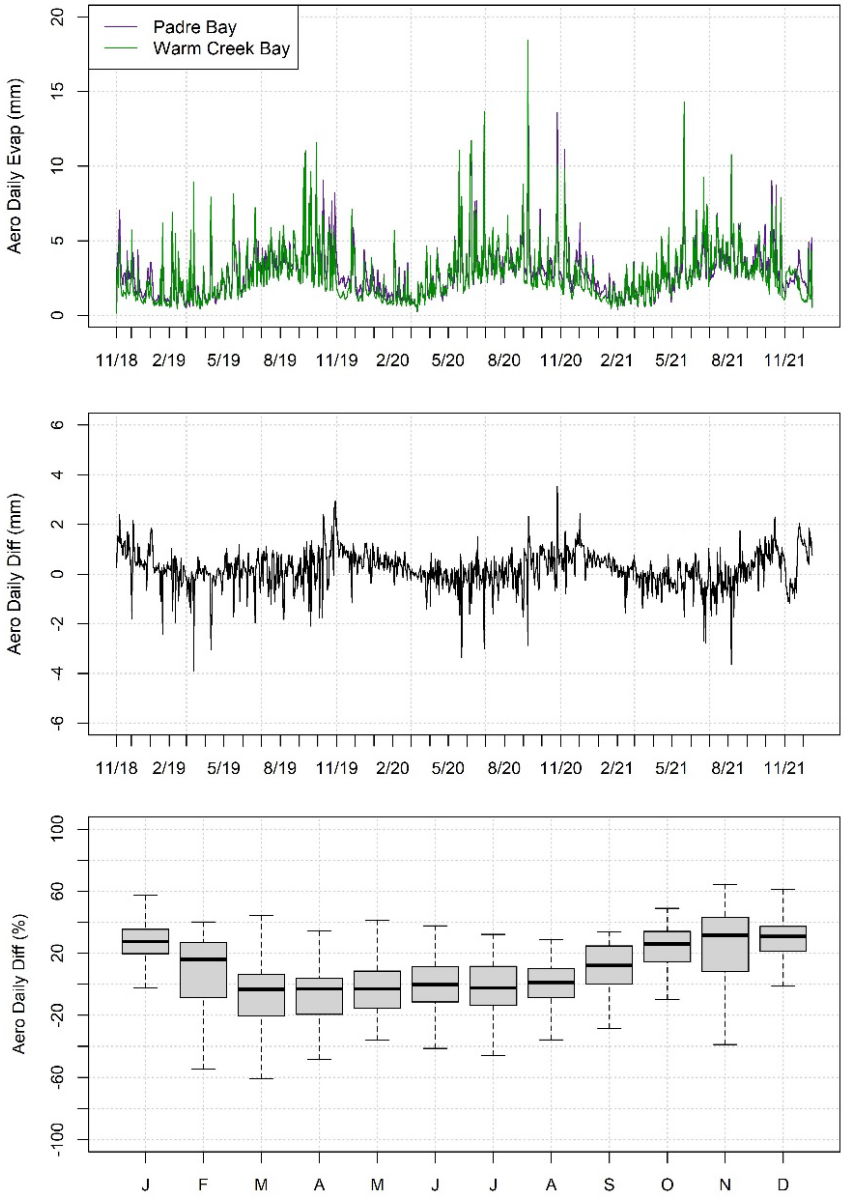



**Figure 11—Same as Figure 10 except based on the aerodynamic approach.**

Differences between the two in-situ methods are illustrated in Figure 12. The top panel shows time series of daily differences at the two locations (EC minus aerodynamic). At Padre Bay, daily differences between the methods range from -2.5 to +4.3 mm. Average daily total evaporation from the aerodynamic method at Padre Bay is 2.9 mm (compared to the 3.6 mm average daily total from EC). At Warm Creek Bay, daily differences between the two methods range from -6 to 3.5 mm, where average daily total evaporation from the aerodynamic method is 2.7 mm over the study period (compared to the 3.2 mm average daily total from EC).

Scatterplots in the bottom two panels of Figure 12 show the relationship between daily EC evaporation totals and daily aerodynamic evaporation totals at the two locations separately. Correlations between the two daily datasets are 0.91 and 0.89 at Padre Bay and Warm Creek Bay, respectively. The slope of a linear regression model fit to EC data predicted using aerodynamic data assuming a y-intercept of 0 (also referred to as slope through origin) is also shown in each panel of Figure 12. The slope through the origin is sometimes used as a metric for bias relative to the x-axis variable (e.g., Melton et al. 2021). In both panels, we see that the slope is greater than 1, indicating that daily EC totals generally exceed daily aerodynamic totals by 17% and 9% at Padre Bay and Warm Creek Bay, respectively. This finding suggests a general negative bias with the MOST-derived aerodynamic estimates.

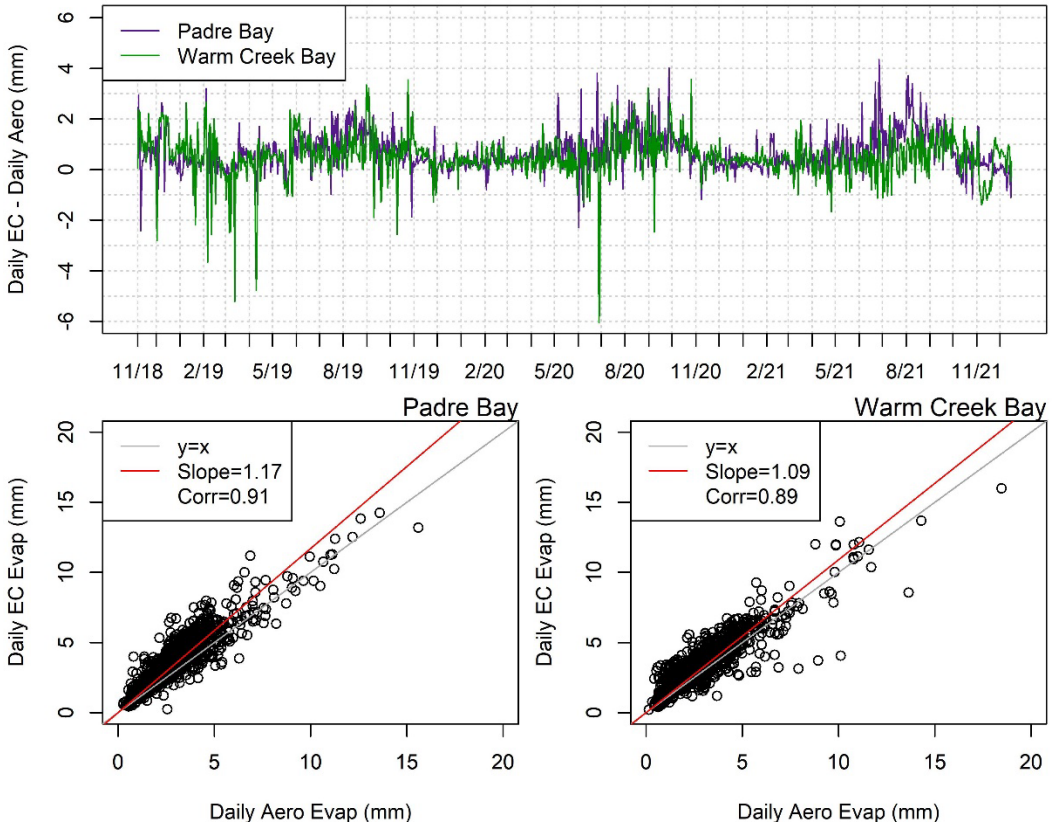



**Figure 12—(top) Time series of daily EC evaporation totals minus daily aerodynamic evaporation totals at Padre Bay and Warm Creek Bay. (bottom) Scatterplots of daily EC evaporation totals (mm) versus daily aerodynamic totals (mm) at (left) Padre Bay and (right) Warm Creek Bay. Slope values represent the slope of a linear model when forced through the intercept (0,0). Correlation values are also listed.**

### 4.1.2 Monthly Time Scale

Location and method comparisons at the monthly time step are shown in Figure 13. Results in the top two panels (a and b) of Figure 13 indicate that monthly evaporation totals from Padre Bay are generally larger than corresponding totals from Warm Creek Bay based on the EC and aerodynamic methods (11% and 5%, respectively). In absolute values, this equates to an average difference of 10.6 mm (0.42 in) between EC estimates at Padre Bay and Warm Creek Bay, where Padre Bay is larger. For aerodynamic totals, Padre Bay is on average 6.1 mm (0.24 in) greater than Warm Creek Bay.

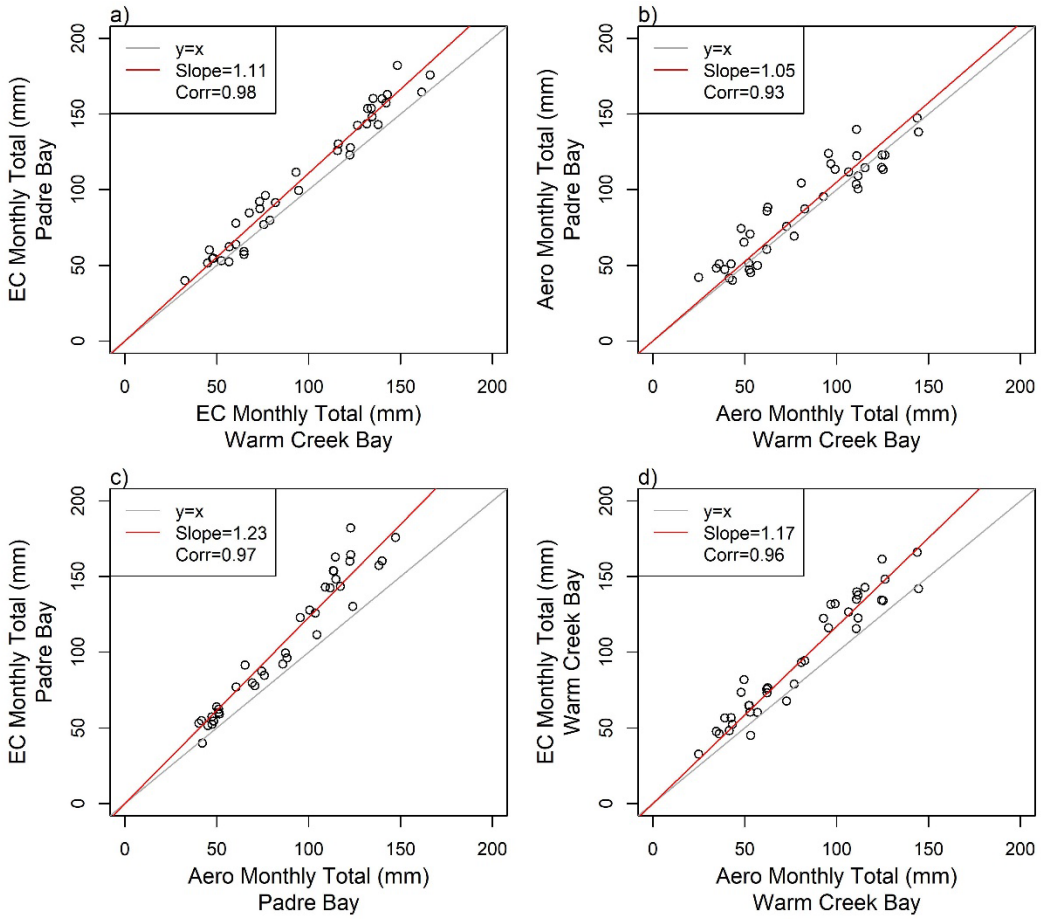



**Figure 13—Scatterplots of monthly evaporation totals (mm): a) EC at Padre Bay versus EC at Warm Creek Bay, b) aerodynamic at Padre Bay versus aerodynamic at Warm Creek Bay, c) EC at Padre Bay versus aerodynamic at Padre Bay, and d) EC at Warm Creek Bay versus aerodynamic at Warm Creek Bay. Slope values represent the slope of a linear model when forced through the intercept (0,0). Correlation values are also listed.**

Results in the bottom two panels of Figure 13 reflect differences between the two estimation methods. Monthly totals from the EC method generally exceed corresponding totals from the aerodynamic method at both locations. The average difference in monthly total evaporation (computed as EC minus aerodynamic) at Padre Bay is 19.81 mm (0.78 in) or a bias of 23% relative to aerodynamic estimates. The average difference in monthly total evaporation between methods at Warm Creek Bay is 15.3 mm (0.6 in) or a bias of 17% relative to aerodynamic estimates. These differences represent the average difference computed across all months in the study period and indicate that monthly differences in evaporation totals between methods are larger than monthly differences in evaporation totals between sites.

Monthly evaporation totals from all possible methods are summarized in Figure 14 and Appendix 3. EC data are shown as bars, while all other methods are shown as lines. Results indicate that monthly totals from the EC method exceed monthly totals from the aerodynamic method at Padre Bay in all months except December 2021, which is a partial month. Similarly, monthly EC totals at Warm Creek Bay exceed corresponding monthly aerodynamic totals in all months except three (March 2019, June 2020, and November 2021). During 2019, monthly total evaporation peaks during September at both locations. During the other two years, monthly total evaporation peaks during August. This difference in timing of peak evaporation could be related to variations in water level experienced over the study period. Water levels were highest during the first year of observation (August 2019) and generally declined after (e.g., section 1.4). This finding demonstrates that the month of peak evaporation may change from one year to another.

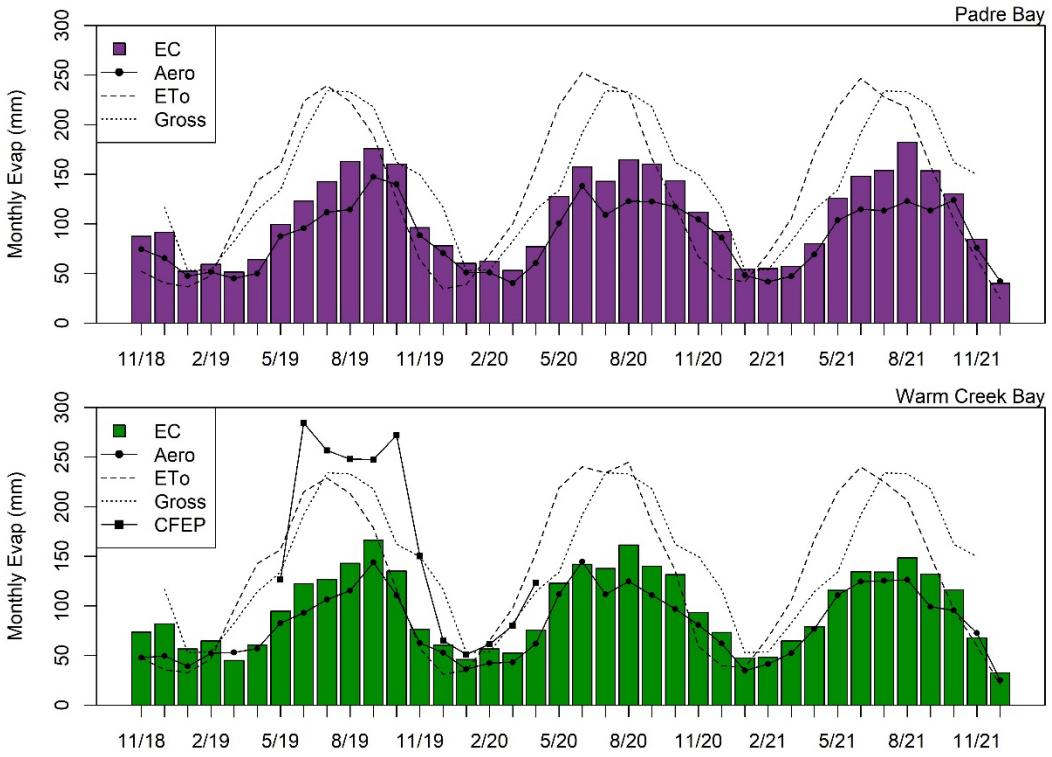



**Figure 14—Monthly evaporation totals (mm) based on EC, aerodynamic, reference ET, gross evaporation coefficients, and CFEP valid at (top) Padre Bay and (bottom) Warm Creek Bay during the study period.**

Additional results in Figure 14 show that monthly ETo peaks in June of each year at each location following Northern Hemisphere solar radiation. The gross evaporation coefficients are typically greater than monthly EC and aerodynamic totals; a few exceptions exist during winter months. We see that gross evaporation coefficients are similar to monthly ETo totals, a finding that demonstrates how Class A pan evaporation data (which informed the gross evaporation method) is closer to reference evapotranspiration than reservoir evaporation at this location. Monthly CFEP totals generally agree with the other estimates during winter months (e.g., December 2019, January 2020, and February 2020). However, during the warm season (May through November 2019), CFEP estimates greatly exceed EC, aerodynamic, and some ETo and gross evaporation coefficients. See Reclamation (2021) for additional details on the CFEP as applied at Lake Powell.

### 4.1.3 Yearly Time Scale

Differences in monthly evaporation totals integrate over time to produce differences in yearly evaporative losses. Totals for each (calendar) year of this study are listed in Table 4.1 and shown graphically in Figure 15. We exclude CFEP results because the period of record for that dataset is split between two calendar years. Results in Table 4.1 and Figure 15 agree with monthly results

discussed above, where EC evaporative totals exceed aerodynamic totals at both sites. Furthermore, three methods (EC, aerodynamic, and reference ET) show higher evaporative losses at Padre Bay compared to Warm Creek Bay. Results also show that evaporation totals during 2019 were lower than evaporation totals during 2020 for each method listed (except the gross evaporation coefficients, which do not vary).

**Table 4.1—Annual evaporation totals (mm) as a function of calendar year. Values in parentheses are in units of feet. Years 2018 (November 7 through December 31) and 2021 (January 1 through December 16) represent partial totals.**

| Year | Padre Bay | | | Warm Creek Bay | | | Gross Evap |
|---|---|---|---|---|---|---|---|
| | EC | Aero | ETo | EC | Aero | ETo | |
| 2018 | 179.01 (0.59) | 139.85 (0.46) | 92.61 (0.3) | 155.51 (0.51) | 97.65 (0.32) | 83.23 (0.27) | - |
| 2019 | 1265.25 (4.15) | 1049.39 (3.44) | 1579.99 (5.18) | 1151.21 (3.78) | 968.99 (3.18) | 1515.02 (4.97) | 1743.71 (5.72) |
| 2020 | 1352.98 (4.44) | 1103.96 (3.62) | 1707.14 (5.60) | 1232.97 (4.05) | 1027.23 (3.37) | 1707.31 (5.60) | 1743.71 (5.72) |
| 2021 | 1265.46 (4.15) | 1016.76 (3.34) | 1650.31 (5.41) | 1120.59 (3.68) | 984.51 (3.23) | 1592.05 (5.34) | - |

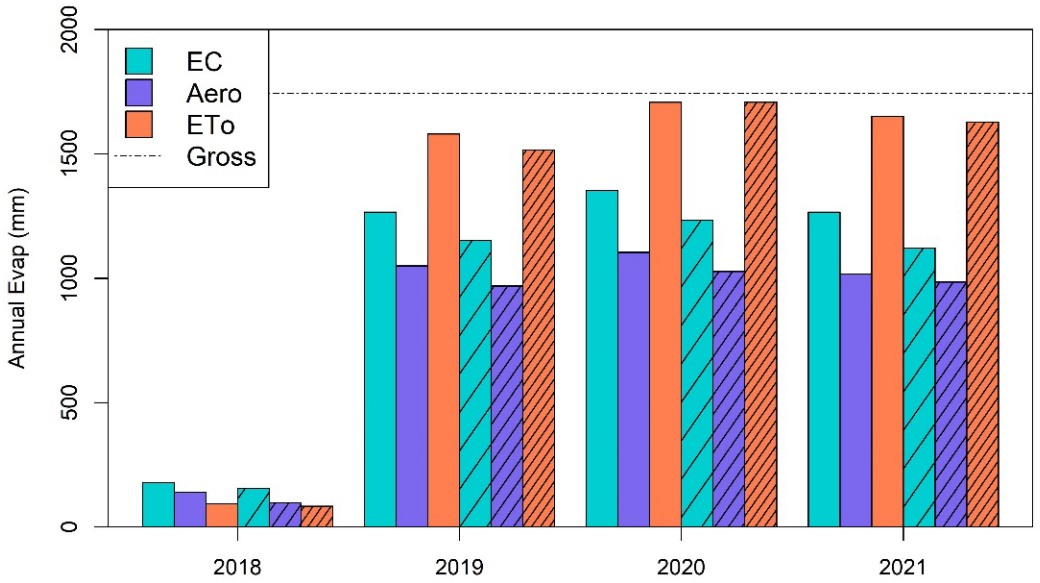



**Figure 15—Yearly evaporation totals (mm) at Padre Bay (solid bars) and Warm Creek Bay (hatched bars) based on three methods during each calendar year of the study. Gross evaporation coefficients (horizontal dash dot line) do not vary by year. Years 2018 (November 7 through December 31) and 2021 (January 1 through December 16) represent partial totals.**

### 4.1.4 Mass Transfer Coefficient Calibration

The aerodynamic method applied in this study relies on MOST for estimation of the bulk mass transfer coefficient, Ce. Historical applications with limited data or processing capability have utilized fixed coefficients based on reservoir size and other static factors (Fisher et al. 1979; Brutsaert 1982). The massive amount of data provided by modern in-situ measurements allows us to understand how Ce varies independently of reservoir size alone. To account for unique reservoir characteristics and atmospheric exchange properties, calibration of Ce using independent evaporation estimates such as EC or energy balance estimates is recommended (Brutsaert, 1982). Our results show that Ce is a function of atmospheric stability and windspeed (Figure 16), where stability is defined by the Monin-Obukhov length, z/L. Stable is defined as $z/L > 0$, unstable is defined as $z/L < 0$, and neutral is defined as $z/L = 0$. Neutral conditions ($z/L=0$) occur when the iterative MOST Ce estimation fails to converge on either unstable or stable solutions. Similar to previous findings, neutral coefficients approach stable and unstable values at windspeeds greater than 8 m/s (Tanny 2007; Verburg and Antenucci 2010).

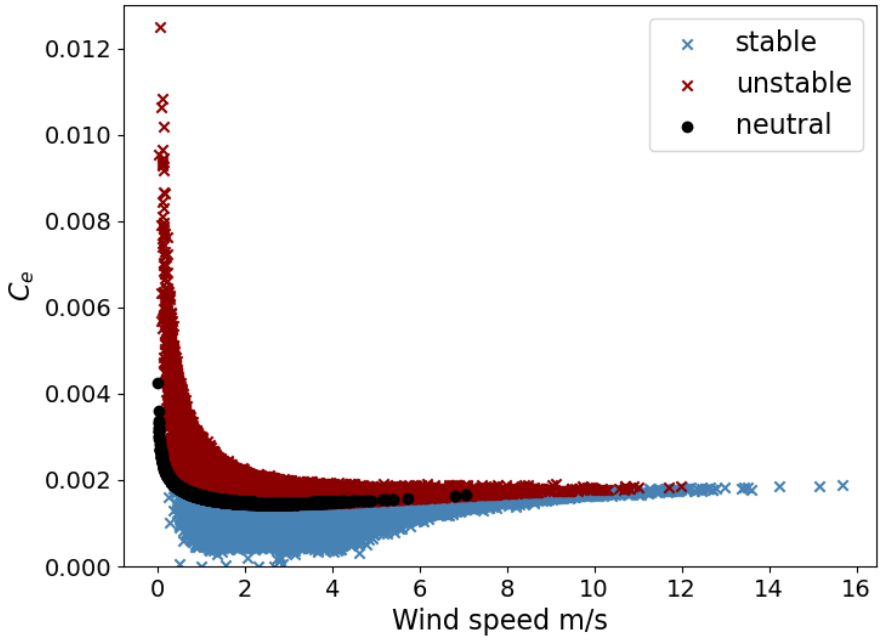



**Figure 16—Scatterplot of MOST derived 30-minute mass transfer coefficient estimates, Ce, versus windspeed and stability at Padre Bay.**

The scatterplot in Figure 16 demonstrates how the MOST transfer coefficient varies as a function of wind speed and atmospheric stability at the 30-minute time scale. The transfer coefficient also varies as a function of month. Figure 17 shows box and whisker plots of 30-minute Ce values plotted as a function of month and year at both locations. Notice the restricted data availability range, which is

associated with the loss of data during the beginning of the study period. Monthly median values of Ce generally peak during cool season months (e.g., October through March) at both locations, with median values reaching a minimum during warm season months (April through August). The lower Ce values experienced during warm season months is likely related to stable atmospheric conditions that develop over water bodies when water temperatures are cooler than air temperatures above (i.e., stably stratified). The opposite tends to be true during the cool season when water temperatures exceed overlying air temperatures. This behavior has been documented on other large lakes (e.g., Spence et al. 2011; Holman et al. 2012).

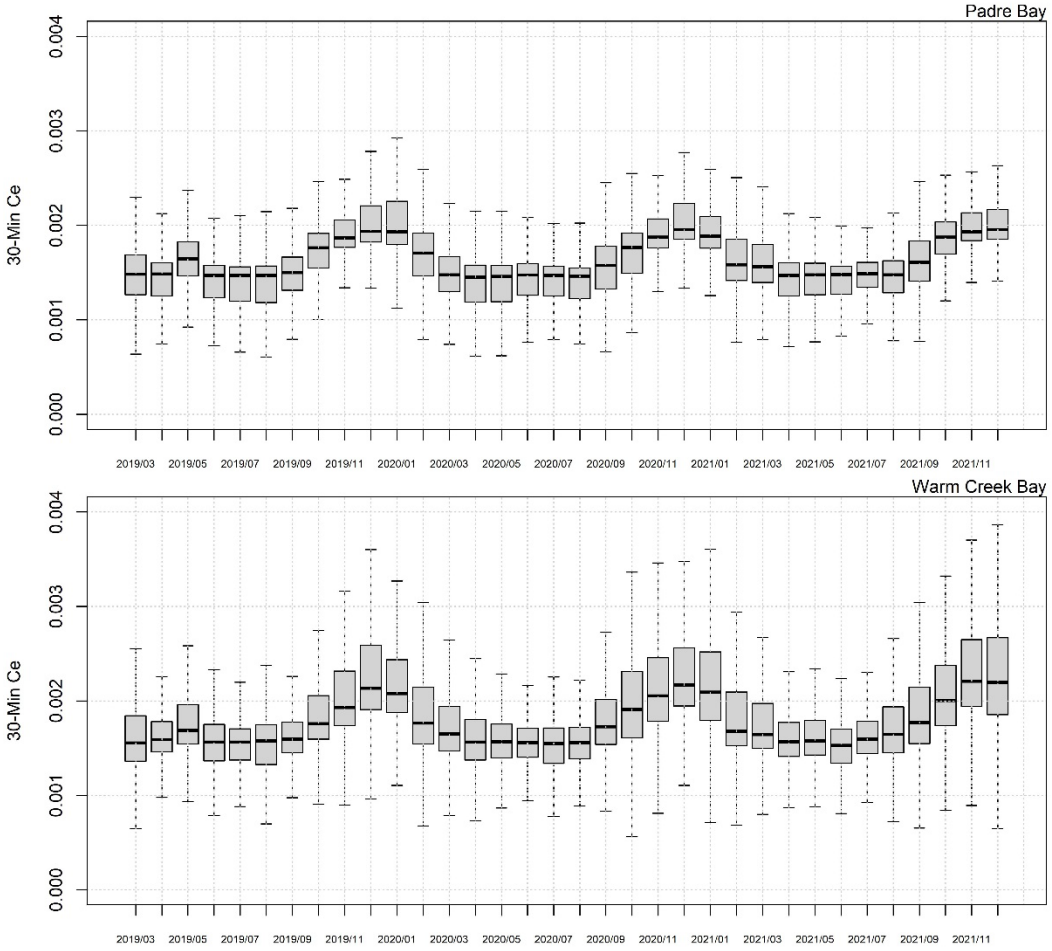



**Figure 17—Box and whisker plots of 30-minute Ce values as a function of year/month at (left) Padre Bay and (right) Warm Creek Bay. Thick horizontal lines represent the population median. Shaded rectangles extend to the 25$^{th}$ and 75$^{th}$ percentiles. Whiskers extend to 1.5 times the inter-quartile range.**

Relative to EC, the aerodynamic approach represents a more cost-effective option for long-term monitoring. However, results in Figure 14 and Figure 15 suggest that evaporation estimates from the aerodynamic method (as applied in this study) are underestimated relative to the EC method at monthly and yearly time scales. We propose two different methods for modifying the MOST bulk mass transfer coefficients to help remedy this finding. The first method involves estimating the bulk mass transfer coefficient by substituting daily EC evaporation and daily average wind speed, saturated specific humidity, and 2 m specific humidity into Equation 2 and solving for Ce. More specifically, Ce is estimated as the slope of a linear regression between the two variables (evaporation and the product of the latent heat of vaporization, wind speed, and saturated specific humidity of the water surface temperature minus the 2 m specific humidity) forced through the intercept. We apply this approach to 30-minute observations from Padre Bay and Warm Creek Bay and estimate a monthly average Ce value for each month separately (see supplemental plots in Appendix 2.3.2). We refer to this method as the EC-based approach. The second method involves calibrating the MOST-derived Ce estimates using results from the EC method as "truth". Specifically, we develop a Ce correction factor by taking the ratio of multi-year average monthly total EC evaporation (12 values) to multi-year average monthly total aerodynamic evaporation (12 values) and multiplying the resulting coefficient by the existing multi-year average monthly average Ce value. We refer to this approach as the scale-factor approach.

Monthly bulk mass transfer coefficients from the three different approaches (MOST-derived, EC-based, and scale factor) are shown in Figure 18. Results indicate that at Padre Bay, the EC-based and scale-factor based Ce estimates exceed the MOST estimates during each month. At Warm Creek Bay, this finding does not hold true. Instead, the EC-based Ce values are less than the MOST-based values between April and August. During the remainder of the year, the EC-based Ce values exceed the MOST-based values. As with Padre Bay, the scale-factor based Ce values exceed the MOST-based values during every month at Warm Creek Bay. We do not use these coefficients in the current study. Rather, we present these adjustments to demonstrate how aerodynamic evaporation estimates could be modified at this location in the absence of EC data.

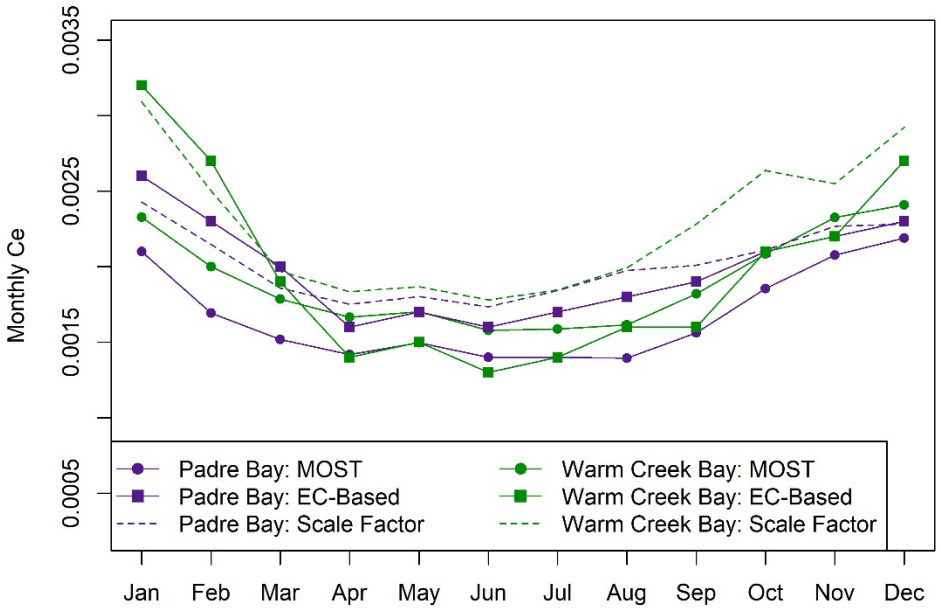



**Figure 18—Average monthly Ce values computed over all years at Padre Bay and Warm Creek Bay based on the original MOST method, EC-based approach, and scale-factor approach.**

Direct comparison of transfer coefficients from other studies and lakes is difficult due to the dynamic nature and dependence of Ce on windspeed, measurement heights, and atmospheric stability. Ce estimates from this study fall within the range of other mass-transfer values reported in the literature. For example, Harbeck (1962) utilized a constant transfer coefficient of 0.0019 for Lake Hefner, a reservoir located in Oklahoma (note that Harbeck Ce values were converted to SI units and reported by Tanny, 2008). Tanny (2008) estimated constant Ce values of 0.00194 and 0.00188 for unstable conditions at measurement heights of 0-0.9 m and 0-2.9 m, respectively, for a small reservoir in Israel. Finally, Verburg and Antenucci (2010) highlighted the importance of stability adjustments when estimating Ce and reported an average Ce value of 0.00185 for a one-year study at Lake Tanganyika.

## 4.2 Gridded Climate and Remote Sensing Comparisons

Continuous data collection that captures the spatial and temporal variability of over-water conditions is difficult and costly to maintain. Therefore, long-term, operational estimation and evaluation of reservoir evaporation likely requires the use of remotely sensed and/or gridded climate datasets to capture such variability. A secondary objective of the current project is to utilize over-water observations to assess the representativeness of readily available gridded climate and remote

sensing datasets at Lake Powell and assess their potential for application within reservoir evaporation models for long-term modeling and prediction.

### 4.2.1 Gridded Weather Comparison

Many gridded climate products do not acknowledge or account for the presence of large water bodies in their land surface modeling. Furthermore, when present, many water mask adjustments fail to provide accurate estimates of over-water weather. Evaporative cooling affects the condition of the atmosphere above a water body, leading to cooler temperatures and increased humidity. Not accounting for the presence of water in near-surface modeling overestimates air temperature and the vapor pressure deficit (VPD), which in turn leads to overestimates of evaporation when applying traditional approaches that rely on accurate weather forcing information such as aerodynamic methods.

For this work, we focus on the Real-time Mesoscale Analysis (RTMA) climate dataset (De Pondeca, 2011). RTMA provides hourly estimates of near-surface weather conditions including air temperature, specific humidity, atmospheric pressure, and wind speed at 2.5-km resolution. Importantly, RTMA incorporates buoy-based datasets and utilizes a land/water mask to restrict the interpolation of land-based observations over water (De Pondeca, 2011). Incoming solar radiation estimates were derived from the North American Land Data Assimilation System-2 (NLDAS-2, Xia, Youlong, et al, 2012) to fulfill all forcing requirements of many open-water evaporation models as well as reference ET. Previous work focusing on agricultural areas demonstrates that RTMA can capture evaporative cooling effects related to irrigation applications not directly accounted for in other forcing datasets such as gridMET (Blankenau, 2020).

Intercomparisons of daily RTMA and NLDAS observations with in-situ observations at the two reservoir sites from November 2018- December 2021 are shown in Figure 19. RTMA data represents a spatial average of all water masked grid cells intersecting Lake Powell. The NLDAS solar radiation observations generally underestimated solar radiation relative to in-situ observations, with bias estimates (indicated by the slope through zero) of 0.94 for both locations, RMSE values between 10.996 and 11.560 W/m$^2$, and $R^2$ values of 0.98 (bottom plot of Figure 19). $R^2$ values close to 1 indicate good correlation and ability to simulate temporal variability. RMSE values of RTMA and in-situ air temperature at Padre Bay and Warm Creek from 2019-2021 were 0.93 and 0.85 degrees C, respectively. Daily average wind speed estimates from RTMA were consistently lower than in-situ station measurements. Slope values for Padre Bay and Warm Creek were 0.80 and 0.91, respectively. The lower wind speeds in RTMA may be an artifact of its use of surface aerodynamic roughness characteristic of vegetation and surrounding terrain during data generation rather than the smoother roughness for open water. The open water roughness produces a steeper wind profile above water and higher wind speeds near the water surface. RTMA VPD estimates show

a relatively high bias relative to in-situ station measurements (slope values of 1.11 and 1.09 for Padre Bay and Warm Creek, respectively). Observed VPD bias is a product of biases in both air temperature and specific humidity where increased temperatures lead to increased VPD when the amount of water vapor in the air remains constant.

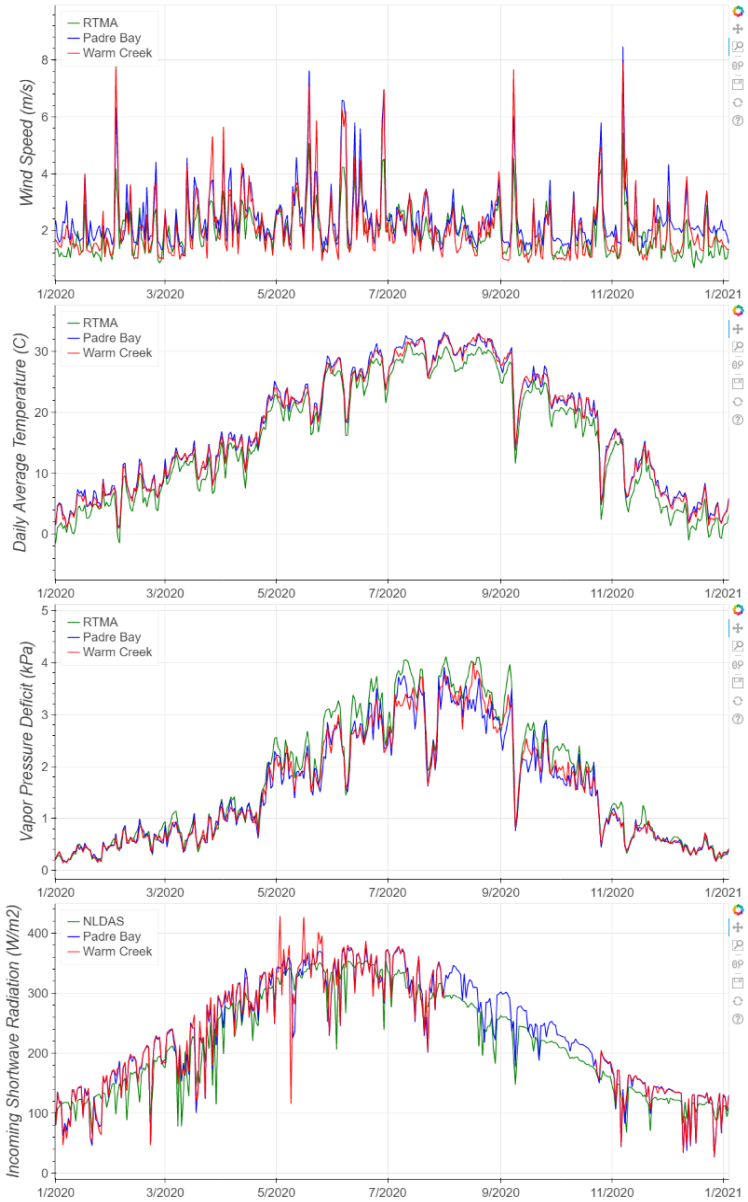



**Figure 19—Timeseries plot of reservoir average RTMA estimates with in-situ observations of wind speed, air temperature, vapor pressure deficit, and incoming shortwave from Padre Bay and Warm Creek stations during 2020.**

Many models of reservoir evaporation, such as the Complementary Relationship Lake Evaporation Model (Morton, 1983) and the Texas A&M Lake Evaporation Model (Zhao and Gao, 2019), employ internal conditioning functions to adjust land-based weather datasets to represent over-water settings. However, the accuracy of these conditioning functions can vary widely depending on location and environment. Results from this comparison demonstrate the ability of RTMA to capture seasonal patterns in over-water weather conditions. Evaporative cooling effects, not accounted for in other gridded climate products, are somewhat represented within RTMA, however, further refinement and testing is needed prior to direct (i.e., out-of-the-box) application of RTMA at all locations and reservoirs. Results from this comparison demonstrate the ability of RTMA to accurately estimate over-water settings, opening opportunities for improved reservoir evaporation modeling.

### 4.2.2 Landsat Surface Temperature

The Landsat Program provides high resolution (~100-m resolution) land surface temperature (LST) observations at 8-to-16-day satellite overpass frequency since 1985. Unless explicitly stated, we use LST to refer to both land and water surface observations. Landsat LST is an instantaneous snapshot collected at approximately 11:00 AM each overpass day. Other satellite platforms provide more frequent image collection; however, they often sacrifice spatial resolution for improved temporal coverage (e.g., MODIS daily LST observations at 1000-m resolution). Use of Landsat helps to avoid interference of land and shallow regions. To avoid issues with Landsat 7 orbital drift and image acquisition time variability, we focus only on Landsat 8 comparisons for this analysis. It should be noted that the Landsat 8 thermal infrared sensor collects data at 100-m resolution and values are resampled to 30-m resolution during processing. Figure 20 shows January, April, July, and October monthly averages of Landsat 8 LST observations from 2014 to 2021 for the southwest region of Lake Powell. Spatial variability in LST changes dynamically throughout the year depending on reservoir characteristics, such as fetch and depth. Note how surface temperatures at Padre Bay (central portion of the figure) remain higher than other areas during the winter months due to greater depth and increased heat storage.

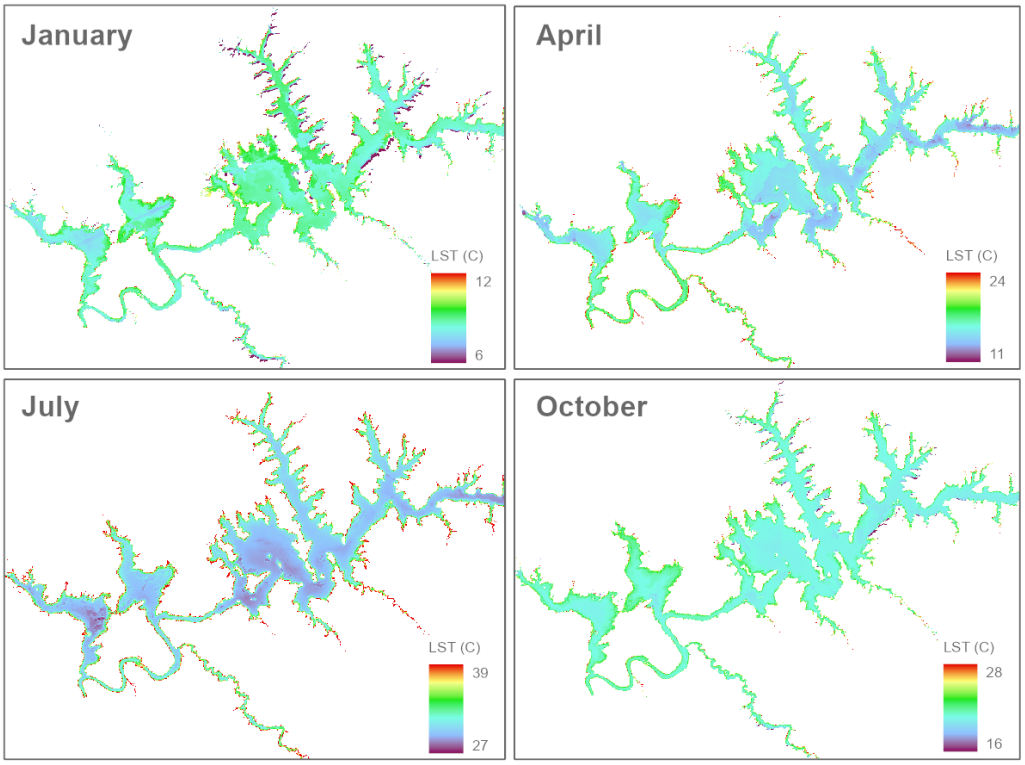



**Figure 20—Monthly average Landsat 8 Land Surface Temperature from 2014-2021 for January, April, August, and October.**

Landsat 8 LST from each monitoring station's coincident Landsat pixel correlated well with in-situ IRT-based skin temperature data at both Padre Bay and Warm Creek study sites ($R^2$ of 0.959 and 0.944, respectively; Figure 21). Both sites had positive bias between in-situ skin temperature and satellite LST observations (slope through zero of 1.071 and 1.070 and mean bias of 1.24 and 1.27 °C for Padre Bay and Warm Creek, respectively). Expansion of the Landsat LST footprint to include additional pixels surrounding the monitoring platforms show similar statistical relationships to the coincident pixel comparisons (data not shown).

There are numerous reasons why satellite LST estimates are not in perfect agreement with in-situ observations. Skin temperature collected at each monitoring platform is based on 30-minute average conditions between 11:00 AM and 11:30 AM which is slightly out of synchronization with Landsat's instantaneous observation (~11:02 AM). Other reasons for differences in temperature may include spatial resolution (i.e., 30-m vs point measurement), inclusion of the monitoring platform within the Landsat pixel (i.e., dock surface relative to water surface), satellite cloud masking, atmospheric corrections, and in-situ correction assumptions such as the emissivity of water, as well as incoming long-wave correction of the IRT measurements. IRT data collected

during this study is not ideal for LST validation due to platform motion and the frequent influence of artifacts such as spider webs and dust (refer to section 1.3.1.1 and Reclamation, 2021). However, strong correlations between in-situ observations collected and satellite-based estimates improve confidence for future modeling applications and use of remote sensing datasets for continuous, broad-scale estimation of reservoir evaporation. Additional investigation is needed to understand spatial variability in lake surface temperatures and the potential influence of the positive bias on remotely sensed evaporation estimates.

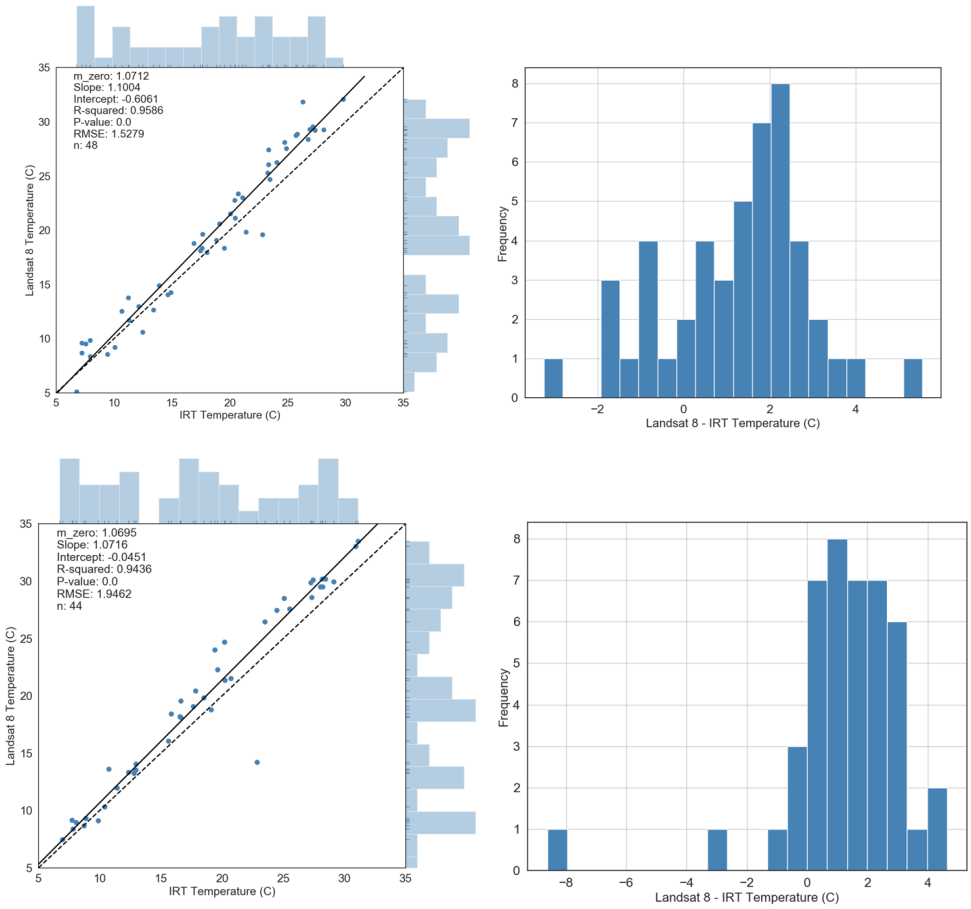



**Figure 21—Scatterplot and distribution of differences comparing average skin temperature observations valid between 11:00 AM to 11:30 AM MST with Landsat 8 LST observations from the coincident 30-m pixel at (top) Padre Bay and (bottom) Warm Creek Bay locations. Least square linear regression line is shown as solid black, while the y=x line is shown as dashed black. Distribution of temperature values is shown using bar plots along each respective axis. Differences are calculated as Landsat 8 temperature minus IRT temperature.**

### 4.2.3 Remotely Sensed Reservoir Evaporation

Remote sensing models (RSMs) utilize satellite-based visible and infrared surface measurements combined with meteorological data to estimate individual components of the surface energy balance or to scale reference evaporative demand values to actual conditions. Multiple RSMs capable of estimating reservoir evaporation exist in the literature (Abdelrady 2016; Allen 2007; Zhao 2021), however, few if any, have been used in operational settings. Lack of consistent, high quality in-situ datasets leads to limited validation, creating uncertainty when applying these methods to new regions and systems. Furthermore, large differences in evaporation estimates from in-situ methodologies create further uncertainty during accuracy assessment (Metzeger 2018; Mosner 2003; Westerhoff 2015).

The Lake Powell monitoring stations provide benchmark evaporation estimates based on over-water measurements using best available science and techniques. These estimates are representative of two large bays at Lake Powell, but differences in water temperature and near-surface weather conditions throughout the reservoir lead to spatially varying evaporation rates. It is likely that using a combination approach based on gridded climate data and remotely sensed surface temperature can help to capture these variations and improve estimates of total reservoir evaporation. Furthermore, in addition to capturing spatial variability, the incorporation of water temperature data helps to account for the impact of heat storage as well as inflow and outflow dynamics.

Most RSMs utilize evaporation estimates at the time of satellite overpass along with hourly and daily climate relationships to scale from instantaneous estimates to daily values. Daily evaporative fraction values derived on satellite overpass days are then interpolated and combined with daily meteorological forcing data to compute longer-term evaporation time series. Uncertainty in climate forcing data and the variability of instantaneous observations relative to longer-term values can be problematic during scaling to daily and monthly estimates. For example, evaporation is highly sensitive to wind speed which can be extremely variable at short time scales. Additionally, the use of land-based gridded climate datasets for over-water applications can lead to overestimation, especially in arid and semi-arid regions where over-water conditions are drastically different from the surrounding landscape.

As proof of concept, we present preliminary evaporation estimates from OpenET's application of AquaSEBS (Abdelrady, 2016) within the PTJPL (Priestly-Taylor Jet Propulsion Laboratory) model (Fisher, 2018). AquaSEBS utilizes an Equilibrium Temperature Model based on surface temperature, albedo, wind speed, humidity, and solar radiation to estimate evaporation at the time of the satellite overpass. The instantaneous estimate is then upscaled to daily through a fractional scaling approach based on instantaneous and daily net radiation.

Currently, OpenET's PTJPL implementation relies on Landsat for surface temperature and albedo and NLDAS-2 for air temperature, vapor pressure, and incoming shortwave and longwave radiation. PTJPL evaporation estimates are produced for each 30-m Landsat pixel throughout the water body.

For this comparison, spatially weighted PTJPL evaporation estimates were extracted for each monitoring site for all cloud-free satellite overpass days using dynamic footprints based on the EC analysis. Comparison of daily estimates taken on satellite overpass days with daily EC estimates (Figure 22) shows bias values of 1.02 and 1.17 (i.e., biases of 2% and 17%) and RMSE of 2.2 and 2.7 mm for Padre Bay and Warm Creek, respectively. $R^2$ values for Padre Bay and Warm Creek were 0.28 and 0.20, with the low $R^2$ driven primarily by a clear mismatch in seasonal evaporation timing (i.e., premature peak). Landsat LST comparisons show good correlation and a high bias relative to in-situ observations (see section 4.6.2). Disagreements between PTJPL and in-situ EC estimates are potentially driven by uncertainty and bias in the meteorological forcing dataset and simulated energy balance. NLDAS-2 is a 12-km resolution product that does not actively adjust for over-water conditions or account for the surrounding arid landscape and complex terrain. In addition, NLDAS wind speed estimates are derived from large-scale (32-km) North American Regional Reanalysis (NARR) model simulations that do not capture the synoptic daily variability in winds well. Future RSM applications with high-resolution climate datasets, such as RTMA, and incorporation of over-water adjustments and/or bias corrections based on in-situ measurements will help improve forcing data and in turn help RSMs better simulate reservoir evaporation.

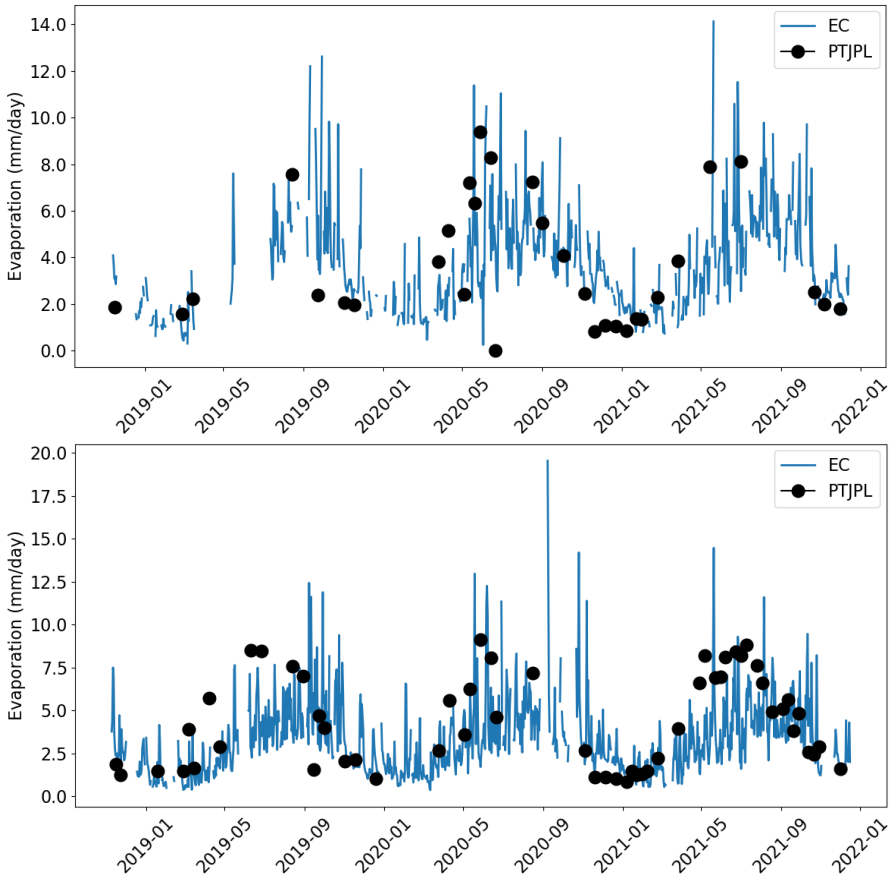



**Figure 22—Time series plot of daily EC evaporation estimates (non-gap filled), and remotely sensed evaporation estimates from the PTJPL RSM on satellite overpass days at (top) Padre Bay and (bottom) Warm Creek Bay.**

Open ET's PTJPL demonstrates one method of estimating reservoir evaporation using satellite data. Other RSM approaches exist that utilize different satellite platforms and are less reliant on the scaling of instantaneous estimates. For example, Texas A&M University recently developed a Lake Evaporation Model (LEM) that utilizes fetch-based conditioning functions to account for evaporative cooling effects and an internal heat storage simulation to estimate heat storage (Zhao, 2019). Model developers are working to couple LEM with remotely sensed surface temperature from MODIS (moderate resolution imaging spectroradiometer) for improved tracking and simulation of water temperature (Zhao, 2021). While MODIS offers more frequent overpass timing, the reduced spatial resolution of 1000 m is not adequate for LST measurement at all reservoirs. Further testing, intercomparisons, and validation work is needed to identify strengths and weaknesses of each approach as well as the impact of different satellite and climate forcing datasets.

# 5 Discussion

Although we utilized state-of-the-art instrumentation and data processing methods to produce evaporation estimates at Padre Bay and Warm Creek Bay, limitations exist. For example, all datasets were impacted (to various degrees) by data gaps. We implemented a gap-filling procedure that has been documented in the literature and applied to EC data. However, alternative gap filling methods exist and could result in different estimates.

Secondly, the EC evaporation estimates presented in this study have not been corrected for energy budget closure imbalances. Energy budget imbalances occur when the sum of the turbulent fluxes does not equal the sum of net radiation and change in heat storage. The heat storage term is notoriously hard to quantify, and there is some debate within the scientific community whether or not the correction is needed (e.g., Foken et al., 2012). While Moreo and Swancar (2013) and Earp and Moreo (2021) account for the energy imbalance issue in evaporation computations at Lake Mead and Lake Mohave, the task is less practical at Lake Powell due to the lack of data on some of the energy sources and sinks to the system. Consequently, we acknowledge this limitation here.

The third limitation of this study relates to the aerodynamic method. More specifically, comparisons between EC estimates and aerodynamic estimates as implemented in this work suggest that the bulk mass transfer coefficient based on MOST may be under-estimated during certain times of year. Estimating the bulk mass transfer coefficient using EC evaporation estimates as truth is an alternative way for estimating the coefficient. Similarly, adjusting the MOST-based mass transfer coefficient so that monthly aerodynamic totals equal monthly EC totals is a second (less common) way to address this difference. Although we presented two methods for updating the bulk mass transfer coefficients, we do not propose to use them unless EC data are missing.

Finally, the evaporation estimates presented in this report are representative of two of Lake Powell's larger bays. Complex bathymetry, wind, and temperature dynamics lead to varying evaporation rates across the reservoir surface. Previous measurements and studies performed in other regions of the reservoir or at locations closer to shore with limited fetch may be biased high relative to stations located at the center of the water body.

In the future, updated evaporation estimates produced in this study will be shared with the Power Office of the Upper Colorado Basin Regional Office for evaluation in their hydrologic modeling system. As data collection continues, reservoir evaporation estimates from the current study (i.e., three years of EC and aerodynamic results) will also be used to support other ongoing operational

evaporation studies at Reclamation. Specifically, the Padre Bay and Warm Creek Bay evaporation time series may be used for validation and comparison of alternative remote sensing datasets, including a dataset generated using the Lake Evaporation Model (LEM) developed by Zhao and Gao (2019).

# 6 Summary

Lake Powell is the second largest man-made reservoir by water capacity in the United States, second only to Lake Mead. Estimates of evaporative losses from Lake Powell are used to support hydrologic modeling and decision making in the Upper Colorado River Basin. Present-day estimates of monthly evaporation rates from Lake Powell, referred to as gross evaporation coefficients, are based on historical estimates developed by Reclamation (1986) and are static and do not reflect variable climate conditions. To support improved water resource management in the Upper Colorado River Basin, Reclamation partnered with the Desert Research Institute (DRI) to develop alternative estimates of evaporation from Lake Powell using modern in-situ methods.

In this study, we developed sub-daily, daily, monthly, and yearly evaporation totals from Lake Powell using two independent methods valid between November 7, 2018, and December 16, 2021. These methods, which include eddy covariance (EC) and bulk aerodynamic, were based on over-water observations recorded via floating platforms at two different locations on Lake Powell. The EC method is often considered the gold standard for evaporation estimation within the scientific community (e.g., Moreo 2013), although the aerodynamic approach is often easier to implement, experiences fewer instrumentation outages, and is less expensive overall (e.g., Friedrich et al. 2018).

Results from the current study indicate that EC and aerodynamic estimates agree well at daily and monthly time scales, with weaker agreement between the two datasets at the 30-minute time scale (at both locations). There is a slight negative bias in daily and monthly aerodynamic estimates relative to EC estimates, which can be addressed by adjusting the bulk mass transfer coefficient. Beyond in-situ methods, we compared monthly, and annual totals developed in the current study with alternative datasets available for Lake Powell (gross evaporation coefficients, reference ET, and CFEP). Results showed that monthly evaporation totals from the three additional datasets generally exceeded corresponding totals from both the EC and aerodynamic methods.

Long-term operation of over-water instrumentation is expensive and difficult. Therefore, we explored how observations obtained in the current study compared with remotely sensed and gridded weather datasets to support alternative methods of estimating reservoir evaporation. Comparison of over-water observations with

gridded estimates from RTMA show good correlation; however, additional corrections are needed to fully capture evaporative cooling effects on modeled air temperature and relative humidity and over-water surface roughness impacts on modeled wind speed. Preliminary assessment of remotely sensed evaporation estimates from the PTJPL AquaSEBs model on satellite overpass days shows large seasonal biases based on estimates driven using forcing data from NLDAS-2. Application of AquaSEBs with high-accuracy forcing data (e.g., RTMA) will likely improve evaporation estimates and model skill.

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# Appendix 1. Aerodynamic Mass Transfer Approach

Reservoir evaporation at each site was calculated following the aerodynamic mass transfer approach (Quinn, 1979; Subrahamanyam, 2002; Tanny 2008; Verburg and Antenucci, 2010). The mass-transfer aerodynamic evaporation code was originally developed in MATLAB under S&T 1512 and later translated to python by DRI (Spears, 2016). The AeroEvap python package developed by the DRI was utilized for all aerodynamic calculations.

The aerodynamic method estimates vapor flux based on differential specific humidity and turbulent transfer theory where

$$E = \rho_{mair} C_E u (q_{sat} - q_2) \times t_{step} \quad (1)$$

and $E$ is evaporation (mm $t_{step}^{-1}$), $t_{step}$ is a time step conversion (s $measurement\ t_{step}^{-1}$), $\rho_{mair}$ is the density of moist air (kg m$^{-3}$), $C_E$ is the bulk transfer coefficient (unitless), $u$ is the windspeed at 2 m (m s$^{-1}$), $q_2$ is the specific humidity at 2 m (kg kg$^{-1}$), and $q_{sat}$ is the saturated specific humidity at the water surface (kg kg$^{-1}$). The timestep conversion scales from an instantaneous flux rate (per second) to flux over the sampling period (30 minutes for this study). Note that vapor flux of kg m$^{-2}$ is equivalent to mm assuming a water density of 1000 kg m$^{-3}$ and length conversion of 1000 mm m$^{-1}$. $C_E$ values for each reservoir were based on Monin-Obukhov Similarity Theory (MOST) following equations developed by Brutsaert, 1982 (see Bulk mass-transfer coefficient section below).

Saturated specific humidity at the water surface, $q_{sat}$, was calculated by

$$q_{sat} = \frac{0.622 e_{sat}}{P - 0.378 e_{sat}} \quad (2)$$

where $e_{sat}$ (kPa) is the vapor pressure at the surface and $P$ is atmospheric pressure (kPa) at the surface. Vapor pressure at the surface, $e_{sat}$, was calculated from the water surface skin temperature by

$$e_{sat} = 0.6108 e^{\frac{17.27 T_{skin}}{T_{skin} + 237.3}} \quad (4)$$

where $T_{air}$ is the air temperature (°C), and $T_{skin}$ is the skin temperature adjusted for both emissivity and reflected radiation (°C; see Skin Temperature Correction section below). The specific humidity at 2 m, $q_2$, was calculated using barometric pressure and vapor pressure

$$q_2 = \frac{.622e_2}{P - .378e_2} \quad (5)$$

where $e_2$ (kPa) is the saturated vapor pressure at 2 m, found using steps similar to equations 2 and 4 above. The density of moist air, $\rho_{mair}$, was calculated according to (Brutsaert, 2005)

$$\rho_{mair} = \frac{P}{R_a T_{air}(1 + .61q_2)} \quad (6)$$

where $P$ is the atmospheric pressure (Pa), $R_a$ is the universal gas constant (286.9 J kg$^{-1}$ K$^{-1}$), and $T_{air}$ is the air temperature (K).

**Bulk mass-transfer coefficient, $C_E$**

The bulk mass-transfer coefficient, $C_E$, was calculated for each time-step using an iterative approach based on MOST. MOST applies stability corrections to the near surface transfer coefficients based on wind speed and atmospheric stability. The Monin-Obukhov length, L (see equation 9), can be used to describe atmospheric stability where, $\frac{z}{L} = 0$ , $\frac{z}{L} > 0$ , and $\frac{z}{L} < 0$ correspond to neutral, stable, and unstable conditions, respectively.

The iterative process relies on values of surface temperature, air temperature, wind speed, atmospheric pressure, and specific humidity. This iterative approach has been applied in various forms to estimate bulk transfer coefficients over water bodies including both oceans and reservoirs (Quinn, 1979; Croley, 1989; Tanny, 2008; Verburg, 2010; Subrahamanyam, 2002). This study follows stability functions and roughness length equations developed by Brutsaert, 1982. The general approach is presented below:

Friction velocity, $u^*$, can be solved by

$$u^* = \frac{u\,k}{\ln\left(\frac{z}{z_0}\right) - \Psi_m} \quad (7)$$

where $u$ is average wind speed at the reference height (m s$^{-1}$), $k$ is von Karman's constant (0.41), $z$ is the measurement height (2 m in this study), $z_o$is the roughness length of momentum (m; estimated below), and $\Psi_m$ is the stability function of momentum. Stability parameters $\Psi_m$ (wind/momentum) and $\Psi_v$ (humidity) are solved for based on atmospheric stability as follows:

Neutral Conditions (z/L=0)

$$\Psi_m = \Psi_v = \Psi_t = 0 \quad (8a)$$

Stable Conditions (z/L ≥ 0)

$$\Psi_m = \Psi_v = \Psi_t = \frac{-5.2\ Z}{L} \quad (8b)$$

Unstable Conditions ($z/L \leq 0$)

$$\Psi_m = 2\ln\left(\frac{[1+x]}{2}\right) + \ln\left(\frac{[1+x^2]}{2}\right) - 2\tan^{-1}(x) + \frac{\pi}{2} \quad (8c)$$

$$\Psi_v = \Psi_t = 2\ln\left[\frac{(1+x^2)}{2}\right]$$

where $x = \left(1 - 16\ (z/L)\right)^4$ .The Monin-Obukhov length, $L$ , can be represented by

$$L = \frac{T_v\, u^{*2}}{g\ K\ \theta^*}, \quad (9)$$

where $T_v$ is the virtual temperature of the atmosphere, $\theta^*$ is the scaling parameter for temperature (Quinn, 1979; Subrahamanyam, 2002), $g$ is the acceleration due to gravity (9.8 m $s^{-2}$). $T_v$ can be solved by

$$T_v = T_{air}(1 + 0.61 q_{air})$$

and $\theta^*$ can be solved by

$$\theta^* = [K(\theta_2 - \theta_0)] / \left[\ln\left(\frac{z}{z_{ot}}\right) - \Psi_t\right] \quad (10)$$

where $\theta_2$ is the potential air temperature at 2 m, $\theta_0$ is the potential temperature at the water surface, and $z_{ot}$ is roughness length of temperature. The roughness length of momentum was estimated by

$$z_o = \frac{\alpha\, u^{*2}}{g} + \frac{0.11\nu}{u^*} \quad (11)$$

Where $\nu$ is the kinematic viscosity,

$$\nu = \frac{4.94\times10^{-8} T_{air} + 1.7185\times10^{-5}}{\rho_{mair}}.$$

The roughness length of humidity, $z_v$, is assumed to be equal to the roughness length of temperature and was estimated by

$$z_v = z_{ot} = 7.4\exp\left(-2.25(z_o u^*)^{.25}\right) \quad (12)$$

The above system of equations can be solved iteratively starting with equations 11, 12, and 10 using the initial conditions of $u^*$=0.1 m $s^{-1}$, and $\Psi_m$ and $\Psi_v$ = 0. The iteration then continues solving equations 9, 8, 10, 11, 12, and 7 until the values converge. The final values are used to solve for $C_E$ by

$$C_E = \frac{k^2}{\left[\ln\left(\frac{z}{z_0}\right)-\Psi_m\right]\left[\ln\left(\frac{z}{z_v}\right)-\Psi_v\right]}$$

This final $C_E$ value can be used in equation 1 to solve for evaporation.

**Skin Temperature Correction, $T_s$**

Following the approach for correcting skin temperature given by Apogee Instruments (2015), the longwave radiation measured by the IRT can be expressed as

$$LW_{sensor} = \varepsilon LW_{water} + (1-\varepsilon)LW_{in} \quad (13)$$

where $LW_{sensor}$ (W m$^{-2}$) is the outgoing longwave radiation measured by the sensor, $LW_{water}$ (W m$^{-2}$) is the outgoing longwave radiation emitted by the water, and $LW_{in}$ (W m$^{-2}$) is the incoming longwave radiation. Equation 13 can then be reduced using the Stephan-Boltzman equation to the form

$$\sigma T_{uncorr}^4 = \varepsilon\sigma T_{corr}^4 + (1-\varepsilon)\sigma T_{sky}^4 \quad (14)$$

where $T_{uncorr}$ (K) is the uncorrected skin temperature reading from the sensor, $T_{corr}$ (K) is the corrected skin temperature, $T_{sky}$ (K) is the background sky temperature, $\varepsilon$ is the emissivity of the water, and $\sigma$ is the Stephan-Boltzmann constant, $5.670 \times 10^{-8} \frac{W}{m^2} K^4$. In this study, the IRT was positioned at approximately 45° to the normal, therefore an emissivity of 0.97 was assumed based on findings by Robinson and Davies (1972). The corrected skin temperature can be found by rearranging equation 14 to

$$T_{corr} = \sqrt[4]{\frac{T_{uncorr}^4-(1-\varepsilon)T_{sky}^4}{\varepsilon}}. \quad (15)$$

Using the Stephan-Boltzman equation, the background temperature of the sky can be expressed as

$$LW_{in} = \sigma T_{sky}^4 \quad (16)$$

where $LW_{in}$ (W m$^{-2}$) is the incoming longwave radiation measured with the upward facing sensors of the CNR4 pyrgeometer. Equation 16 can be rearranged to estimate $T_{sky}^4$ as

$$T_{sky}^4 = \frac{LW_{in}}{\sigma}. \quad (17)$$

Substituting equation 17 into equation 15 gives

$$T_{corr} = \sqrt[4]{\frac{T_{uncorr}^4 - \frac{(1-\varepsilon)LW_{in}}{\sigma}}{\varepsilon}} \quad . \tag{18}$$

# Appendix 2. Thirty-Minute Evaporation Data

## Appendix 2.1 Eddy Covariance

### Appendix 2.1.1 Platform Motion

Figure 23 shows scatterplots of 30-minute average wind components (u, v, and w) of motion-uncorrected (i.e., observed) and motion-corrected time series at Padre Bay and Warm Creek Bay over the study period. Results indicate that motion-corrected horizontal winds (the u- and v-wind components) are nearly identical to corresponding motion-uncorrected winds (u- and v-components). However, there are differences in the vertical (w) wind component between the two datasets at each platform. One possible reason why w-component corrected wind speeds are different from w-component measured wind speeds is that surface waves mostly induce vertical platform motion (not horizontal). A second possible reason is that the anchoring system installed at both platforms reduces platform accelerations in the east/west and north/south directions but does not reduce platform accelerations in the vertical direction. Stated differently, the anchoring systems attached to both platforms inhibited lateral accelerations but did not inhibit vertical accelerations. The percent difference (computed as motion-corrected wind component minus observed component relative to motion-corrected wind component) averaged over the study period for each site is shown in Table 8.1. Large differences in the vertical component at Warm Creek Bay may be related to enhanced boat activity and/or the mounting of the CFEP to the platform. The differences in vertical wind speed have a very small impact on the 3D wind speed between the two datasets.

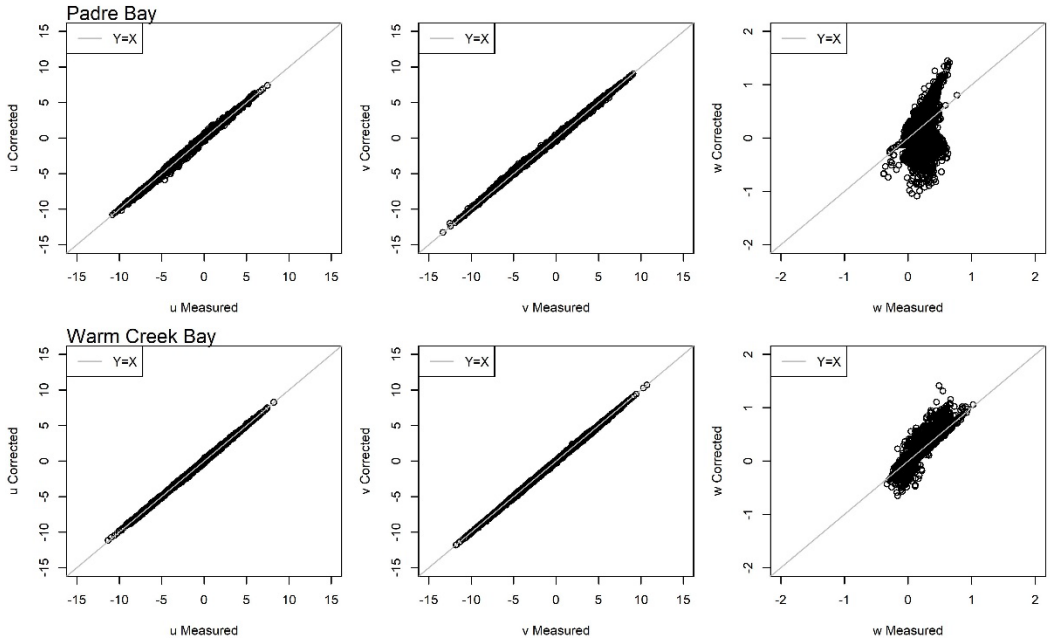



**Figure 23—Scatterplots of 30-minute average (left) u-corrected versus u-measured, (middle) v-corrected versus v-measured, and (right) w-corrected versus w-measured wind components (m/s) at (top) Padre Bay and (bottom) Warm Creek Bay over the study period.**

**Table 8.1—Percent difference in individual wind component speeds (u, v, and w) between motion-corrected and measured variables at Padre Bay and Warm Creek Bay over the study period.**

| Component of Total Wind Vector | Percent Difference (Corrected minus Measured) | |
|---|---|---|
| | Padre Bay | Warm Creek Bay |
| u (zonal) | 6.1 | -0.1 |
| v (meridional) | 0.6 | 1.6 |
| w (vertical) | -5.5 | -53.6 |

To understand the impacts of correcting for platform motion on evaporation totals at Padre Bay and Warm Creek Bay based on the EC method, we present scatterplots of evaporation totals computed using motion-corrected winds versus evaporation totals computed using motion-uncorrected winds (i.e., observed winds). Results at the 30-min time scale are shown in Figure 24. Scatterplots (top panels of Figure 24) indicate that motion-corrected, and motion-uncorrected evaporation estimates are highly correlated (r=0.94 and 0.96 at Padre Bay and Warm Creek Bay, respectively) with little bias (slope=0.87 and 0.93 at Padre Bay and Warm Creek Bay, respectively, when forced through the intercept), and that agreement between these datasets is stronger at the Warm Creek Bay location.

Box and whisker plots are shown in the bottom four panels of Figure 24, which summarize differences in the motion-corrected and motion-uncorrected estimates as a function of month. Thick horizontal lines in the box and whisker plots represent the population median, shaded rectangles extend to the 25$^{th}$ and 75$^{th}$ percentiles, and whiskers extend to 1.5 times the inter-quartile range. Outliers are not shown in order to emphasize median conditions. Percent differences between motion-corrected and motion-uncorrected 30-min evaporation totals (relative to motion-corrected) at Padre Bay and Warm Creek Bay are shown in the bottom row of Figure 24. Approximately 96.5% and 96.6% of the differences in 30-min motion-corrected and motion-uncorrected values are between -100% and +100% and at Padre Bay and Warm Creek Bay, respectively.

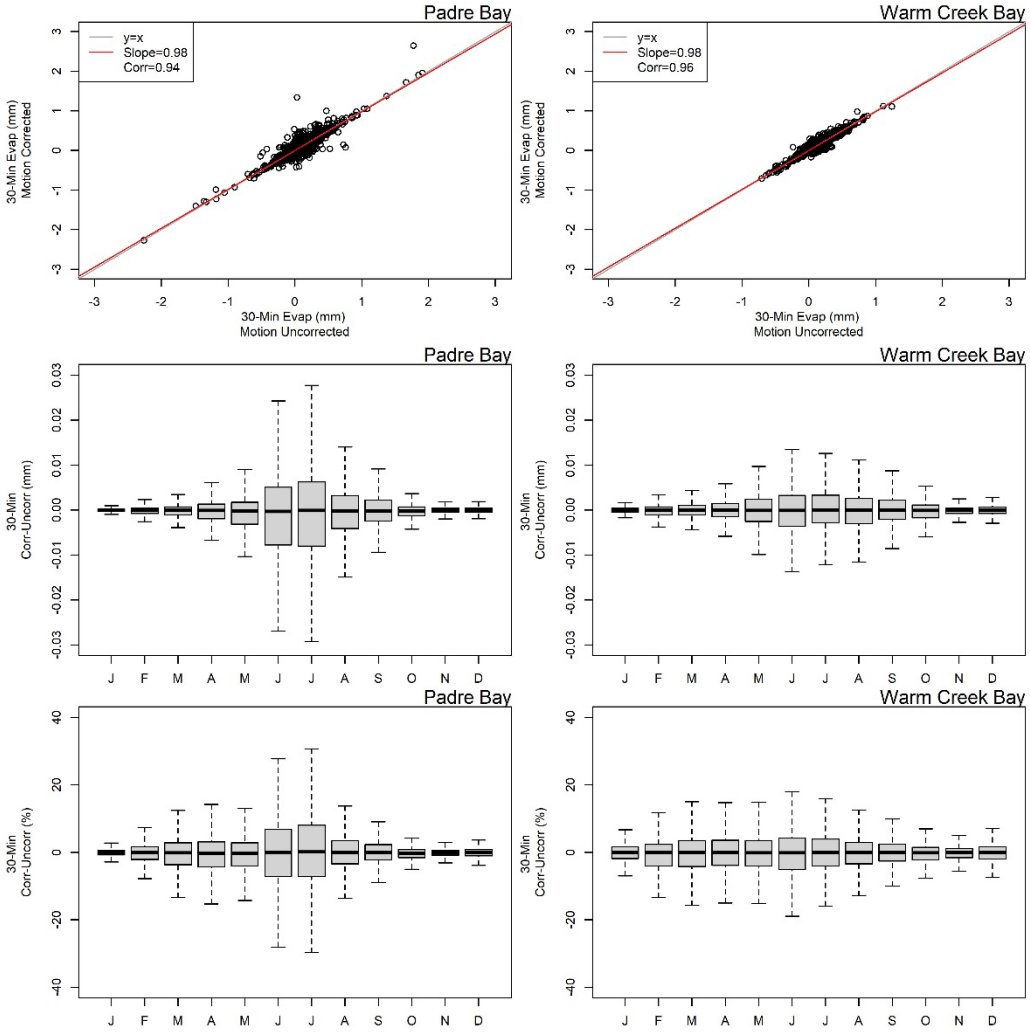



**Figure 24—(top row) Scatterplots of 30-min motion corrected evaporation rates (mm) versus 30-min motion uncorrected evaporation rates (mm). Slope values represent the slope of a linear model when forced through the intercept (0,0). (middle and bottom rows) Box and whisker plots of difference between 30-min estimates (corrected minus uncorrected) as a function of month of year at (left) Padre Bay and (right) Warm Creek Bay expressed in mm and %, respecitvely. Whiskers in the boxplots extend to 1.5 times the inter-quartile range.**

Results in the bottom four panels of Figure 24 indicate that median differences between 30-min motion corrected and motion uncorrected evaporation estimates differ between the two locations, though there is a clear seasonal component at both. For instance, the range of observed differences is larger during summer months at Padre Bay than Warm Creek Bay. This is reflected in both plots expressed as mm and percent. At Padre Bay, the largest positive median differences (expressed as a percent) occur during June and July, while the largest

negative median differences occur May and October. At Warm Creek Bay, all median differences (expressed as a percent) are negative, with the largest negative median difference in May.

Scatterplots and box and whisker plots demonstrating differences between motion-corrected and motion-uncorrected evaporation estimates at the daily time scale are shown in Figure 25. As with the 30-min estimates, the daily totals at both sites show strong agreement (correlation of 0.99 and 1 at Padre Bay and Warm Creek Bay, respectively). Daily totals reach almost 15 mm at both sites (14.65 mm from motion-uncorrected estimates at Padre Bay and 15.99 mm from motion-corrected estimates at Warm Creek Bay). As with the 30-min data, monthly differences (mm) in the datasets at Padre Bay show a more pronounced seasonal cycle, with the largest range in differences observed during June, July, and August again. Differences between the datasets at Warm Creek Bay show variations throughout the year, though monthly differences show less variability than with the 30-min datasets. The seasonal cycle of percent differences at Warm Creek Bay is out of sync with percent differences at Padre Bay. More specifically, the largest median percent differences at Warm Creek Bay occur during cool season months.

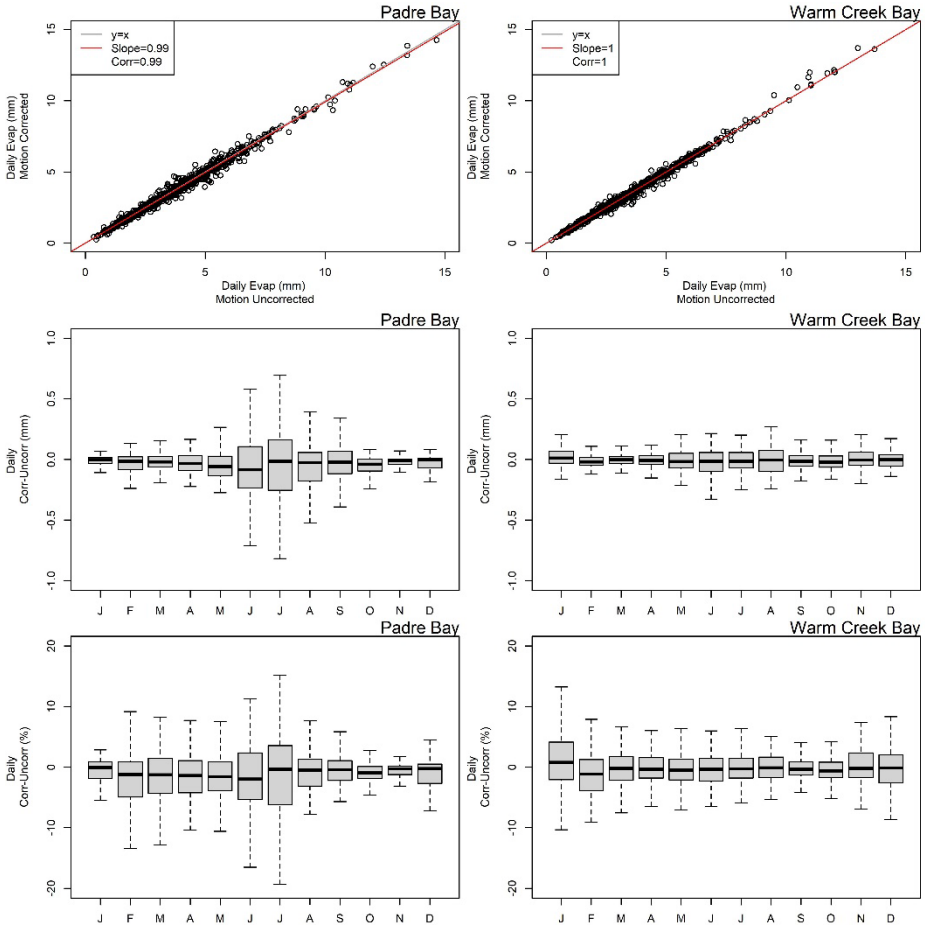



**Figure 25—Same as Figure 24 except with at the daily time scale.**

Differences in 30-min evaporation totals between the motion-corrected and motion-uncorrected estimates have a minimum impact on annual totals. For example, at Padre Bay, the annual difference ranges from -16.5 mm to -0.61 mm, while at Warm Creek Bay, the annual difference ranges from -6.48 mm to 1.16 mm (corrected minus uncorrected). Relative to motion-corrected totals, these differences reach at most 1% and 3% at Padre Bay and Warm Creek Bay, respectively.

## Appendix 2.1.2 Gap Filling

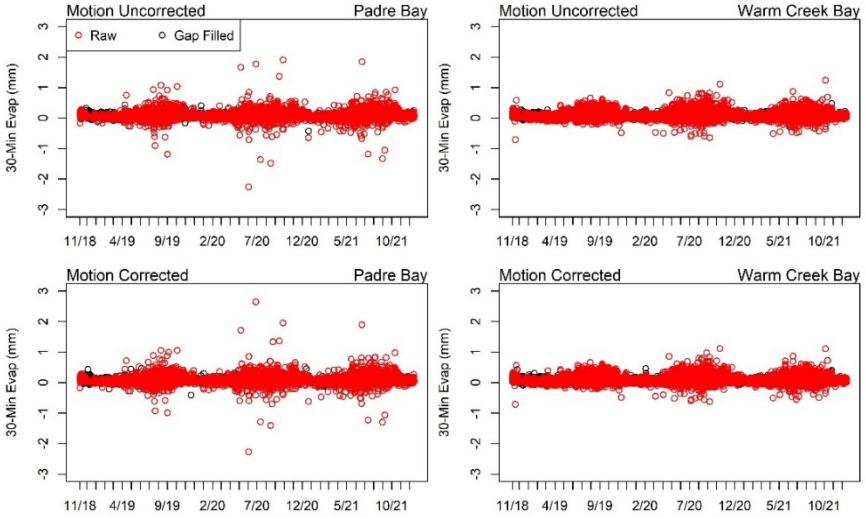



**Figure 26—Raw and gap filled time series of 30-min average evaporation rates (mm) at (left) Padre Bay and (right) Warm Creek Bay based on the EC method.**

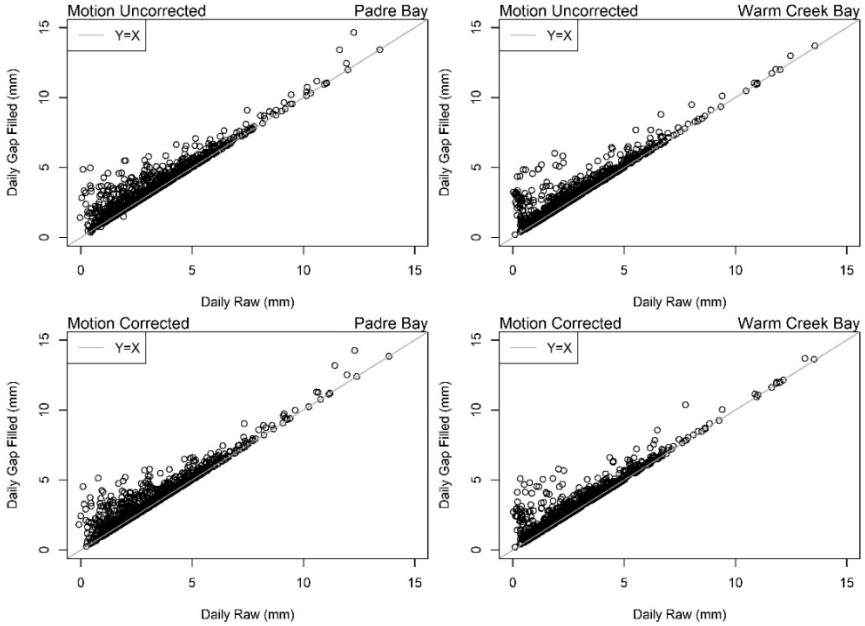



**Figure 27—Scatterplots of daily gap filled evaporation rates (mm) versus daily raw evaporation rates (mm) at (left) Padre Bay and (right) Warm Creek Bay based on the EC method. Y-axis values represent 24-hour totals, while x-axis values represent totals valid for less than 24 hours (due to missing values).**

## Appendix 2.1.3 30-Min Evaporation Estimates

Time series of 30-min evaporation totals at Padre Bay and Warm Creek Bay are shown in the top panels of Figure 28. Box-and-whisker plots of 30-min evaporation totals as a function of month are shown in the bottom panels, where box-and-whisker features are defined in the same manner as above (e.g., the thick horizontal line represents the median, the shaded rectangles extend to the 25$^{th}$ and 75$^{th}$ percentiles, and the whiskers extend to 1.5 times the inter-quartile range). Time series in the top two panels indicate that 30-min evaporation totals encompass positive and negative values at both locations. The box-and-whisker plots in the bottom two panels of Figure 28 demonstrate the variability in 30-min evaporation totals as a function of month. Median totals at both locations peak during July, August, and September, while median totals are lowest during January, February, and March. While both sites show similar monthly variability, median totals at Padre Bay are larger than the corresponding median totals at Warm Creek Bay during every month of the year.

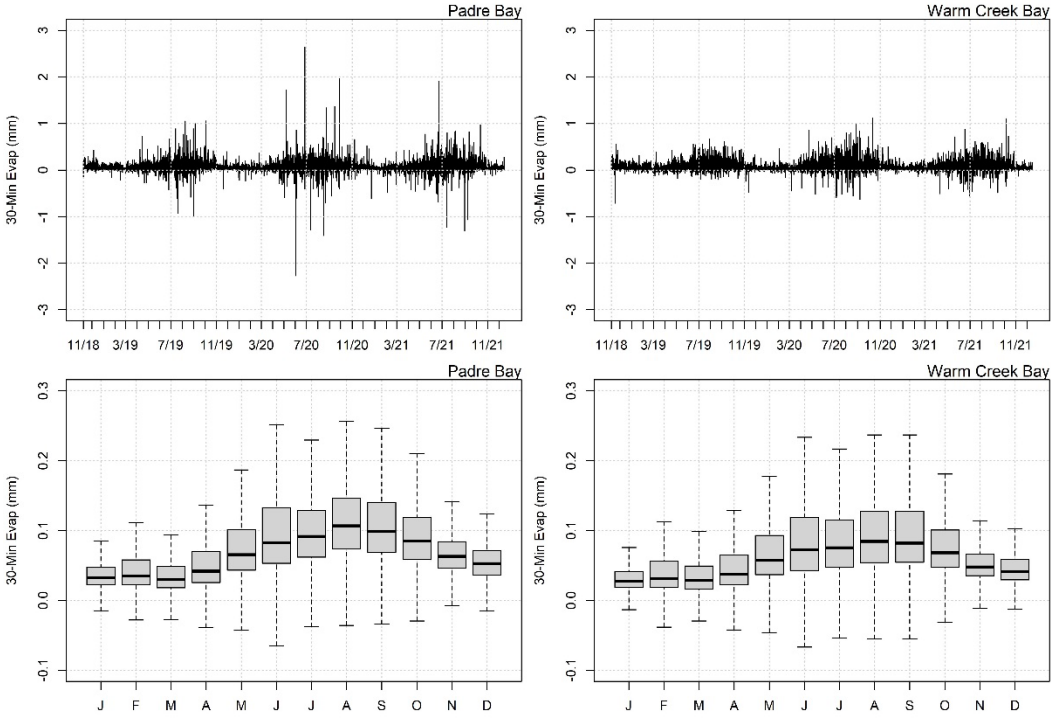



**Figure 28—(top) Time series and (bottom) monthly box and whisker plots of 30-min evaporation rates (mm) from the EC method at (left) Padre Bay and (right) Warm Creek Bay.**

# Appendix 2.2 Aerodynamic

## Appendix 2.2.1 Gap Filling

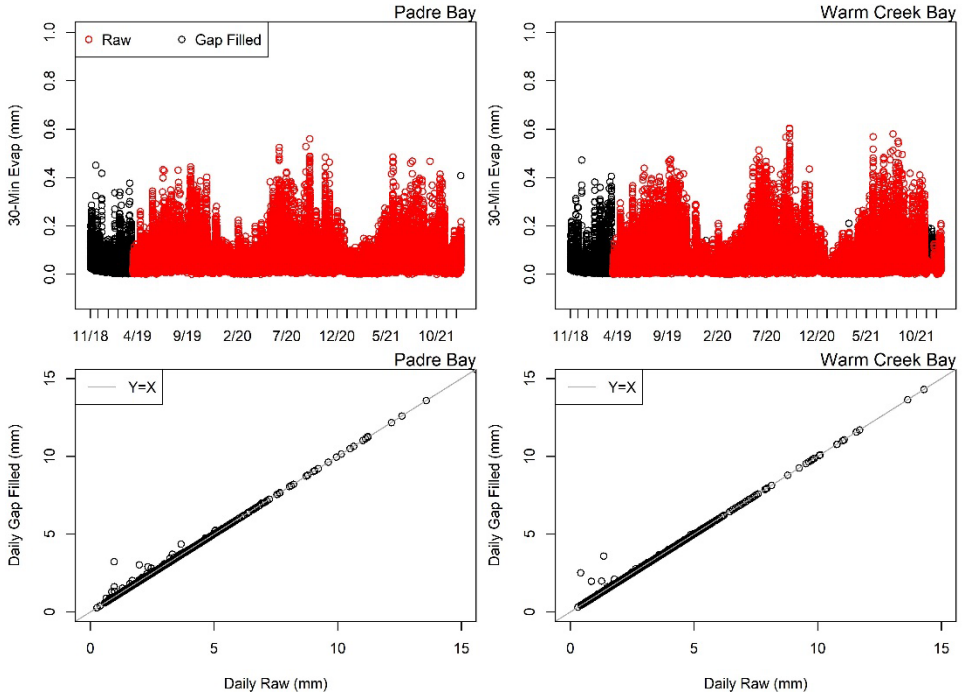



**Figure 29—(top row) Raw and gap filled time series of 30-minute average evaporation rates (mm) and (bottom row) scatterplots of daily gap filled evaporation rates (mm) versus daily raw evaporation rates (mm) at (left column) Padre Bay and (right column) Warm Creek Bay. Y-axis values represent 24-hour totals, while x-axis values represent totals valid for less than 24 hours (due to missing values).**

## Appendix 2.2.2 30-Min Evaporation Estimates

Figure 30 shows time series and box-and-whisker plots of 30-min evaporation totals computed using the aerodynamic method. Characteristics of the box-and-whisker plots are the same as previous definitions. The top two panels of the figure show that 30-min totals are relatively similar between the two locations. Both sites show a hard lower-limit near 0 mm, with a maximum 30-min total near 0.6 mm. Monthly variability in median 30-min totals differs between the two locations. The median 30-min total at Padre Bay peaks during October, with August ranked second and September ranked third. At Warm Creek Bay, the median 30-min total peaks during August, with July ranked second and September ranked third. This finding suggests that 30-min aerodynamic totals peak later in the season at Padre Bay compared with Warm Creek Bay. Median totals at Padre Bay reach a minimum in March, whereas at Warm Creek Bay, median totals reach a minimum in January.

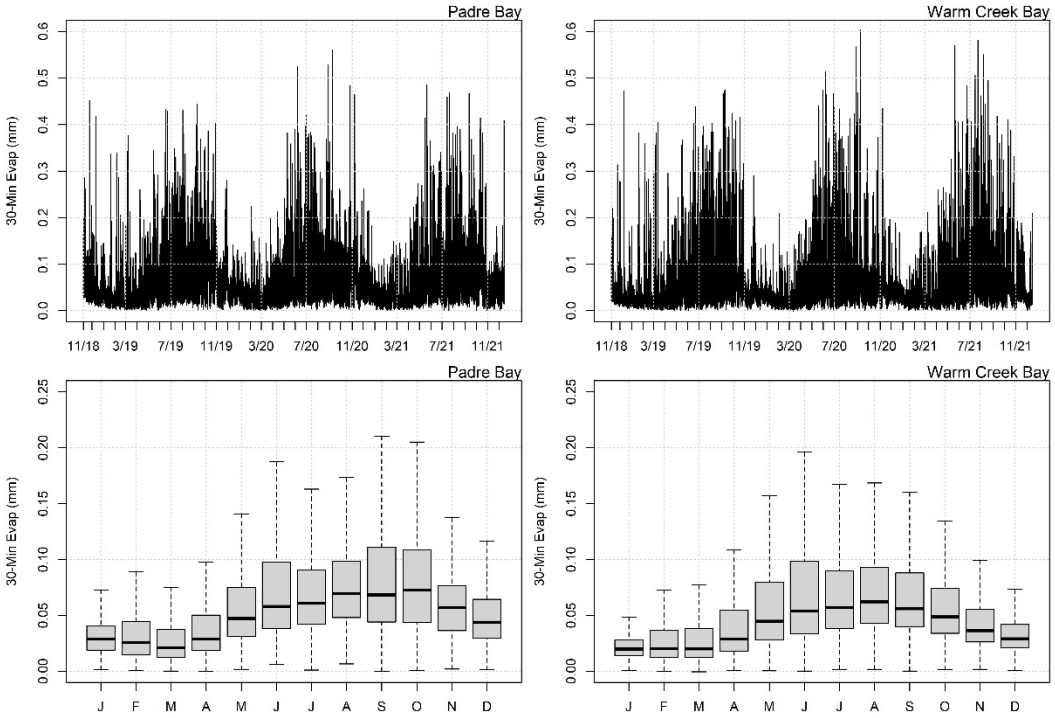



**Figure 30—(top) Time series and (bottom) monthly box and whisker plots of 30-min evaporation totals (mm) from the aerodynamic method at (left) Padre Bay and (right) Warm Creek Bay.**

## Appendix 2.3 Method Comparisons

Scatterplots in Figure 12 show EC evaporation totals versus corresponding aerodynamic evaporation totals at Padre Bay and Warm Creek Bay at the 30-min time scale. Correlations between the two 30-min datasets are 0.61 and 0.64 at Padre Bay and Warm Creek Bay, respectively. The weaker correlations with the 30-min data (relative to daily totals in the section 4.1.1) appear related to behavior at low aerodynamic totals. More specifically, 30-min EC estimates at Padre Bay show larger variability (i.e., ± 3 mm) when the 30-min aerodynamic estimates are less than 0.1 mm. This finding suggests that the two methods show less agreement during periods of low evaporation (as estimated by the aerodynamic method). Similar results are shown at Warm Creek Bay, albeit with a smaller range in 30-min EC estimates (i.e., ± 1 mm).

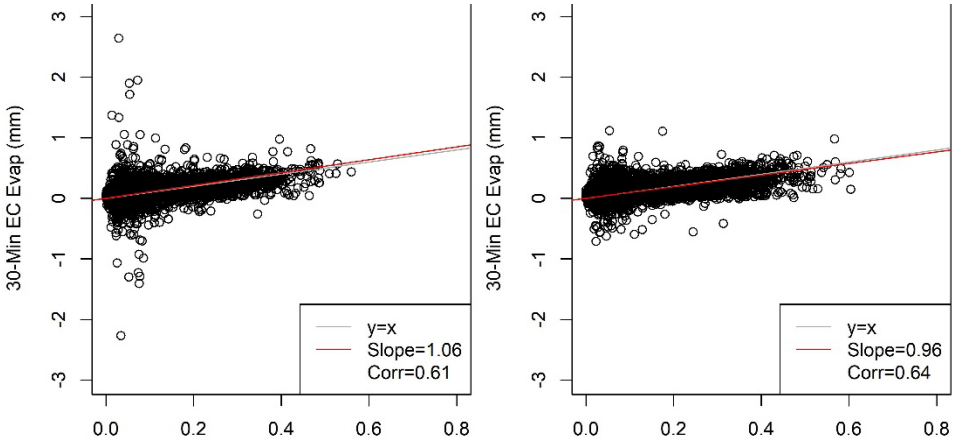



**Figure 31—Scatterplots of evaporation totals (mm) from the eddy covariance method versus the aerodynamic method at 30-min time scales at (left) Padre Bay and (right) Warm Creek Bay. Slope values represent the slope of a linear model when forced through the intercept (0,0). In some instances, the y=x line is under the linear model forced through the intercept.**

### Appendix 2.3.1 Comparison Metrics

We computed four metrics commonly used to summarize relationships between observed and modeled data. We treated EC data as observed and aerodynamic data as modeled. The metrics include correlation (r), root mean squared error (RMSE), mean absolute error (MAE), and slope. The correlation coefficient between both datasets was computed using the Pearson product moment coefficient of linear correlation. The RMSE was computed as the square root of the average of the squared differences between the modeled and observed values. The MAE was computed as the arithmetic average of the absolute values of the differences between each pair of observed and modeled data. The RMSE is more sensitive to outliers than MAE (Wilks, 2019). Metrics based on 30-min and daily observations at Padre Bay are listed in Table 8.2. Analogous values for Warm Creek Bay are listed in
Table 8.3.

**Table 8.2—Basic statistical metrics that describe the relationship between monthly EC and aerodynamic evaporation estimates at Padre Bay. r represents correlation. RMSE (mm) and MAE (mm) are computed by treating EC estimates as "observed" and aerodynamic estimates as "modeled". Slope through origin represents the slope of a linear regression model fit to the monthly data (EC versus aerodynamic) while forcing the y-intercept to 0.**

| Month | 30-Minute Data | | | | Daily Data | | | |
|---|---|---|---|---|---|---|---|---|
| | r | RMSE (mm) | MAE (mm) | Slope thru Origin | r | RMSE (mm) | MAE (mm) | Slope thru Origin |
| January | 0.61 | 0.02 | 0.01 | 0.77 | 0.88 | 0.39 | 0.29 | 0.89 |
| February | 0.54 | 0.03 | 0.02 | 0.69 | 0.75 | 0.82 | 0.59 | 0.81 |
| March | 0.54 | 0.03 | 0.02 | 0.67 | 0.79 | 0.59 | 0.45 | 0.82 |
| April | 0.55 | 0.04 | 0.03 | 0.62 | 0.88 | 0.66 | 0.56 | 0.83 |
| May | 0.64 | 0.06 | 0.04 | 0.67 | 0.93 | 0.94 | 0.79 | 0.85 |
| June | 0.47 | 0.1 | 0.05 | 0.53 | 0.88 | 1.33 | 1.06 | 0.82 |
| July | 0.41 | 0.08 | 0.05 | 0.54 | 0.68 | 1.37 | 1.21 | 0.75 |
| August | 0.41 | 0.09 | 0.06 | 0.51 | 0.79 | 1.77 | 1.61 | 0.7 |
| September | 0.63 | 0.07 | 0.04 | 0.67 | 0.94 | 1.43 | 1.26 | 0.82 |
| October | 0.76 | 0.04 | 0.03 | 0.83 | 0.95 | 0.84 | 0.71 | 0.90 |
| November | 0.71 | 0.03 | 0.02 | 0.85 | 0.91 | 0.66 | 0.48 | 0.91 |
| December | 0.52 | 0.03 | 0.02 | 0.77 | 0.75 | 0.73 | 0.47 | 0.87 |

**Table 8.3—Same as Table 8.2 except valid for EC and aerodynamic evaporation estimates valid at Warm Creek Bay.**

| Month | 30-Minute Data | | | | Daily Data | | | |
|---|---|---|---|---|---|---|---|---|
| | r | RMSE (mm) | MAE (mm) | Slope thru Origin | r | RMSE (mm) | MAE (mm) | Slope thru Origin |
| January | 0.47 | 0.03 | 0.02 | 0.62 | 0.72 | 0.67 | 0.82 | 0.75 |
| February | 0.52 | 0.04 | 0.02 | 0.68 | 0.75 | 0.92 | 0.63 | 0.81 |
| March | 0.51 | 0.04 | 0.02 | 0.76 | 0.73 | 0.85 | 0.52 | 0.94 |
| April | 0.56 | 0.04 | 0.03 | 0.69 | 0.74 | 0.85 | 0.58 | 0.92 |
| May | 0.68 | 0.06 | 0.04 | 0.78 | 0.95 | 0.74 | 0.57 | 0.95 |
| June | 0.58 | 0.08 | 0.05 | 0.72 | 0.88 | 1.21 | 0.84 | 0.94 |
| July | 0.47 | 0.08 | 0.05 | 0.64 | 0.79 | 0.95 | 0.76 | 0.85 |
| August | 0.59 | 0.08 | 0.05 | 0.63 | 0.88 | 1.19 | 0.96 | 0.80 |
| September | 0.67 | 0.07 | 0.05 | 0.73 | 0.94 | 1.29 | 1.10 | 0.85 |
| October | 0.69 | 0.06 | 0.03 | 0.70 | 0.92 | 1.13 | 0.95 | 0.81 |
| November | 0.59 | 0.04 | 0.02 | 0.73 | 0.83 | 0.87 | 0.75 | 0.86 |
| December | 0.46 | 0.03 | 0.02 | 0.67 | 0.68 | 0.86 | 0.63 | 0.76 |

## Appendix 2.3.2 Mass Transfer Coefficient Estimates

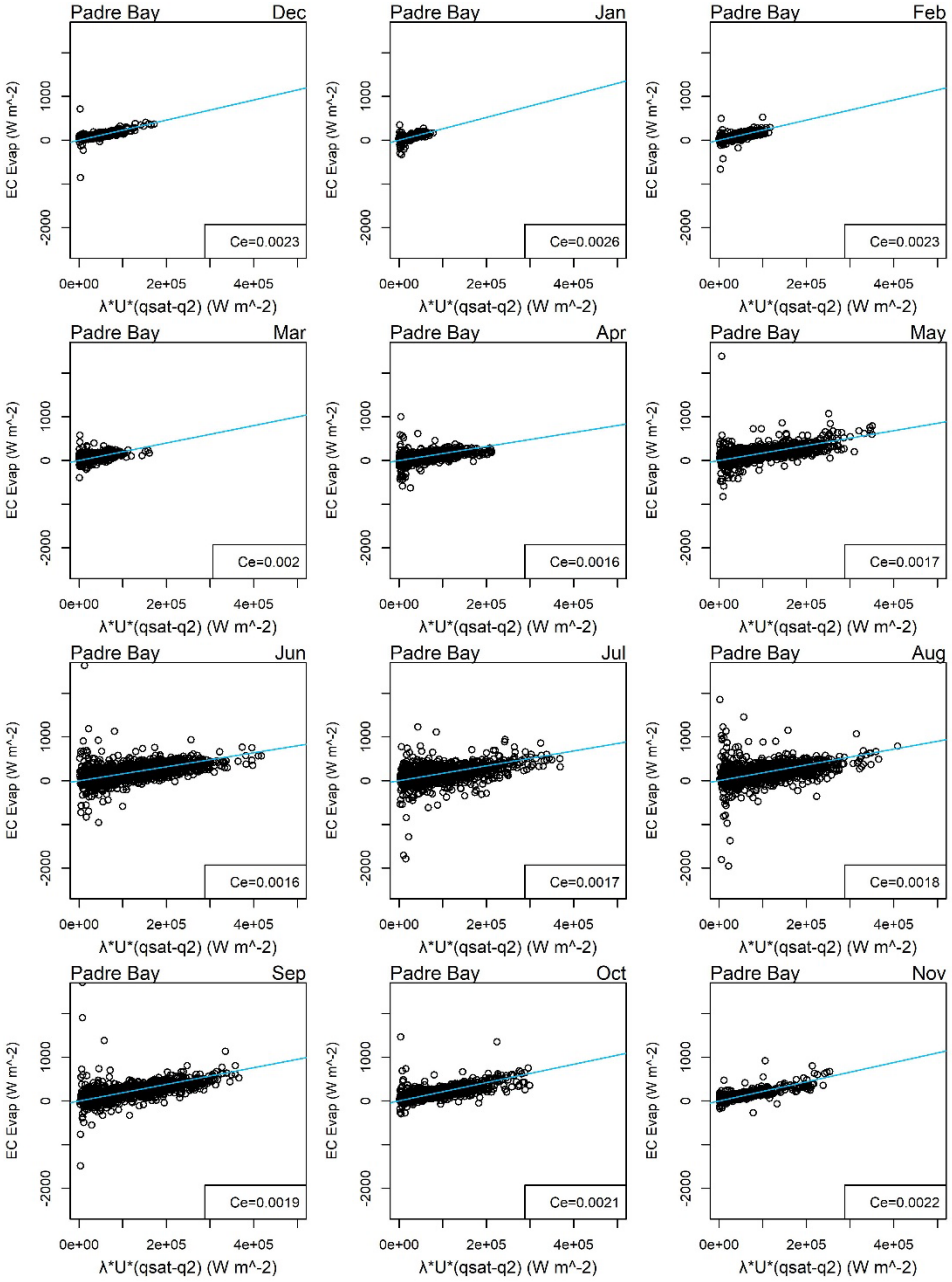



**Figure 32—Scatterplots of EC latent heat flux (W $m^{-2}$) versus the product of the latent heat of vaporization, wind speed, and difference between saturated specific humidity and specific humidity at 2 m (W $m^{-2}$; all 30-min time step) at Padre Bay as a function of month of year.**

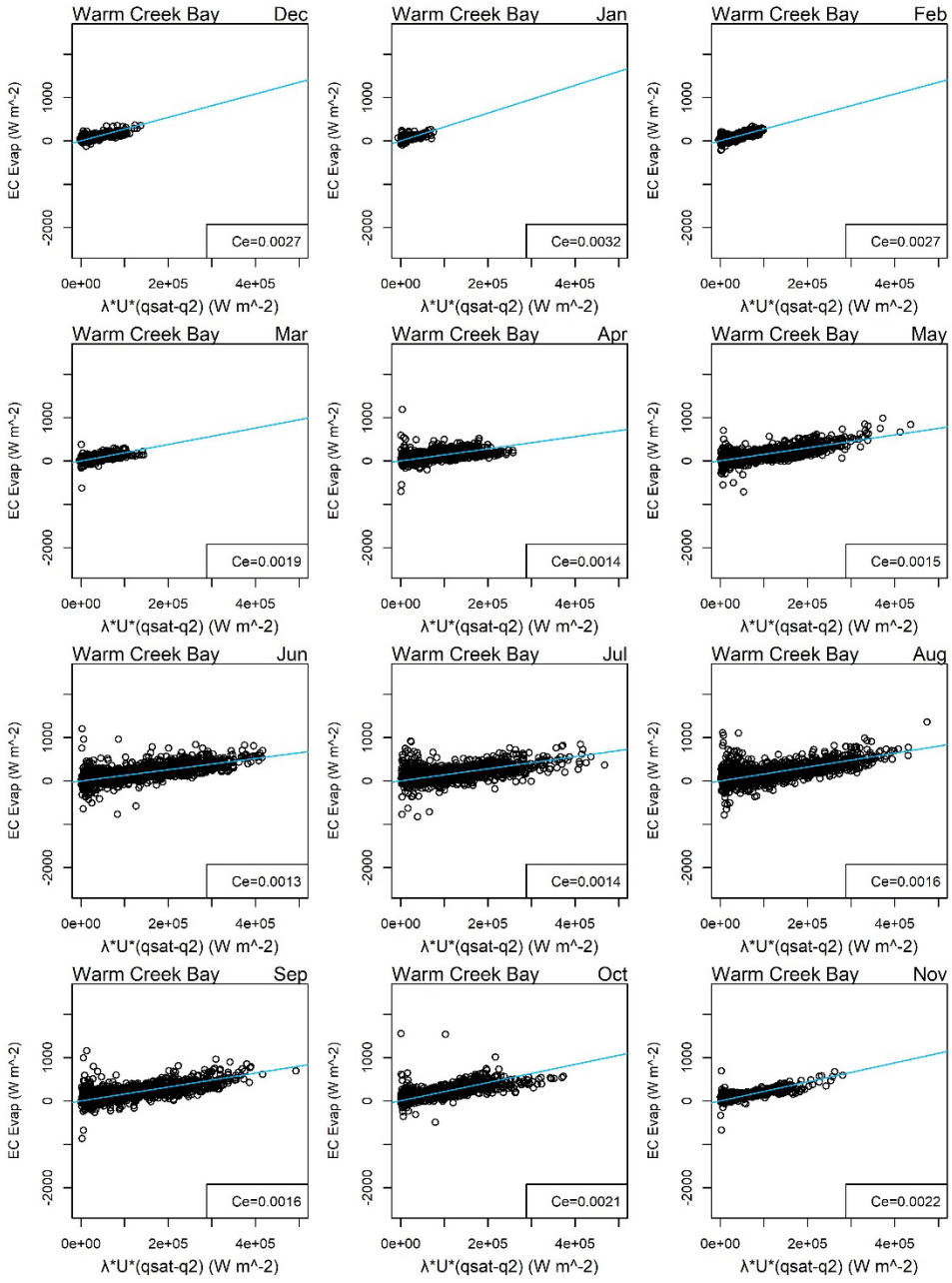



**Figure 33—Same as Figure 32 except for Warm Creek Bay.**

# Appendix 3. Monthly Evaporation Totals

**Table 8.4—Monthly evaporation totals (mm) at Padre Bay and Warm Creek Bay based on the two in-situ methods applied in the current study. Aerodynamic estimates are based on the standard method (i.e., not the alterative, adjusted Ce estimates).**

| Year | Month | EC Padre Bay | Aerodynamic Padre Bay | EC Warm Creek Bay | Aerodynamic Warm Creek Bay |
|---|---|---|---|---|---|
| 2018 | 11 | 87.54 | 74.5 | 73.52 | 47.97 |
| 2018 | 12 | 91.47 | 65.35 | 81.99 | 49.68 |
| 2019 | 1 | 52.49 | 47.39 | 56.68 | 39.14 |
| 2019 | 2 | 59.26 | 51.52 | 64.84 | 52.21 |
| 2019 | 3 | 51.57 | 45.18 | 45.01 | 53.17 |
| 2019 | 4 | 63.93 | 49.94 | 60.36 | 56.98 |
| 2019 | 5 | 99.5 | 87.4 | 94.5 | 82.67 |
| 2019 | 6 | 122.9 | 95.47 | 122.41 | 92.85 |
| 2019 | 7 | 142.43 | 111.7 | 126.65 | 106.51 |
| 2019 | 8 | 162.89 | 114.5 | 142.87 | 115.35 |
| 2019 | 9 | 175.85 | 147.3 | 166.05 | 143.89 |
| 2019 | 10 | 160.25 | 139.94 | 135.02 | 110.74 |
| 2019 | 11 | 96.2 | 88.31 | 76.46 | 62.59 |
| 2019 | 12 | 77.97 | 70.73 | 60.37 | 52.88 |
| 2020 | 1 | 60.25 | 51.06 | 46.09 | 36.13 |
| 2020 | 2 | 62.41 | 51.08 | 56.77 | 42.58 |
| 2020 | 3 | 53.13 | 40.25 | 52.48 | 43.3 |
| 2020 | 4 | 76.98 | 60.58 | 75.6 | 61.93 |
| 2020 | 5 | 127.75 | 100.62 | 122.67 | 111.72 |
| 2020 | 6 | 157.36 | 138.16 | 142.05 | 144.53 |
| 2020 | 7 | 142.95 | 109.08 | 137.73 | 111.63 |
| 2020 | 8 | 164.55 | 122.88 | 161.49 | 124.7 |
| 2020 | 9 | 160.18 | 122.5 | 139.96 | 110.91 |
| 2020 | 10 | 143.6 | 117.24 | 131.65 | 96.93 |
| 2020 | 11 | 111.64 | 104.51 | 93.2 | 80.8 |
| 2020 | 12 | 92.18 | 86 | 73.28 | 62.08 |
| 2021 | 1 | 54.57 | 48.31 | 47.71 | 34.59 |
| 2021 | 2 | 54.91 | 41.66 | 48.21 | 41.55 |
| 2021 | 3 | 57.22 | 47.25 | 64.78 | 52.43 |

| | | | | | |
|---|---|---|---|---|---|
| 2021 | 4 | 79.89 | 69.31 | 78.88 | 76.86 |
| 2021 | 5 | 125.83 | 103.59 | 115.67 | 110.64 |
| 2021 | 6 | 148.2 | 114.76 | 134.48 | 124.51 |
| 2021 | 7 | 153.91 | 113.33 | 134.04 | 125.28 |
| 2021 | 8 | 182.16 | 122.89 | 148.27 | 126.33 |
| 2021 | 9 | 153.6 | 113.6 | 132.09 | 99.16 |
| 2021 | 10 | 130.32 | 124.04 | 116.06 | 95.59 |
| 2021 | 11 | 84.75 | 75.88 | 67.76 | 72.66 |
| 2021 | 12 | 40.1 | 42.14 | 32.62 | 24.89 |

**Table 8.5—Monthly evaporation totals (ft) at Padre Bay and Warm Creek Bay based on the two in-situ methods applied in the current study. Aerodynamic estimates are based on the standard method (i.e., not the alterative, adjusted Ce estimates).**

| Year | Month | EC Padre Bay | Aerodynamic Padre Bay | EC Warm Creek Bay | Aerodynamic Warm Creek Bay |
|---|---|---|---|---|---|
| 2018 | 11 | 0.29 | 0.24 | 0.24 | 0.16 |
| 2018 | 12 | 0.3 | 0.21 | 0.27 | 0.16 |
| 2019 | 1 | 0.17 | 0.16 | 0.19 | 0.13 |
| 2019 | 2 | 0.19 | 0.17 | 0.21 | 0.17 |
| 2019 | 3 | 0.17 | 0.15 | 0.15 | 0.17 |
| 2019 | 4 | 0.21 | 0.16 | 0.2 | 0.19 |
| 2019 | 5 | 0.33 | 0.29 | 0.31 | 0.27 |
| 2019 | 6 | 0.4 | 0.31 | 0.4 | 0.3 |
| 2019 | 7 | 0.47 | 0.37 | 0.42 | 0.35 |
| 2019 | 8 | 0.53 | 0.38 | 0.47 | 0.38 |
| 2019 | 9 | 0.58 | 0.48 | 0.54 | 0.47 |
| 2019 | 10 | 0.53 | 0.46 | 0.44 | 0.36 |
| 2019 | 11 | 0.32 | 0.29 | 0.25 | 0.21 |
| 2019 | 12 | 0.26 | 0.23 | 0.2 | 0.17 |
| 2020 | 1 | 0.2 | 0.17 | 0.15 | 0.12 |
| 2020 | 2 | 0.2 | 0.17 | 0.19 | 0.14 |
| 2020 | 3 | 0.17 | 0.13 | 0.17 | 0.14 |
| 2020 | 4 | 0.25 | 0.2 | 0.25 | 0.2 |
| 2020 | 5 | 0.42 | 0.33 | 0.4 | 0.37 |
| 2020 | 6 | 0.52 | 0.45 | 0.47 | 0.47 |
| 2020 | 7 | 0.47 | 0.36 | 0.45 | 0.37 |
| 2020 | 8 | 0.54 | 0.4 | 0.53 | 0.41 |
| 2020 | 9 | 0.53 | 0.4 | 0.46 | 0.36 |

| | | | | | |
|---|---|---|---|---|---|
| 2020 | 10 | 0.47 | 0.38 | 0.43 | 0.32 |
| 2020 | 11 | 0.37 | 0.34 | 0.31 | 0.27 |
| 2020 | 12 | 0.3 | 0.28 | 0.24 | 0.2 |
| 2021 | 1 | 0.18 | 0.16 | 0.16 | 0.11 |
| 2021 | 2 | 0.18 | 0.14 | 0.16 | 0.14 |
| 2021 | 3 | 0.19 | 0.16 | 0.21 | 0.17 |
| 2021 | 4 | 0.26 | 0.23 | 0.26 | 0.25 |
| 2021 | 5 | 0.41 | 0.34 | 0.38 | 0.36 |
| 2021 | 6 | 0.49 | 0.38 | 0.44 | 0.41 |
| 2021 | 7 | 0.5 | 0.37 | 0.44 | 0.41 |
| 2021 | 8 | 0.6 | 0.4 | 0.49 | 0.41 |
| 2021 | 9 | 0.5 | 0.37 | 0.43 | 0.33 |
| 2021 | 10 | 0.43 | 0.41 | 0.38 | 0.31 |
| 2021 | 11 | 0.28 | 0.25 | 0.22 | 0.24 |
| 2021 | 12 | 0.13 | 0.14 | 0.11 | 0.08 |

JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION

AMERICAN WATER RESOURCES ASSOCIATION

# LOSS RATES FROM LAKE POWELL AND THEIR IMPACT ON MANAGEMENT OF THE COLORADO RIVER[1]

*Tom Myers*[2]

ABSTRACT: As demand for water in the southwestern United States increases and climate change potentially decreases the natural flows in the Colorado River system, there will be increased need to optimize the water supply. Lake Powell is a large reservoir with potentially high loss rates to bank storage and evaporation. Bank storage is estimated as a residual in the reservoir water balance. Estimates of local inflow contribute uncertainty to estimates of bank storage. Regression analyses of local inflow with gaged tributaries have improved the estimate of local inflow. Using a stochastic estimate of local inflow based on the standard error of the regression estimator and of gross evaporation based on observed variability at Lake Mead, a reservoir water balance was used to estimate that more than 14.8 billion cubic meters ($Gm^3$) has been stored in the banks, with a 90% probability that the value is actually between 11.8 and 18.5 $Gm^3$. Groundwater models developed by others, observed groundwater levels, and simple transmissivity calculations confirm these bank storage estimates. Assuming a constant bank storage fraction for simulations of the future may cause managers to underestimate the actual losses from the reservoir. Updated management regimes which account more accurately for bank storage and evaporation could save water that will otherwise be lost to the banks or evaporation.

(KEY TERMS: Lake Powell; reservoir bank storage; surface water/groundwater interactions; water conservation; water supply; reservoir operations simulations.)

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## INTRODUCTION

As demand for water in the southwestern United States (U.S.) increases and climate change potentially decreases the inflow to the Colorado River system (Christensen and Lettenmaier, 2007; Barnett and Pierce, 2008; Barsugli *et al.*, 2009; Miller and Piechota, 2011), the need to optimize the water supply will increase. The Colorado River has 73.4 billion cubic meters ($Gm^3$) of available storage in its 10 largest reservoirs (USBR, 2011), which is approximately four times the river's average annual flow. The live storage in those reservoirs on October 1, 2011, was 47.7 $Gm^3$ (USBR, 2011), after the wettest runoff year in at least 15 years. The available storage space, 25.7 $Gm^3$, is about one and a half years of long-term average inflow, estimated to be 18.5 $Gm^3$ per year ($Gm^3$/yr) (USBR, 2007). Lake Powell, the second largest reservoir on the river, has a maximum storage equal to 32.1 $Gm^3$. As of August 2010 there was 22.3 $Gm^3$ stored in the banks of the reservoir according to an ongoing water balance (http://www.usbr.gov/lc/region/g4000/NaturalFlow/documentation.html, accessed August 23, 2010).

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The U.S. Bureau of Reclamation (USBR) manages the Colorado River and reservoirs according to a complex system of laws, treaties, and agreements known as the Law of the River (http://www.usbr.gov/lc/region/g1000/lawofrvr.html, accessed September 6, 2012). The USBR simulates the Colorado River system using the Colorado River Simulation System (CRSS) (USBR, 1986), which has been incorporated in RIVERWARE software (Zagona *et al.*, 2001). Assumptions used in CRSS, including reservoir loss rates, affect the results of the simulations (USBR, 2007) and therefore potentially the decision-making processes. The assumptions include loss rates from Lake Powell.

Lake Powell loses water from the river system in two ways — to evaporation from the free water surface and bank seepage. Bank seepage is flow to the banks that does not return to the river system whereas bank storage may return to the reservoir or river system. CRSS does not simulate seepage but rather assumes a change in bank storage equal to 8% of the monthly change in reservoir storage (Jerla, 2005), which averages 0.53 $Gm^3$/month. The simulation assumption does not account for the USBR's published values of bank storage. No studies have been completed that demonstrate that water which seeps into the banks actually returns to the reservoir to justify treating all of it as bank storage. The fact that the amount of water stored in the banks approximates a year's worth of river flow suggests that unaccounted for, the bank storage is a large potential error in the simulations and a source of inaccuracy in the management of the river system that is the source of water supply for about 30 million people in the southwestern U.S.

The objective of this article was to improve the estimate of monthly and cumulative bank storage and seepage on Lake Powell by improving the estimate of local inflow, which is ungaged and estimated as a fraction of the difference in gages on the mainstem river as described below. Variability in the estimates of bank storage is estimated using the stochastic properties of local inflow and evaporation. The article also discusses the differences in actual and simulated bank storage and makes recommendations for utilizing this new information to make more accurate predictions for the management of the water resources in Lake Powell.

## HYDROLOGY OF LAKE POWELL AND THE UPPER COLORADO RIVER BASIN

Lake Powell lies near the downstream end of the upper basin of the Colorado River system which is divided politically into upper and lower basins at Lees Ferry, Arizona (Figure 1). The total area of the upper basin is 293,200 square kilometers ($km^2$), which is roughly split between the Rocky Mountains headwaters and the Colorado Plateau (Fenneman, 1931). The Colorado River at Lees Ferry gaging station 9380000 (Figure 1 and Table 1), which lies about 25 kilometers (km) downstream from Glen Canyon Dam, measures the flow from the upper to the lower basins. The flow at this gage has varied with time (Figure 2) with construction of Lake Powell causing the largest change to the flow from the upper basin.

The Colorado Plateau consists of nearly horizontal sedimentary strata deeply incised by major stream systems and interrupted by north-south trending monoclines, structural domes, and basins along with widely scattered extrusive and intrusive igneous features (Blanchard, 1986). The Navajo Sandstone forms the walls of Glen Canyon, and contains and

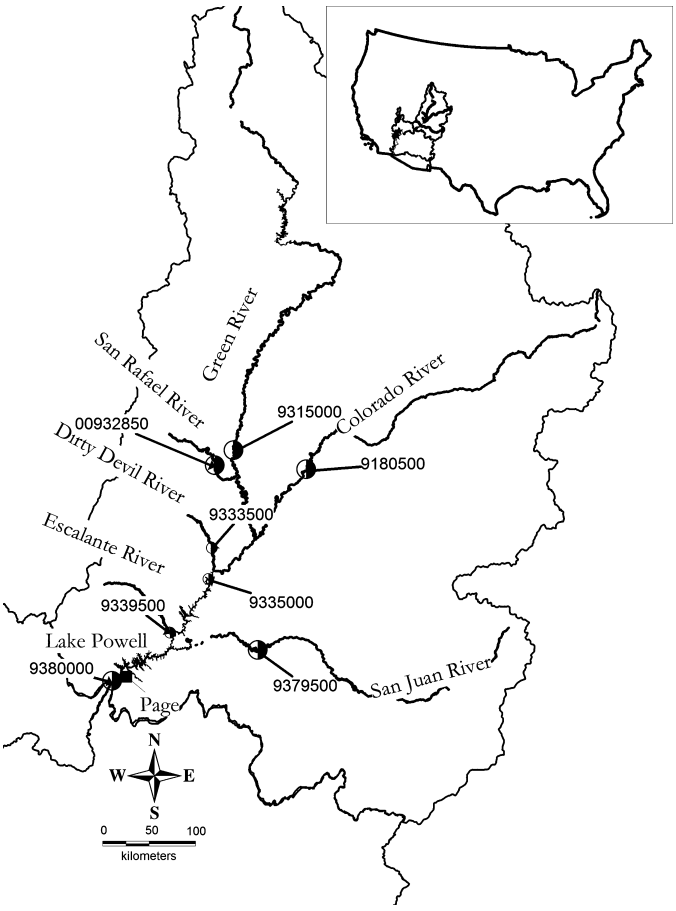



FIGURE 1. Upper Colorado River Basin and Select Gaging Stations. Gaging station 9380000 — Colorado River at Lees Ferry, Arizona; 9335000 — Colorado River at Hite, Utah; 9315000 — Green River at Green River, Utah; 9180500 — Colorado River near Cisco, Utah; 9379500 — San Juan River, near Bluff, Utah; 9339500 — Dirty Devil River above Poison Spring Wash, Utah; 9339500 — Escalante River at mouth near Escalante, Utah; 9328500 — San Rafael River near Green River, Utah. See Table 1 for drainage area and periods of record.

TABLE 1. U.S. Geological Survey Gaging Stations in the Upper Colorado River Basin, Used for This Analysis. See Figure 1 for the location of these stations within the basin. Data from U.S. Geological Survey National Water Information System for Utah and Arizona (http://waterdata.usgs.gov/ut/nwis/sw) and Arizona (http://waterdata.usgs.gov/az/nwis/sw/).

| Gaging Station Name | Gaging Station Number | Drainage Area ($km^2$) | Period of Record[1] | Avg. Annual Flow ($Gm^3$/yr) | Month Count |
|---|---|---|---|---|---|
| Colorado River near Cisco, Utah | 9180500 | 62,400 | 10/13-present | 6.43 | 1,092 |
| San Juan River near Bluff, Utah | 9379500 | 59,600 | 10/14-present | 2.00 | 1,019 |
| Green River at Green River, Utah | 9315000 | 116,000 | 10/1894-present | 5.42 | 1,315 |
| Sum of river inflow gages | | 238,000 | | 13.8 | |
| Colorado River near Lees Ferry, Arizona | 9380000 | 289,600 | - | 18.5[2]<br>14.6[3]<br>12.1[4] | 1,227 |
| **Other Gages** | | | | | |
| Colorado River at Hite, Utah | 9335000 | 198,000 | 8/47-9/58 | 12.0 | 134 |
| Escalante River near Escalante, Utah | 9339500 | 829 | 10/42-9/55; 12/71-present | 0.00957 | 610 |
| Dirty Devil River above Poison Creek near Hanksville, Utah | 9333500 | 10,800 | 10/43-9/98; 6/2001-present | 0.0885 | 640 |
| San Rafael River near Green River, Utah | 9328500 | 4,260 | 10/09-9/18; 10/45-present | 0.118 | 876 |

[1]The period of record may include periods without measurement, however, the intent is to use only gages with a mostly complete record.
[2]Lees Ferry gage natural flows as estimated by USBR for 1906 through 2007 (Prairie and Callejo, 2005).
[3]Actual Lees Ferry gage flows for 10/21-9/63.
[4]Actual Lees Ferry gage flows 10/63-9/2009.

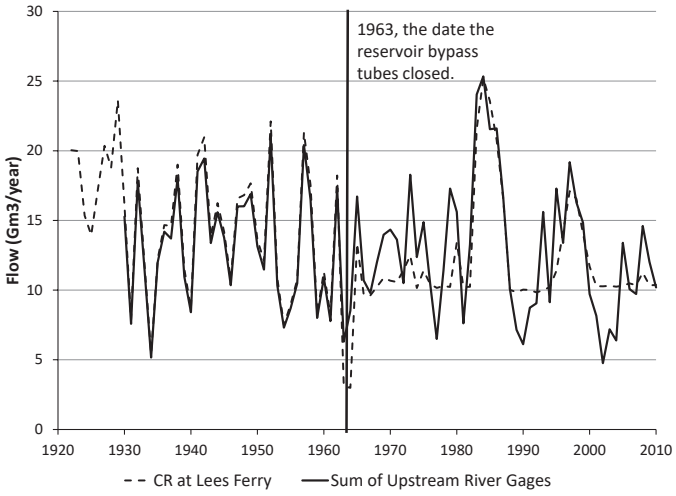



FIGURE 2. Historic Annual Flows on the Colorado River, by Water Year, Below Lake Powell (CR at Lees Ferry) and Main River Inflow to Lake Powell. See Table 1 for gaging station numbers and data citation.

transmits any bank storage and seepage. Thomas (1986) found that the Navajo Sandstone dips northward from the reservoir with a conductivity of about 0.4 meters per day (m/day). Jacoby *et al.* (1977) estimated that 10.4 $Gm^3$ of water had been stored in the banks between 1964 and 1976. Thomas (1986) developed a groundwater model which essentially verified Jacoby *et al.*'s estimate of bank storage and indicated that much of the water in the banks would not return to the reservoir.

Natural river flows are the flows that would have occurred without upstream human-induced consumptive use (Prairie and Callejo, 2005). Natural flows at Lees Ferry from 1906 to 2007 averaged 18.5 $Gm^3$/yr and for 1963 through 2007 averaged 17.8 $Gm^3$/yr. Historic flows, the actual gaging station flow measured at the Lees Ferry gage, averaged 14.8 $Gm^3$/yr for 1927 through 1962 and 11.9 $Gm^3$/yr for 1963 through 2007 (Figure 2). The difference between natural and historic flows is the USBR's estimate of consumptive use within the upper basin. The difference between the two periods includes the effect of Lake Powell and any changes in the watershed condition.

Mainstem river inflow to Lake Powell is estimated as the sum of flow at three upstream gages and outflow is the measured flow at the Lees Ferry gage downstream from the reservoir (Table 1 and Figure 1). Errors in the flow rates are primarily due to measurement error and normally distributed around zero (Haan, 1977). Local inflow is ungaged inflow that enters the river or reservoir from the 51,400 $km^2$ that lies between the upper and lower gaging stations. Local inflow from this semiarid area includes groundwater discharge, local runoff, and several perennial rivers. Groundwater inflow would be relatively constant to the river or to the reservoir basin although development of the reservoir would change the hydraulic gradient so that the discharge to the reservoir would be lessened or even reversed (Blanchard, 1986; Thomas, 1986). Local runoff and stream inflow would continue unchanged due to the reservoir except for a portion of the area covered by the reservoir.

The USBR estimated local inflow for reservoir management as a fraction of the difference in average monthly pre-dam flows measured at the three upstream and one downstream gaging stations (Figure 3), similar to Jacoby *et al.* (1977) (Rick Clayton, USBR Salt Lake

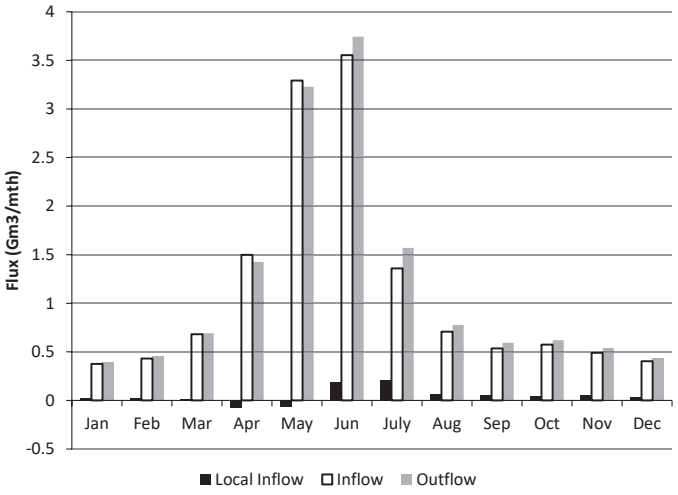



FIGURE 3. Local Inflow, Inflow, and Outflow Determined as the Difference between Inflow and Flow to the River Reach between the Upstream Gages Used as Inflow to Lake Powell and the Downstream Gage Used as Outflow from the River Reach for the Period of Record 1927 Through 1962 (Jacoby *et al.*, 1977).

City, November 29, 2010, personal communication). Both methods estimate that 0.063 $Gm^3$/month is the average for the 1927 through 1962 period, just prior to the closure of the bypass tubes of Glen Canyon Dam in 1963, but the fractions differ by month (Figure 3). Local inflow for the period before the reservoir began filling is a gain during all months, except for April and May (Figure 3) when high flows are recharging the banks. The estimates do not vary among wet or dry years or account for actual watershed conditions, but do account for development in the basin in that the estimates have been adjusted to represent natural flows.

## METHOD OF ANALYSIS

### *Reservoir Water Balance*

Reservoir water balance may be described with Equations (1-3).

$$\text{Inflow-Outflow} = \text{Change in Storage} + \text{Residual} \quad (1)$$

$$\text{Inflow} = Q_\text{i} + Q_\text{l} + P \quad (2)$$

$$\text{Outflow} = E + Q_\text{o} \quad (3)$$

$Q_\text{i}$ is major river inflow, $Q_\text{l}$ is local inflow, and $P$ is precipitation on the reservoir surface. $E$ is evaporation from the reservoir surface and $Q_\text{o}$ is river outflow. Change in reservoir storage may be estimated with stage/volume relationships (USBR, 1985, 2007). If all of the water balance factors are estimated independently, bank storage is a residual that also accounts for errors in the estimation or measurement of any of the factors. Accuracy in the bank storage estimates depends on the accuracy of the estimation of the terms in Equations (2) and (3).

The local inflow estimate may be the largest source of uncertainty in reservoir bank storage estimates. Local inflow may depend less on the high elevation runoff from the Rocky Mountains than on local factors which are not represented by the three upstream gages. Assuming that relations between local gaging stations and the calculated local inflow are the same after 1963 as before, statistical analyses including correlation and multiple linear regression were used to revise the estimate of local inflow used as input to the reservoir water balance analysis. The multiple linear regression included indicator variables to account for differences among months and the Durbin-Watson test of residuals used to test whether significance depends on autocorrelation (Neter *et al.*, 1985).

The residual of the reservoir water balance, calculated using historic flows with Equations (1-3), is flow to the bank. Monte Carlo simulations with local inflow and net evaporation estimated as stochastic variables were used to account for uncertainty. The estimated variables were assumed to be normally distributed, using the polar method for estimating $N(0,1)$ random variants (Law and Kelton, 1991). For local inflow, the actual standard error from the regression was used for adjusting to actual inflow estimates. The standard deviation for the monthly evaporation rate equaled 10%, based on data presented in Westenburg *et al.* (2006). Simulations continued until the moving average of all simulations fluctuated within 2% of the deterministic value of bank storage, determined from the local inflow regression and average evaporation. The upper and lower 90% confidence bands were determined as the simulation, which yielded the final bank storage within 5% of the lowest and highest simulated values. Multiple linear regression of bank storage with reservoir storage characteristics using the deterministic bank storage values was used to consider the controls on the rate that bank storage accumulates or seepage is lost.

## RESULTS

### *Local Inflow Estimation*

The correlation coefficient of historic local monthly inflow with the sum of the historic flow at the three

upstream gages, for the 1927 through 1962 period, is 0.230 and with the San Juan, Colorado, and Green River gages is 0.24, 0.22, and 0.23, respectively. This shows that the flow from above these mainstream gages explains only a small amount of variation in local inflow.

Table 2 provides monthly and annual statistics for historic local inflow and other rivers that enter the river within the area considered for local inflow (Figure 1). Monthly local inflows from 1927 to 1962 have positive skew and the mean (0.063 $Gm^3$/month) exceeds the median by 1.6 times. Local inflows have high variability as indicated by the standard deviation being 2.2 times the mean and numerous negative values due to the river recharging the banks. Accounting for local factors is essential for understanding the variability of local inflow.

TABLE 2. Average Monthly, Average Annual Flow, and Monthly Standard Deviation at Gaging Stations on Three Lake Powell Tributaries (Escalante River near Escalante, Dirty Devil River above Poison Creek, and San Rafael River near Green River) for Their Period of Record to 2010 and Local Ungaged Inflow to the Lake Powell Reach from 1927 to 1962. Statistics for local tributaries based on complete period of record (Table 1). Count is the number of months included in calculating the statistics, and the effective count reflects the reduced information content in the mean based on lag 1 autocorrelation.

| Month | Local Ungaged Inflow (1927-1962) | Escalante | Dirty Devil | San Rafael |
|---|---|---|---|---|
| | Average Flow ($Mm^3$/month) | | | |
| January | 21.53 | 0.62 | 7.53 | 3.15 |
| February | 26.89 | 0.69 | 9.27 | 4.59 |
| March | 10.10 | 0.93 | 10.43 | 7.33 |
| April | 68.80 | 0.95 | 7.72 | 6.99 |
| May | 39.86 | 1.73 | 6.23 | 20.71 |
| June | 190.21 | 1.40 | 4.79 | 37.76 |
| July | 211.27 | 0.47 | 3.88 | 10.66 |
| August | 99.30 | 0.64 | 6.69 | 6.22 |
| September | 57.32 | 0.49 | 6.21 | 5.33 |
| October | 49.18 | 0.60 | 9.52 | 6.89 |
| November | 52.03 | 0.51 | 9.18 | 4.65 |
| December | 33.20 | 0.53 | 7.12 | 3.32 |
| Annual ($Mm^3$/yr) | 642.38 | 9.56 | 88.59 | 117.59 |
| | Standard Deviation | | | |
| January | 21.43 | 0.45 | 2.84 | 2.31 |
| February | 27.04 | 0.45 | 2.60 | 2.71 |
| March | 51.91 | 0.61 | 3.64 | 7.91 |
| April | 75.64 | 0.95 | 5.71 | 9.35 |
| May | 148.11 | 2.19 | 5.94 | 26.90 |
| June | 151.55 | 2.65 | 7.44 | 44.84 |
| July | 107.93 | 0.53 | 4.76 | 14.61 |
| August | 94.49 | 0.58 | 8.33 | 6.07 |
| September | 76.49 | 0.61 | 9.07 | 5.01 |
| October | 67.17 | 0.56 | 16.24 | 9.24 |
| November | 48.15 | 0.39 | 10.14 | 3.91 |
| December | 23.74 | 0.36 | 2.14 | 1.78 |
| | Autocorrelation of Monthly Flows | | | |
| Lag 1 | 0.27 | 0.54 | 0.27 | 0.48 |
| Lag 2 | 0.04 | 0.24 | 0.08 | 0.15 |
| Lag 3 | 0.18 | 0.15 | 0.07 | 0.05 |
| Lag 12 | 0.47 | 0.04 | 0.14 | 0.44 |
| Count | 427 | 610 | 640 | 876 |
| Effective count | 245 | 183 | 370 | 309 |

Three gaged perennial tributary rivers enter the Colorado River within the local inflow reach — the Escalante, Dirty Devil, and San Rafael (Table 1, Figure 1). Their total average annual flow is about 0.216 $Gm^3$/yr for years with coinciding periods of record meaning they account for more than a third of the average local inflow, leaving almost two-thirds unaccounted for (Figure 4 and Table 2). Measured flows from these rivers and the computed local inflow have decreased over the period of record (Figure 4), with decreases for local inflow, San Rafael River, Dirty Devil River, and the Escalante River equaling 1.19, 0.905, 0.00937, and 0.00395 million cubic meters per year ($Mm^3$/yr), respectively. The cause of the decrease could be development, of which there has been little, or long-term flow changes, as in the Colorado River watershed (Woodhouse *et al.*, 2006; Brekke *et al.*, 2007; Meko *et al.*, 2007).

Computed local inflow can be negative whereas measured tributary flow is positive. The highest local inflow months correspond with the highest tributary flows on the Escalante and San Rafael Rivers, but not the Dirty Devil (Table 2). The Escalante and San Rafael Rivers have much higher elevation headwaters with snowmelt controlled flow. The Dirty Devil River flows more in response to the rainfall/runoff regime,

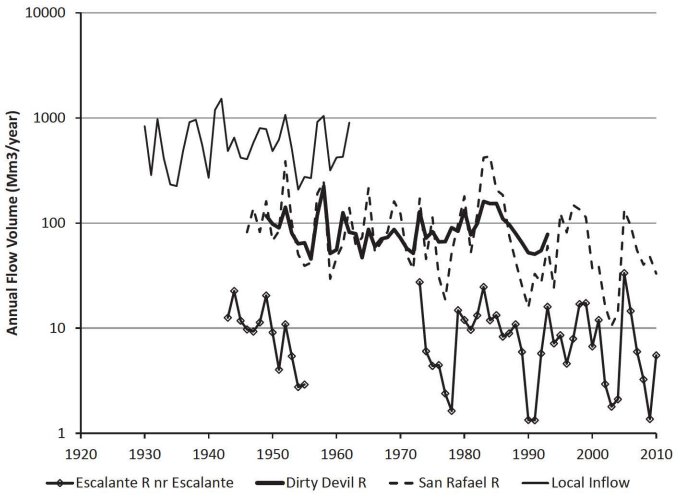



FIGURE 4. Water Year Flow at Gaging Stations on Three Lake Powell Tributaries (Escalante River near Escalante, Dirty Devil River above Poison Creek, and San Rafael River near Green River) for Their Period of Record Through 2010, and Local Inflow to the Lake Powell Reach from 1927 to 1962. See Tables 1 and 2 for gaging station numbers, data citations, and flow statistics and Figure 1 for location.

so high flows can occur during any month, but least frequently during summer due to small areal storm coverage. The months May through August were most variable, as shown by the standard deviation of the monthly flows, with the exception of October on the Dirty Devil River (Table 2).

The autocorrelation of monthly local inflow reflects how antecedent conditions can influence runoff, but the differences of autocorrelation among local gaged sites reflects how small-scale events likely influence runoff in the semiarid region contributing to local inflow (Table 2). The 12-month lag is tantamount to year-to-year autocorrelation and is high for overall local inflows and the San Rafael River gage simply because these represent larger drainage areas (Table 1).

Simple linear regression analyses between the monthly local inflow and the gaged tributary flows for their common periods of record, yielded low coefficients; the highest coefficient of determination ($R^2$) equals 0.16 for local inflow with San Rafael River flow and the other two are less than 0.01. Simple linear regression of local inflow with the sum of the three tributary gages for the period of record that overlaps all three tributary gages explained 27% of the variance. Multiple regression of local inflow with the three gages for the corresponding period from October 1948 through September 1955 during which all gages have records resulted in the following regression (adjusted $R^2$ [adj $R^2$] = 0.25)

$$Q_l = 8.1 + (\ \ 0.00437)Q_{Esc} + 0.000803Q_{DD} + 0.00306Q_{SR} \quad (4)$$

$Q_l$ is local inflow, $Q_{Esc}$, $Q_{DD}$, and $Q_{SR}$ are monthly flows ($Mm^3$/month) at Escalante, Dirty Devil, and San Rafael Rivers, respectively (Table 2). Only the coefficient for $Q_{SR}$ was significant, with $p = 5.7 \times 10^{-6}$, which is reasonable because its drainage area represents more of the local inflow area. Overall, the correlation and regression results reflect that many factors control local inflow and that the gages measure flow from only a portion of the total tributary area.

Indicator variable regression (Neter *et al.*, 1985) with $Q_{SR}$, with monthly indicators equaling 1 for observations during that month and 0 otherwise, helps to control for differences in the average flow from the tributary gage and the local inflow among months. This regression (data not shown) showed there is a substantial difference in flows among months, but it implicitly assumes the slope of the flow relation is constant among months. The slope and intercept were 0.00293 and 19.5 $Mm^3$/month, just slightly different than Equation (4), but the indicator variables for April, May, June, July, and August showed the flows differed from the monthly average by 140, 94.6, 71.3, 156, and 52.7 $Mm^3$/month ($p = 1.21 \times 10^{-5}$, 0.003, 0.032, $1.63 \times 10^{-6}$, and 0.081, respectively). The adj $R^2$ increased to 0.715.

To test whether the flow relation might differ by month, indicators for the four months which had significant coefficients ($p < 0.05$) were retained, and used to create an interaction term wherein the indicator, 0 or 1, is multiplied by the flow for each month. The interaction term will account for how the relationship varies among months. The resulting equation is

$$\begin{aligned} Q_l = {} & 16.2 + 0.00502Q_{SR} \quad 83.5APR \quad 123.MAY \\ & + 100.JUN + 105.JUL \quad 0.010Q_{SR}APR \\ & \quad 0.00068Q_{SR}MAY \quad 0.00281Q_{SR}JUN \\ & + .005485Q_{SR}JUL \end{aligned} \quad (5)$$

The adj $R^2$ is 0.78, indicating that Equation (5) explains a substantial amount of variance. The regression coefficients for the monthly indicator variables reflect the difference in average local inflow by month. The regression coefficient of the month and San Rafael River flow interaction terms is the amount that the slope of the flow relationship for that month differs from the overall regression slope. The differing relations by month reflect the snowmelt and beginning of the summer monsoon season. The Durbin-Watson statistic is 2.37 which indicates the residuals are not autocorrelated and the relationship may be used for further analysis without adjustment (Neter *et al.*, 1985).

With some exceptions, the local inflow predicted with this regression developed herein tends to be less than the USBR estimate of local inflow (Figure 5).

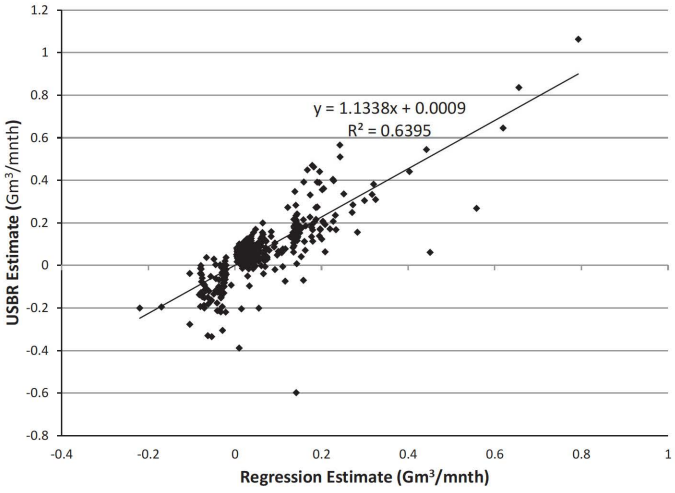



FIGURE 5. Relation of the U.S. Bureau of Reclamation Estimated Local Inflow and the Local Inflow Based on Equation (5).

The slope is 1.13 which indicates the USBR estimate is about 13% higher. Several high outliers occur for situations that regression prediction is higher than the USBR estimate. In May 1984, high predicted local inflow causes a large residual because the negative coefficient and high river flow caused the USBR to estimate 0.616 $Gm^3$/month (Figure 5).

*Precipitation and Evaporation*

Annual precipitation at Page, Arizona (Figure 1), equals 16.4 cm/yr (Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?azpage, accessed November 16, 2010) (Figure 6). The monthly precipitation volume, equaling the average precipitation over the monthly reservoir areas, was used directly in the water balance analysis.

The USBR estimates monthly evaporation based on a net value of 121 cm/yr distributed as shown in Figure 6 (Clayton, 2004; R. Clayton, "Reclamation Evaporation Methodology for Lake Powell," unpublished report, U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, Utah, 2008). Net evaporation equals gross evaporation minus pre-reservoir evapotranspiration (ET). Gross evaporation is 176 cm/yr and pre-reservoir ET loss within the inundated reservoir area (at full pool 664 $km^2$) is 0.280 $Gm^3$/yr (Jacoby *et al.*, 1977). Pre-reservoir ET loss included evaporation loss from the hillside area (0.0784 $Gm^3$/yr), transpiration from the riparian vegetation, and evaporation from the river surface. Jacoby *et al.* (1977) assumed that an average water surface area of 506 $km^2$ for a two-thirds full reservoir is representative of the long-term operations of the reservoir. At this area, the total gross evaporation loss is 0.893 $Gm^3$/yr. Subtracting the 0.280 $Gm^3$/yr pre-reservoir losses from the gross evaporation yields a net evaporation loss of 0.617 $Gm^3$/yr, which for a surface area of 506 $km^2$ is 1.22 meters per year (m/yr), the rate used for CRSS modeling (USBR, 2007).

*Reservoir Water Balance*

As of September 2009, the estimated deterministic cumulative bank storage is 15.0 $Gm^3$ (Figure 7). Considering stochasticity, the cumulative bank storage ranges from 11.9 to 18.8 $Gm^3$ for the fifth through ninety-fifth percentile estimate (Figure 7). The highest and lowest bank storage estimates of 125 traces were 20.8 and 10.3 $Gm^3$, respectively.

The deterministic cumulative bank storage first exceeded 14.8 $Gm^3$ in June 1983. Since that time it has fluctuated between 17.3 $Gm^3$ and slightly less than 14.8 $Gm^3$, the lowest value of which was 14.2 $Gm^3$ in April 2008, which also coincided with the lowest reservoir volume since its initial filling. From the peak in June 1989, cumulative bank storage decreased slowly until February 1995, losing about 1.0 $Gm^3$. Reservoir levels then began to increase and the cumulative bank storage crested again in December 1997 and remained mostly constant for several years while the reservoir remained at higher levels. Cumulative bank storage then began to decrease to its nadir in April 2008, losing about 2.47 $Gm^3$ in 10 years during a long-term drought.

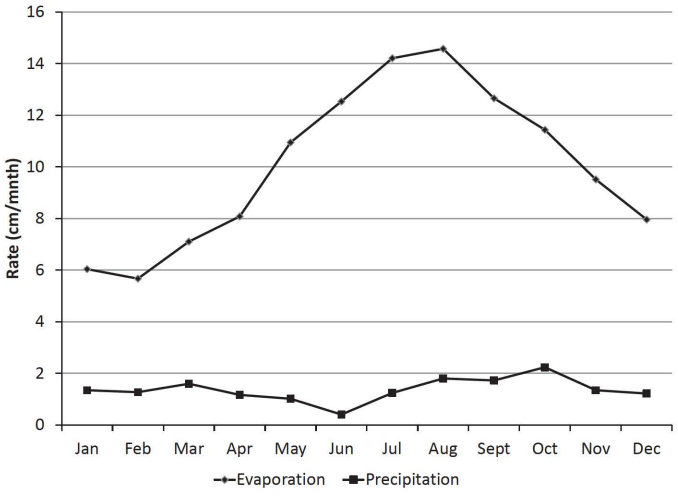



FIGURE 6. Evaporation and Precipitation Rates for Lake Powell as Simulated in the Water Balance. Evaporation as simulated by USBR (2007) and precipitation for 1957 through 2005 (Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?azpage, accessed November 30, 2010).

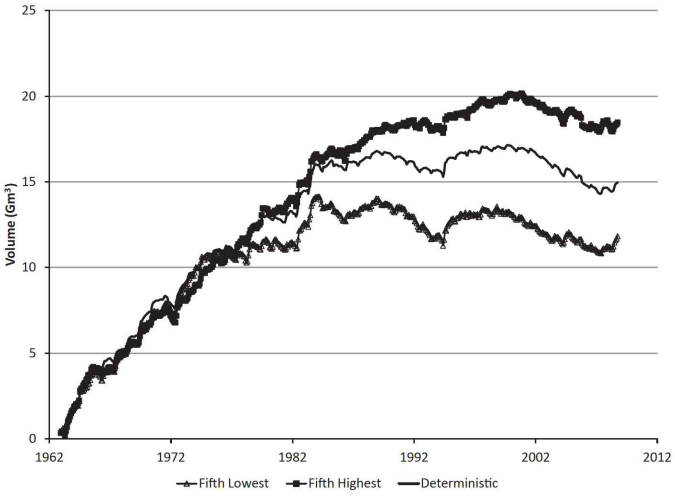



FIGURE 7. Deterministic and 5th and 95th Percentile Cumulative Bank Storage Curves.

The fluctuations since 1984 suggest that cumulative bank storage decreases with the reservoir level suggesting that water returns to the reservoir, but at a much lower rate than it had entered the banks during filling. The following regression of bank and reservoir storage over the entire time period shows that monthly bank storage is less when cumulative bank storage is higher and higher when the reservoir storage is high.

$$\Delta V_b = 0.0448 \quad 0.0107V\mathrm{b} + 0.0410\Delta V + 0.00457V \\ +0.0301\mathrm{Fall} \quad 0.0346\mathrm{Spring} + 0.112\mathrm{Summer} \tag{6}$$

$V_b$ is bank storage, $V$ is reservoir storage, $\Delta$ means "change in," and Spring, Fall, and Summer are indicator variables specifying the season. Adjusted $R^2$ is 0.49 and all coefficients are highly significant ($p < 0.0016$). The errors are not autocorrelated as the Durbin-Watson statistic is 1.73 (Neter *et al.*, 1985). Bank storage is larger both during months with large changes in reservoir storage and/or a near full reservoir, which reflects the hydraulic gradient for flow into the banks. Based on the sign and coefficients for the seasonal indicator variables, the largest amount of water entering bank storage occurs in the summer and water generally leaves the banks during the spring. Overall, the estimated bank storage values are quite variable which reflects their calculation as a water balance residual that has all of the uncertainty in the reservoir water balance relationship.

## DISCUSSION

The deterministic bank storage estimate made herein is about two-thirds of the 2010 USBR estimate. None of the Monte Carlo simulations predicted bank storage as high as the USBR estimate. This estimate is lower because estimated local inflow in the Lake Powell reach is less (Figure 5). The USBR estimate depends on upriver flow which is not as predictive of local inflow as is gaged local tributary flow, which has decreased with time, leading to a decrease in estimated total local inflow. The USBR also uses natural flow estimates; therefore, the bank storage includes error inherent in that estimate as part of its bank storage estimate. Natural flows are higher than historical flows, therefore, bank storage estimates using natural flow are higher, but include water that has been lost to consumptive use.

The USBR changed its long-term bank storage estimate effective January 1, 2012 (Katrina Grantz, USBR Salt Lake City, February 1, 2013, personal communication). In its 24-month operations report issued 12/9/2011, the USBR reported that bank storage at the end of November 2011 equaled 23.5 $Gm^3$ but the next month's report, issued 1/12/2012, reported that bank storage equaled 6.6 $Gm^3$ (Operation Plan for Colorado River System Reservoirs (24-Month Study), http://www.usbr.gov/lc/region/g4000/24mo/, accessed August 8, 2012). The methodology has not been documented in a formal study (Katrina Grantz, USBR Salt Lake City, February 1, 2013, personal communication).

The deterministic bank storage accumulated since 1964 is almost equivalent to a year's worth of inflow to the reservoir. There are three apparent questions to consider about bank storage or seepage in Lake Powell: (1) where does the water go?; (2) will it return to the reservoir as the reservoir lowers?; and (3) how much more water will be stored in the banks?

### *Where Does the Water Go?*

The reservoir water seeps into the Navajo Sandstone and other sedimentary rocks around the reservoir. When the reservoir is full, the total inundated river length is about 299 km with about 233 km along the Colorado River and 66 km along the San Juan River portion of the reservoir, for a total river bank of about 599 km. The unsaturated thickness from the original river level to an approximate average depth is about 152 m at the dam (Thomas, 1986). The pre-reservoir groundwater level sloped up from the river to a point where the groundwater level approximates the full reservoir elevation, about 8 km from the river at the dam (Blanchard, 1986). The volume of an unsaturated wedge in the sandstone surrounding the reservoir is about 180 $Gm^3$ accounting for the riverbed slope. If the sandstone porosity varies between 0.01 and 0.1 (Anderson and Woessner, 1992), the available bank storage is about 1.80-18.0 $Gm^3$ below the pre-reservoir groundwater level.

Groundwater flowing toward the river likely no longer reaches it due to backwater caused by the rising reservoir because of backwater into the sediments above the reservoir level (Blanchard, 1986; Thomas, 1986), as seen in rising groundwater levels near the reservoir (Figures 8 and 9). Thomas' (1986) groundwater model simulations found that a long-term equilibrium would result in about 400 years with half of the total bank storage having occurred by 1983. He projected that 36 and 57% of the second half of the equilibrium storage would be reached within 50 and 100 years, respectively, although his estimates do not account for fluctuation in the reservoir level. This suggests that another 14.8 $Gm^3$ will accumulate in the banks over the next 400 years. Because

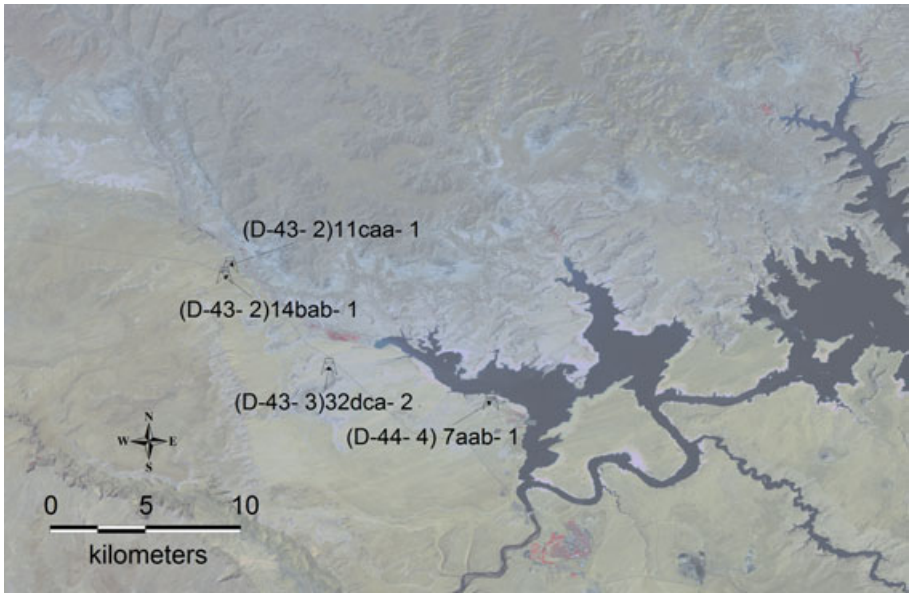



FIGURE 8. Location of Four Monitoring Wells Near Lake Powell. All wells are northwest of the dam within 10 km of the reservoir. Site map upper right is the Upper Colorado River region, see Figure 1.

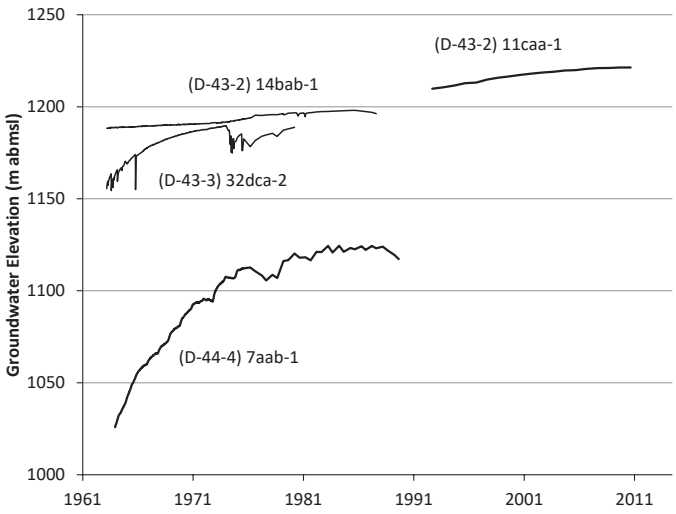



FIGURE 9. Groundwater Elevation at Wells Monitored Near Lake Powell (see Figure 8). The full lake level is 1,128 m above mean sea level.

the groundwater levels near the reservoir have already risen to the level of equilibrium storage, most of the future bank storage will be from groundwater inflow.

*Will the Water Return to the Reservoir?*

Water returns to the reservoir as the reservoir level lowers because the gradient reverses near the reservoir, but the regression relations indicate the rate of return is much lower than for water flowing into the banks. Because the sandstone dips downward to the north, water in the banks to the north may have barriers to overcome to return to the reservoir or river system and some may flow past a point where geology prevents its return.

Thomas (1986) indicated that the reservoir had not yet affected regional flow patterns in the sandstone, but that "levels in wells within 1 mile of the lake shoreline indicate that the direction of groundwater movement near the lake reverses following the seasonal fluctuations of the lake level" (Thomas, 1986, p. 16). His groundwater model showed that within 20 years, groundwater levels will have increased 100 m near the downstream end of the reservoir and more than 7 m, up to 40 km from the Colorado River. However, the potentiometric surface would still slope toward the river, as found by Blanchard (1986). Neither simulations nor observations suggest a groundwater divide has or will form to prevent water from returning to the reservoir; a divide could form downgradient of the dam causing water to return to the river far below the dam (Thomas, 1986).

*How Much More Water Can Be Stored in the Bank of Lake Powell?*

The answer depends on the combination of seepage and how groundwater inflow to the Colorado River and inundated tributaries now backs up due to the reservoir level. If the bank storage was half full in 1983, then full storage is about 29.0 $Gm^3$ and there is room

for an additional 15 $Gm^3$ over the next 400 years. Bank storage accumulates above the full pool elevation because groundwater flowing toward the reservoir mounds up against the inflow to sandstone units from the reservoir as shown by groundwater levels near the downstream end of the reservoir (Figure 9).

*Effect of Simulating Reservoir Management Using a Constant Bank Storage Fraction*

As noted, the USBR CRSS simulations of the operation of Lake Powell assume that bank storage is 8% of the change in reservoir storage; this value has not changed even though the USBR estimated cumulative bank storage has changed, as noted above. This effectively means that the USBR assumes the storage which accumulates in the reservoir is 8% greater than the measured water volume increase. It also assumes that water returns to the reservoir at the same rate as the reservoir volume lowers and ignores the long-term storage.

The actual fraction that the monthly change in bank storage is of the monthly change in reservoir storage varies substantially but the median negative and positive bank storage fraction has been 0.12 and 0.15 for the entire time period (Figure 10). Since 1983, the median fraction has been 0.12, both positive and negative, indicating more water than simulated both enters and leaves the reservoir bank storage.

Bank storage returns to the reservoir slowly as the reservoir volume decreases — much slower than the water flowed to the banks while it was filling — because the reservoir levels generally decrease more slowly than they increase. Since 1983, bank storage decreased at small rates for two periods; the first was quickly made up as the reservoir filled in 1998 (Figure 7). Statistics and modeling indicate that the bank storage will continue to increase if the reservoir returns to high levels. If the long-term trend is toward low reservoir levels some of the bank storage may return, though some may be downstream from the dam. If this were the case, CRSS may actually underestimate the long-term bank storage return.

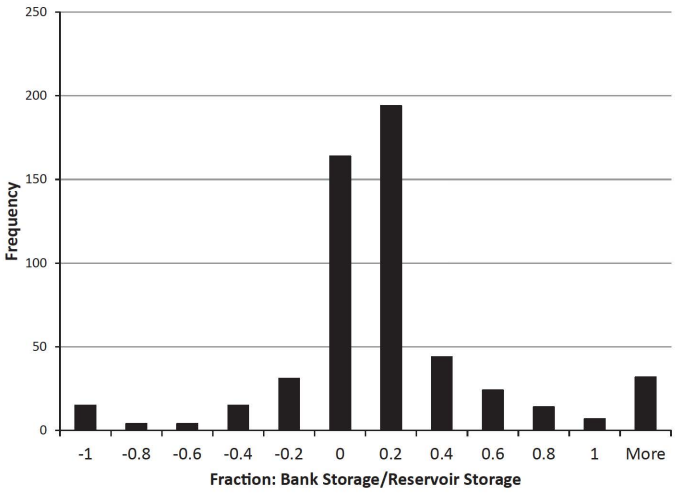



FIGURE 10. Histogram of the Fraction That Change in Bank Storage by Month Is of Change in Reservoir Storage by Month. The figure does not include higher or lower fractions which primarily occurred during periods with very small reservoir storage changes.

*Effect of Simulating Net Evaporation*

Assuming evaporation based on the difference between gross evaporation and the salvaged losses for a particular reservoir storage amount biases the evaporation estimate. When the reservoir volume is low, the surface area is low and the water considered salvaged by a full reservoir will actually still be lost in the river channel and hillside areas not inundated. It is more accurate to estimate gross evaporation and account for precipitation onto the water surface and proportional salvaged ET. Salvaged ET is the rate determined for a full reservoir adjusted by the proportion of the reservoir area actually inundated.

The effect USBR's assumptions would have on CRSS results depends on the average reservoir level. During low reservoir stage, the assumption would underestimate the actual evaporation loss because use of a net value assumes water is not lost that actually is lost. When the reservoir is near full, the method may estimate a net value that is too high because the full pool may actually salvage more pre-reservoir losses than assumed. In the future if the reservoir level remains low, the USBR assumption may allow too little evaporation loss and allow the USBR to overpredict reservoir storage.

*Local Inflow between Lake Powell and Lees Ferry*

The only way to estimate inflow or outflow between Glen Canyon Dam and the gage at Lees Ferry is to determine the difference between the gage and the dam releases. U.S. Geological Survey (USGS) gage number 09379910, Colorado River below Glen Canyon Dam, has operated intermittently just 1,370 m downstream from the dam, from October 1989 to March 1993 and from March 2000 to September 2002. The flow difference between 1989 and 1993 averaged 0.397 cubic meters per second (cms) and between 2000 and 2002 averaged 3.43 cms.

Using flow measurements through the power plant since 2000, the USBR has estimated seepage between

the dam and Lees Ferry gage to be about 187.5 $Mm^3$/yr, which is about 5.95 cms (Rick Clayton, USBR Salt Lake City, November 29, 2010, personal communication). Seepage to the river below the dam from the Navajo Sandstone below the dam began as early as 1983, after 20 years of reservoir filling, and continues to this day (David Wegner, former Program Manager, Glen Canyon Environmental Studies, August 6, 2011, personal communication).

Water that enters the river between the dam and Lees Ferry is essentially returning bank storage that is counted as part of the discharge from the system. The fact there is seepage into the river below the dam indicates the estimated bank storage is a net value, with some of the water entering the reservoir returning to the system. Seepage below the dam is accounted for at the Lees Ferry gage, therefore, it should not affect the water balance or the bank storage estimate unless seeps discharge below Lees Ferry, more than 25.6 km below the dam.

## CONCLUSION

Lake Powell has lost or stored more than 14.8 $Gm^3$ of water in its banks since the bypass tubes were closed in 1963 according to the water balance presented above. Groundwater models completed by others had predicted that amount and indicated that about that much more will flow into the banks within 400 years. The accumulating bank storage is not an error in the estimate of local inflow.

Water loss to the banks has lessened but has not yet reached steady state. Equilibrium may require as much as 400 years, but much of the loss may actually be due to groundwater not reaching the reservoir rather than to water flowing into the banks from the reservoir. Bank storage returns to the reservoir when the reservoir is low but accumulates much faster when the reservoir fills. Keeping the reservoir lower or even empty may salvage water lost to the banks, reduce evaporation, and possibly recover up to 14.8 $Gm^3$ of water already stored there. Keeping the reservoir near empty, however, could affect other values generated in the river, but these are beyond the scope of this article.

Simulating the reservoir operations with a constant bank storage estimate that returns all of the water to the reservoir fails to account for some system losses. Using the higher bank storage fraction determined herein and also accounting for cumulative bank storage separately would provide superior estimates and improve the reservoir management.

Bank storage relationships are not constant with time and factors not considered in the simple water balance calculation affect the amount of water lost to and returning from the banks. A network of monitoring wells and piezometers around the reservoir would improve the understanding and management of bank storage. Because of differing transmissivity values, there may be levels at which more water discharges into the banks. A detailed groundwater model of bank storage linked to the river simulation models could help to integrate bank storage into surface water management. Detailed monitoring and modeling could allow the USBR to optimize its reservoir storage with bank storage rather than assuming that all water lost will return.

Local inflow and evaporation estimates have a large uncertainty. Installing gaging stations on as many local tributaries as feasible and updating the evaporation data so that year-to-year and seasonal variability is better known would also improve the understanding of reservoir water losses. Both of these water budget components could change with time due to a changing climate, a factor which increases the importance of improving the data. Including the updated estimates in CRSS would change the management of bank storage and evaporation which currently leads to an estimate of more water availability, especially as the reservoir levels trend downward. The evaporation rate accounts for too much salvage of pre-reservoir water loss; long-term downward trends in the reservoir level could result in more predicted bank storage returning to the reservoir than is realistic.

### ACKNOWLEDGMENTS

The author thanks Rick Clayton, Dave Wegner, and Michael Kellett for helpful technical criticisms and editing. He also thanks the Glen Canyon Institute for funding this research.

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***Letter #:*** 7727

***Date Received:*** 3/1/2026

***Sender Names:*** 7671: Chaleco House

***Emails:*** 7671: sj5113778@gmail.com

***Organizations:***

***Subject:*** Out of state visitors

DOI - . I notice many visitors come from out of state. Could this impact our water resources? Should they possibly pay an extra fee/tax for using our finite water supply? I know we have many visitors from Utah and Colorado. I'm sure they understand OUR dire situation. If a Federal plan is implemented, would it be fair to ALL states involved? Also, could Arizona build an ocean water treatment plant? Water could be piped in from northern Baja California. Thank you for all the hard work you do. Crescencio Samuel Juarez

***Letter #:*** 5851

***Date Received:*** 2/28/2026

***Sender Names:*** 5811: Christopher Howe

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***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, Dear government, Drastic measures are needed to reduce overall water use in the Colorado watershed. Dead pool is coming and significant changes need to happen NOW. Both to infrastructure and regulations. Glen canyon and Hoover need modifications to allow water to bypass thru the bottom of the dam to prevent the complete dewatering of the Colorado thru the Grand Canyon. Since the engineers of old didn't consider major drought scenarios it's now time for the engineers of today to carry the torch and come up with ground breaking solutions that are just as great and challenging as it was to build these dams in the first place. They must figure out a way to by pass the dams once water levels go below the intakes of the generators. Regulation wise drastic cuts must be made to water consumption up and down the Colorado from its headwaters to the very last trickles of the river. Desalination plants and vast piping/pump systems will be likely needed to sustain drinking water and agricultural needs that have grown dependent on this natural resource that is rapidly depleting. These alternatives must be rigorously researched and invested in immediately to off set the problems that arise with out this resource. In my opinion alternatives need to be explored under the assumption that the Colorado is no longer an option at all. In short imagine the Colorado wasn't there and go from there. I've paddled thru the Grand Canyon on two different trips from lees ferry to pierce ferry, and losing this possibility for generations to come will have an exponential negative impact on our environment. And depriving people from all over the world of the unique experience of setting of on a river trip through the most geologically rich location in the planet is a just a complete disservice to humanity. You all at the Department of Reclamation have a complete ticking time bomb on your hands and yall need to defuse it now before it's too late. The Grand Canyon is one of the natural wonders of the world and it's time that reclamation treat it like such. Sincerely Christopher g Howe Sincerely, Mr. Christopher Howe 42 Cottage Rd Kingfield, ME 04947-4143 funpow89@yahoo.com

***Letter #:*** 9266

***Date Received:*** 12/4/2024

***Sender Names:*** 9165: Chad Hubbard

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***Organizations:***

***Subject:*** Page 0363

I Highly Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. If the human population were like it was 100 years ago I'd have a different opinion but its not. We need water to be stored behind damns, we need to be able to draw water in the midst of dry times. We cannot afford to let the water flow back into the ocean. We need full reservoirs. On top of that we have an infrastructure of lake recreation already there and ready to use, we just need more water. When people get outdoors and enjoy outdoor activities, they generally take care of it and will also vote to protect the environment. Anyway, I highly suggest we do our best to keep our reservoirs full and keep our rivers flowing the best that we can. I know the rivers will suffer as the lakes fill but once full and or near full, then we can manage the river flow with the Post-2026 Colorado River 363 of 5176 amount of rain we get. Thank you Post-2026 Colorado River

***Letter #:*** 4056

***Date Received:*** 2/27/2026

***Sender Names:*** 4011: Kori Huber

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***Organizations:***

***Subject:*** Kori Huber Comments on Colorado River

Great Basin Water Network DOI - . The document fails to consider the following:The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.Three Alternatives Do Not Likely Comply With The Law Of The River. Programmatic Review Is Necessary And So Is Congressional ActionIn Appendix C, the DEIS implies that modeling justifying three of the proposals "may not be implementable" because potential non-compliance with "laws, contracts, agreements, and other authorities that are part of the Colorado River legal and contractual framework referred to as Law of the River." That is a reference to the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternative. Without any deal in place among the states or congressional action, a Record of Decision supporting those alternatives poses legal challenges that may be insurmountable.Therefore, according to the DEIS, the No Action Alternative and Basic Coordination Alternative are among the only options that could avoid a legal challenge after a Record of Decision.Those options pose some of the worst outcomes for Lakes Powell and Mead. We believe that no course of action as put forth in the DEIS is a sufficient means of stabilizing the system under the current Law of the River framework. This is troubling considering Reclamation is predicting some of the most dire reservoir elevations ever in the coming two years.Reclamation should undertake a programmatic review as the states continue negotiating. This year's low flows will inevitably get people back to the negotiating table in a meaningful way. Congress will act when the reservoirs are in crisis. We have seen congressional, bi-partisan action multiple times in the past seven years. When Congress is ready, enlist the National Academy of Sciences to undertake a programmatic review in partnership with the Department of Interior, Reclamation and other cooperating agencies. This document is not the beginning of the end. We believe it is merely the end of the beginning.The DEIS Fails To Consider Impacts On Irretrievable Resources By Sanctioning The Repurposing Of Water ResourcesThe DEIS offers multiple alternatives that impose varying levels of cuts in the Lower Basin and no meaningful cuts in the Upper Basin. Some alternatives mention the possibility of Upper Basin "conservation" but those offerings do not describe who, what, where and when. There is nothing steadfast for cuts in the Upper Basin.The DEIS also showcases a modified version of the 2016 Upper Basin Depletion Schedule that still assumes considerable new uses of water in the Upper Basin in the coming decades. Because of the limited resources available, there's no doubting that cuts imposed on the Lower Basin will be repurposed by the Upper Basin. That repurposing defeats the intent of this analysis. Once that water is re-appropriated by Upper Basin regulators, waters with established beneficial uses will not return to where those uses were first proven in the Lower Basin. This is highly suspect.Furthermore, we question how Reclamation can execute its recognized authority to force a curtailment in one basin but not even questioning how development of new appropriations in another part of the basin will impact the whole system and those who had to undertake curtailment. Upper Basin reservoirs are subject to the "apportionments" among

the two basins, seven states and Mexico (See Colorado River Storage Project Act, Pub. L. No. 84-485, SS 4, 70 Stat. 107 (1956)). Reclamation has a great deal of say in how certain rights are managed in the system. But how can regulators sequester the differences between the starting and end points of a highly connected system where some users have established decades worth of use? This gray area is at the heart of the ongoing conflict among the seven states, and we request more information on this in the FEIS.We fear that it is an unacceptable practice to allow the Upper Basin to repurpose water from Lower Basin in the name of state-led permitting efforts in Colorado, New Mexico, Utah and Wyoming. Further declines in the system will challenge Reclamation's mission to protect infrastructure, ecosystems, and communities. It means less water making its way through the southernly reaches of the system in the majority of years if current trends continue. Every state needs a curtailment plan on the Colorado River. This DEIS fails to compel the Upper Basin States to meaningfully consider how they will act to protect federal assets and resources.Finally, this could also bring about conflict over tribal water rights in the Upper and Lower Basins -- especially where settlements have been established. There must be consideration of reducing, at a 1-for-1 rate, junior non-tribal use for those senior tribal rights that have not yet been put to use. How Reclamation would undertake this matter in the Upper and Lower Basin must included in any FEIS. Also, there must be consideration of how Reclamation would prevent new Upper Basin appropriations put forth by non-native water users from using, in a de facto sense, settled and adjudicated rights of Lower Basin tribes.DEIS Ignores Glen Canyon Dam's Antique PlumbingThe analysis in the DEIS fails to consider bypass, decommissioning, and other meaningful resolutions available at Glen Canyon Dam, which poses considerable concerns for water delivery and endangered species protections. We understand and respect the legal arguments for not including the One-Dam Alternative. But it is a mistake to not undertake comprehensive analysis on this matter. Keeping Lake Powell's elevations above 3550', 3525, and 3490' are not realistic scenarios for the long-term. Failure to include greater analysis on Glen Canyon Dam's river outlet works will ultimately cost us all -- imposing direct impacts on Lake Mead, Hoover Dam, other federal infrastructure, metropolitan areas, agricultural hubs, tribal resources, sensitive species, National Park Service units, U.S. Fish and Wildlife units, and other conservation areas in the Lower Basin.The DEIS' Purpose-And-Need Is Too Narrow And Segments Requisite ReviewsReclamation, admittedly so in its Purpose and Need statement, recognizes the grave uncertainties we face if conditions do not improve on the river system. Reclamation also recognizes the direct connections the DEIS makes with upstream infrastructure associated with the Colorado River Storage Project units and in Lower Basin units at Parker Dam, Davis Dam, Imperial Dam, and Palo Verde. The DEIS would benefit from greater analyses in the technical appendices dealing with directly related impacts at the dams during low-flow periods. The same can be said for analyzing impacts at all Colorado River Storage Project facilities in low-flow periods too. They will be essential for propping up Lakes Powell and Mead. What will operations look like if CRSP and Lower Basin Infrastructure are only operating collectively at 10-20 percent of normal? What can we expect? To say that management at Mead and Powell are not directly connected to that management is implausible.If you have any additional questions please contact me.Kori
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***Letter #:*** 2100

***Date Received:*** 2/26/2026

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***Organizations:***

***Subject:*** Comments on the DEIS

DOI - . To whom it may concern,I would like to submit my comments concerning the Draft EIS for the Post-2026 operation of Lakes Powell and Mead.My name is Emmy Huefner, and I am a river guide with Western River Expeditions. I have been working for Western going on 8 years now and have been guiding in Grand Canyon for going on 3 years now.I am deeply concerned about the future of the water in the Colorado River and Grand Canyon. It greatly affects both my personal and professional life, as well as having many other major effects to many people, communities, the environment, the economy, and Grand Canyon itself.I would like the future decisions concerning the Colorado River water to comply with the mandates of the Grand Canyon Protection Act of 1992. I would like the level of Lake Powell to be maintained to ensure that High Flow Experiments can continue. I would like to prevent invasive non-native fish from passing through the dam, and I would like to protect the Humpback Chub. I would like recreational flows of 8,000 cfs minimum to be required April through September each year in order to sustain safe motorboat travel through the canyon. I would like the supply/demand imbalance to be rectified and ensure that the Colorado River reductions are sufficient for stabilizing the system for a sustainable future. My most personal connection to the current Draft EIS is the worry that river flows in the canyon would not be sufficient to run the trips I currently work. Below, I quote Lynn Hamilton, the Executive Director of Grand Canyon River Guides, Inc.:"Simply put, motorized trips would become more dangerous in the future unless the Supply Driven or Basic Coordination Alternatives are selected. We support the continuation of motorized travel as embodied in the Colorado River Management Plan because it offers an alternative means to access the Grand Canyon for large segments of the population who otherwise would never witness firsthand the sublime beauty and awe of the inner canyon. We believe that minimum flows of 8,000 cfs during the motor season from April 1 through September 15 each year are a necessity. Based on our experience, 5,000 cfs is not a 'safe whitewater boating threshold.' This DEIS acknowledges serious boating accidents, life-threatening injuries, and damaged equipment that occurred during September 2023 after flows were reduced to 5,000 cfs. (DEIS, TA 14.2.4). GCRG would like to impress upon the BOR that every 1,000 cfs +/- makes a difference for boaters in terms of navigability and safety for the over 20,000 people who run the Colorado River through Grand Canyon each year."This issue is very important to me, and I would like my comments to be known concerning this issue.Thank you,Emmy Huefner

PROPOSAL

A Causal Dynamic, Holistic River Basin Model to Satisfy the Objective of Alternatives 3 and 5.

by

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## INTRODUCTION

The Colorado River management is currently at a critical impasse as key agreements governing the **River are set to expire at the end of 2026. The new long-term framework is designed to address** contemporaneous and future drought conditions and climate change.

Five alternatives for managing the River after 2026 have been issued. Based on *Alternatives 3. Enhanced Coordination*, which incorporates the feedback from Tribal Nations and federal agencies to protect key environmental and hydropower resources and *Alternative 5. Supply-Driven Alternative*, that ties operations directly to the river's hydrology rather than fixed targets or reservoir elevations, the following proposal has been written. It is axiomatic that beginning now and enduring into the future, the Colorado River will continue to provide water for the many uses on a Sustainable basis, *if and only if the water supply by the River and the water flows for the many uses are in equilibrium*.

This is a complex problem to solve since both the water supply and demand flows are subjected to continuous changes that have to be taken into consideration with the appropriate tools that can rapidly detect the variation and then provide actions to terminate the imbalance, whether by increasing the supply or diminishing the demand or both.

## OBJECTIVE

This proposal is for the development of a **Pilot Project**, whose objective is to build and evaluate systems that maintain the supply and demand balanced for a reservoir that supply water to four different uses:

1. *Colorado River Aqueduct*: Delivers water to the Metropolitan Water District of Southern California, supplying the Los Angeles and San Diego areas.

2. *Central Arizona Project* (CAP): Carries water hundreds of miles to municipal, agricultural, and tribal lands in central and southern Arizona.
3. *Flood Control*: It provides essential flood protection for downstream communities along the Colorado River
4. *Parker Dam features on-site power plant* that generates electricity for towns across Arizona, Nevada, and California. The finished version of the model will be identified as MAUA-Havasu.

Lake Havasu provides supplies of water for the four different uses mentioned and it has been selected to develop of this **Pilot Project** whose expected results are of two kinds:

1. The supply and demand systems that will be built and validated through the operation of the water uses of Lake Havasu, and
2. The design of a Control System to guide the operations of supply and demand flows of the entire for Lake Havasu.

Since the water supply for the Lake Havasu is provided by Lakes Powell and Mead, a system of controls to coordinate their operation to ensure sustainability should be designed. This system will operate at a higher level than the individual controls of the Basin components, like Lake Havasu. In its supervisory function the higher-level system will provide optimal inputs to the components to optimize the overall supply and demand process in the Basin. At the end of this project the products developed can be adapted and use for the rest of the reservoir that draw their water supply from other reservoirs.

## MODELING METHODOLOGY

The distinction between *operational* and *strategic* remains a cornerstone of project success. While *Strategy* defines the "what" and "why," *Operations* define the "how" and "when". Strategic thinking involves analyzing the environment of a river basin to find alternatives to maintain a sustainable operation. But success requires both since strategy without operations is just a dream, and operations without strategy is an aimless activity.

## MAUA MODEL

MAUA® (Multidimensional Analysis of Urban, Industry and Agricultural) is a causal State-Space dynamic, holistic river basin model, that accurately portrays the water cycle, environmental, demographic, socioeconomic, agricultural, and industrial systems of a River Basin. When the model is solved numerically, it closely simulates the time-related behavior (dynamics) of the Basin or some part of it.

MAUA® enables the model's users to transfer a modeled Basin's from a present state to a new desired state in a user specified time period. The importance of this is essential to formulate scenarios when dealing with an environment whose climate is changing and population that continuously grows. These two stressors produce great variability.

MAUA® in different versions, has been employed as the analytical instrument for over twenty projects in watershed and river basin, two are particularly relevant to the present project:

1. The Lerma River project in Central Mexico had as objective to equitably allocate the river's water among the multiple uses -municipal, agricultural, and industrial uses-, in five states located on the basin. This project has been acknowledged as the "Archetypal Approach of Integrated Water Resources Management approach of River basins," by the faculty of the IHE School of Water Resources of Delft, Netherlands, after assessing multiple river projects around the World.

   Another praise to this project came from two hundred similar projects that were evaluated in the Literature Review of Computer-Aided Collaborative Decision Making" of the US Army Corp of Engineers and the paper*, "Systems Dynamics Approach to Conflict Resolution in Water Resources: The Model of the Lerma-Chapala Watershed,"* of Dr. J. Huerta-Tolis, obtained the first place.

2. In 2002 the deficit of Mexico's water contribution to the Bravo River basin, in accordance with the Treaty of 1944, exceeded the 2,500 cubic million meters of water and the US administration demanded to cover that deficit. The Mexican government employed to MAUA- Bravo/Grande River Basin to determine the rates of the outflows to be delivered to the U.S. minimizing the economic impact on the agricultural producers of the Mexican side. Both conditions were satisfied and the negotiation between the countries was declared a success.

## Mathematical foundation of MAUA®

A requisite for IWRM implementation is created by integrating a collection of models that correspond to the subsystems including demographic, political, technological, economic, social, environmental, and other subsystems. The known attempt to accomplish this integration was the *Multidisciplinary Approach* of von Bertalanffy, author of the *General System Theory* book, to unify demographics, policy analysis, economics, etc., under one system umbrella. Soon it was discovered that each discipline had an extended body of considerations that made the "one model idea" unsuitable.

In the 1960s the *Intradisciplinary Approach* draws its foundation from Dr. Miajhlo D. Mesarovic, in the *General Systems Theory: Mathematical Foundation* (GST) whose stated object is the "System itself" regardless of whether the system is electric, or economic, or communication, or flight control of an airplane. The GST deals with the most fundamental concepts and aspects of Systems Theory, such as Stability, Controllability, Observability and Decomposition of large complex systems into subsystems. The GST's define *time*, as the coordinating index of all systems and subsystems that compose large-scale, complex systems.

**Dynamics of the MAUA®**

By employing time-domain State-Space representation of a system of differential equations, a seamlessly integrated model that portray the environmental, socio-demographic, and economic realities of a Modeled River Basin can be obtained. These models numerically generate the quantitative behavior of the River Basin.

**MAUA®, A Dynamics, and Holistic model of a River Basin**

MAUA®, generates time-related behaviors at three levels of the physical environment:

1. Atmosphere: where precipitation, temperature and evaporation are modeled as part of the Water Cycle
2. Surface: where the following components are modeled:
   *2.1Sociodemographic*. This sub-model has three related components: population, education, and labor force and employment. This feature enables the analyst of a River Basin
   *2.2 Productive Processes*. The industries considered vary from case to case, depending on the characteristics of the watershed being modeled. Every industry modeled utilizes a Production Function that consider as inputs: Labor, Capital, Water and Other inputs.
   *2.3 Agricultural Production*. This sub-model utilizes the Penman-Monteith model to represent crops for both the spring/summer and the fall/winter production cycles; it also considers the production of perennial crops. The primary objective of this sub-model is to generate production inputs with emphasis on water, land use, and labor.
   ` *2.4 Land Portion of the Water Cycle* having as components: runoff, infiltration, evapotranspiration, water storage in lakes, reservoirs as well as extraction by type of use: agricultural, domestic, industrial, and other.
3. Underground: This sub-model handles extractions and recharges the aquifers in the watershed.

## Features of MAUA®

1. *It is holistic* since one modeling construct *includes all the subsystems* that interact among themselves through direct feedback connections, evolving over time.
2. Each *subsystem* is defined by one or several processes. For example, a crop of corn advances over time through the phenological stages of the plant.
3. Each process has a *controller* that serves the purpose of starting and stopping the "process," and to guide the pattern of execution that the process will follow. There could be many alternative "controls" (also known as policies variables) that a user can input a new Controller to be executed, producing different resulting patterns every time.
4. While being "holistic" addresses inclusiveness of MAUA components, time is the index that synchronizes the evolution, so it accurately replicates the behavior of the real River Basin. Time is increased in steps of one-day; since this is the frequency most often employed by water authorities in World regions to collect the primary water resources data – rain, temperature, evaporation, stream and river flows and reservoir operations - that provide the River Basin's "Ground Truth."

## Reliance on Data

MAUA® assesses natural and manmade processes in River Basins that are characterized by significant variability. Where variability exists, the shorter a time-step between two consecutive measurements of the variable values, the better is the representation of the underlying process. MAUA® employs one-day time steps as most water agencies collect and compile primary data once a day.

## Integrated Water Resources Management (IWRM)

MAUA® represents the coexisting and interacting social, economic, and environmental realities in a watershed with differential equations in the State-Space format amply utilized in the field of Systems and Control Engineering. The evaluation integrates multiple factors driving the time related behavior of urban, rural, and mixed watersheds. Solved numerically, the model equations generate the response of the watershed realities to the driving factors which include, among other variables, the water supply and demand flows, basic inputs to the water balance process.

The time related behavior of the watershed provides visibility into the following axiom: *If the computation of the balance between supply and demand is positive or zero in one time instant, the watershed is sustainable in that time instant but not necessarily in the next time instant.* An imbalance can be corrected by increasing supply or controlling the demand by decreasing its flow. Supply can be

increased by adding new fresh water and by reusing water for specific uses. A decrease in demand causes volume swaps among water users, which is part of the water governance process.

MAUA® computes the time related evolution of the model variables. Understanding the axiom above, the evolution of the watershed is not predetermined; utilizing the control mechanism of the model the decision maker can change the model outcome by:

- Modifying the control variables (the model and the modeled watershed are mirrors of each other or Twins, of the model to change the possible outcomes of the time evolution of the watershed in accordance with specified objectives.
- At any point in time, accounting for the humidity in the atmosphere, the surface and the groundwater of the watershed, additional variables are considered to correct the imbalance of supply and demand.
- Evaluating the trade-offs when the model results indicate increases in water demand of one water use that produces an undesired result in the others.
- Designing resilience policies that allow the watershed to recover from undesirable temporal or permanent changes to the surrounding environment, including increases of human settlements, climate variability, or other causes.
- Since MAUA® portrays the Twin of the River Basin, training of personnel in the operation of the water resources of the WS can be carried through with the model used as a Flight Simulator.

When the model achieves the desired outcome, the watershed policy variables will be aligned with the model control variables resulting in actual watershed behavior in line with the simulation.

**Computer Version of MAUA-HAVASU**

MAUA-HAVASU will be developed in Vensim Professional, which is what is needed for managing large and complicated models. It provides Causal Tracing™ of structure and behavior, and has Monte Carlo sensitivity, optimization, and subscription (array) capabilities. Vensim DSS adds an interface development tool for creating management simulators, external functions and macros, compiled simulations, and more.

**PROGRAM OF ACTIVITIES**

Activity 1. Creation of the Model MAUA-Havasu. An easy to adapt version of MAUA® will be provided by the Consultant to be tailored to Lake Havasu and its region. Also, utilized to create the models for:

1. *Colorado River Aqueduct*:
2. *Central Arizona Project* (CAP):
3. *Flood Control*:
4. *Parker Dam features on-site power plant* the finished version of the model will be identified as MAUA-Havasu.

Activity 2 Build the Data Base of MAUA-Havasu model. For this activity, the following sources will be utilized:

a) Groundwater & Total Storage: NASA's GRACE-FO (Gravity Recovery and Climate Experiment) and Terrestrial Water Storage (TWS) Anomaly.
b) Evaporative Demand: EDDI (Evaporative Demand Drought Index) and Vapor Pressure Deficit.
c) Consumptive Use Verification: OpenET and Satellite-based Evapotranspiration (ET).
d) Demographic, Industrial and Agricultural Production Information in accordance with the data required by MAUA-Havasu

Activity 3. Parameter Estimation and Calibration of MAUA-Havasu . This process involves five years of historic daily data to estimate the parameters of MAUA-Havasu and calibrate the model. Once calibrated, test scenarios will be simulated to certify MAUA-Havasu to certify that it is free of errors and can start to operate on a regular basis.

Activity 4. Formulation and Assessment of Scenarios with the MAUA-Havasu. Coherent with Alternative 5. *Supply-Driven Alternative*, MAUA-Lake Havasu will recreate through simulation, the real-life operations to replenish of the Lake water and the water to the four end-users of the Lake's water. With the information provided by the Model, a better understanding of the daily operation of the Lake will be available.

To formulate scenarios to be simulated with MAUA-HAVASU the use utilize the panel of Policy Variables available with the Model. By setting the appropriate Policy Variables the Model user can

formulate scenarios for different seasons of the year, by a change of crops in certain regions and so on.

The type of feedback control mechanisms to be design and built are of the form.
In the formulation of the Tracking Problem the *WaterSupplyFlow(t)* becomes the *Reference Variable*, and *WaterDemandFlow(t)*, the *Controlled Variable* that tracks (pursues or hunts) continuously the *WaterSupplyFlow(t)* and satisfies the condition:

$$WaterDemandFlow(t) \cong WaterSupplyFlow(t), \text{ for } t_0 \leq t \ldots (A$$

To be able to meet this condition, the *Tracking Model* needs to compute a proper value for the *Input Variable, u(t)*, shown in Figure 1.

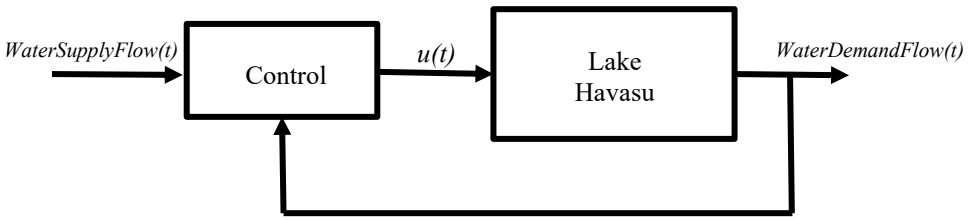



Figure 1. Closed-Loop Tracking Model

The mechanism to keep the *WaterDemandFlow (t)* as close as possible to the *WaterSupplyFlow(t)* is we define:

$$(WaterSupplyFlow(t) - WaterDemandFlow\ (t) = \mu(t) \ldots (1$$

if *μ(t)* is equal or greater than zero, there is enough *WaterSupplyFlow(t)* to satisfy the *Water DemandFlow(t)*; but if *μ(t) is negative,* the *WaterDemandFlow(t*) is greater than the *WaterSupplyFlow(t),* and becomes necessary to reduce the *WaterDemandFlow(t).*

The purpose of these mechanisms is to be able to operate Sustainably the Colorado River by diminishing the waste of water in its transfer from one reservoir to another, in its consumptive use and to increase it by reusing. To achieve this goal, MAUA-HAVASU, becomes the prototype of the algorithms and procedures to be also utilized in the various chains of reservoirs that descend from the Tandem, and cover the region of the Basin.

Activity 5. Optimization of the Reservoirs of the River. In the Colorado River system, water flows downstream through a gravity-fed sequence of dams. Lake Mead acts as the primary control point for

the Lower Basin, releasing water to smaller reservoirs located south of it to meet the water and power needs of Arizona, California, and Mexico. It is therefore particularly important that the reservoir volume are always above the operating level  to supply the chain.

**ESTIMATED DURATION OF THE PROJECT**

Since MAUA® is a proven model, the estimated duration of the project is 6 months, with session with the client (BOR) and technical work remote to be agreed with the client.

**DELIVERABLES  OF THE PROJECT**

MAUA-HAVASU® Model, installed in equipment designated by the client.
User Manual
Training Course of two weeks duration for the costumer personnel in charge of the model.
License of MAUA® with a ten year of validity.
License of Vensim for the version employed for this project.
Monthly Project Reports
Final Project Report

**PROJECT COST**

The Fix-Price cost of this project is 450,000 USD.

**RESPONSIBLE**

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***Letter #:*** 3184

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***Organizations:***

***Subject:*** Western Freshwater Compact

DOI - . The Colorado River was never meant to supply the populations that currently exist among the users. I have a plan that can end the West's water crisis. In less than 8 years we can have water flowing from the Columbia River to lake Powell. 12-17 MAF a year. Nothing else will work. My plan works and it pays for itself in less than 12 years. It's called the Western Freshwater Compact.Here is the planThe Western Freshwater Compact:Revival for California's 25th District and the Colorado River Basins 7 river States.As your candidate for the U.S. House of Representatives in California's 25th Congressional District, I am dedicated to delivering bold, practical solutions that protect and grow our local economy. CA-25 depends on the Colorado River for agriculture, municipal water, jobs, and community vitality, which is made possible through crucial connections to the Metropolitan Water District of Southern California and the Imperial Valley's world-class farming operations. Today, with Lake Powell at approximately 28% capacity, Lake Mead at 33%, and Level 1 shortages in effect as of January 2026, a structural deficit of 2 to 3 million acre-feet per year threatens our economic foundation. The current operating rules expire at the end of 2026, and the Bureau of Reclamation's Draft Environmental Impact Statement (public comments open until March 2, 2026) calls for decisive action.My Policy Vision: Bold Augmentation for Unprecedented Economic GrowthRapidly refill Lakes Powell and Mead to near-full levels within a few yearsEliminate mandatory shortages and structural deficits foreverRestore full hydropower generation (over 4,000 MW of clean, reliable energy)Create a decades-long buffer against climate change and droughtThe Profound Economic Benefits for CA-25 and the Entire BasinAgriculture - The heart of our economyMunicipal and urban growthHydropower and clean energy reliabilityRecreation, tourism, and quality of lifeProtecting Equity and CollaborationThe Health and Economic Toll of the Dying Salton SeaEscalating Health ImpactsAs the Salton Sea's lakebed continues to dry, toxic dust containing pesticides, heavy metals, and microbial toxins is released into the air. This environmental hazard has resulted in respiratory illnesses at rates three times higher than the national average, driving a surge in emergency room visits for respiratory conditions. The region's air quality has rapidly deteriorated, and offensive odors--particularly hydrogen sulfide emissions from frequent algal blooms--further contribute to health complaints.The exposed playa increases PM10 levels, worsening chronic health issues, especially among vulnerable populations. Chronic dust exposure has been directly linked to severe respiratory and gastrointestinal conditions. Children are among the most affected, with asthma-related emergency room visits now tripling the U.S. average.The Salton Sea and the Colorado River decline is both an environmental and economic crisis, especially impacting low-income Hispanic farmworker communities in the Coachella Valley. I will declare a Public Health Crisis Emergency to expedite project development and restore water flow. We will use the Stafford act to advance the Compact. Healthcare Costs BreakdownCost CategoryAnnual Estimate (2025)20-Year TotalNotesAsthma/Respiratory ER Visits & Meds$50-$100M$1.2-$2.5BTriple national rate; 4,000 homes need air filters/weatherizingChronic Exposure (COPD, GI Issues)$30-$60M$0.7-$1.5BLinked to hydrogen sulfide and black carbon; affects 150,000 residentsLost Productivity (Sick Days)$20-$40M$0.5-$1BFarm and tourism workers missing shifts; increased environmental justice gapsTotal Healthcare$100-$200M/year$2.4-$5BExcludes indirect cancer risks from toxins Economic ConsequencesThe region's key economic drivers--tourism and agriculture--are already suffering due to declining air quality and pervasive odors. Tourism, valued at approximately $9 billion, is threatened as parks close and visitors are deterred. Agriculture, with more than $1 billion in annual value, faces significant losses from dust-coated crops and water cuts, potentially reducing yields by up to 50%.Property values are falling, leading to migration and further destabilizing the local economy. As the area becomes increasingly uninhabitable, the loss of farmworker populations worsens the crisis, impacting businesses, schools, and community infrastructure.Economic Costs BreakdownCost CategoryAnnual Estimate (2025)20-Year TotalNotesTourism Decline$200-$400M$5-$10B10-20% drop due to dust/odors;

$9B total impact at riskAgriculture Losses$100-$200M$2.5-$5BDust coats crops; farms ruined; water cuts may reduce yields by 50%Property Devaluation & Migration$150-$300M$3.5-$7BUninhabitable zones; loss of farmworker populationTotal Economic$450-$900M/year$11-$22BExcludes lithium revenue delays Total Cost of InactionIf left unaddressed, the combined impact of health and economic losses could amount to $29-$50 billion over the next 20 to 30 years. This looming crisis threatens the stability of hospitals, schools, farms, and jobs throughout the region, underscoring the urgent need for intervention.The Crisis: A Desert Apocalypse Unleashed on Our Children, The Imperial and the Coachella Valley faces the same fateCalifornia's 25th District is a proud and resilient region where over 70% of residents are Hispanic and farmworkers who rise before dawn to feed the nation. Now, they face an unprecedented environmental and health catastrophe. The Salton Sea, once a source of life, now threatens families with a disaster that is rapid and severe.Our Children Are Suffocating: In communities like Mecca, Thermal, and North Shore, one in four Latino children battles asthma, with rates soaring to 26%--the highest in California and nearly double the state average. On dust-storm days, emergency rooms become battlegrounds, with visits spiking three to five times the national rate. Doctors confront families with dire diagnoses: permanent lung scarring, stunted growth, and a lifetime dependent on inhalers and steroids.Our Farmworker Parents Are Breaking: The heroes who labor in the fields inhale toxic air contaminated with pesticides, heavy metals, arsenic, and selenium. Many suffer from coughing blood, heart disease, gastrointestinal issues, and heightened cancer risks. These parents often face impossible choices between purchasing medicine and paying rent, watching their children's futures slip away breath by breath.The Looming Catastrophe if We Do Nothing: By 2040, full exposure of the lakebed could unleash five to ten times more dust, transforming the district into a ghost zone. Childhood asthma rates may skyrocket to 50-70%, the highest in the Western Hemisphere. Life expectancy could drop five to ten years below the California average, and tens of thousands may flee as outdoor activity becomes impossible for children. This scenario is not just a possibility--it is already beginning, with projected healthcare costs of $500-900 billion over 25 years and a total devastation of $2-3 trillion. Our farm workers, elders, and future generations are at risk due to ongoing inaction.I refuse to let this epic tragedy define us. As a lifelong Mojave Desert enthusiast and resident, my family has persevered through hard work and education. I have spent my adult life in the trades, as a union member and IBEW 47 Union Steward for a decade. My experience spans every corner of the region, from working train wrecks as a Freight Carman at Santa Fe to operating and maintaining state-of-the-art power plants. I know how to build multi-billion-dollar projects, how to keep trains running, and I understand the entire utility system from generation to transmission and distribution. I will bring my knowledge to solve our problems and expand our future. No challenge is too big, no obstacle insurmountable--knowledge and education are power. My wife and I have both.  And we can bring prosperity not only to our district but to all our fellow citizens across the West.The Epic Solution: The Western Freshwater Compact - A Monument to American GritTimid measures and endless studies are no longer enough. The proposed Western Freshwater Compact is a bold infrastructure initiative, on par with the Hoover Dam, designed to unite 11 states, sovereign tribes, and Mexico in a shared destiny of abundance.Phase 1: Immediate Lifeline - Aquifer Pumping Bridge (2026-2028)On day one, a national emergency is declared, utilizing Stafford Act powers to expedite action.Begin pumping 500,000 to 1 million acre-feet per year from the Colorado aquifers directly under the Sea.This immediate action will drastically reduce dust storms within months and cut asthma attacks, giving children their first clean breaths in years.The process will be sustainable, monitored, and aquifers will be recharged to prevent long-term depletion.Estimated cost: $5-6 million in capital plus $100-150 thousand per year in operations and maintenance.Phase 2: The Forever Legacy - Columbia River Diversion (2027-2035+)Creation of an interstate, tribal, federal, and Mexico alliance to divert 12-18 million acre-feet per year of fresh water from the Columbia River--just 7-9% of its flow.Construction of the Western Aqueduct, an 800-1,000-mile gravity-fed marvel from Bonneville Dam through Oregon, Idaho, and Nevada to California and Arizona.Allocation of water resources:8-9 MAF/year to refill Lakes Mead and Powell, restoring the Colorado River's lakes and its aquifers. This will prevent the loss of Lake Powell's and Lake Mead's critical hydroelectric power.2-3 MAF/year to flood the Salton Sea, transforming it into California's largest freshwater lake within five years and creating 150-mile wetlands to the Gulf. This will restore the bird flyway lost after the sea became too salty. After the sea is flushed, less water will be needed to maintain it as a freshwater lake, allowing 1 MAF to become available for additional farming and cities.3-5 MAF/year to irrigate Central Valley farms, Southern California cities, Arizona fields, and tribal lands.  This will take the pressure off of the Imperial valley and they

will be able to get all the water the Farmers and Ranchers need.Construction of a 150-mile gravity-flow outlet to the Gulf will flush toxic salts within five years and create a permanent freshwater oasis at -200 ft elevation.Generous buyouts for Imperial farmland at $15,000-$25,000 per acre will ensure farmers thrive and jobs are preserved.Funding will come from federal bonds, IRA expansions, and royalties--no new taxes for families.Total cost: $500-800 billion in capital plus $11-15 billion per year in operations and maintenance, totaling $430-550 billion over 25 years. The payback period is estimated at 5-8 years through widespread prosperity.The Epic Payoff: Health, Nature, and Wealth RebornHealth Reborn: Our Children Breathe FreeAsthma rates drop from 26% to under 5% within a generation.The Imperial and Coachella Valleys are saved from a potential total environmental catastrophe, with no more sick children suffering permanent lung damage and an economic boom centered around a new freshwater lake.Emergency room visits for asthma disappear. Children stay healthy. The Hispanic population booms with new jobs, businesses, and a leap into the future. The valleys become leading tourist destinations, and increased revenue enables the creation of significant cultural, educational, and business opportunities. Food prices plummet.No more scarred lungs or stolen childhoods--life expectancy increases by 5-10 years.Farmworker parents can work without fear, restoring family well-being.Nature Reborn: Deserts Bloom, Ecosystems Roar Back86 tons per day of toxic dust eliminated, resulting in clean air from Imperial to Baja.The Salton Sea becomes California's freshwater crown jewel, surrounded by 30,000-40,000 acres of thriving wetlands extending to the Gulf.The Pacific Flyway revitalizes, attracting over 400 bird species in the millions and transforming the district into a global ecological destination.The Colorado River Delta expands with 150,000 acres of wetlands, supporting abundant fish and wildlife.  The Bird fly way will come back.Hydropower is sustained, millions of tons of $CO_2$ are avoided, and wildfires are curbed by moist landscapes and green zones can be created and irrigated around our cites.A new economic corridor will be built along the canal with water available for future growth.Wealth Reborn: $150-$180 Billion Per Year in New Prosperity for Every Western StateAbundant water will reclaim 9-10 million acres of farmland and ranches, igniting a boom across the West. The benefits will be widespread:State / PartnerAnnual Epic Gain (post-2035)Unleashed OpportunitiesCalifornia$60-100 billion1M+ fallowed acres revived; Central Valley crop yields surge; 25th District tourism grows from $9B to $100B+ with lake, resorts, and birdingArizona$15-25 billionCotton, citrus, and dairy industries expand; Phoenix metro area thrivesNevada$8-12 billionLas Vegas growth unlocked; water shortages endUpper Basin (CO/UT/WY/NM)$10-18 billionRanchlands flourish; hydropower restored30 Sovereign Tribes$5-10 billion + sacred revivalFull water rights: fisheries and cultural sites renewedMexico$3-6 billionDelta wetlands become a fisheries and tourism goldmineOregon and Washinton State$3-5 billion direct + $10B+ indirectRoyalties increase; hydropower attracts factories and jobsUnion Jobs (West-wide)200,000+ prevailing-wageConstruction and operations thrive, prioritizing Hispanic workers and veterans in the district 25th District Epic Spotlight: A massive freshwater lake and Gulf wetlands will attract over 20 million visitors per year, creating a "Desert Tahoe" and propelling tourism to $100 billion. Reclaimed farmlands and ranches will add billions in crops and protect or create more than 10,000 jobs, ensuring prosperity for farm workers and the entire community.The Epic Timeline: From Crisis to Conquest2026: Emergency declared; aquifer pumps activated; dust levels drop.2027-2030: First Columbia River waters reach the Salton Sea, sparking its revival.2029-2034: Massive flush to the Gulf removes salt permanently.2035+: The West is reborn, with abundant water and boundless prosperity.This is the epic saga our district deserves--from poison to paradise, from despair to destiny. As a 41-year IBEW fighter who has faced wrecks and wildfires, I pledge to deliver this vision in Congress. Our children's lungs are sacred, and the future of the West is unstoppable.We Will Bring the Water.We Will Ignite the Boom.We Will Make Our Kids Breathe Again--and the Desert Roar with Life.POR LA SALUD DE NUESTROS HIJOS Y EL FUTURO EPICO DE NUESTRA GENTE -- !SI SE PUEDE!Ronald Huffmanhttps://ronaldhuffmanforcongress.com/Candidate for U.S. Congress, California's 25th District - 2026Authorized and paid for by Ronald Huffman for Congress

***Letter #:*** 7374

***Date Received:*** 3/2/2026

***Sender Names:*** 7333: Rocky Hughes

***Emails:*** 7333: blackbeltllc@hotmail.com

***Organizations:***

***Subject:*** EIS comment (Lake Powell & Lake Mead)

DOI - . Regarding Lake Powell & Lake Mead, Please prioritize our declining water resources ranking human food (farming & ranching) above recreation (golf, fountain evaporation). Thank you, Rocky Hughes blackbeltllc@hotmail.com Get Outlook for iOS

***Letter #:*** 222

***Date Received:*** 1/11/2026

***Sender Names:*** 219: Jackie Hulsen

***Emails:*** 219: jbhulsen@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - .Southern Nevada needs to stop adding new communities which are reducing the water in Lake Mead. Las Vegas has replaced grass and limits the days allowed for watering.Sent from my iPhone

***Letter #:*** 452

***Date Received:*** 2/22/2026

***Sender Names:*** 443: Lynne Humphries

***Emails:*** 443: lbh44@att.net

***Organizations:***

***Subject:*** Support for AZ use of water

DOI - . I am filing this as a comment to the proposed action of the US Bureau of Reclamation to impose a plan on the 7 states using Colorado River as its water source. I believe that allocations should be based upon population and current use agricultural needs and not antiquated agreements or arrangements. Water is a very precious commodity. It must be allocated fairly so that people and crops and agriculture animals can continue to thrive. Times change and the use allocations must change with the times. Thank you for considering this comment. Lynne Humphries,Support Breast Cancer Research -- I'm a 25 year two-time survivor!! Please excuse the typos and brevity of my emails sent from my iPhone or iPad

***Letter #:*** 7556

***Date Received:*** 3/2/2026

***Sender Names:*** 7507: Tim Hunt

***Emails:*** 7507: azthunt@yahoo.com

***Organizations:***

***Subject:*** Colorado River

DOI - . I would like to submit my opinion regarding the Colorado River. Arizona is the heart of the desert in our United States. Arizonans are protectors of this desert and should not have water taken away from us. Unlike other states that share water rights, Arizona has no lakes and rivers or oceans to use. Thank you for listening to and sharing my opinion. Yahoo Mail: Search, Organize, Conquer

***Letter #:*** 3859

***Date Received:*** 2/27/2026

***Sender Names:*** 3819: James Hunter

***Emails:*** 3819: patrick.hunter1@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, I have had the opportunity to raft the portions of the Green River in Utah and the Colorado River through the Grand Canyon. These were some of the best experiences I have had in my life. I hope to raft these and other rivers in the future and I hope future generations are given the same opportunity. I urge you to take immediate action to protect the future of the Colorado River Basin and to recognize the many ecosystem services that the river and its tributaries provide. Specifically, the Bureau should prioritize: - Storage in Lake Powell and management and infrastructure of Glen Canyon Dam to support opportunities for High Flow Experiments in the Grand Canyon for the purposes of sediment and nutrient transport. This seems particularly important to maintenances of Grand Canyon beaches which are critical for camping. - Infrastructure updates at Glen Canyon Dam to ensure that the dam is capable of passing variable flows downstream as reservoir levels become lower and less predictable. - Conservation measures and delivery of water between the Upper and Lower Basins to balance maintaining minimum flows at all times in the Grand Canyon with allowing for flow variability across the annual hydrograph to support both the river ecosystem and river recreation opportunities. - Water delivery measures at Blue Mesa and Flaming Gorge Reservoirs that consider immediate and downstream impacts to river ecosystems and recreation opportunities, and seek to provide multiple benefits whenever possible. - Maintaining and increasing river recreation opportunities on the Colorado River and the San Juan River despite changing reservoir levels. - Analysis of how operations will affect daily flows in the Grand Canyon and upstream river segments post-2026 before a final decision is determined, not after. - Tribal water rights and respect for Tribal sovereignty throughout the Colorado River Basin. Thank you for considering my comments. Sincerely, Mr. James Hunter 210 Summerglen Dr Asheville, NC 28806-9598 patrick.hunter1@gmail.com

***Letter #:*** 4603

***Date Received:*** 2/28/2026

***Sender Names:*** 4570: Lester Hurrelbrink

***Emails:*** 4570: leh3md@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, I realize that the water usage of the Colorado River is highly complex, highly political, and can confer very real risks to millions of people who rely on that water for living, agriculture, and other business. Unfortunately, unbridled growth without adequate water resources combined with an increasingly arid climate in that area has strained the Colorado River watershed to the breaking point. The government will need to consider some radical moves such as limiting water usage by large cities as a way to control their growth. However, what the government should never do is dewater the Colorado River basin/Grand Canyon to the point that it can no longer sustain any recreational value. The river was a vibrant element to the Southwest before Las Vegas, Phoenix, and other cities were ever built. To sacrifice a river that I have rafted so that some more condominiums can be built is devastating, unconscionable, and wrong. Everyone, including the recreational users, is going to have to give some. But maintaining a natural habitat must be one of the highest priorities. If we lose this river once we will never get it back. Going down the river through the Grand Canyon is a unique trip that cannot be replicated and must be preserved. Please make sure that your priorities are in line with most Americans who I think feel the way that I do. Thank you for your time. Sincerely, Dr. Lester Hurrelbrink 1111 Kensington Dr High Point, NC 27262-4502 leh3md@gmail.com

***Letter #:*** 7648

***Date Received:*** 3/2/2026

***Sender Names:*** 7597: I a. Iৗöŋɖaɖ

***Emails:*** 7597: id@iamirondad.com

***Organizations:***

***Subject:*** Comment on Draft EIS

DOI - . To whom it may concern: I am Irondad, a resident of North Shore and a member of the Salton Sea community. I'm also an endurance athlete and environmental activist who has been running around the sea every year to track its receding shoreline. The first year it was 96 miles, then 92, then 89. I don't know exactly how far I'll be running this year, but it's a safe bet that it will be shorter still. It's very concerning that the DEIS excludes analysis of any impacts on the Salton Sea and its shoreline communities from post-2026 allocation decisions on the Colorado River. To wit: Reclamation does not control the end use and management of delivered or conserved water. As such, Reclamation has no management authority over inputs to the Salton Sea, and Reclamation has no enforcement authorities over the Salton Sea. The State of California, IID, and CVWD have their own authorities not controlled by Reclamation. Reclamation would need new authorities and compliance to implement any policies that change how water shortages are distributed to IID and CVWD. To understand the situation at the Salton Sea, one has to put it in historical context. While the introduction of irrigation water from the Colorado River to Imperial Valley set the current environmental disaster in motion, the federal government added its stamp of approval by formally designating the Salton Sea a reservoir for agricultural waste water in 1924 as part of the Bureau of Reclamation's strategy to manage the runoff from the new fields. Now the problems that have arisen from using this resource exactly as you directed are everyone's problems but yours? These historical facts are archived in many federal documents. The historical context you won't find in your own documents includes stories of a community that, when faced with an existential threat from the rising waters of their beloved sea due to mismanagement of Colorado River water, picked up shovels and built berms to protect their homes from flooding. So what is the Salton Sea? It's been an agricultural sump for over 100 years, according to the federal government. But there's another answer. The Salton Sea is a community that has never given up and never will. We are the Salton Sea, and we will not be ignored. Thank you, Irondad

***Letter #:*** 6080

***Date Received:*** 2/28/2026

***Sender Names:*** 6053: Warren Icke

***Emails:*** 6053: icke63@gmail.com

***Organizations:***

***Subject:*** Comments on Draft EIS on Post-2026 Dam Operations on Colorado River

DOI - . I am taking a six-week course on this topic at the University of Arizona and submit the following comments. 1). Upper basin states must share equitably to shortages of available water in the river. 2) Upstream reservoirs must work together to maintain a level in Lake Powell sufficient to generate electric power without disruption. 3) Delivery of water to all states and areas must be based on a proportion of the water available, not on a fixed amount specified in advance. Deliveries to Lower Basin states should be based on proportions of average of flows at Lee's Ferry, AZ, never on fixed amounts. 4) The amount of the proportion to the CAP specified as much as 77% is completely unworkable to the citizens of Arizona, and should never be considered seriously. 5). All states must have develop restrictions in use on a wholistic basis. Water should not be highly restricted for some uses ( e.g.residential development) while other sectors (agriculture or data centers) are allowed to use millions of gallons of water. States need to develop an equitable list of restrictions. All stakeholders must be given a voice and consideration. 6). If agreement between states cannot be reached and defers to a decision by the Dept. of Interior or other federal agencies, all political influence must be prohibited. 7). If deadline dates are passed without agreement, negotiations should continue intensely, with any deadline being the date where federal authors with make the binding decision. Resolution of this issue is of critical importance, and cannot abide by continuous indecision. Alternatives need to be developed which involve added water cost to both the upper and lower regions. 8). Mexico must participate and should not be left with zero water flow. Thank you for your consideration. This is obviously easier said than done! Warren Icke 11050 N. Avenida Posada de Oro, Appt 2208 Oro Valley, AZ 85737

***Letter #:*** 7255

***Date Received:*** 3/2/2026

***Sender Names:*** 7215: dominick lodato

***Emails:*** 7215: dllodato@hotmail.com

***Organizations:***

***Subject:*** Water allocations to Arizona

DOI - . Please be generous about the allocations of Colorado River water to AZ. I am a 45-year resident of Arizona. I have seen ways this state has conserved its water supply. Additionally, more chip technology plants desire to settle here, something that can benefit the nation's economy. Please be fair to our state.

***Letter #:*** 7683

***Date Received:*** 3/2/2026

***Sender Names:*** 7631: jacobson1277@gmail.com

***Emails:*** 7631: jacobson1277@gmail.com

***Organizations:***

***Subject:*** Citizen comment on the Draft EIS regarding Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - . I am a 48-year resident in Southern Arizona. I have followed the CAP negotiations and the subsequent Colorado River shortages and disputes for those years. I am proud of the efforts that so many of us in Pima County have made to conserve water. As the drought years have increased the discrepancies between allocated water and actual river flow, the entire 7 state region must make changes to reflect the reality of decreased flow. I request that the Bureau of Reclamation make decisions that: Maintain water levels in Lake Mead and Lake Powell sufficient to continue to generale electricity. This can include releasing water from upstream dams such as in Flaming Gorge. Recognize that the Upper Basin states must share in the reduction of allocations so that the Lower Basin states are not crippled in their agricultural economies nor in their residential usage. I would like to see the Bureau of Reclamation impose mandates that only the most efficient irrigation methods be used in all seven states in order to keep a viable agricultural sector throughout the region. We know that both Arizona and California produce considerable amounts of food that is distributed across the entire United States. However, the Upper Basin states have an agricultural industry, albeit smaller, that should be included in the mandate for efficient irrigation methods. It would be inequitable and unworkable for the Upper Basin States to continue to use their entire allocation before sending water to the Lower Basin states. This is especially true as the original allocations were based on flow data which did not reflect the real averages of flows. Thank you for your consideration. Katherine Jacobson Tucson, AZ

Nancy C Jacques
Nan.c.jacques@gmail.com
4632 N Paseo Pitiquito
Tucson AZ 85750

Bureau of Reclamation

Attn: BCOO-1000

PO BOX 61470

Boulder City NV 89006

Via email: cfbpost2026@usbr.gov

Ref: *Drafter Environmental Ipact Statement Post 2026 Operational Guidelines And Strategies Lake Power and Lake Mead DEIS*

I was the Executive Director of River Advocacy Organizations in the 1990s, and worked for Ecosystems Management Intnl for a decade. I have researched and written on climate change for over 40 years. Yes, I'm an activist, and I saw this coming and wrote about Glen Canyon Dam and water shortages for that long.

MY COMMENTS:

This, obviously, is not the 20th Century, and we MUST adapt to changing conditions in the Arid West. Bureaus must keep up with the science. Therefore:

**Next three years** – Take time to assess a longer-term set of guidelines for perhaps 20 years, not longer, as conditions stand to worsen. For now, use the following actions:

A. Provide a knowledgeable Facilitator of the conditions on the ground, with experience in working with all interest groups, including the indigenous nations.
B. Give her/him the power and budget to engage the National Academy of Sciences to perform analyses of existing climatological and hydrology information and predictions.

**C.** Provide a quarterly review for the Federal Government, **including Congress** on what specific actions WILL be necessary.

**D.** Create a WATER BANK, "Pilot Project" these three years, while moving water FROM Lake Powell to Lake Mead. This will help to prevent yet further evaporation rates.

a. Analyze, via the above facilitations the operations, savings and benefits for both upper and lower basin states.
b. Forbid any litigation
c. Include longer term scientific studies of REALISTIC future water use in each of the states, with, like it or not: **climate change**.
d. Study the environmental integrity of ecosystems impacted.

E. Replumb Glen Canyon Dam. There isn't enough water to operate generators and there are many ways today to make up that deficit! Afterall, this IS the Arid West and solar connected to pre-existing transmission is perfectly logical.

F. Establish Water Banking. Set up a system whereby water rights holders can sell their shares downstream **and out of state**, **requiring Congress to stay informed!** Allow the agricultural industries to fallow their lands, using water for MandI beneficial use AND get paid for it.

a. Have the States administer the water markets so that, when, in the future, there are further shortages, the states take precedence over the out of state markets.
b. Charge water users the MARKET VALUE OF WATER!

G. "Encourage" all states to pass legislation monitoring and managing their ground water, including rationing.

Water is necessary for all life of the Arid West and we cannot be using groundwater to avoid paying the real price for water. If we don't charge the real price of water now, taking these actions, we WILL be forced to do it in the future. Except those towns dependent on groundwater will become ghost towns.

Respectfully submitted 3/2/26

Nancy C Jacques

***Letter #:*** 228

***Date Received:*** 1/29/2026

***Sender Names:*** 229: Leslie James

***Emails:*** Not Provided

***Organizations:***

***Subject:*** CR DEIS Public Meeting Comments

Will the rate analysis be available prior to distribution of the final EIS?

***Letter #:*** 8758

***Date Received:*** 3/3/2026

***Sender Names:*** 8672: Vernita -. James

***Emails:*** 8672: vernitajames@arizona.edu

***Organizations:***

***Subject:*** Public Comment on CRB Draft

DOI - . March 02, 2026 Subject: Public Comment on Colorado River Basin Draft EIS/NEPA process and post-2026 guidelines - Navajo Nation Perspective To: crbpost2026@usbr.gov Dear Regional Director, I write to you as a concerned member of the public who recognizes that the Colorado River Basin is at a critical juncture. The Department of the Interior's plan to advance the post-2026 draft environmental impact statement (EIS) for Lake Mead and Lake Powell, with public comments opened through March 2nd, 2026, warrants careful information and principled engagement from all stakeholders, especially tribal nations whose rights and futures are directly affected. Key concerns and principles I urge you to focus on the NPA process and on the development of any post-2026 guidelines to include: Tribal sovereignty, self-determination, and meaningful participation The Colorado River Basin contains 30 federally recognized tribes, with the Navajo Nation accounting for a substantial portion of the Upper Colorado River Basin's land base and hydrology. Tribal water rights, treaty obligations, and the Nation's responsibilities to its people must be central in any modeling and decision-making. The Navajo Nation's interest extends beyond the lower basin, while the nation's direct water deliveries in the upper basin are area-specific, and the potential downstream and downstream-related impact on water quality allocation and tribal resources must be evaluated holistically and with robust tribal consultation. Adequate and transparent modeling of impacts to the Navajo Nation's rights and resources The drive EIS should provide transparent, Navajo-accessible data and modeling results, including how the alternatives affect Navajo water rights treaty rights and any future settlements or adjudications. Modelling must capture the nation's cultural resources, renewable energy projects, livestock, and cultural needs, as well as the maintenance of critical water infrastructure within Navajo lands. Settlement rights and future protections Ensure that no proposed alternative undermines existing Navajo water settlement terms, settlement funding mechanisms, or future water rights protection. The NEPA process must honor and advance the nation's settled rights and any ongoing settlement processes. recognize and preserve their rights for the Navajo Nation to pursue future settlement and to have adequate water security for current and future generations. Intergovernmental collaboration, governance, and trust A transparent, nation-to-nation consultation process is essential, including timely access to data modeling results and draft alternatives that explicitly address the nation's rights and needs. There should be a formal mechanism for ongoing Navajo input at all stages of the process with respect for the nation's sovereignty and governance structures. Hydrology-informed decision-making with legal and cultural context hydrology and remain central, but decisions must be informed by legal rights, treaty rights settlements, cultural resources protection, economic development needs, and the nation's longstanding obligation to its people. Environmental justice should explicitly acknowledge the ways climate variability and drought affect Navajo communities and cultural resources. What I request from the Bureau is to support the Navajo Nation: ensure full meaningful Navajo Nation consultation throughout the EPA process, with timely access to data modeling results and draft alternatives that explicitly address Navajo rights and needs including settled, unsettled, and future claims reassessment and revision of draft alternatives to avoid disproportionate impact on Navajo water security and to reflect the full range of potential consequences for Navajo communities and resources. Provide clear, publicly available documentation on how the Navajo treaty rights, water rights settlement, and future settlement terms are being incorporated into the modeling analysis and decision-making framework, establishing enforceable protection for Napa water rights with explicit recognition of tribal sovereignty in all stages of the process. Consider extending the public comment period if necessary to ensure the Navajo Nation and other stakeholders have adequate time to review and comment on revised analyses and alternative formulations, including explicit references to tribal consultation protocol and any nation-to-nation agreement that should guide the N EPA process, and ensure alignment with Navajo governance and sovereignty. In summary, The post 2026 guidelines and the EIS process must be anchored in respect for Navajo sovereignty honor settlements and future rights and a hydrology informed analysis that fully reflect the rights and realities of the Navajo Nation within the Colorado River basin I urge the OINW Bureau to

foreground these principles in every stage of the NEA process and to ensure that the resulting management framework supports HHS durable and cooperative path forward for Navajo communities and all basin stakeholders. Thank you for your consideration of these comments. I appreciate your commitment to a transparent, inclusive process that honors the law, science, and nation-to-nation relationships that defined the Colorado River basin, including the Navajo Nation. Sincerely,  Vernita James Dine PO Box 4183 Window Rock, Arizona 86515 ,

***Letter #:*** 2955

***Date Received:*** 2/25/2026

***Sender Names:*** 2927: janetfiore@aol.com

***Emails:*** 2927: janetfiore@aol.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead.This Draft fails to meet its stated purpose and need as it ignores options that would provide operational flexibility and environmental benefits. The Colorado River guidelines must: (1) Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems. 2) Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology cannot fill Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue drowning OUR national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option will benefit the ecosystems and management of the entire Basin. (3) Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been a wonderful reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin. (4) Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously demanding each state to produce plans to reduce demand. These agencies must also put a moratorium on new water diversions with the exception of Tribes with senior water rights. Thank you for your consideration.

***Letter #:*** 3995

***Date Received:*** 2/26/2026

***Sender Names:*** 3949: jangell@earthlink.net

***Emails:*** 3949: jangell@earthlink.net

***Organizations:***

***Subject:*** Woefully Inadequate Post-2026 Colorado River Basin Draft EIS requiring substantial revisions and appropriate processes and procedures

DOI - . The Draft EIS the Bureau has proposed is inadequate to address the crisis that we face, and the agency has failed to reveal what its preferred alternative will be. This denies the public the only real opportunity we will have to comment on the inadequacies of the Bureau's proposal before a final decision is made. We must demand that our communities have a full opportunity to express our concerns before the government takes final action.I urge the Bureau of Reclamation to strengthen the Draft EIS by: Centering climate science and realistic supply projections Protecting water quality and reducing pollution impacts as flows decline Preventing further ecological collapse in the Colorado River Delta and Basin tributaries Respecting Tribal water rights and ensuring meaningful Tribal consultation Prioritizing demand reduction and conservation over unsustainable allocations The Colorado River's future depends on bold action, not incremental adjustments.Americans need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposal before issuing its final decision. The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. The Colorado River cannot afford delay.

***Letter #:*** 7723

***Date Received:*** 3/2/2026

***Sender Names:*** 7667: Cynthia Jaranson

***Emails:*** 7667: cjalaska2000@yahoo.com

***Organizations:***

***Subject:*** No more unfair water cuts to Arizona.

DOI - . Arizona has already cut 18% of water allocation from Colorado River. Upper basin needs to make similar cuts to their water share of Colorado as lower basin states. No more unfair cuts to Colorado River water for Arizona. Thank you Cynthia Jaranson Sun City, AZ 85351

***Letter #:*** 8533

***Date Received:*** 3/2/2026

***Sender Names:*** 8456: Mari N. Jensen

***Emails:*** 8456: jensenmn@earthlink.net

***Organizations:***

***Subject:*** Comment on Draft EIS for Post-2026 Operational Guidelines Lakes Powell & Mead

DOI - . Thank you for the opportunity to comment on the Draft Environmental Impact Statement for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. I have reviewed the Executive Summary of the report with a particular focus on ES 2: Alternatives and ES 5: Summary of Potential Effects. Tables ES-1 (Summary Comparison of Alternatives) and ES-5 (Summary of Potential Effects of the Alternatives) were extremely helpful as I reviewed the alternatives presented in the Draft EIS. I have been a resident of Tucson, Arizona since 1978. I have first-hand knowledge of the changing climate in the last 45+ years - it has been increasingly hotter and drier since I moved here, particularly since 2000. At the same time, the population of Arizona has grown from 2.7 million in 1980 to 7.1 million in 2020. I oppose the No Action Alternative - that's just not an option. I also oppose the Basic Coordination Alternative because it was not developed with stakeholder engagement (ES.2.2). That leaves three other proposed alternatives. The best is the Enhanced Coordination Alternative for the following reasons: -- It was developed with the engagement of the Basin Tribes, federal agencies, and other stakeholders "to achieve protection of critical infrastructure while benefitting key resources (e.g., natural, hydropower and recreation) through an approach to distributing storage between Lake Powell and Lake Mead." -- A key and especially important part of this alternative is this: "Shortages would be triggered based on combined storage in Lake Powell and Lake Mead and distributed pro rata." This alternative therefore requires water shortages to be distributed among all seven basin states rather than the older system of priority." If I had to choose a second alternative, it would be the Maximum Operational Flexibility Alternative. However, this alternative would distribute shortages based on priority - which I oppose. I want the final alternative to include: -- using reservoirs upstream of Lake Powell to maintain Powell's critical elevations; -- requiring the Upper Basin states to share in the shortages necessary to maintain critical elevations in Lake Powell and Lake Mead; -- reductions in Lower Basin deliveries should be done on a pro rata basis rather than priority. Sincerely yours, Mari Jensen Arizona citizen, taxpayer, and voter # # # # #

***Letter #:*** 2274

***Date Received:*** 2/25/2026

***Sender Names:*** 2255: Shelly Jenson

***Emails:*** 2255: shellysothermailbox@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . Please have all states reduce their water demands.Please fill lake Mead first.Please restore Glen Canyon.Please be responsible with the level of water that EXISTS, not the level of water that is wished for. To ignore the reality of the water situation in the west is not detrimental, it is disastrous-- in the very near future.Thank you, ShellyTo whom it may concern, I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits. Specifically, the new Colorado River guidelines must: - Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems. - Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology cannot fill either Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. - Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin. - Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights. Thank you for your consideration.>> My religion is kindness. ~ 14th Dalai Lama <<

***Letter #:*** 3479

***Date Received:*** 2/26/2026

***Sender Names:*** 3447: jhmerrick@comcast.net

***Emails:*** 3447: jhmerrick@comcast.net

***Organizations:***

***Subject:*** Colorado River

DOI - . Protect the Colorado River

***Letter #:*** 494

***Date Received:*** 2/24/2026

***Sender Names:*** 484: Michael Johan

***Emails:*** 484: michael.mjcenter@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico We must wake up to today's reality about our scarcity of water. And while we are at it how about all those transmission line coming off of Hoover Dam. How about we build a solar farm in this dessert to feed the infrastructure already in place? Let's look forward and not backwards. Sincerely, Michael Johan 1600 Waneka Lake Trail Lafayette, CO 80026 michael.mjcenter@gmail.com

***Letter #:*** 4040

***Date Received:*** 2/27/2026

***Sender Names:*** 3996: Carol A. John

***Emails:*** 3996: cacollins1492@comcast.net

***Organizations:***

***Subject:*** colorado river

DOI - . save the Colorado river

***Letter #:*** 1816

***Date Received:*** 2/18/2026

***Sender Names:*** 1805: Dianne Johns

***Emails:*** 1805: diphx@yahoo.com

***Organizations:***

***Subject:*** Water Reduction Plan for CAP

DOI - . to Bureau of Reclamation:Please see that all 7 states in the CAP reduction plan receive an equal cut inwater amongst all 7 states. I live in AZ and it's not right that one state should bear the brunt of the water cut. Please do what's right and give an equalcut to all 7 states. Thank you - Dianne Johns

***Letter #:*** 3920

***Date Received:*** 2/26/2026

***Sender Names:*** 3878: Nan Johnson

***Emails:*** 3878: nan.n.johnson@gmail.com

***Organizations:***

***Subject:*** Draft EIS for Colorado River

DOI - . The Colorado River is in crisis.After decades of overallocation, accelerating climate impacts, and shrinking supplies, the Colorado River Basin can no longer sustain business-as-usual water management.Yet the Bureau of Reclamation, the federal agency within the U.S. Department of the Interior that manages water infrastructure and supply across the western United States, has released a Draft Environmental Impact Statement for how the Colorado River Basin water system will be managed after 2026. Simply put: it fails to meet this urgent moment. The Draft EIS lays out several possible approaches that the agency is considering taking but does not clearly identify which recommendation is its "preferred alternative," which it is legally required to do. Furthermore, the alternatives the agency has proposed are inadequate to meet the crisis that the system faces.We are urging the Bureau to put forward its "preferred alternative" and give Tribes, impacted communities, and the public a meaningful chance to comment on its recommendation before a final decision is made. If the Bureau does not include its "preferred alternative" in its Draft EIS and waits to do so in its final action, the public will have no opportunity to comment on the actual proposal the Bureau recommends. We urge the Bureau of Reclamation to strengthen the Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocationsSincerely, Nan and Dave Spencer-Johnson628 CR 3402 Eureka Springs, AR 72632479-244-6949

***Letter #:*** 7458

***Date Received:*** 3/2/2026

***Sender Names:*** 7414: Sarah Johnson

***Emails:*** 7414: sarah@wildroseeducation.com

***Organizations:***

***Subject:*** Comment on Post-2026 Operational Guidelines

DOI - . To: Bureau of Reclamation, Attn: BCOO-1000 Re: Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead As the Founder of Wild Rose Education, a Colorado Public Benefit Corporation, the Director of the Colorado Youth Climate Summit, and a long-time resident of the Colorado River Basin, I am writing to express my concerns regarding the Post-2026 Operational Guidelines. My professional background in water leadership, climate literacy, and systemic equity informs my belief that the Bureau must move away from reactive crisis management toward proactive, resilient strategies. My primary recommendation is that the Bureau prioritize the Maximum Operational Flexibility Alternative. This path aligns with my organizational philosophy that authentic action is always preceded by clear sight; by basing shortages on total system storage and recent hydrology, we gain the "clear sight" necessary to stabilize the basin before reaching a breaking point. I urge the Bureau to ensure the final guidelines encompass the following: Expanded, Flexible Water Conservation Pools: Current programs are insufficient. We need flexible "water savings accounts" that allow conserved water to move between Lake Powell and Lake Mead. This ensures we can protect river health in the Grand Canyon and maintain critical infrastructure during dry years.Protection Against "Deadpool" and Hydropower Loss: Management that risks deadpool is unsustainable for the 35 million people who rely on this water. Guidelines must prioritize maintaining minimum power pool elevations--3,490 feet at Lake Powell and 950 feet at Lake Mead--to prevent unplanned emergency shortages that devastate local economies and ecosystems.Honoring Tribal Sovereignty: For too long, the 30 federally recognized Tribes in the Basin have been excluded. The new guidelines must fulfill the federal trust responsibility by providing clear pathways for Tribal collaboration and inclusion in conservation programs.A Systemic Focus on River Health: The Colorado River is a living system. Reservoir plans must incorporate ecosystem mitigation and support restoration efforts, such as those in the Colorado River Delta. We are at a critical crossroads. As an educator who trains the next generation of climate leaders in Colorado and beyond, I know that our communities cannot plan for a resilient future if the river is constantly on the brink of crisis. I advocate for a "third way" that rejects dualistic thinking and embraces the complexity of our shared watershed to ensure a just and sustainable future for all. Respectfully, Sarah R. Johnson, MAEd | She, Her, Hers Environmental Education Specialist Founder and Principal, Wild Rose Education Carbondale, Colorado, USA Sarah@WildRoseEducation.com WildRoseEducation.com +1 970-510-0697 (cell)

***Letter #:*** 430

***Date Received:*** 2/20/2026

***Sender Names:*** 424: Bill Jones

***Emails:*** 424: billjonesreal@gmail.com

***Organizations:***

***Subject:*** Colorado River water

DOI - . -Lake Powell has 25-26 million acre feet of water when full-Lake Mead has 28-29 million acre feet of water when full-The Columbia River "dumps" 192 million feet acres of water into the Pacific annually...after we have used all we need-We have over 229,000 miles of hazardous liquid pipelines in the USA...we know how to build pipelines for liquids!-We aggressively redistribute incomes in this nation, why not water?-It shouldn't take a Lassie to figure this out.

***Letter #:*** 7257

***Date Received:*** 3/2/2026

***Sender Names:*** 7217: Jeff Jones

***Emails:*** 7217: choncej@outlook.com

***Organizations:***

***Subject:*** Colorado River

DOI - . Sent from my cell Joseph Jones, Page, AZ resident. ( former supervisor of the Glen Canyon Dam) Simply stop letting out more water than is coming in!!! Lake Powell is at an all time low and is jeopardizing the capability to produce power which the dam relies on to operate. Also the city of Page requires water for its citizens and many thousands of visitors here. Doesn't take a genius to figure out letting more water out than is incoming is causing a dangerous situation for us all! Common sense please!

***Letter #:*** 3572

***Date Received:*** 2/26/2026

***Sender Names:*** 3539: Charlotte Jones

***Emails:*** 3539: ragbaby@earthlink.net

***Organizations:***

***Subject:*** Colorado River Water

DOI - . Please take some corrective actions that truly work, not some band aids that will not help the water supply. Short cuts are not the answer. Look at the real solutions that will help this terrible problem. Thank you, Charlotte Jones.....ragbaby@earthlink.net

# SALMON, LEWIS & WELDON, P.L.C.

Attorneys at Law

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March 2, 2026

*Via E-Mail Only*
United States Bureau of Reclamation
crbpost2026@usbr.gov

Re: Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead Draft EIS

Dear Acting Commissioner Cameron:

We are writing on behalf of Central Arizona Irrigation and Drainage District ("CAIDD"), Maricopa-Stanfield Irrigation & Drainage District ("MSIDD"), New Magma Irrigation and Drainage District ("NMIDD"), Queen Creek Irrigation District ("QCID"), and San Carlos Irrigation and Drainage District ("SCIDD") (collectively "Districts") regarding the Bureau of Reclamation's ("Reclamation") Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Draft Environmental Impact Statement ("Post-2026 DEIS").

The Post-2026 DEIS presents five alternatives for potential Post-2026 Colorado River Basin reservoir management: (1) No Action; (2) Basic Coordination; (3) Enhanced Coordination; (4) Maximum Operational Flexibility; and (5) Supply Driven. As discussed below, however, each alternative and its associated analysis in the Post-2026 DEIS is fundamentally flawed.

## I. The Post-2026 DEIS Includes No Alternative That Complies With The Law Of The River.

Management of the Colorado River is governed by an extensive body of law commonly referred to as the "Law of the River," which includes, among other things, the 1922 Colorado River Compact ("Compact"), federal statutes, United States Supreme Court decisions, treaties, agreements, and various rules, regulations, and guidance documents issued by the United States Department of the Interior ("Interior") pursuant to these authorities. The Post-2026 DEIS indicates that Interior "intends to consider, adopt and implement the proposed federal action consistent with the Law of the River, including the [Compact] . . . and other provisions of applicable federal law." Post-2026 DEIS at 1-4.

The Compact is a foundational component of the Law of the River. Article II of the Compact divides the Colorado River Basin into an Upper Basin and Lower Basin and defines the Upper Division States as consisting of Colorado, New Mexico, Utah, and Wyoming ("Upper Division") and the Lower Division States as consisting of Arizona, California, and Nevada ("Lower Division"). Crucially, Article III of the Compact requires the Upper Division to deliver at Lee Ferry water to supply: (1) one-half of the United States' obligation pursuant to the Treaty with Mexico; **and** (2) 75 million acre-feet in any period of ten consecutive years in continuing progressive series. Compact Art. III(c)-(d). The Colorado River Storage Project Act ("CRSP") provides that the use of

Colorado River water by the Upper Division "consistently with the provisions of the [Compact]" is an express purpose of CRSP and requires compliance with the Compact in the use of water and operation of all facilities. *See* 43 U.S.C. §§ 620; 620c; 620f; 620h; 620m. Moreover, the Colorado River Basin Project Act ("CRBPA") requires compliance with the Compact, directs Interior to develop criteria for the coordinated operation of the reservoirs constructed and operated pursuant to CRSP and the Boulder Canyon Project Act ("BCP") "in order to comply with and carry out the provisions of the [Compact]," and specifically requires that such operating criteria "shall make provision" for the storage and releases of water to satisfy the Upper Division's obligations to deliver water to supply one-half of the Mexico Treaty amount and the Lower Basin pursuant to Articles III(c) and (d) of the Compact. 43 U.S.C. §§ 1551(a); 1552.

CRSP and CRBPA plainly direct Interior to develop operating criteria and to operate CRSP and BCP facilities in compliance with the Compact, expressly including the Upper Division's obligations to supply water to satisfy Articles III(c) and (d) of the Compact. Moreover, the Post-2026 DEIS seemingly acknowledges that Interior must develop operating criteria and operate reservoirs and releases to comply with Compact requirements. *See, e.g.*, Post-2026 DEIS at 1-25; 1-29; 1-30. The Post-2026 DEIS includes no alternative providing for compliance with the Upper Division's delivery obligations under the Compact, however.

Given upcoming deliveries to the Lower Basin during the remainder of the current operating guidelines and under each of the Post-2026 DEIS alternatives, not only is it reasonably foreseeable that Upper Division deliveries will fall short of the those required by the Compact, but virtually certain. No Post-2026 DEIS alternative would require the Upper Division to reduce water use to avoid depleting the flow of water delivered to the Lower Basin as required by the Compact. Rather, the Post-2026 DEIS assumes increasing Upper Division water use during the term of the new operating guidelines. *See* Post-2026 DEIS at 3-8; Appx. I. Likewise, no Post-2026 DEIS alternative contemplates releases of water from CRSP reservoirs to ensure that those facilities are operated consistent with the Compact as expressly required by CRSP and CRBPA. Because no alternative in the Post-2026 DEIS complies with the Law of the River, Reclamation cannot implement any such alternative without breaching its express statutory duties and Reclamation must propose other alternatives that comply with governing law.

## II. The Post-2026 DEIS Fails To Analyze Technically And Economically Feasible Alternatives Consistent With The Law Of The River.

NEPA requires an agency to include in an environmental impact statement ("EIS") analysis of a reasonable range of alternatives that are "technically and economically feasible, and meet the purpose and need of the proposal." 42 U.S.C. § 4332(c)(iii). The Post-2026 DEIS identifies Interior's statutory obligation under CRBPA to adopt coordinated Colorado River reservoir operating criteria as a need for the proposed federal action. Post-2026 DEIS at 1-6. Interior's CRBPA statutory duties specifically include adopting reservoir operating criteria that comply with the Compact.

The Post-2026 DEIS states that Glen Canyon Dam was not envisioned to operate below elevation 3,490 feet, expresses concern about use of the river outlet works below elevation 3,490 feet, and seeks to prevent Lake Powell from falling below elevation 3,490 feet in its alternatives. *See, e.g.*, Post-2026 DEIS at 1-22; 2-10; 2-15; 2-28; 2-33; 3-25. As discussed above, however, the Post-2026 DEIS includes no alternative involving reductions in water use by the Upper Division or

requiring water releases from upstream CRSP reservoirs to prevent Lake Powell from reaching critical elevation and ensure that operations comply with the Compact, CRSP, and CRBPA. Moreover, the Post-2026 DEIS considers no potential technically and economically feasible engineering solution concerning Glen Canyon Dam that could address Reclamation's infrastructure concerns while allowing water releases to the Lower Basin in compliance with the Compact and Interior's statutory obligations. Instead, the Post-2026 DEIS alternatives seek to protect against Lake Powell falling below elevation 3,490 feet primarily by permitting Reclamation to reduce deliveries to the Lower Basin, increasing the likelihood that operations will violate the Law of the River and cause Lower Basin users to bear unlawful and inequitable water supply reductions.

Reclamation's failure to propose alternatives that analyze potential engineering solutions for Glen Canyon Dam abandons millions of acre-feet of water stored in Lake Powell that could be available for delivery to the Lower Basin to help satisfy Compact and statutory obligations. Potential engineering solutions exist, however, that could allow additional releases of water from Glen Canyon Dam below elevation 3,490 feet and directly serve the purpose and need of the proposed federal action. Reclamation cannot shirk requirements of the Law of the River and NEPA by simply neglecting to consider such potential solutions in its EIS.

## III. The Post-2026 DEIS Fails To Adequately Analyze Socioeconomic And Environmental Impacts.

The Central Arizona Project ("CAP") is an essential source of irrigation water for agriculture in the Districts, comprising more than 260,000 acres located primarily in Pinal County, Arizona. The Districts are the predominant users of the CAP Agricultural Settlement Pool dedicated to agricultural users who relinquished long-term subcontracts and allocations of CAP Non-Indian Agricultural Priority water to help facilitate Indian water rights settlements and resolve CAP repayment issues in connection with the Arizona Water Settlements Act of 2004 and underlying settlement agreements. CAP water delivered to the Districts helps sustain some of the most productive and efficient agriculture in the United States. A December 2018 study conducted by the University of Arizona found that, relative to all U.S. counties, Pinal County ranks in the top 2% for total value of agricultural sales, the top 1% for animal product sales, the top 1% for milk sales, the top 3% for total crop sales, and the top 7% for vegetable, fruit, and nut production.[1] Pinal County has a large, thriving dairy industry that supplies a substantial portion of the dairy products for the majority of Arizona's population. Water from the CAP system is crucial for the viability of agriculture in the Districts, which remains a foundation for the regional economy and a critical resource for local and national food security.

The Districts already have suffered severe water supply reductions under the current 2007 Guidelines and Drought Contingency Plan, resulting in farmers fallowing approximately half of all acres. Of the land remaining in agricultural production today, more than 30,000 acres currently rely entirely on CAP water for irrigation. The additional reductions posed by the Post-2026 DEIS alternatives threaten to eliminate much, if not all, of the CAP water supplies on which those farmers rely.

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[1] Ashley Kerna Bickel et al., Contribution of On-Farm Agriculture and Agribusiness to the Pinal County Economy (2018).

The Post-2026 DEIS analysis of economic impacts of the alternatives pertaining to central Arizona agriculture is woefully inadequate and fails to account for cascading impacts affecting the broader socioeconomic landscape resulting from large-scale, regional fallowing of agricultural land. Although the Post-2026 DEIS acknowledges that each alternative will increase fallowed cropland and associated losses of farm output generally, *see, e.g.*, Post-2026 DEIS at 3-178; 16-41 to 16-48, the Post-2026 DEIS fails to recognize that implementing those alternatives likely will result in fallowing most or all of the acres in central Arizona regions now reliant on CAP supplies abruptly and all at once. In those areas, water supply reductions resulting from the Post-2026 DEIS alternatives would not just cause increased fallowing and reduced farm output, but effectively eliminate all agriculture. That loss of agriculture would seriously threaten surrounding non-agricultural businesses that rely on agriculture-related income and agribusiness enterprises that are necessary to sustain agriculture on the remaining acres that may not face the immediate loss of all irrigation water supplies. Thus, the socioeconomic impacts of the Post-2026 DEIS alternatives on central Arizona agriculture extend far beyond the fallowing and farm output effects analyzed in the Post-2026 DEIS.

Furthermore, additional large-scale fallowing in Pinal County under the Post-2026 DEIS alternatives would have significant adverse environmental and health impacts affecting the majority of Arizona's residents, which are not addressed in the Post-2026 DEIS. Pinal County includes more than 500,000 residents and the Districts are situated directly between, and in close proximity to, Arizona's main population centers in the Phoenix and Tucson metro areas. The scale of increased fallowing resulting from implementation of any of the Post-2026 DEIS alternatives would result in significant erosion, soil degradation, and windblown dust affecting most of Arizona's residents and cause serious safety hazards along more than 100 miles of the heavily traveled Interstate 10 and Interstate 8 corridors between Phoenix and Tucson.

As discussed above, the Districts contend that the Post-2026 DEIS is inadequate because it (1) fails to present an alternative that complies with the Law of the River; (2) fails to analyze technically and economically feasible alternatives; and (3) fails to adequately analyze socioeconomic and environmental impacts. Accordingly, the Districts urge Reclamation to withdraw the Post-2026 DEIS, or alternatively, to revise its proposed alternatives to satisfy its obligations under the Law of the River and NEPA.

Please contact us if you have any questions.

Very truly yours

Salmon, Lewis & Weldon, P.L.C.

By 
Daniel B. Jones

***Letter #:*** 3825

***Date Received:*** 2/26/2026

***Sender Names:*** 3786: Janice Jones

***Emails:*** 3786: jan@metrostation.com

***Organizations:***

***Subject:*** Water

DOI - . The Colorado River disent have an endless supply. Water conservation and recycling is the way to go, and the only way for the future. Sincerely, Jan Jones Sent from my iPad

***Letter #:*** 7711

***Date Received:*** 3/2/2026

***Sender Names:*** 7656: Peter Jones

***Emails:*** 7656: threedogvending@yahoo.com

***Organizations:***

***Subject:*** Solution for Southwest USA fresh water

DOI - . I have the solution for the Southwest USA fresh water requirement: Flocean's subsea desalination pods with a thorium molten-salt reactor (MSR). What Flocean Brings- Flocean's underwater desalination system uses natural ocean pressure at 300-600 meters depth to drive reverse osmosis, cutting energy use by 30-50% compared to land plants. This reduces the power requirement but does not eliminate it; the system still needs electricity for pumping, control systems, and water delivery. What Thorium Reactors Bring- Modern thorium MSR developers--such as Copenhagen Atomics--are building 100 MWt modular molten-salt reactors designed for mass manufacturing, low cost, and industrial applications like hydrogen, ammonia, and desalination. These reactors aim for extremely low energy prices (EUR20/MWh) and can run continuously for years. Bottom Line- A Flocean + thorium MSR system is technically feasible, strategically aligned, and increasingly realistic as both technologies mature. It would create a desalination system that is: * Low-energy * Low-carbon * Modular * Scalable * Offshore-capable It's the kind of pairing that could redefine water production for arid regions--Arizona included--if modular reactors become commercially available in the 2030s. FYI- I am an old NYU Alumnus with a MS Management of Technology. Thank You, Peter Allen Jones

***Letter #:*** 1791

***Date Received:*** 2/25/2026

***Sender Names:*** 1780: Dorothy Jordan

***Emails:*** 1780: dorrie.jordan@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement I am writing to strongly encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued bi-national cooperation with Mexico. We need guidelines that support the various functions that the Colorado River now supply such as: Provides water to nearly 40 million people for municipal use Supports the generation of hydroelectric energy annually powering the needs of approximately 700,000 homes, and nearly 50% of the Navajo Nation Sustains 5.5 million acres of farmland and agricultural land Serves as a vital cultural, economic and environmental resource for 30 Tribal Nations and the Republic of Mexico Is home to seven National Wildlife Refuges, four National Recreation Areas, and 11 National Parks, along with countless state parks and wildlife areas. All of these need to be kept in mind and preserved. Sincerely, Dorothy Jordan 1407 Abbott Rd Lynden, WA 982649401 dorrie.jordan@gmail.com

***Letter #:*** 7738

***Date Received:*** 3/2/2026

***Sender Names:*** 7683: Ilon Jorgenson

***Emails:*** Not Provided

***Organizations:***

***Subject:*** New Voicemail from Jorgenson Ilon (480) 393-3637 to PM_Bureau-Reclamation (Ext. 17782) on Mon Mar 2, 2026 11:53

Last name is Jorgenson. 480-393-3637. I'm very concerned about the lack of urgency regarding water rights in the state of Arizona. I've been a resident here since the mid-70s, and moved here Because I... enjoy the outdoors, I enjoy the beauty of the state. And I also enjoy living in the Phoenix metropolitan area, particularly Scottsdale. With that being said, With all these, Brand new, factories that are going in, chip factories, and you're trying to install data centers, which require an exorbitant amount of water and electricity. who's looking at paying for all of that, and why is Arizona It gets, like, the crumbs, literally, of this water reclamation when the cap was built Probably before I was born. So, with that being said. Somebody get on it before the state runs dry, and the beautiful scenery, and the majesty of this state will disappear and dry up, much like Lake Mead has. Thank you for listening.

***Letter #:*** 3908

***Date Received:*** 2/26/2026

***Sender Names:*** 3867: Veda Joy

***Emails:*** 3867: mysnowball12@yahoo.com

***Organizations:***

***Subject:*** Colorado River

DOI - . It is your responsibility to PROTECT the Colorado River and make sure it receives all the protection it needs. This is an important river and needs to be protected and not harmed.I am counting on you to do your job and protect this important river now.Thank you.Veda Jpy

***Letter #:*** 7320

***Date Received:*** 3/2/2026

***Sender Names:*** 7280: jrzelik@verizon.net

***Emails:*** 7280: jrzelik@verizon.net

***Organizations:***

***Subject:*** Colorado River Basin water rights

DOI - . Dear BOR Representative, I have not had an opportunity to completely digest the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Draft Environmental Impact Statement (EIS), which I will do. But it is evident that Arizona is taking a disproportional reduction in water rights for the Colorado River Basin. This is particularly problematic considering the amount of reduction Arizona has made in the last 10 years. Utah and Colorado should be taking more of the share of water rights reduction. This reduction by State needs to be made very clear in the report instead of being buried in statistics requiring significant time to understand. I am requesting that before this goes forward, a very simple chart be completed showing the reduction by State for each of the alternatives. This current proposal has all the offensive odor of political payoffs for favored States by the current administration. Thanks, Jeff Zelik Jeff Zelik 2422 N. 157th Drive Goodyear, AZ 85395 Cell: (856) 759-2709

***Letter #:*** 3734

***Date Received:*** 2/27/2026

***Sender Names:*** 3697: karen k.

***Emails:*** 3697: kumasong@icloud.com

***Organizations:***

***Subject:*** Protect the Colorado River system for the future.

DOI - . The Draft EIS the Bureau of Reclamation has proposed for management of the Colorado River Basin water system is inadequate to address the crisis that we face and could lock in more water scarcity. The Colorado River's future depends on bold action, not incremental adjustments.We require a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocations These are solutions that proactively address the crisis that we face. I also urge that you put forward your "preferred alternative"and give Tribes, impacted communities, and the public a meaningful opportunity to comment on its recommendation before a final decision is made. The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. The Colorado River cannot afford delay.Thank you.Karen Kirschling

***Letter #:*** 8041

***Date Received:*** 3/2/2026

***Sender Names:*** 7975: Conrad Kampp

***Emails:*** 7975: conradkampp@gmail.com

***Organizations:***

***Subject:*** Colorado River Basin allocation

DOI - . As Arizona residents, we strongly object to the proposed 70% reduction in Arizona's allotment of the Colorado River Basin water. This reduction would be devastating to our state's businesses, agriculture and overall quality of life. There needs to be a more just and equitable distribution of the precious water supply, especially in the current climate crisis. Conrad and Barbara Kampp 960 Northwood Loop Prescott, Az. 86303

***Letter #:*** 6176

***Date Received:*** 3/1/2026

***Sender Names:*** 6149: J Kapps

***Emails:*** 6149: info@greatbasinwater.org

***Organizations:***

***Subject:*** J Kapps Comments on Colorado River

Great Basin Water Network DOI - . We need the water
policy and allocation to support our communities, businesses, and lives. Thank youIf you have any additional questions please contact me.J Kapps(c) Great Basin Water Network. Powered by

weForms.

***Letter #:*** 3654

***Date Received:*** 2/26/2026

***Sender Names:*** 3617: Lois Karasek

***Emails:*** 3617: catwomanlsk@gmail.com

***Organizations:***

***Subject:*** Colorado River Management

DOI - . The Colorado River provides drinking water for40 million people, supports Tribal nations, sustains farms and cities, and is the lifeblood of fragile desert ecosystems.But the Basin is facing:Record-low reservoir levelsIncreasing salinity and pollution risksCollapsing aquatic habitatsRising temperatures and reduced snowpackGrowing threats to safe, reliable water suppliesThe Colorado River's future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposalbefore issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply.I'm trusting in you to do the right thing by submitting a plan that will protect this vital water supply and provide safe and plentiful water for the millions of people who need it for many years to come.Lois Karasek57845 Cherry Grove RdDowagiac MI 49047

***Letter #:*** 3377

***Date Received:*** 2/27/2026

***Sender Names:*** 3346: Karen

***Emails:*** 3346: talleecat@yahoo.com

***Organizations:***

***Subject:***

DOI - . Sent from Yahoo Mail for iPhone

***Letter #:*** 2466

***Date Received:*** 2/20/2026

***Sender Names:*** 2445: karithewitch

***Emails:*** 2445: karithewitch@pm.me

***Organizations:***

***Subject:*** Concerned resident

DOI - . Here is my comment on the Colorado River management process-Upper basin states need to make cuts, more than just 'there hasn't been enough snowpack/climate change'.I do my best to not use or waste water in my own home here in AZ. More people need to do the same, especially upper basin states/residents.Everyone can do more, a lot more, but forcing lower basin states to take the brunt of water cuts is ridiculous.Thank you.

***Letter #:*** 1729

***Date Received:*** 2/24/2026

***Sender Names:*** 1718: Diane Kastel

***Emails:*** 1718: classylady471@gmail.com

***Organizations:***

***Subject:*** Please support a, smarter, future for the Colorado River, and, all who depend on it!

DOI - . Dear Bureau of Land Mangement Our family encourages the "Bureau of Reclamation" to combine elements from the, proposed, alternatives in the, draft, "Environmental Impact Statement" (DEIS) to ensure a, sustainable, future for the Colorado River with, new, long-term, guidelines that: - Provide clarity, and, predictability: continued, crisis, management puts everything, and, everyone, in the basin, at risk. New guidelines MUST promote conservation, and, respond to conditions on the ground! - Incorporate flexible, adaptive, tools for conserving, storing, and, managing, water: new, guidelines MUST allow for, more, flexibility in how water is stored, and, moved, to protect, and, stabilize, the system! - Embed, environmental, stewardship: the Colorado River is more than a, plumbing, system! New guidelines MUST account for the river, itself, and, the bounty of life it sustains. - Provides for meaningful, and, voluntary, Tribal, participation grounded in sovereignty, and, self-determination: the 30, federally, recognized Tribes, in the Basin, MUST be included in decision-making! - And, preserve pathways for advancing, in-basin, mitigation, and, continued, binational, cooperation with Mexico! Sincerely, Diane Kastel 1658 Dover Ct Wheaton, IL 601898444 classylady471@gmail.com

***Letter #:*** 7144

***Date Received:*** 2/28/2026

***Sender Names:*** 7109: Jerry Kauffman

***Emails:*** 7109: aquaphile111@gmail.com

***Organizations:***

***Subject:*** Draft EIS for the Post-2026 operation of Lakes Powell and Mead

DOI - . I care deeply about the Colorado River in the Grand Canyon and deciding how to manage it in the future. The demand supply balance between the reservoirs must be dealt with to make sure things are sustainable. I believe a minimum of 8000 CFS should be released out of the dam. Non-native invasive fish need to be prevented from passing through the dam. I want the humpback chub protected. I hope you abide by the mandate of the Grand Canyon protection act of 1992. I want to make sure that high flow experiments can be continued to replenish the critical beaches where I camp and for the protection of the species that live there. The river and the canyon need more protection even at the cost of lost revenues. Thank you for allowing me to comment. Jerry Kauffman

***Letter #:*** 3677

***Date Received:*** 2/27/2026

***Sender Names:*** 3640: Abigail Keel

***Emails:*** 3640: info@greatbasinwater.org

***Organizations:***

***Subject:*** Abigail Keel Comments on Colorado River

Great Basin Water Network DOI - . I am a citizen who is disappointed the Bureau's leadership, frustrated by the inaction on the part of the seven basin states and concerned about the future for people, other species and the planet.The DEIS Avoids A Hard Look At Cumulative ImpactsThe document fails to consider the following:The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.Three Alternatives Do Not Likely Comply With The Law Of The River. Programmatic Review Is Necessary And So Is Congressional ActionIn Appendix C, the DEIS implies that modeling justifying three of the proposals "may not be implementable" because potential non-compliance with "laws, contracts, agreements, and other authorities that are part of the Colorado River legal and contractual framework referred to as Law of the River." That is a reference to the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternative. Without any deal in place among the states or congressional action, a Record of Decision supporting those alternatives poses legal challenges that may be insurmountable.Therefore, according to the DEIS, the No Action Alternative and Basic Coordination Alternative are among the only options that could avoid a legal challenge after a Record of Decision.Those options pose some of the worst outcomes for Lakes Powell and Mead. We believe that no course of action as put forth in the DEIS is a sufficient means of stabilizing the system under the current Law of the River framework. This is troubling considering Reclamation is predicting some of the most dire reservoir elevations ever in the coming two years.Reclamation should undertake a programmatic review as the states continue negotiating. This year's low flows will inevitably get people back to the negotiating table in a meaningful way. Congress will act when the reservoirs are in crisis. We have seen congressional, bi-partisan action multiple times in the past seven years. When Congress is ready, enlist the National Academy of Sciences to undertake a programmatic review in partnership with the Department of Interior, Reclamation and other cooperating agencies. This document is not the beginning of the end. We believe it is merely the end of the beginning.The DEIS Fails To Consider Impacts On Irretrievable Resources By Sanctioning The Repurposing Of Water ResourcesThe DEIS offers multiple alternatives that impose varying levels of cuts in the Lower Basin and no meaningful cuts in the Upper Basin. Some alternatives mention the possibility of Upper Basin "conservation" but those offerings do not describe who, what, where and when. There is nothing steadfast for cuts in the Upper Basin.The DEIS also showcases a modified version of the 2016 Upper Basin Depletion Schedule that still assumes considerable new uses of water in the Upper Basin in the coming decades. Because of the limited resources available, there's no doubting that cuts imposed on the Lower Basin will be repurposed by the Upper Basin. That repurposing defeats the intent of this analysis. Once that water is re-appropriated by Upper Basin regulators, waters with established beneficial uses will not return to where those uses were first proven in the Lower Basin. This is highly suspect.Furthermore, we question how Reclamation can execute its recognized authority to force a

curtailment in one basin but not even questioning how development of new appropriations in another part of the basin will impact the whole system and those who had to undertake curtailment. Upper Basin reservoirs are subject to the "apportionments" among the two basins, seven states and Mexico (See Colorado River Storage Project Act, Pub. L. No. 84-485, SS 4, 70 Stat. 107 (1956)). Reclamation has a great deal of say in how certain rights are managed in the system. But how can regulators sequester the differences between the starting and end points of a highly connected system where some users have established decades worth of use? This gray area is at the heart of the ongoing conflict among the seven states, and we request more information on this in the FEIS.We fear that it is an unacceptable practice to allow the Upper Basin to repurpose water from Lower Basin in the name of state-led permitting efforts in Colorado, New Mexico, Utah and Wyoming. Further declines in the system will challenge Reclamation's mission to protect infrastructure, ecosystems, and communities. It means less water making its way through the southernly reaches of the system in the majority of years if current trends continue. Every state needs a curtailment plan on the Colorado River. This DEIS fails to compel the Upper Basin States to meaningfully consider how they will act to protect federal assets and resources.Finally, this could also bring about conflict over tribal water rights in the Upper and Lower Basins -- especially where settlements have been established. There must be consideration of reducing, at a 1-for-1 rate, junior non-tribal use for those senior tribal rights that have not yet been put to use. How Reclamation would undertake this matter in the Upper and Lower Basin must included in any FEIS. Also, there must be consideration of how Reclamation would prevent new Upper Basin appropriations put forth by non-native water users from using, in a de facto sense, settled and adjudicated rights of Lower Basin tribes.DEIS Ignores Glen Canyon Dam's Antique PlumbingThe analysis in the DEIS fails to consider bypass, decommissioning, and other meaningful resolutions available at Glen Canyon Dam, which poses considerable concerns for water delivery and endangered species protections. We understand and respect the legal arguments for not including the One-Dam Alternative. But it is a mistake to not undertake comprehensive analysis on this matter. Keeping Lake Powell's elevations above 3550', 3525, and 3490' are not realistic scenarios for the long-term. Failure to include greater analysis on Glen Canyon Dam's river outlet works will ultimately cost us all -- imposing direct impacts on Lake Mead, Hoover Dam, other federal infrastructure, metropolitan areas, agricultural hubs, tribal resources, sensitive species, National Park Service units, U.S. Fish and Wildlife units, and other conservation areas in the Lower Basin.The DEIS' Purpose-And-Need Is Too Narrow And Segments Requisite ReviewsReclamation, admittedly so in its Purpose and Need statement, recognizes the grave uncertainties we face if conditions do not improve on the river system. Reclamation also recognizes the direct connections the DEIS makes with upstream infrastructure associated with the Colorado River Storage Project units and in Lower Basin units at Parker Dam, Davis Dam, Imperial Dam, and Palo Verde. The DEIS would benefit from greater analyses in the technical appendices dealing with directly related impacts at the dams during low-flow periods. The same can be said for analyzing impacts at all Colorado River Storage Project facilities in low-flow periods too. They will be essential for propping up Lakes Powell and Mead. What will operations look like if CRSP and Lower Basin Infrastructure are only operating collectively at 10-20 percent of normal? What can we expect? To say that management at Mead and Powell are not directly connected to that management is implausible.If you have any additional questions please contact me.Abigail Keel(c) Great Basin Water Network.
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***Letter #:*** 4018

***Date Received:*** 2/27/2026

***Sender Names:*** 3977: Kirk Keil

***Emails:*** 3977: info@greatbasinwater.org

***Organizations:***

***Subject:*** Kirk Keil Comments on Colorado River

Great Basin Water Network DOI - . I am writing in connection with the Bureau of Reclamation's Post-2026 Colorado River Reservoir Operations DEISThe document fails to consider the following:The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.Three Alternatives Do Not Likely Comply With The Law Of The River. Programmatic Review Is Necessary And So Is Congressional ActionIf you have any additional questions please contact me.Kirk Keil(c) Great Basin Water Network. Powered by

weForms.

***Letter #:*** 5767

***Date Received:*** 2/28/2026

***Sender Names:*** 5730: Bill Kelly

***Emails:*** 5730: bkellyhome@me.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . Dear Sir or Madam, I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. Lake Powell must be better engineered to allow low water conditions to bypass the turbines and continue flowinging into the Grand Canyon. Please design, and build, river level bypass of Glen Canyon Dam. Sincerely, Bill Kelly

***Letter #:*** 3860

***Date Received:*** 2/27/2026

***Sender Names:*** 3820: Joseph Kenosky

***Emails:*** 3820: jfk11090@gmail.com

***Organizations:***

***Subject:*** Protect the Colorado River

DOI - . Do the right thing and protect the river. No more water scarcity.

***Letter #:*** 3147

***Date Received:*** 2/26/2026

***Sender Names:*** 3118: Debra Kern

***Emails:*** 3118: ddkern@icloud.com

***Organizations:***

***Subject:*** Drinking Water

DOI - . Sent from my iPhone

***Letter #:*** 3276

***Date Received:*** 2/26/2026

***Sender Names:*** 3246: Patricia Kincaid

***Emails:*** 3246: pkcaid@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . If you don't protect the Colorado, we will run out of water. Patricia Kincaid

***Letter #:*** 3936

***Date Received:*** 2/27/2026

***Sender Names:*** 3893: Caroline Kinsley

***Emails:*** 3893: carolinekinsley395@everyactioncustom.com

***Organizations:***

***Subject:*** Please consider protecting the river: Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, I am grateful for this opportunity to share my input on the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Draft Environmental Impact Statement (Post-2026 Operations). Please protect the future of the Colorado River Basin. This is an act that can have an impact on the river itself, the ecosystems that rely on it, and our society. I request that the Bureau of Reclamation prioritize the below elements as a preferred Alternative for Post-2026 Operations. To work directly with the seven basin states and Tribes as a way to ensure that water conservation measures are effective and capable of supporting a living river for generations to come. Please consider the following as top priority to care and protect: - Storage in Lake Powell and management and infrastructure of Glen Canyon Dam must support opportunities for High Flow Experiments in the Grand Canyon for the purposes of sediment and nutrient transport. - Infrastructure updates at Glen Canyon Dam must be prioritized in the short-term to ensure that the dam is capable of passing variable flows downstream as reservoir levels become lower and less predictable. - Conservation measures and delivery of water between the Upper and Lower Basins must balance maintaining minimum flows at all times in the Grand Canyon with allowing for flow variability across the annual hydrograph to support both the river ecosystem and river recreation opportunities. - Water delivery measures that implicate Blue Mesa and Flaming Gorge Reservoirs must consider immediate and downstream impacts to river ecosystems and recreation opportunities, and seek to provide multiple benefits whenever possible. - Impacts to river recreation opportunities on the Colorado River and the San Juan River due to changing reservoir levels must be analyzed and mitigated. - Post-2026 Operations must analyze and consider how operations will affect daily flows in the Grand Canyon and upstream river segments before a final decision is determined, not after. - Operations and agreements must provide for Tribal water rights and respect Tribal sovereignty throughout the Colorado River Basin. To whomever is is reading this, have you had a chance to take a trip through the canyons of the Colorado River? If you have you know it leaves a lasting impression on all who make the journey. If you have not had the chance yet, please know that your work will directly impact your ability to that the opportunity. The river that carved these canyons is the hardest working in the country. Keeping the river flowing and healthy is integral to protecting the mental, emotional, and physical safety and welfare of the people who rely on it. As a mental health therapist, I know the immense research that supports this fact. We must work with what nature provides and do so together. This is an ask to please collaborate with others around these decisions. All of the Colorado River's water users are going to feel a strain, but we cannot sacrifice these special river canyons and the ecosystem services that they provide. Thank you for considering and I appreciate your consideration in caring, protecting, and loving the Colorado River. Sincerely, Mrs Caroline Kinsley 1823 Montana St Apt E Missoula, MT 59801-1433 carolinekinsley395@gmail.com

***Letter #:*** 3145

***Date Received:*** 2/27/2026

***Sender Names:*** 3116: kismetabc@aol.com

***Emails:*** 3116: kismetabc@aol.com

***Organizations:***

***Subject:*** Protect the Colorado River

DOI - .

***Letter #:*** 7430

***Date Received:*** 3/2/2026

***Sender Names:*** 7387: Adam Klepp

***Emails:*** 7387: adam.klepp@abc15.com

***Organizations:***

***Subject:*** test

DOI - . test Get Outlook for iOS Scripps Media, Inc., certifies that its advertising sales agreements do not discriminate on the basis of race or ethnicity. All advertising sales agreements contain nondiscrimination clauses.

Gregory Knapp
P.O. Box 185
Mesa, CO 81643
(970) 234-1416
gknapp.kenv@gmail.com

February 28, 2026

Bureau of Reclamation
Attn: BCOO-1000
P.O. Box 61470
Boulder City, NV 89006

RE: Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead
Draft EIS Comments

The critical water supply shortage for Lakes Powell and Mead has reached the point of mandatory actions to reduce consumption in both the Upper and Lower Basins. The difficult choices of how and where the water is consumptively used must now be made. These decisions will not decide "winners and losers", hydrology has already made that decision.

The choice is clear: modern Southwestern US economic activity or a century-old agriculture economy. A 2014 paper from Arizona State University estimated the economic importance of the Colorado River to each state's economy (James et al, 2014). The river's annual value to the Upper Basin states was found to be $280 billion and $1.02 trillion for the Lower Basin states (including New Mexico). This study assumes 10.87 million acre-feet per year of Colorado River flow. This study is now dated. An update will likely show the discrepancy between the Upper and Lower Basin value of an acre-foot to be greater.

The vast majority of Upper Basin water use is for agriculture and a 2024 accounting estimates that of the total consumptive 3,563 million cubic meters (MCM) by humans, 3,246 MCM is used for irrigated agriculture. Of that 90% goes to raising cattle:

> "*Cattle-feed crops consume 90% of all water used by irrigated agriculture within the Upper Basin, where the consumed volume associated with these cattle-feed crops amounts to more than three times what is consumed for municipal, commercial, or industrial uses combined." (Richter et al, 2024).*

Further, a 2021 study has shown that the cattle industry contributes approximately 1% to State Gross Domestic Product for the Upper Basin States and these states produce less than 1% of United States beef cattle sold (Knapp, 2021).

Most Colorado River states will not accept mandatory reductions in 1922 allocations citing the need to have water available for future growth. Further, Colorado has taken the position that reducing water delivery pursuant to existing water rights is a legal taking and monetary compensation must be made to the holders of those rights.

Given just these key factors regarding reallocation of the current annual flow in the Colorado River, the following findings can be made:

a) The Lower Basin has demonstrated a greater beneficial economic use of Colorado River water
b) The raising of cattle in the Upper Basin uses Colorado River water in a less economically efficient manner and that use is not supporting state economies in a meaningful amount
c) Reallocation of modern, lower Colorado River annual flows will still include an agricultural component and of that a large portion will still be for raising cattle. States can make the decision to redistribute that water for non-agricultural growth
d) Restriction of water delivery pursuant to a water right due to lack of water caused by drought or Act of God is generally not considered a taking requiring compensation in the United States. In fact, even in Colorado, this occurs nearly every year somewhere without compensation as senior right holders may receive some portion of their right and junior holders may receive nothing.

The 2026 reallocation of Colorado River annual flows should be based on the highest economically efficient uses historically demonstrated on a state basis. The equal split between Upper and Lower Basins established in 1922 should be eliminated. All Colorado River states must accept cuts to the 1922 allocations – water that isn't present in the river cannot be delivered.

One approach would be to start with the actual water received by each state over the past 10 years, which have seen a dramatic decrease in annual river flows due to lower precipitation and greater evaporation. These deliveries are shown in Table 1.

The annual calculation of water needed to preserve critical levels in Lakes Powell and Mead must be performed. Critical levels should take into account avoiding dead pool, environmental/habitat needs in the river, the Mexico share, and others deemed critical. Added to that would be an amount to "bank" with the goal of restoring surplus storage in Lakes Powell and Mead. The remaining "deliverable" amount to each state would be then determined according to the historically demonstrated use as shown in Table 2.

The Bureau of Reclamation, in determining historical "efficient use" by the states, may have to adjust a states' percentage to reflect any determinations of inefficient use.

Table 1
Colorado River Water Delivery to States
2015 Through 2024
(Acre-feet)

Data Sources: Upper Colorado River System, Consumptive Uses and Losses 1971-2024, Interior Region 7: Upper Colorado Basin. 1971-2024 Lower Colorado River System CUL Data Lower Colorado Region Boulder Canyon Operations Office

| | Colorado | Utah | Wyoming | New Mexico | Upper Basin Total | California | Arizona | Nevada | Lower Basin Total | River Total | Mexico (5-year delivery |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 Allocation | 3,860,000 | 1,710,000 | 1,040,000 | 840,000 | 7,450,000 | 4,400,000 | 2,800,000 | 300,000 | 7,500,000 | 14,950,000 | |
| 2015 | 1,578,059 | 931,278 | 633,737 | 343,895 | 3,486,971 | 4,155,256 | 1,518,022 | 219,927 | 5,893,205 | 9,380,176 | |
| 2016 | 1,933,417 | 934,281 | 598,842 | 344,958 | 3,811,499 | 3,988,435 | 1,493,151 | 235,412 | 5,716,998 | 9,528,497 | |
| 2017 | 2,044,902 | 1,014,582 | 652,482 | 456,076 | 4,168,042 | 3,665,674 | 1,415,613 | 242,212 | 5,323,499 | 9,491,541 | |
| 2018 | 2,069,402 | 931,346 | 712,196 | 346,425 | 4,059,370 | 3,852,714 | 1,522,373 | 242,470 | 5,617,557 | 9,676,927 | |
| 2019 | 2,083,523 | 969,279 | 650,692 | 430,218 | 4,133,711 | 3,439,730 | 1,427,592 | 232,480 | 5,099,802 | 9,233,513 | |
| 2020 | 2,162,487 | 1,119,833 | 727,253 | 385,091 | 4,394,664 | 3,659,859 | 1,402,537 | 254,378 | 5,316,774 | 9,711,438 | 1,381,118 |
| 2021 | 1,804,285 | 834,521 | 590,286 | 354,600 | 3,583,692 | 3,984,709 | 1,357,868 | 240,419 | 5,582,996 | 9,166,688 | 1,384,864 |
| 2022 | 1,846,994 | 912,415 | 666,370 | 347,348 | 3,773,128 | 4,034,688 | 957,248 | 222,543 | 5,214,479 | 8,987,607 | 1,330,544 |
| 2023 | 2,301,726 | 1,049,098 | 589,642 | 424,347 | 4,364,813 | 3,365,114 | 818,265 | 185,636 | 4,369,015 | 8,733,828 | 1,311,658 |
| 2024 | 1,917,325 | 1,154,042 | 686,759 | 345,359 | 4,103,485 | 3,588,082 | 883,684 | 211,604 | 4,683,370 | 8,786,855 | 1,2027,40 |
| 10 Year Delivery Mean | 1,974,212 | 985,068 | 650,826 | 377,832 | 3,987,937 | 3,773,426 | 1,279,635 | 228,708 | 5,281,770 | 9,269,707 | 1,322,185 |
| 10 Year Mean as % of 1922 Allocation | 51.15% | 57.61% | 62.58% | 44.98% | 53.53% | 85.76% | 45.70% | 76.24% | 70.42% | 62.00% | |
| Lowest 5 Year Delivery Mean | 1,816,016 | 908,768 | 612,640 | 345,597 | 3,683,022 | 3,543,692 | 1,083,920 | 214,438 | 4,842,050 | 8,525,072 | |
| Lowest 5 Year Mean as Pct of 1922 Allocation | 47.05% | 53.14% | 58.91% | 41.14% | 49.44% | 80.54% | 38.71% | 71.48% | 64.56% | 57.02% | |

Table 2

Revised State Delivery Percent Of
Colorado River Water Available

| | **Colorado** | Utah | Wyoming | New Mexico | California | Arizona | Nevada | River Total |
|---|---|---|---|---|---|---|---|---|
| Lowest 5 Year Delivery Mean | 1,816,016 | 908,768 | 612,640 | 345,597 | 3,543,692 | 1,083,920 | 214,438 | 8,525,072 |
| Percent of River Total | 21.30% | 10.66% | 7.19% | 4.05% | 41.57% | 12.71% | 2.52% | 100.00% |
| Example Of 7,000,000 AF Deliverable Water | 1,491,144 | 746,197 | 503,043 | 283,772 | 2,909,752 | 890,015 | 176,077 | 7,000,000 |

While these deliveries are shocking to every state, they are a vision into a very possible future. Of course the possibility of larger future annual flows could allow higher deliveries if we are to be so fortunate. Our modern economies must adapt – and they will.

The United States government is now required to implement what the states themselves are not willing to accept.

References

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Knapp, G. 2021. Water and Cattle in the American West A 21st Century Impact Analysis. Unpublished.

Richter, B. et al. 2024. New water accounting reveals why the Colorado River no longer reaches the sea. Communications Earth & Environment. 5, Article number: 134. https://doi.org/10.1038/s43247-024-01291-0

Gregory Knapp
February 28, 2026

***Letter #:*** 1006

***Date Received:*** 2/24/2026

***Sender Names:*** 996: Ari Koeppel

***Emails:*** 996: ahkoeppel@gmail.com

***Organizations:***

***Subject:*** Strategic Management of the Colorado River Basin

DOI - . Dear EIS Reviewers:I am writing in support of new, long-term guidelines that will secure a sustainable future for the Colorado River. The Bureau of Reclamation has identified alternative management strategies that achieve this goal, which I hope to see adopted. These guidelines should:Incorporate flexible, adaptive mechanisms for water storage, conveyance, and management - The system needs adaptable tools that allow water to be stored and moved in ways that protect and stabilize the river's ecosystems, commerce, and operations.Embed robust environmental stewardship - The Colorado River is far more than a conduit; it sustains a rich ecosystem. Management plans must protect the river itself and the diverse life it supports.Ensure meaningful, voluntary Tribal participation rooted in sovereignty and self-determination - All 30 federally recognized Tribes within the basin must have a seat at the decision-making table.Preserve pathways for in-basin mitigation and continued binational cooperation with Mexico - Strategies should keep open avenues for local mitigation projects and maintain strong, collaborative ties with our Mexican partners.Consider river recreation a public interest - Strategies should weigh the quality of life and economic impact of non-motorized river operations as a major interest.Sincerely,Ari KoeppelSnowmass Village, CO

***Letter #:*** 1452

***Date Received:*** 2/26/2026

***Sender Names:*** 1441: Jim Kohl

***Emails:*** 1441: kohldsmoke@yahoo.com

***Organizations:***

***Subject:*** Colorado River Allocations

DOI - . California needs to reduce its allocation because it wastes significant amounts of water by using open water irrigation systems. Instead of wasting water that could be used by other states, it should be forced to reduce its allocation and make up the reduction by upgrading its irrigation systems.

Best,Jim

***Letter #:*** 3802

***Date Received:*** 2/26/2026

***Sender Names:*** 3763: Raphael Kosek

***Emails:*** 3763: rakosek75@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . Dear Bureau of Reclamation:Our Drinking Water Is at RiskThe Colorado River provides drinking water for 40 million people, supports Tribal nations, sustains farms and cities, and is the lifeblood of fragile desert ecosystems.But the Basin is facing:Record-low reservoir levelsIncreasing salinity and pollution risksCollapsing aquatic habitatsRising temperatures and reduced snowpackGrowing threats to safe, reliable water suppliesThis EIS must reflect the reality of climate-driven water scarcity and prioritize clean water protections, ecosystem health, and equitable solutions, not simply divide up a shrinking supply.The Draft EIS the Bureau has proposed is inadequate to address the crisis that we face, and the agency has failed to reveal what its preferred alternative will be. This denies the public the only real opportunity we will have to comment on the inadequacies of the Bureau's proposal before a final decision is made. We must demand that our communities have a full opportunity to express our concerns before the government takes final action.The Solutions We NeedWe urge the Bureau of Reclamation to strengthen the Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocationsThe Colorado River's future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposal before issuing its final decision.Sincerely,Raphael H. Kosek

***Letter #:*** 3210

***Date Received:*** 2/26/2026

***Sender Names:*** 3180: Evan J. Kriss

***Emails:*** 3180: samesamejane@gmail.com

***Organizations:***

***Subject:*** Colorado River Water Supply

DOI - . Our Drinking Water Is at RiskThe Colorado River provides drinking water for 40 million people, supports Tribal nations, sustains farms and cities, and is the lifeblood of fragile desert ecosystems.But the Basin is facing:Record-low reservoir levelsIncreasing salinity and pollution risksCollapsing aquatic habitatsRising temperatures and reduced snowpackGrowing threats to safe, reliable water suppliesThis EIS must reflect the reality of climate-driven water scarcity and prioritize clean water protections, ecosystem health, and equitable solutions, not simply divide up a shrinking supply.The Draft EIS the Bureau has proposed is inadequate to address the crisis that we face, and the agency has failed to reveal what its preferred alternative will be. This denies the public the only real opportunity we will have to comment on the inadequacies of the Bureau's proposal before a final decision is made. We demand that our communities have a full opportunity to express our concerns before the government takes final action.The Solutions We NeedWe urge the Bureau of Reclamation to strengthen the Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocationsPlease consider these recommendations! Please also STOP unchecked development of housing and services in these water scarce areas!Thank you.Evan Jane Kriss

***Letter #:*** 7343

***Date Received:*** 3/2/2026

***Sender Names:*** 7303: Gary Kruczynski

***Emails:*** 7303: krunch48@rocketmail.com

***Organizations:***

***Subject:*** 70%Loss of Colorado River water

DOI - . To whom it may concern: I am deeply concerned about the possible loss of 70% of the Colorado River water. How do we miss a deadline on such a meaningful aspect of our desert lifestyle. I am a very concerned citizen. Please give us more time to meet a new deadline. This state is in a 20 year drought and we can't afford to lose that much water. If there is anything I can do as a concerned citizen, please respond with correspondence to this email address. krunch48@rocketmail.com Thank you for your concern in this matter. Gary Kruczynski 4215 N. Cholla Dr. Golden Valley, Az. 86413 Yahoo Mail: Search, Organize, Conquer

***Letter #:*** 3316

***Date Received:*** 2/27/2026

***Sender Names:*** 3286: kshort60957

***Emails:*** 3286: kshort60957@gmail.com

***Organizations:***

***Subject:***

DOI - . Sent from my T-Mobile 5G Device

February 10, 2026

The Honorable Katie Hobbs
Governor of Arizona
Arizona State Capital
1700 W Washington Street
Phoenix, AZ 85007

Mr. David Palumbo
Deputy Commissioner, Operations
Bureau of Reclamation
1849 C Street NW
Washington DC 20240-0001

Dear Governor Hobbs and Dear Mr. Palumbo:

I am writing both of you, and copying Becky Mitchell, to suggest a possible 6th alternative to the "Post 2026 Colorado River Reservoir Operations EIS". This alternative is a 1500 CFS pipeline, built with Federal funding, that starts in Kansas and deposits 1-million acre feet of water in the Colorado River near Granby, CO. I know I am not the first person to propose such a pipeline, but I may be the first with a practical solution to the political barriers that currently block this solution. In parallel with this political solution I have also created a feasibility study that shows a proposed path for the pipeline, approximate pumping plant locations along with both operating and construction costs. I personally did all the engineering calculations while several well-known pipeline equipment and construction companies came up with the estimated 5 years to build it and $18.5 billion for the actual design and construction.

My practical political solution is to offer the Colorado River Basin states this additional water at a specific price and use revenue sharing to reward Kansas and Missouri for approving the diversion. Portions of the interstate highway system have used revenue sharing for years and I am merely proposing that this practice be extended to this interstate water transport system. My proposed process for starting discussions is to use a price I have established, then offer a percentage of revenue to Kansas and Missouri in return for their approval of a diversion permit. If these two states express interest in the concept, then Reclamation would poll the 7 Colorado River Basin States to see how much of this water they might purchase at this price 5 to 6 years in the future. If there is strong interest in the concept, then move to formal negotiations while the 9 states that benefit from the project ask their members of Congress to pass a bill to build the pipeline. With one-fifth of the seats in the House occupied by representatives from these 9 states, there may be enough support to quickly pass such a bill.

Based on Arizona's rejection of the IDE proposal for desalinated water at over $3000/AF and the estimated price of the smaller desalination plant they are pursuing, I propose an initial price for these discussions at $1250/AF for the first 5 years of operation. At this price, if the pipeline operates 24/7 for 50 weeks a year, $1.25 billion in revenue would be generated and one million AF would be transferred. By agreeing to give Missouri and Kansas 8% of pipeline revenues, these states could each receive as much as $200 million per year in shared revenues, which leaves $850 million per year to operate the pipeline. To motivate Colorado to fast-track construction, I propose an upfront one-time $50 million payment from the construction budget in return for this state

agreeing to finalize the construction permits and all the land purchase/easement agreements within one year. I include this incentive for Colorado because Boulder County, across which the pipeline must cross, is known as a challenging place to obtain permits.

Assuming my power calculations are correct, $800 million per year is needed to pay for the power to run the pumps and pay salaries of staff at Reclamation to manage the pipeline. This leaves $50 million per year to cover operational cost overruns and/or fund the purchase of some water on behalf of the US government. If the members of Congress from these 9 states are unable to pass a bill to fund the project, Plan-B is to raise the price to $1450/AF, form an organization similar to the CAWCD and use the additional $200 million per year to pay down a 50-year loan in the same way the CAP was originally funded.

My first step in selling this concept is to approach Mark Burghart, the secretary of Revenue for Kansas, to test his reaction. I would prefer to start with Governor Kelly's office but unless someone like Governor Hobbs of Arizona can arrange a meeting for me, I'll start with Mr. Burghart and work my up. The offer will include the above 8% of revenue (up to $200 million per year) in return for approving a diversion of 5% of the river's volume and giving fast track status to the construction. With the average volume of this river at my proposed diversion point being 30,000 CFS, the Army Corp's Omaha office agrees with me that this 1500 CFS for 50 weeks a year will not be a problem. Kansas will also see several billion dollars spent building the pipeline over a 5-year span. Since Governor Kelly of Kansas has stated that her state needs an additional $50 million/year to make up for the reduced SNAP funding that came with the Big Beautiful Bill, I predict Mr. Burghart will be interested and take the proposal to the governor. Once the Governor of Kansas expresses "official interest" in the project, I'll advise her to contact David, and I will go to the next step.

Step 2 is to have Governor Kelly, Governor Hobbs (or both) introduce me to the right people in Missouri, whose approval is needed for the diversion. Mike Kehoe, the Governor of Missouri, and Senator Josh Hawley, have both publicly stated their concerns about SNAP funding with some estimates of the budget shortfall eventually reaching $200 billion per year. Based on existing case law, Kansas and Missouri are the only states that need to approve the diversion and per the Supreme Court decision of Kansas v. Colorado, 206 U.S. 46 (1907), both states need to benefit equally from this arrangement. If there is interest from Missouri, I will also inform Governor Kehoe that his office should contact David at Reclamation so his team can go to the next step.

Step 3, as I mentioned above, is to have David's team at Reclamation test the idea of purchasing additional water at $1250/AF from a future interstate pipeline that can be completed in 5 years once permits and land usage agreements are finalized. Simultaneous with Reclamation polling the 7 Colorado River Basin States, of course Governor Polis of Colorado needs to be informed about the one-time $50 million offer plus the billions in construction expenditures in return for the project support mentioned above.

I realize there are many ways to allocate the privilege of purchasing this new water, and to help out Arizona, I am proposing a "right to purchase" model. With this model the "right to purchase" this future water will be distributed annually in the reverse order of any allocation cuts in place. As an example, if we assume today's allocation cuts are still in place when the pipeline starts operating, Arizona would have the right of first refusal to the first 512,000 AF for 5 years, Nevada would be next with rights to purchase 21,000 AF for 5 years followed by Mexico. After the states with allocation cuts made their purchase decisions, the remaining purchase rights would be distributed among all 7 states using the original allocation percentages. If any state chooses not to exercise its right to purchase in any year, they could sell those rights to any other state. Any volume left over after all 7 states exercised their purchase rights could be purchased by Reclamation using funds left over from its annual $50 million share of revenues. If any portion is not purchased after Reclamation exercises its rights, the pipeline would be operated over fewer weeks that year to ensure that volume flowing into the Colorado River always equals purchased volume.

Now, let me tell you a little about myself and my past efforts to explore this solution. I have a degree in Mechanical and Aerospace engineering, I'm retired and I do not expect any compensation for contributing to this solution. My curiosity started in 2018 when the Missouri River flooded, causing billions in damage while the Colorado River volume had already begun declining. I thought it was odd that we had two rivers on opposite sides of the Continental Divide, less than 600 miles apart, with one flooding the other going dry. I wondered why a pipeline moving water between these two river basins was not being considered. Anyone familiar with the CAP in Arizona or the CRA pipeline in California knows the answer is the lack of interstate/Federal cooperation and not technology. I then began trying to answer 2 questions which are (1) what would it cost to build and operate this pipeline and (2) whose agreement is needed to divert Missouri River water into the pipeline.

As mentioned above, I began working with several pipe, pump and construction companies who provided costs after I had researched a practical pipeline path. With these numbers in hand, I have discussed this concept via mail, in ZOOM meetings and phone calls with Ted Cooke when he was GM of the CAP, Chelsea McGuire of AZ-WIFA, Jeff Drager of Northern Water in Colorado, Camille Touton when she was Commissioner of Reclamation, the staff of Senator Ricketts of Nebraska and the Omaha office of the Army Corp of Engineers. Except for Ricketts' staff, all showed interest in the concept but had understandable reservations, the most common of which was the difficult task of motivating certain Midwest governors to allow such a diversion. Ted Cooke also questioned if there was enough power in the existing grid to meet the needs of the pumping plants in this pipeline. Senator Ricketts' staff rejected the idea because it conflicted with that canal from Colorado to Southwest Nebraska he authorized when he was governor.

After each of these discussions, I used the feedback I received to update the design including moving the diversion point from Nebraska to Kansas, investigating the cost of overhead or buried power cables and which power plants in the region have existing capacity. With the above changes,

I think I now may have a version of the plan that is still not perfect, but it is much more accurate than all previous versions.

I know the odds of this plan being successful are pretty low but I hope both of you agree it's worth a try. However, before I start this sales cycle, I need two things from Reclamation. The first is to have the staff at Reclamation review the numbers in my plan for accuracy of operational and construction costs to confirm they are close enough to start these discussions. Second, I need an agreement from one or both of you on how to represent myself to these state officials. I ask this because the Army Corp has told me that neither they nor Reclamation can promote any project not yet approved by Congress. However, I'm confident that a private citizen like me can engage in these types of discussions.

Here are two ways for me to represent myself. As I've done in the past, I can state that I am a private citizen doing my civic duty to help solve the dual problems of reduced SNAP funding and the water shortage in Colorado River Basin and that Reclamation is aware of my efforts but cannot yet officially support them. On the other hand, I can say I am an unpaid consultant to Arizona and/or Reclamation with the task of obtaining the reaction of state officials to this new concept. There are other ways for me to represent myself, but the important point is that there is an agreement on this prior to me contacting Kansas or Missouri because I'm sure I'll be asked the question.

As I hope you both agree, getting cooperation on any joint multi-state Federal project is rare and frequently a crisis is needed to make this happen. My hope is that the combined crises of the reduced volume of the Colorado River and needy families facing a reduction in nutrition caused by the Big Beautiful Bill might be the confluence of crises that is needed to create this much needed cooperation. I hope this letter captures your interest and I can obtain your feedback soon. Next week I will follow up on this letter, first with a call to Mr. Polumbo's office followed by a call to Governor Hobbs' office and then to Ms. Mitchell's office. I look forward to someday discussing this concept with you or members of your staff.

Regards,

Robert Kunio

Robert Kunio – BSMAE
Arlington Heights, Il
847-207-5740- mobile
rjkunio@gmail.com

CC: Ms. Becky Mitchell - Colorado Water Conservation Board
1313 Sherman Street, Room 718
Denver, CO 80203 (303) 866-3441

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WASHINGTON DC 20240

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***Letter #:*** 342

***Date Received:*** 2/17/2026

***Sender Names:*** 340: Neil Labrensz

***Emails:*** 340: neil.labrensz@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - .  Dear who it may concernI am writing to request that we move forward with the water flow for [Project/Location Name]. Given the ongoing concerns regarding droughts, I believe it is time to prioritize the release and let the waters flow.Please let me know if there are any specific steps needed to facilitate this.Best regards,NeilNeil G. Labrensz

***Letter #:*** 8412

***Date Received:*** 3/2/2026

***Sender Names:*** 8325: Nate Laird

***Emails:*** 8325: natejlaird@gmail.com

***Organizations:***

***Subject:*** Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - . I am writing to express my strong support for the continued protection, stabilization, and thoughtful management of Lake Powell and its critical role in the future of the Southwest. Lake Powell is far more than a reservoir. Formed by Glen Canyon Dam on the Colorado River, it serves as a vital water storage system for millions of people across the Southwest. As our region continues to grow, maintaining adequate water reserves is essential for municipalities, agriculture, energy production, and long-term drought resilience. Lake Powell functions as a strategic safeguard, helping stabilize water deliveries and protect communities from severe shortages during prolonged dry cycles. For these reasons, it is essential that a clear, long-term plan be implemented to keep Lake Powell at sustainable and functional levels. This should include coordinated basin-wide water management strategies, conservation incentives, infrastructure investment, and enforceable agreements among the Upper and Lower Basin states. Without a proactive plan to protect storage levels, the risks to water security, hydropower generation, and downstream obligations will only increase. A stable and responsibly managed Lake Powell is foundational to the Southwest's future. Beyond water security, Lake Powell is also a cornerstone of recreation and economic activity. Families, anglers, boaters, and outdoor enthusiasts from across the country depend on the lake for access to safe, affordable recreation. Tourism tied to the lake supports small businesses, local jobs, and entire surrounding communities whose economies rely heavily on visitation. Maintaining healthy water levels directly protects these livelihoods. Equally important is Lake Powell's role as habitat. The reservoir and its surrounding shoreline provide refuge for numerous fish species, migratory birds, and desert wildlife. Healthy water levels contribute to ecosystem stability and biodiversity in a region already facing significant environmental stress. As policymakers evaluate the future of water infrastructure and allocation in the Southwest, I respectfully urge you to prioritize a responsible plan that keeps Lake Powell viable, protects long-term water reserves, sustains recreation economies, and preserves wildlife habitat. Thank you for your leadership and your commitment to securing a stable water future for our communities. Thanks, Nate Laird 1231 Cedar Hollow Blvd. Lehi,UT 84043

***Letter #:*** 6801

***Date Received:*** 2/28/2026

***Sender Names:*** 6770: Signa Larralde

***Emails:*** 6770: signalarralde@icloud.com

***Organizations:***

***Subject:*** Comments, Colorado River Operations DEIS

DOI - . I am commenting on the Draft Environmental Impact Statement (DEIS) for the management of Colorado River flows through Lake Powell and Lake Mead in the absence of an agreement between the Upper and Lower Basin States to manage the river after the current agreement expires in 2026 (as outlined in ES.1.2 Proposed Action).Reclamation must manage these flows to avoid the worst case scenarios of the drop of river elevations below the level that allows generation of electricity (the hydropower pen stocks at 3490') at Glen Canyon Dam. Above all, the river elevation must not be allowed to drop below the river outlet works, when no water can be released from Glen Canyon Dam because the river level is below any of the existing outlets (3370') and Lake Powell becomes the deadpool.The first of these two worst case scenarios would result in the lack of power generation for millions of downstream users; the second, in the transformation of Lake Powell into a stagnant toxic pond.The hydrology analysis (ES.5 Summary of Potential Effects) is critical; all the other analyses effectively depend on it. For hydrology, the alternatives that would best address these worst case scenarios are the Enhanced Coordination Alternative and the Maximum Flexibility Alternative. None of the others offer much hope that the worse case scenarios could be avoided, if the current lake level projections are accurate. It is a good thing that Reclamation included an alternative that doesn't require the Colorado River States' agreement, but this alternative does not provide reassurance that the worst case scenarios can be avoided. So within the framework of the DEIS, clearly the best alternatives are the Enhanced Coordination Alternative and the Maximum Flexibility Alternative.I strongly agree with the Lower Basin States in the letter they sent to the Secretary of the Interior on February 13, 2025 (Wade Graham, High Country News, February 11, 2026), in which they emphasize the alarming fact that infrastructure changes are not addressed in the DEIS. Reclamation needs to address the lack of a drain at the base of Glen Canyon Dam NOW - there needs to be a way to move the Colorado River downstream at the base of the dam. This is a major design flaw that Floyd Dominy himself suggested a solution for. Since Reclamation decided that this DEIS is not the vehicle for presenting infrastructure alternatives, then please reassure everyone with a stake in the Colorado River system that a document presenting these infrastructure alternatives will be released soon. Time is of the essence.The Colorado River must be allowed to bypass Glen Canyon Dam completely, at the current river level at the bottom of the dam. This would ensure both the upstream and downstream survival of the river system. RespectfullySigna Larralde23 Chusco RoadSanta Fe, NM. 87508Sent from my iPad

***Letter #:*** 7170

***Date Received:*** 3/1/2026

***Sender Names:*** 7135: Anna Larsson

***Emails:*** 7135: Anna.Larsson@messages.fwwatch.org

***Organizations:***

***Subject:*** Save the Colorado River Basin

DOI - . Dear Bureau of Reclamation, It is past time to revisit how the water from the Colorado River is apportioned, and more importantly, what it is used for. The Bureau should use its authority to help the impacted states reach a joint agreement that prioritizes people and the environment over corporate interests. I am an environmental educator, and I share with my audiences how half of the water in the Colorado River is used for cattle ranching and dairy. Those industries in the Southwest are much less efficient users of water than similar businesses located elsewhere. And these industries don't just serve local needs - their meat and dairy is exported far outside the boundaries of the Colorado watershed. This is a colossal and unnecessary waste of precious natural resources in a highly resource-constrained region. I urge the Bureau of Reclamation to prioritize sustainability and the needs of the 40 million people relying on the Colorado River for drinking water over corporate profit. Sincerely, Anna Larsson 801 Washington Ave N Minneapolis, MN

***Letter #:*** 3460

***Date Received:*** 2/25/2026

***Sender Names:*** 3429: Glenn Lauper

***Emails:*** 3429: glauper18@icloud.com

***Organizations:***

***Subject:*** Support enhanced coordination

DOI - . I support the enhanced coordination proposal offered by USBR for the lake mead and lake Powell, Colorado River upper and lower basins. Please insist and require additional water conservation efforts from all states in this agreement... less livestock feed production in lower basin states. Glenn Lauper Sent from my iPhone

***Letter #:*** 3405

***Date Received:*** 2/26/2026

***Sender Names:*** 3374: Edward Laurson

***Emails:*** 3374: eddie47d@gmail.com

***Organizations:***

***Subject:*** Water

DOI - . This shouldn't even be an issue.Yet we squabble over water all the time. Step up to the plate or get out of the way. Thank You, Edward Laurson

***Letter #:*** 3387

***Date Received:*** 2/27/2026

***Sender Names:*** 3356: learysport@aol.com

***Emails:*** 3356: learysport@aol.com

***Organizations:***

***Subject:*** Colorado Water Safety

DOI - . It is necessary for the government to do everything to maintain water safety for Colorado.The Colorado citizens need a clean sustainable water system. Everything must be done to establish and secure their water supply systemlearysport@aol.com

***Letter #:*** 442

***Date Received:*** 2/22/2026

***Sender Names:*** 436: John Leech

***Emails:*** 436: johnrleech@gmail.com

***Organizations:***

***Subject:*** Draft Environmental Impact Statement - Post 2026 Colorado River Operations | Bureau of Reclamation

DOI - . To meet their obvious needs lower basin states must have a commitment from the US Department of the Interior to move water from Upper Basin reservoirs, if necessary on an annual basis, in combination with Lake Powell release rules, to avert declines in Lake Mead.Should Lower Basin reductions exceed 1.5 million acre feet, if the available water in the Upper Basin reservoirs is insufficient, common sense and common purpose require additional mandatory, measurable, and verifiable annual reductions from the Upper Basin.Upper Basin contributions beyond 1.5 million acre feet should match the Lower Basin reductions. For a great number of years lower basin parties have sought conservation measures on an equitable basis. Upper basin interests in the long run will compel the same. In addition, while the river basin parties need to honor the Law of the River 1922 compact, we must also recognize the realities of our current situation, and move toward equitable sharing of a common resource proportionally rather than by hard and obsolete numbers. John Leech2750 E Camino a los VientosTucson AZ 85718-5052 520-615-6422https://www.usbr.gov/ColoradoRiverBasin/post2026/draft-eis/index.htmlHow to comment on the bureau's proposalsHere's how to submit comments on the U.S. Bureau of Reclamation's draft environmental impact statement for the Colorado River:SNAIL MAIL: Bureau of ReclamationAttn: BCOO-1000P.O. Box 61470Boulder City, NV 89006PHONE: (602) 609-6739EMAIL: crbpost2026@usbr.gov

***Letter #:*** 3098

***Date Received:*** 2/26/2026

***Sender Names:*** 3069: Peter Lefebvre

***Emails:*** 3069: pleflave@hotmail.com

***Organizations:***

***Subject:*** Draft EIS for Lake Powell and Lake Mead

DOI - . To whom it may concern,Here are some points that I think should be considered when managing the Colorado River.-There are many emerging ecosystems above the dam, on the San Juan and Colorado Rivers, that should be considered when managing lake levels. Rapids, flourishing natural habitats, native vegetation, songbird populations, should not be re-inundated by refilling Lake Powell.-The dam should be re-engineered to allow water through at river level, we are on the brink of Glen Canyon Dam not being able to function properly.-There should be a priority on filling Lake Mead first, having 2 mostly empty reservoirs makes no sense.-The flow through Grand Canyon should not drop below 8,000cfs during motor seasonThank you for considering these points.Best,Peter Lefebvre

***Letter #:*** 578

***Date Received:*** 2/25/2026

***Sender Names:*** 568: Brook Leigh

***Emails:*** 568: brookpleigh@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern, I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits. As Lake Powell reaches historic low levels (yet again), I am urging you to consider restoring Glen Canyon to its natural flow, while using Lake Mead as the main water storage location. As a casual outdoor enthusiast, and appreciator of common-sense public policy, I am really disappointed to not see that option even being studied. Glen Canyon is a truly exceptional landscape, and continuing to drown it while we run up against a water shortage crisis at the same time is deeply frustrating. Specifically, the new Colorado River guidelines must: - Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems. - Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology does not support filling both Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue needlessly drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. - Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin. - Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights. Thank you for your consideration. Brook Leigh 948 S 800 E Apt B Salt Lake City, UT 84105

***Letter #:*** 3443

***Date Received:*** 2/27/2026

***Sender Names:*** 3412: Kathryn Lemoine

***Emails:*** 3412: truth58@outlook.com

***Organizations:***

***Subject:*** Protect the Colorado River — Not Lock In More Water Scarcity

DOI - . The Colorado River's future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensures the public has an opportunity to comment on its revised proposalbefore issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. The Colorado River cannot afford delay.Kathryn K. Lemoinetruth58@outlook.com

***Letter #:*** 3609

***Date Received:*** 2/26/2026

***Sender Names:*** 3574: Margot Lenhart

***Emails:*** 3574: mdlenhart@gmail.com

***Organizations:***

***Subject:*** Colorado River in Crisis

DOI - . The Colorado River provides drinking water for 40 million people, supports Tribal nations, sustains farms and cities, and is the lifeblood of fragile desert ecosystems.But the Basin is facing:Record-low reservoir levelsIncreasing salinity and pollution risksCollapsing aquatic habitatsRising temperatures and reduced snowpackGrowing threats to safe, reliable water suppliesThis EIS must reflect the reality of climate-driven water scarcity and prioritize clean water protections, ecosystem health, and equitable solutions, not simply divide up a shrinking supply.The Draft EIS the Bureau has proposed is inadequate to address the crisis that we face, and the agency has failed to reveal what its preferred alternative will be. This denies the public the only real opportunity we will have to comment on the inadequacies of the Bureau's proposal before a final decision is made. We must demand that our communities have a full opportunity to express our concerns before the government takes final action.We urge the Bureau of Reclamation to strengthen the Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocations

***Letter #:*** 1507

***Date Received:*** 2/26/2026

***Sender Names:*** 1496: Martin Lenich

***Emails:*** 1496: martinlenich@inspectit1st.com

***Organizations:***

***Subject:*** DEIS Comments: Pending Water Supply decisions/dividing up limited Colorado River water...

DOI - . I am an Arizona Resident for over 3 decades (via Pennsylvania). As a mechanical engineer, I relocated here to work and support semiconductor and related DoD manufacturing facilities, as a contamination control consultant. Given the incredible investment by public and private entities in Arizona regarding advanced technologies and the innovation and economic output that is resulting, the Federal Government should not undermine Arizona at this critical time. Penalizing Arizona by drastically limiting its water access based on old rules is not only bad economic policy but also likely harms national defense capability.Granted, there is not enough water for everyone, but old water rules for dividing up the water should be discarded and replaced with forward looking rules that equalize the usage of water based on economic output and environmental stewardship.Thank you for considering my viewpoint in your deliberations.MartyBefore you buy or sell, Inspect-It 1st!Martin Lenich, ACI, PECo-Owner/Chief InspectorInspect-It 1st, Greater Phoenix MetroD: 602-318-7480 O:480-471-6781D: MartinLenich@InspectIt1st.comO: Office.GreaterPhoenixMetro@InspectIt1st.com

***Letter #:*** 7609

***Date Received:*** 3/2/2026

***Sender Names:*** 7559: Brandon LeVangie

***Emails:*** 7559: rb.levangie@gmail.com

***Organizations:***

***Subject:*** Arizona water

DOI - . Hello, It is my opinion that there needs to be better management and/or a reduction in frequency of sprinkler water usage. I live in an apartment off 19th Ave and Bell road. The sprinklers go off so much here that the ground is MUDDY. That's quite an achievement in a dry heat city like Phoenix, Arizona where the temperatures reach as high as 118deg. Surely there are more important uses of water in a city like this than overactive sprinklers for grass which was likely imported from elsewhere anyway because it is too hot and dry for most plants, including grass at times, to survive here. Thank you, Richard LeVangie

***Letter #:*** 1162

***Date Received:*** 2/20/2026

***Sender Names:*** 1152: Seth Levy

***Emails:*** 1152: sethmountainman@gmail.com

***Organizations:***

***Subject:*** Public comment on Post-2026 Colorado River Operational Guidelines Draft EIS

DOI - . I am writing to express my strong opposition to inequitable cuts in Colorado River water to Arizona, such as a reported 77% CAP cut in the Basic Coordination Alternative of the draft EIS. A cut that large and inequitable will have devastating socioeconomic and environmental consequences for our state. The Bureau can and must oppose inequitable apportionment of cuts because they violate core tenets of our Constitution. First among those principles was equality of the states. Not least among them are the rights of U.S. citizens. Water access is critically important to the livability of our state. Please reconsider this drastic cut.Best Regards,Seth Levy, MDTucson, AZ

***Letter #:*** 6393

***Date Received:*** 3/1/2026

***Sender Names:*** 6366: Constance Lewis

***Emails:*** 6366: info@greatbasinwater.org

***Organizations:***

***Subject:*** Constance Lewis Comments on Colorado River

Great Basin Water Network DOI - . As an Arizona citizen I want to comment on the Bureau of Reclamation's Draft Environmental Impact Statement. As the 7 Basin State leaders have been unable to agree on fair cuts, it has fallen on you to decide this for us all. What a responsibility!I have two comments for your consideration.1. I support that the Upper Basin States share in the shortages. Clear and mandatory requirements must be given to these states with follow-up reporting. Clearly describe the who, what, where and when.2. I support the pro-rata sharing of Lower Basin shortages. Please honor the fairness that the Lower Basin's Central Arizona Project (CAP) cut is only as much as ensures everyone receives or pays their "fair share" relative to their stake.This is clearly complex, but fairness must be mapped out. Please accept my comments as someone who wants to be fair, and who wants to maintain a water supply in Arizona.Respectfully,Constance LewisIf you have any additional questions please contact me.Constance Lewis(c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 4255

***Date Received:*** 2/28/2026

***Sender Names:*** 4222: libbo

***Emails:*** 4222: libbo@comcast.net

***Organizations:***

***Subject:*** Colorado River

DOI - . Please allow what water is left in the Colorado River for recreationists, wildlife, solid, water, air and climate! Corporations have abused this resource long enough!!!Sent from my Galaxy

***Letter #:*** 3822

***Date Received:*** 2/27/2026

***Sender Names:*** 3783: Regina D. Lippert

***Emails:*** 3783: rdefalcolippert@gmail.com

***Organizations:***

***Subject:*** The Colorado River EIS

DOI - . The Draft EIS for the Colorado river lays out several possible approaches that the agency is considering taking but does not clearly identify which recommendation is its "preferred alternative," which it is legally required to do. Furthermore, the alternatives the agency has proposed are inadequate to meet the crisis that the system faces.I urge the Bureau to put forward its "preferred alternative" and give Tribes, impacted communities, and the public a meaningful chance to comment on its recommendation before a final decision is made. If the Bureau does not include its "preferred alternative" in its Draft EIS and waits to do so in its final action, the public will have no opportunity to comment on the actual proposal the Bureau recommends. I urge the Bureau of Reclamation to strengthen the Draft EIS by:Centering climate science and realistic supply projectionsProtecting water quality and reducing pollution impacts as flows declinePreventing further ecological collapse in the Colorado River Delta and Basin tributariesRespecting Tribal water rights and ensuring meaningful Tribal consultationPrioritizing demand reduction and conservation over unsustainable allocationsThis EIS must reflect the reality of climate-driven water scarcity and prioritize clean water protections, ecosystem health, and equitable solutions, not simply divide up a shrinking supply.Thank you,Ms Regina DeFalco LippertWesthampton, MA 01027 Virus-free.www.avast.com

***Letter #:*** 7418

***Date Received:*** 3/2/2026

***Sender Names:*** 7376: Misty Little-Bitsuie

***Emails:*** 7376: smdbitsuie@gmail.com

***Organizations:***

***Subject:*** Lake Powell

DOI - . To whom it may concern I would love to see lake Powell left alone it is a beautiful place and was made a park for a reason just because it doesn't suit your needs doesn't mean get rid of it. Thank you

***Letter #:*** 1980

***Date Received:*** 2/20/2026

***Sender Names:*** 1966: Jeff Lloyd

***Emails:*** 1966: lloydjbl@gmail.com

***Organizations:***

***Subject:*** Colorado River plans

DOI - . Don't allow the states to gather and do NOTHING again. They are never going to agree.
An arbitrator needs to step in and lay down the law. STOP BUILDING NEW HOMES, hey that might help.Ultimately, this is a problem for the Fed. Scary, yes, but the Federal Government needs to start building Desal plants on the west coast of CA, and simultaneously building aqueducts to Lake Powell to forever recharge the system. Then, you can build out Vegas, Phoenix, Tucson exponentially and everywhere inbetween.And do this by eminient domain, or national emergency (which is what this is). We don't have time for lawsuits wanting to protect 1inch long fish. This is a matter of saving a major part of this country's economy. It's time to get to work.Best Regards,Jeff Lloyd

***Letter #:*** 7383

***Date Received:*** 3/2/2026

***Sender Names:*** 7342: Karol Long

***Emails:*** 7342: info@greatbasinwater.org

***Organizations:***

***Subject:*** Karol Long Comments on Colorado River

Great Basin Water Network DOI - . The DEIS Fails To Consider Impacts On Irretrievable Resources By Sanctioning The Repurposing Of Water Resources The DEIS offers multiple alternatives that impose varying levels of cuts in the Lower Basin and no meaningful cuts in the Upper Basin. Some alternatives mention the possibility of Upper Basin "conservation" but those offerings do not describe who, what, where and when. There is nothing steadfast for cuts in the Upper Basin. The DEIS also showcases a modified version of the 2016 Upper Basin Depletion Schedule that still assumes considerable new uses of water in the Upper Basin in the coming decades. Because of the limited resources available, there's no doubting that cuts imposed on the Lower Basin will be repurposed by the Upper Basin. That repurposing defeats the intent of this analysis. Once that water is re-appropriated by Upper Basin regulators, waters with established beneficial uses will not return to where those uses were first proven in the Lower Basin. This is highly suspect. Furthermore, we question how Reclamation can execute its recognized authority to force a curtailment in one basin but not even questioning how development of new appropriations in another part of the basin will impact the whole system and those who had to undertake curtailment. Upper Basin reservoirs are subject to the "apportionments" among the two basins, seven states and Mexico (See Colorado River Storage Project Act, Pub. L. No. 84-485, SS 4, 70 Stat. 107 (1956)). Reclamation has a great deal of say in how certain rights are managed in the system. But how can regulators sequester the differences between the starting and end points of a highly connected system where some users have established decades worth of use? This gray area is at the heart of the ongoing conflict among the seven states, and we request more information on this in the FEIS. We fear that it is an unacceptable practice to allow the Upper Basin to repurpose water from Lower Basin in the name of state-led permitting efforts in Colorado, New Mexico, Utah and Wyoming. Further declines in the system will challenge Reclamation's mission to protect infrastructure, ecosystems, and communities. It means less water making its way through the southernly reaches of the system in the majority of years if current trends continue. Every state needs a curtailment plan on the Colorado River. This DEIS fails to compel the Upper Basin States to meaningfully consider how they will act to protect federal assets and resources. Finally, this could also bring about conflict over tribal water rights in the Upper and Lower Basins -- especially where settlements have been established. There must be consideration of reducing, at a 1-for-1 rate, junior non-tribal use for those senior tribal rights that have not yet been put to use. How Reclamation would undertake this matter in the Upper and Lower Basin must included in any FEIS. Also, there must be consideration of how Reclamation would prevent new Upper Basin appropriations put forth by non-native water users from using, in a de facto sense, settled and adjudicated rights of Lower Basin tribes. If you have any additional questions please contact me. Karol Long (c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 3608

***Date Received:*** 2/27/2026

***Sender Names:*** 3178: lorieji@cs.com

***Emails:*** 3178: lorieji@cs.com

***Organizations:***

***Subject:*** Fw: Please protect the Colorado River

DOI - . Thank you for your kind attention,Lori ErbsPO Box 50 - 5310 Marda LaneAcme, WA 98220----- Forwarded Message -----From: lorieji@cs.com <lorieji@cs.com>To: crbpost2026@usbr.gov <crbpost2026@usbr.gov>Sent: Thursday, February 26, 2026 at 10:37:41 PM PSTSubject: Please protect the Colorado RiverThe Colorado River's future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposalbefore issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply.

***Letter #:*** 3809

***Date Received:*** 2/26/2026

***Sender Names:*** 3770: Lyn Lowry

***Emails:*** 3770: lynlowry6@gmail.com

***Organizations:***

***Subject:*** Colorado River's Future

DOI - . Please step up with a good management plan for the Colorado River that prioritizes long term sustainability and protects water quality. The whole ecosystem must be protected and, since the water is already so overallocated, meaningful steps toward reduction in demand must be taken. The current situation can't go on, and among other things, reductions must be serious and enforceable. We need to protect the river so that it can keep sustaining us. Thank you, Lyn Lowry Colorado

***Letter #:*** 7057

***Date Received:*** 3/1/2026

***Sender Names:*** 7025: Landon Lucy

***Emails:*** 7025: landonlucy@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern,I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits.Specifically, the new Colorado River guidelines must:Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems.Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology does not support filling both Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue needlessly drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin.Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights.We cannot continue behaving with a man vs nature attitude towards the river. It is the same mentality as that of divisive politics, which haults productivity- we must find compromise. Luckily, there is a solution that benefits all parties involved. If we can come to terms with the impermanence of Lake Powell, then we can create a future of a thriving ecosystem in the Colorado River, without sacrificing the recreation economy created by Powell (Glen Canyon would make a magnificent National Park) or the utilities created by the dams. Alternatives provide the same, if not greater, benefit. A small chunk of land in the Glen Canyon area dedicated to solar power could generate the same amount of electricity as the dam. Water can be stored in Lake Mead. Please open your minds to the obvious solution that no one wants to see.Thank you for your consideration.Sincerely,Landon Lucy

***Letter #:*** 2141

***Date Received:*** 2/26/2026

***Sender Names:*** 2124: Dan, Lori and Conner Lundberg

***Emails:*** 2124: danlundberg9@gmail.com

***Organizations:***

***Subject:*** Citizens' Concerns about the Draft Environmental Impact Statement for Post - 2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

DOI - . To Whom this concerns: My name is Daniel Lundberg, my family and I live in Scottsdale, Arizona. North Scottsdale, for over 30 yrs. The community I live in, and all of North Scottsdale, are almost entirely dependent on the Colorado River water we get from the Central Arizona Project. All of the communities, schools, hospitals and business that were built in North Scottsdale were built after the CAP was completed bringing much needed water that started flowing in 1985. My home is in a desert community that was developed in 1997 where we live now. Without the water from the CAP this community and all of North Scottsdale would never have been built and would not be here. We cannot survive in our homes, along with every other home owner, business owner, school and business in North Scottsdale and other parts of the state reliant on the CAP and Colorado River water. This water is critical to our survival and our future, we have only a limited source of ground water that is also fed by the Colorado River water and CAP. That ground water will not last but a couple of years and we are then...doomed. Without the CAP water we have not future here and our homes are worthless. In the desert summer heat, without water, you may last 1 day, maybe 2 but this kind of heat without water is certain death!!!I am a lifetime native of Scottsdale, I grew up in central Scottsdale south of where I live now. I was here when Glen Canyon Dam was finished in 1963, and the 17 years it took to fill the lake by 1980. The CAP was built and finished in 1985 bringing life sustaining live saving water to much of our state and North Scottsdale. Our communities cannot exist without it, our homes would be worthless without this water. Ground water will not sustain us for long and will be depleted if that's our only source. Businesses, schools and hospitals will fail and lives, hundreds of thousands of lives will be ruined. We had a hard and fast rule growing up, we don't go out into the desert in the day, in the summer time, period. The heat can kill you quickly. That's is where my home is now and it is considered a very nice area, but also a very harsh environment. The Sonoran Desert is considered to be one of the harshest environments on the planet. I am writing to you to express my highly elevated and horrifying concerns my family and I, and members of our community, all share regarding the possible water cuts that our state and the magnitude of the water cuts. Arizona is being targeted for water cuts when none of the other states in the Colorado River basin are willing to take cuts or will be required to take an equal percentage of mandatory water cuts. This is not fair to Arizonans. Every state in the Colorado River Basin should have to take the same percentage of water cuts, not just Arizona. We are Americans, Arizona is a part of America and we should be treated fairly and equally and deserve to maintain our water supply and our lives here. Please treat us fairly. If there are to be water cuts, please spread the water cuts equally across all 7 states and please don't devastate our state, our home, Arizona! Please be reasonable and treat us fairly! Thank you for your consideration and help! Dan, Lori and Conner LundbergPinnacle Peak Reserve community7545 E. Alameda Rd.Scottsdale, AZ 85255

***Letter #:*** 453

***Date Received:*** 2/22/2026

***Sender Names:*** 444: Ed Lyman

***Emails:*** 444: edlyman@me.com

***Organizations:***

***Subject:*** Colorado River

DOI - .The likelihood that Arizona's allocation would be reduced by 70% is devastating!! Any imposition by the Bureau of Reclamation should be based on population and need, not some 100 year old agreement.As a citizen of Arizona, I am watching this situation with trepidation and fear.  Please do the right thing for all!Ed LymanOro Valley Arizona

***Letter #:*** 5581

***Date Received:*** 2/28/2026

***Sender Names:*** 5545: Denise Lytle

***Emails:*** 5545: info@greatbasinwater.org

***Organizations:***

***Subject:*** Denise Lytle Comments on Colorado River

Great Basin Water Network DOI - . The document fails to consider the following:-The DEIS ignores the complete geographic scope, and the impacts of that narrowed scope from curtailments, inaction, and limited action in directly affected communities in the Lower Colorado River Basin.-Air quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.-Water quality impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.-Water availability impacts on communities in the Lower Colorado River Basin are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.-Impacts on Lower Region MSCP (27 species including listed Endangered Species) are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts that will result from the alternatives in the DEIS.-Socioeconomic impacts on communities are too narrowly reviewed in the Technical Appendices. The DEIS avoids addressing those direct impacts on Lower Colorado River communities that will result from the alternatives in the DEIS.=Impacts on recreation facilities, refugia, park service units, federal infrastructure, and directly connected waterways of the Colorado River System are too narrowly reviewed in the Technical Appendices.In Appendix C, the DEIS implies that modeling justifying three of the proposals "may not be implementable" because potential non-compliance with "laws, contracts, agreements, and other authorities that are part of the Colorado River legal and contractual framework referred to as Law of the River." That is a reference to the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternative. Without any deal in place among the states or congressional action, a Record of Decision supporting those alternatives poses legal challenges that may be insurmountable.Therefore, according to the DEIS, the No Action Alternative and Basic Coordination Alternative are among the only options that could avoid a legal challenge after a Record of Decision.Those options pose some of the worst outcomes for Lakes Powell and Mead. We believe that no course of action as put forth in the DEIS is a sufficient means of stabilizing the system under the current Law of the River framework. This is troubling considering Reclamation is predicting some of the most dire reservoir elevations ever in the coming two years.Reclamation should undertake a programmatic review as the states continue negotiating. This year's low flows will inevitably get people back to the negotiating table in a meaningful way. Congress will act when the reservoirs are in crisis. We have seen congressional, bi-partisan action multiple times in the past seven years. When Congress is ready, enlist the National Academy of Sciences to undertake a programmatic review in partnership with the Department of Interior, Reclamation and other cooperating agencies. This document is not the beginning of the end. We believe it is merely the end of the beginning.The DEIS offers multiple alternatives that impose varying levels of cuts in the Lower Basin and no meaningful cuts in the Upper Basin. Some alternatives mention the possibility of Upper Basin "conservation" but those offerings do not describe who, what, where and when. There is nothing steadfast for cuts in the Upper Basin.The DEIS also showcases a modified version of the 2016 Upper Basin Depletion Schedule that still assumes considerable new uses of water in the Upper Basin in the coming decades. Because of the limited resources available, there's no doubting that cuts imposed on the Lower Basin will be repurposed by the Upper Basin. That repurposing defeats the intent of this analysis. Once that water is re-appropriated by Upper Basin regulators, waters with established beneficial uses will not return to where those uses were first proven in the Lower Basin. This is highly suspect.Furthermore, we question how Reclamation can execute its recognized authority to force a curtailment in one basin but not even questioning how development of new appropriations in another part of the basin will impact the whole system and those who had to undertake curtailment. Upper Basin reservoirs are subject to the "apportionments" among the two basins, seven states and Mexico (See Colorado River Storage Project Act, Pub. L. No. 84-485, SS 4, 70 Stat. 107 (1956)). Reclamation has a great deal of say in how certain rights are managed in the system. But how can regulators sequester the differences between the

starting and end points of a highly connected system where some users have established decades worth of use? This gray area is at the heart of the ongoing conflict among the seven states, and we request more information on this in the FEIS.We fear that it is an unacceptable practice to allow the Upper Basin to repurpose water from Lower Basin in the name of state-led permitting efforts in Colorado, New Mexico, Utah and Wyoming. Further declines in the system will challenge Reclamation's mission to protect infrastructure, ecosystems, and communities. It means less water making its way through the southernly reaches of the system in the majority of years if current trends continue. Every state needs a curtailment plan on the Colorado River. This DEIS fails to compel the Upper Basin States to meaningfully consider how they will act to protect federal assets and resources.Finally, this could also bring about conflict over tribal water rights in the Upper and Lower Basins -- especially where settlements have been established. There must be consideration of reducing, at a 1-for-1 rate, junior non-tribal use for those senior tribal rights that have not yet been put to use. How Reclamation would undertake this matter in the Upper and Lower Basin must included in any FEIS. Also, there must be consideration of how Reclamation would prevent new Upper Basin appropriations put forth by non-native water users from using, in a de facto sense, settled and adjudicated rights of Lower Basin tribes.The analysis in the DEIS fails to consider bypass, decommissioning, and other meaningful resolutions available at Glen Canyon Dam, which poses considerable concerns for water delivery and endangered species protections. We understand and respect the legal arguments for not including the One-Dam Alternative. But it is a mistake to not undertake comprehensive analysis on this matter. Keeping Lake Powell's elevations above 3550', 3525, and 3490' are not realistic scenarios for the long-term. Failure to include greater analysis on Glen Canyon Dam's river outlet works will ultimately cost us all -- imposing direct impacts on Lake Mead, Hoover Dam, other federal infrastructure, metropolitan areas, agricultural hubs, tribal resources, sensitive species, National Park Service units, U.S. Fish and Wildlife units, and other conservation areas in the Lower Basin.Reclamation, admittedly so in its Purpose and Need statement, recognizes the grave uncertainties we face if conditions do not improve on the river system. Reclamation also recognizes the direct connections the DEIS makes with upstream infrastructure associated with the Colorado River Storage Project units and in Lower Basin units at Parker Dam, Davis Dam, Imperial Dam, and Palo Verde. The DEIS would benefit from greater analyses in the technical appendices dealing with directly related impacts at the dams during low-flow periods. The same can be said for analyzing impacts at all Colorado River Storage Project facilities in low-flow periods too. They will be essential for propping up Lakes Powell and Mead. What will operations look like if CRSP and Lower Basin Infrastructure are only operating collectively at 10-20 percent of normal? What can we expect? To say that management at Mead and Powell are not directly connected to that management is implausible.If you have any additional questions please contact me.Denise Lytle(c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 723

***Date Received:*** 2/26/2026

***Sender Names:*** 713: Kai M

***Emails:*** 713: kai.myers.a@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, To the Bureau of Reclamation, I appreciate the opportunity to submit my feedback regarding the Draft Environmental Impact Statement (DEIS) for the Post-2026 Operational Guidelines for Lake Powell and Lake Mead. I am writing to strongly advocate for a management strategy that treats the Colorado River not just as a plumbing system, but as a living ecosystem that provides indispensable services to the entire Southwest. As you evaluate the Preferred Alternative, I urge the Bureau to collaborate closely with the Seven Basin States and Tribal Nations to implement the following priorities: Core Operational Priorities * Sediment and Nutrient Health: Operations at Lake Powell and Glen Canyon Dam must ensure sufficient storage and infrastructure to support High Flow Experiments (HFEs). These pulses are vital for maintaining the ecological integrity of the Grand Canyon. * Infrastructure Resilience: We must prioritize immediate mechanical upgrades at Glen Canyon Dam. The facility must remain capable of delivering variable downstream flows even as reservoir elevations drop into unpredictable ranges. * Flow Reliability and Variability: Water delivery protocols between the Upper and Lower Basins must guarantee minimum base flows for the Grand Canyon while mimicking a natural annual hydrograph. This variability is essential for both biological health and the river's recreational economy. * Holistic Reservoir Management: Any decisions impacting Blue Mesa and Flaming Gorge should be vetted for their immediate and downstream ecological consequences. We should strive for "multi-benefit" solutions that support both water security and recreation. * Recreational Mitigation: The Bureau must proactively analyze and mitigate how fluctuating reservoir levels impact access and safety for river recreation on the Colorado and San Juan Rivers. * Proactive Flow Analysis: The impact of operations on daily flows--both in the Grand Canyon and upstream--should be a primary factor in the decision-making process, rather than an afterthought addressed after the guidelines are set. * Tribal Sovereignty: All future agreements must fully integrate Tribal water rights and respect the sovereignty of Indigenous nations across the Basin. Closing Reflection The Colorado River is arguably the most vital artery in our nation. While I recognize the immense pressure on every water user in the Basin, we cannot afford to sacrifice the health of our iconic river canyons. A sustainable future requires us to live within the hydrological limits of the river while protecting the natural wonders that define this region. Sincerely, Mr. Kai M 6120 Fordham Way Sacramento, CA 95831-1816 kai.myers.a@gmail.com

***Letter #:*** 8635

***Date Received:*** 3/3/2026

***Sender Names:*** 8557: Susan M

***Emails:*** 8557: susanfromnh@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern, My name is Susan Munroe, and I am a resident of Colorado who depends on Dolores River water from the McPhee Reservoir. I am also a professional rafting guide who has worked on the Green, Colorado, San Juan, and Yampa Rivers for 15 years. I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. As a resident of an Upper Basin state and someone whose livelihood depends on the Colorado River system, I've been following this document closely, and I believe that it does not meet its stated purpose and need. It overlooks critical infrastructure issues with Glen Canyon Dam that could potentially make any other proposed management infeasible. The EIS must analyze a river-level bypass of Glen Canyon Dam to prevent a "Dead Pool" scenario. No one wins if the reservoir reaches dead pool, and the water supply for the millions of people who depend on annual releases through the dam will be put in jeopardy. If the river reaches dead pool, something like 1.7 million acre fee of water will be effectively stranded in Lake Powell, unusable by anyone and subject to continued evaporation and seepage. A bypass option should be developed that would allow Reclamation to drain Lake Powell. This could be engineered to also be closed again if climate conditions change and it's possible to refill the lake. The EIS should also require curtailment plans from each of the seven basin states. The states clearly cannot come to an agreement on their own. It's time for the federal government to openly acknowledge that there has never been enough water in the system to meet an annual use of 15 million acre feet, and the supply that does exist is dwindling. The reality of our water supply needs to be addressed directly. Each state needs to create a plan to reduce demand. It's going to be extremely difficult, but it will be less difficult if we are proactive. There should also be a moratorium on new water diversions, with the exception of Tribes with senior water rights. The EIS should analyze the possibility of storing all the water in Lake Mead and calculate the possible water savings that would result from not having two nearly empty water bodies evaporating into the desert. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. Thank you for your consideration. Sincerely, Susan Munroe Cortez, Colorado (801) 560-9716

The EIS avoids discussing dam flow from dam operations which does impact the other flows and the whole point of the LTEMP and the protection of these resources under the Grand Canyon protection act.

Though models are good there are things they cannot get to.

Tribal and cultural resources section.
Seems a check box. No discussion with tribes individually for these sections that should have happened.
No mention of cultural use. Wetland areas for example

Sites such as numbers are not discussed in depth. Further things need to be explored beyond aeolian deposits and protection via the enhanced and maximum operational flexibility alternatives.  How are these sites impacted and what option impacts have them.

***Letter #:*** 8807

***Date Received:*** 3/3/2026

***Sender Names:*** 8720: Jenna MacEwen

***Emails:*** 8720: jenna@water4lifeglobal.org

***Organizations:***

***Subject:*** Colorado River

DOI - . The Colorado River's future depends on bold action, not incremental adjustments. We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities. I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS and ensure the public has an opportunity to comment on its revised proposal before issuing its final decision. The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand. The Colorado River cannot afford delay. Jenna MacEwen Executive DirectorWater4Life Global @jenna@water4lifeglobal.org ASan Marcos La Laguna, Guatemala Wwater4lifeglobal.org

***Letter #:*** 7688

***Date Received:*** 3/2/2026

***Sender Names:*** 7635: Alan MacMeekin

***Emails:*** 7635: alansdrapery@gmail.com

***Organizations:***

***Subject:*** Colorado Water Distribution

DOI - . Federal Plan is unacceptable. Too small of allocation for Arizona. Up stream States should have to take a cut back. Alan 805-441-3309 alansdrapery@gmail.com

***Letter #:*** 408

***Date Received:*** 2/18/2026

***Sender Names:*** 403: Nikane Mallea

***Emails:*** 403: nikane@mac.com

***Organizations:***

***Subject:*** Draft EIS

DOI - . To Whom It May Concern,I am writing to comment on the Draft Environmental Impact Statement (EIS) for the 2026 operational guidelines for Lake Powell and Lake Mead. This EIS does not adequately address the real, looming challenges. The future is clear: water flows are shrinking, and we must act decisively--not with band-aids, but with lasting solutions.First, the EIS must analyze the full bypass of Glen Canyon Dam. The dam is becoming a liability, preventing water from flowing downstream. We must face this reality head-on. Analyzing this option would give the entire river system flexibility to adapt to a drier future.Second, we must adopt a "Fill Mead First" model. It's illogical to maintain two failing reservoirs when neither can reliably fill. It's time to stop drowning Glen Canyon. Prioritizing Mead gives us one functional reservoir and allows Glen Canyon's restoration to continue.Finally, the EIS must stop assuming that more water in Lake Powell benefits emerging resources. The Cathedral in the Desert, riparian ecosystems, and priceless ecological sites deserve real protection, not false assumptions.This is coming. We can't ignore the inevitable and patch things up. It's time to make the hard decision--embrace the future, act boldly, and ensure a sustainable path for the entire basin. Thank you for considering these urgent points.Sincerely,Nikane MalleaTucson, Arizona

***Letter #:*** 6287

***Date Received:*** 3/1/2026

***Sender Names:*** 6260: manager@projectworldview.org

***Emails:*** 6260: manager@projectworldview.org

***Organizations:***

***Subject:*** comment on 2026 Bureau of Reclamation Colorado River water use strategies DEIS

DOI - . Friends:The 1600 + page 2026 Bureau of Reclamation Colorado River water use strategies DEIS document--itself the result of years of work and input from many individuals and diverse groups--is an intimidating document. It would be nice if its four alternatives beyond "no action" really "cut to the chase," facilitated understanding of what's at stake, and informed our moving forward in the best possible manner. Alas, given the legal aspects of this 100 year + history--with water rights' key moments way back in 1929 and 1968 and subsequent NEPA and other legislative requirements--understanding what actions are permitted, and under what circumstances, is a daunting task. I believe that unless surplus river water magically appears--very unlikely given climate change-based projections of up to 40% flow decrease by 2050--unless a compromise is found some users are going to suffer greatly from cuts that will be needed. Who those users are is what remains to be determined.With that introduction, I see the strategy I suggest below as a "common sense" "cut to the chase" approach based on my values--and I believe the values of a significant portion of Americans in the seven-state region involved in crafting a Colorado River water use compromise. It is based on the following statement--which appeared in a February 27 2026 article "How to Save the Colorado River" posted on theTime magazine website:"More than half of the water consumed in the Colorado River Basin goes to growing 10 to 15 annual cuttings of alfalfa crops and hay for cattle feed, much of it for international export to Saudi Arabia and China."If this is anywhere near true, that Saudi Arabia and China are big beneficiaries of Colorado River / dry southwestern USA water is outrageous! State Legislatures need to pass laws fixing this. This can start in my home state of Arizona, in the House Natural Resources, Energy and Water Committee. There, given committee lack of concern for conserving Arizona groundwater and need for efficient use of Central Arizona Project water, it seems Saudi Arabian and Chinese lobbyists have the ear of key people like Committee Chair Gail Griffin! I may have missed it, but I failed to find any mention of use of Colorado River water for alfalfa growing in 2026 Bureau of Reclamation DEIS. My suspicion is that this is largely confined to the lower basin--specifically in La Paz and Yuma Counties in Arizona, and Imperial County in California--but I don't know for sure? At bare minimum the final EIS should address this information deficiency...Ideally increasing realization of this foreign water beneficiaries outrage I'm calling attention to can be part of a compromise that will prevent implementation of"The Basic Coordination alternative". As I understand it, if states can't agree, this could be implemented, requiring the Lake Powell release of between 7 million and 8.23 million acre-feet per year. (Note in the 2025 water year, about 5.4 million acre-feet of water entered Lake Powell; 2026 water year could be worse.) Not sure where these numbers come from, except I note that AZ and CA allocations (2.8 and 4.4 million acre-feet per year respectively) sum to 7.2 million acre-feet per year. This is unrealistic, and I believe would eventually lead to reservoir deadpool / catastrophe / widespread "dry taps."I very much oppose federal implementation of that alternative! Something more in the spirit of a smart compromise between upper and lower basin states is needed! Thank you for the chance to comment.Sincerely, Stephen P. CookFYI: I maintain houses in both Prescott and Yuma, Arizona

***Letter #:*** 4054

***Date Received:*** 2/27/2026

***Sender Names:*** 4009: Tiffany Mapel

***Emails:*** 4009: tiffmapel@yahoo.com

***Organizations:***

***Subject:*** Colorado River comments

DOI - . Hello,Thank you for allowing the public to weigh in on future operations for the Dams on the Colorado River.I represent the recreational aspect, as I have been enjoying Lake Powell since 1984. I've seen the water level fluctuate up in good snow years, and down in poor snow years. I've always felt that when Lake Powell's water level is particularly low, then releases should mirror what is coming into the reservoir. That way, it won't continue to drop. It's really difficult being bound by a Compact that was written in 1922. We are certainly not living in those past times, and neither is our current climate situation.

With the five proposed alternatives, I think a combination of the last three would be the best:The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected.Time is critical, so drastic actions need to be taken by the start of the next water year, October 1, 2026. Thank you,Tiffany MapelDurango, CO

***Letter #:*** 8577

***Date Received:*** 3/3/2026

***Sender Names:*** 8500: Lisa Marcusson

***Emails:*** 8500: Lisa.Marcusson.1414277400@sendgrassroots.com

***Organizations:***

***Subject:*** Comments on the Post-2026 Colorado River Guidelines

DOI - . Dear U.S. Bureau of Reclamation, As a citizen concerned about the changes brought about by over-committing water from the Colorado River, and the resultant negative ecological changes that has caused, I urge you to do your very best to manage the resources of the Colorado River/Grand Canyon ecosystem in a sustainable and responsible manner. I was fortunate enough to raft the Colorado River on a 3-week field course through Prescott College in May 1985, and that experience instilled in me a love for the natural world and for the Canyon that still remains strong over 40 years later. Because I care deeply about this unique river corridor, and because you have a responsibility to ensure that the Colorado River ecosystem remain a healthy and vital resource, I urge you to commit to the following: * Follow the Grand Canyon Protection Act of 1992, as the law compels you to do, and release water from the Glen Canyon Dam infrastructure in a manner that protects the cultural and ecological values of Glen Canyon NRA and Grand Canyon NP. * Ensure that the water levels in Lake Powell remain above 3,525 feet. * Do your best to restrict the passing of non-native fish species through the dam, and to facilitate conditions that protect native fish. * Do a complete study of the Glen Canyon Dam infrastructure to ensure its design allows adequate flows. * Ensure that the tribes and the environment receive equitable shares of the River's flows in the future. The water has been committed unfairly and inadequately in the past. Thank you for your time and consideration in the management of priceless ecological resources. I know we can all do better to protect it. Sincerely, Lisa Marcusson

***Letter #:*** 232

***Date Received:*** 1/29/2026

***Sender Names:*** 233: Kathleen Marion Carr

***Emails:*** Not Provided

***Organizations:***

***Subject:*** CR DEIS Public Meeting Comments

Which alternative in the draft EIS does Reclamation believe is most likely to keep Lake Powell and Lake Mead above minimum power pool through 2050, assuming a repeat of the 2000 to 2022 hydrology, and why?

***Letter #:*** 296

***Date Received:*** 2/17/2026

***Sender Names:*** 294: Michael Markovic

***Emails:*** 294: mikmark@cox.net

***Organizations:***

***Subject:*** Colorado River

DOI - .Hello,Would it be possible to begin "Rain Water Harvesting"? All commercial properties capable of collecting rain water would be outfitted with rain collecting systems. Also, pipelines from northern areas that have an over abundance of rainwater/flooding channeling to the closest water tributaries.Michael MarkovicRare Capture Photography(702) 355-5840

***Letter #:*** 8977

***Date Received:*** 12/4/2024

***Sender Names:*** 8916: JD Marshall

***Emails:*** 8916: napjeeper@gmail.com

***Organizations:***

***Subject:*** Page 0063

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. I am writing to express my strong support for the Colorado River Abundance Act. As someone who has spent a significant portion of my life exploring the public lands and waters of the West--both as a writer for Trails Offroad and as the host of The Trailhead Podcast--I have seen firsthand the devastating impact of the ongoing water crisis on our communities, our economy, and our recreational heritage. As a registered Democrat who consistently supports conservation-focused policies and environmental stewardship, I believe the traditional approach of managing the Colorado River through "negotiated scarcity" is a failing strategy. We cannot Post-2026 Colorado River 63 of 5176 conserve our way out of a structural deficit. I support the Colorado River Abundance Act because it shifts the paradigm toward a 21st-century solution: manufacturing water at scale to ensure our reservoir systems, including Lake Powell and Lake Mead, can function as they were intended. The reliability of our water supply is inseparable from the health of our recreation economy. In recent years, we have watched as collapsing reservoir levels forced the closure of boat ramps and marinas, effectively locking the public out of their own waters. These "emergency" measures are not management; they are a sign of a system in failure. For many in the recreation community, especially those with physical limitations, these reservoirs provide the primary means of experiencing the backcountry. When water levels drop to critical lows, we lose more than just a place to boat--we lose equitable access to the outdoors for an entire segment of the population. This Act provides a bold framework to develop up to 7 million acre-feet of new, reliable water through large-scale desalination, advanced water reuse, and infrastructure modernization. By stabilizing reservoir elevations, we protect low-cost hydropower and the trillion-dollar recreation economy that rural Western communities depend on for survival. This is the kind of forward-thinking investment in critical infrastructure that our party and our country should lead. I urge you to support the Colorado River Abundance Act. We need a future defined by abundance and certainty, not perpetual crisis and restrictive regulation. It is time to stop managing decline and start building the stability that the West deserves. Thank you for your leadership and for considering my perspective on this vital issue for our region's future.

***Letter #:*** 8029

***Date Received:*** 3/2/2026

***Sender Names:*** 7963: Jenny Martenson

***Emails:*** 7963: j21martenson@yahoo.com

***Organizations:***

***Subject:*** DEIS

DOI - . As a lifelong resident of Colorado I would like to strongly comment on the DEIS Colorado River Post 2026. The main things that seem important: 1) The Upper Colorado River Water Basin States and the Tribes have kept to their end of the bargain with the water compact. The Lower Colorado Water Basin States have not. We should not be punished for the poor planning and practices of the lower states. Unchecked growth and development in the face of water shortages and possible power shortages has not slowed them down. 2) Any plan, or combination of plans, must take into consideration the actual amount of water available at any point in time. Some of them do not and are base on stored water usage. The Bureau of Reclamation needs to stop calling this a "drought" (as the State of Colorado has). This is the new norm, not a drought and it will only worsen over the long run as climate change lessons precipitation and increases aridity. Please take in the gravity and consequences of this and consider these points. Jenny Martenson Sent from Yahoo Mail for iPhone

***Letter #:*** 5874

***Date Received:*** 2/28/2026

***Sender Names:*** 5834: Ruth Martin

***Emails:*** 5834: rapidruth@gmail.com

***Organizations:***

***Subject:*** Protect the Colorado River and it's Ecosystems

DOI - . This is the time to follow scientific research recommendations to protect the Colorado River and it's ecosystems. I demand a future that protects the Colorado River, not one that entrenches overuse and environmental decline.Ruth MartinBend, Oregon

***Letter #:*** 3143

***Date Received:*** 2/26/2026

***Sender Names:*** 3114: Stephen Martin

***Emails:*** 3114: steve7890@gmail.com

***Organizations:***

***Subject:*** Colorado River draft proposal

DOI - . Hello,I'm writing to urge you to obey the law, and designate which alternative is your recommended one.I also urge you to take into account the extremely likely prospect of continuing decline in the available water. I believe that alfalfa farming will have to be curtailed somehow, if not now in a controlled manner, then later on an emergency basis.Thank you.Stephen Martin2908 Harper St., Berkeley CA 94703

***Letter #:*** 4025

***Date Received:*** 2/27/2026

***Sender Names:*** 3983: Denise Martini

***Emails:*** 3983: info@greatbasinwater.org

***Organizations:***

***Subject:*** Denise Martini Comments on Colorado River

Great Basin Water Network DOI - . In Appendix C, the DEIS implies that modeling justifying three of the proposals "may not be implementable" because potential non-compliance with "laws, contracts, agreements, and other authorities that are part of the Colorado River legal and contractual framework referred to as Law of the River." That is a reference to the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternative. Without any deal in place among the states or congressional action, a Record of Decision supporting those alternatives poses legal challenges that may be insurmountable.Therefore, according to the DEIS, the No Action Alternative and Basic Coordination Alternative are among the only options that could avoid a legal challenge after a Record of Decision.Those options pose some of the worst outcomes for Lakes Powell and Mead. We believe that no course of action as put forth in the DEIS is a sufficient means of stabilizing the system under the current Law of the River framework. This is troubling considering Reclamation is predicting some of the most dire reservoir elevations ever in the coming two years.Reclamation should undertake a programmatic review as the states continue negotiating. This year's low flows will inevitably get people back to the negotiating table in a meaningful way. Congress will act when the reservoirs are in crisis. We have seen congressional, bi-partisan action multiple times in the past seven years. When Congress is ready, enlist the National Academy of Sciences to undertake a programmatic review in partnership with the Department of Interior, Reclamation and other cooperating agencies. This document is not the beginning of the end. We believe it is merely the end of the beginning.If you have any additional questions please contact me.Denise Martini(c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 28

***Date Received:*** 1/17/2026

***Sender Names:*** 26: Katherine Marvin

***Emails:*** 26: kbcinaz@yahoo.com

***Organizations:***

***Subject:*** Can't find input for 45 day public review and comment

DOI - . I want to ask that the Verde Valley watershed be given a dam so the water is stored by the 3 rivers we have here. I see a dam was purposed in the 30s but not constructed. If we get less Colorado water we need to save what we do have. I see that our Verde Valley water is directly sent to the salt river and I also see that on some years the salt river released water because they had too much. It makes sense to save water upstream. There has been massive home construction in the valley straining water from the Verde River and a reservoir would also help that tooYahoo Mail: Search, Organize, Conquer

***Letter #:*** 3178

***Date Received:*** 2/26/2026

***Sender Names:*** 3149: Marty Maskall

***Emails:*** 3149: mmaskall@gmail.com

***Organizations:***

***Subject:*** Please protect the Colorado River

DOI - . Don't lock in more water scarcity.Thank you.Marty MaskallSacramento, CA

***Letter #:*** 10131

***Date Received:*** 12/4/2024

***Sender Names:*** 9938: Steve and Kari Mathis

***Emails:*** 9938: sunkissedkari@gmail.com

***Organizations:***

***Subject:*** Page 1267

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation I am writing to submit comments in support of the Enhanced Coordination Alternative as my first choice for the Post-2026 Colorado River Operational Guidelines, and the Maximum Operational Flexibility Alternative as my second choice. The Enhanced Coordination Alternative provides the most balanced and responsible path forward. By formally coordinating operations between Lake Powell and Lake Mead and adjusting releases based on conditions at both reservoirs, this approach reduces the risk of either reservoir reaching critically low elevations. Proactively balancing storage levels strengthens system resilience, protects hydropower Post-2026 Colorado River 1267 of 5176 generation and critical infrastructure, and promotes long-term sustainability across the basin. Importantly, this alternative recognizes the need to respond earlier to declining conditions rather than waiting for crisis thresholds. In an era of prolonged drought and reduced inflows, a coordinated strategy that prevents catastrophic drawdowns is both fiscally and operationally prudent. As a second choice, I support the Maximum Operational Flexibility Alternative. While more aggressive, it prioritizes infrastructure protection and allows the Bureau to respond adaptively to worsening hydrologic conditions. Preserving operational integrity at Glen Canyon Dam and throughout the system must remain a top priority. Maintaining viable reservoir elevations is essential not only for water delivery and power generation, but also for recreation, tourism economies, and the communities that depend on stable lake access. Protecting recreation is fully compatible with responsible water management when operations are grounded in realistic hydrologic conditions. I respectfully urge you to adopt the Enhanced Coordination Alternative, or a final framework that incorporates its core balancing principles, to ensure a stable, resilient Colorado River system through 2060. Thank you for your consideration.

***Letter #:*** 418

***Date Received:*** 2/19/2026

***Sender Names:*** 412: Donald Mauch

***Emails:*** 412: drmauch@gmail.com

***Organizations:***

***Subject:*** Public Comment: Post-2026 Colorado River Operating Guidelines Draft EIS Date: February 19, 2026

DOI - . My name is Donald Mauch, and I am a resident of Mohave County, Arizona. I am writing to formally submit my comments regarding the Draft Environmental Impact Statement (EIS) for the Post-2026 Colorado River Operating Guidelines. As a citizen of a community that borders the Colorado River, I am deeply concerned that the proposed federal frameworks may not fully account for the unique vulnerabilities of rural, "on-river" towns like mine. I ask that the following points be entered into the official record: 1. Prioritization of On-River Municipal Infrastructure Unlike major metropolitan hubs that have the infrastructure to pump water over hundreds of miles or store it in vast underground aquifers, Mohave County's river communities--including Bullhead City and Lake Havasu City--rely directly on the river's physical flow. Any management plan that allows Lake Mead or Lake Powell to drop to critical "dead pool" levels isn't just a policy shift for us; it is an existential threat to our basic water access and the functionality of our local water intakes. 2. Protecting the Local Economy and Property Values While I do not own a business, my financial security and the quality of life for my neighbors are inextricably linked to the health of the Colorado River. Our local economy is built on river-access tourism and a tax base driven by the desirability of our waterfront and lake-adjacent properties. If the Final EIS chooses an alternative that results in drastically lower lake levels or reduced allocations for rural Arizona, it will lead to a collapse in property values and a loss of funding for our local schools and emergency services. 3. Equitable Distribution of Reductions Arizona has already stepped up and made significant voluntary sacrifices. In the Post-2026 era, the burden of "shortage" cannot fall disproportionately on Lower Basin states or rural contract holders. I urge Reclamation to adopt a strategy that shares the burden of water scarcity across the entire Basin--including the Upper Basin--rather than using the "junior priority" status of Arizona as a primary tool for management. 4. Final Request I ask that the Bureau of Reclamation ensure that Mohave County has a permanent "seat at the table" during these negotiations. Our communities must not be treated as an afterthought or a secondary priority to larger urban centers in the Southwest. Thank you for your time and for considering the voice of a concerned Mohave County resident. Sincerely, Donald Mauch8294 Pine drMohavey ValleyAZ 86440

***Letter #:*** 4028

***Date Received:*** 2/27/2026

***Sender Names:*** 3986: Anne E. Maughan

***Emails:*** 3986: amaughan@certerra.com

***Organizations:***

***Subject:*** Draft EIS for the Colorado River Basin

DOI - . Hello Bureau of Reclamation,I'm reaching out to provide public comment on the Draft EIS for the Colorado River Basin. This Draft EIS is concerning - it requires extreme levels of accountability from some states while letting other states use their water willy-nilly. This Draft EIS does NOT contain any economic impacts for, effectively, shutting off the water to Arizona.For a people of any size - a nation, a state, a city, a community, a family - to function as a unified group, compromiseis required of all parties. Since some of the upper basin states are resistant to compromise, it seems that the place of the BoR is to find a fair and equitable compromise. All of the options that have been proposed in this Draft EIS are not just unfair, but potentially catastrophic. Quite frankly, the BoR appears to be playing favorites, which is not the place of the federal government.Arizona is a desert - no one denies this, and most people in Arizona try to be water-concious. Arizona has taken the bulk of the water usage cuts in prior years, andif given time can build up the infrastructure to take larger cuts. Very little time has been given them.Whoever reads this, if anyone does, please, please, please do something. For all of this polite and formal talk, I'm genuinely terrified. None of this is AI, none of this is written for me. All of this is my concern that the desert will turn into a wasteland. Please prepare a more equitable proposal.Thanks for reading, and have a good day,Anne Maughan, GITField Geologist 1805 W Drake Drive, Tempe, AZ 85283O: 602.437.3737M: (509)521-8322 certerra.comCopyright (c) Certerra. This message contains information which is confidential and protected by copyright or which may contain any other intellectual property rights. The use of such without the prior written consent of our company is forbidden. If you are not the intended recipient of this message, please delete it and destroy all copies. If you are the intended recipient of this message, you should not disclose or distribute this message to third parties without the consent of the company. Our company does not represent, warrant and/or guarantee that the integrity of this message has been maintained nor that the communication is free of viruses, interception, or interference.

***Letter #:*** 4051

***Date Received:*** 2/27/2026

***Sender Names:*** 4006: Michele May

***Emails:*** 4006: ambmay@sbcglobal.net

***Organizations:***

***Subject:*** Colorado River Basin Draft EIS

DOI - . Dear Bureau of Reclamation:The Colorado River's future depends on bold action, not incremental adjustments. We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposal before issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply.Please release a draft EIS that advocates for realistic, science-backed policy to conserve the Colorado River for healthy ecosystem function and drinking water. These must be the priorities, not agriculture or industry. You must advocate for long-term ecosystem sustainability, as it is foundational to everything else.Michele May

***Letter #:*** 4030

***Date Received:*** 2/27/2026

***Sender Names:*** 3987: Allen McCaw

***Emails:*** 3987: jallenmccaw@gmail.com

***Organizations:***

***Subject:*** Colorado River EIS Comment

DOI - .I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability.I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy.As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible.The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected.Allen McCaw9707992462jallenmccaw@gmail.com

***Letter #:*** 601

***Date Received:*** 2/25/2026

***Sender Names:*** 591: Sarah B. McClain

***Emails:*** 591: sgmcclain@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern,I am submitting comments on the Draft Environmental Impact Statement (EIS) for the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. I am an avid Colorado River user and I care about the river as a living system, not only a water-supply system. The Draft EIS does not meet its stated purpose and need because it narrows the range of alternatives and does not fully grapple with the scale of the supply-demand gap.Please ensure the final EIS evaluates the following:Demand reduction with real attention to agricultural consumptive use (including alfalfa). If the goal is to align demand with supply, the EIS should directly analyze pathways that reduce consumptive use in irrigated agriculture, including high-water-use forage production such as alfalfa. That analysis should include tools like compensated, voluntary, temporary fallowing; rotational shortage-sharing; irrigation efficiency paired with enforceable consumptive-use accounting (so "saved" water is real); and changes to cropping and export-oriented forage where feasible.River-level bypass at Glen Canyon Dam. The EIS should analyze river-level bypass operations to better approximate naturalized flows through the Grand Canyon, support ecological recovery in Glen Canyon, and expand operational flexibility under continued low inflows."Fill Mead First" and one-reservoir variations. Current hydrology makes it unlikely the system can reliably fill both Mead and Powell. The EIS should analyze "Fill Mead First" and realistic variations on a one-reservoir strategy, including environmental tradeoffs and Basin-wide management implications.Glen Canyon's reemerging resources. As reservoir elevations decline, Glen Canyon is revealing substantial natural, cultural, and recreational resources and revitalized riparian areas. These resources should be explicitly inventoried and treated as significant values in the alternatives analysis.Curtailment planning and limits on new depletions. The EIS should analyze an approach that requires each Basin state to produce transparent curtailment and demand-reduction plans consistent with available supply. Federal agencies should also evaluate limits on new non-Tribal diversions and new increases in consumptive use, while respecting Tribal sovereignty and the exercise of Tribal water rights.Thank you for your consideration.

***Letter #:*** 1146

***Date Received:*** 2/20/2026

***Sender Names:*** 1136: MIKE MCCLELLAN

***Emails:*** 1136: mmcclellan3141@msn.com

***Organizations:***

***Subject:*** Colorado River deal

DOI - . As a resident of drought-stricken Arizona, I hope that any deal the federal government is forced to impose comes with restrictive water conditions, requiring better conservation measures from communities like those in Arizona. Mike McClellan Gilbert, Arizona Sent from my iPhone

***Letter #:*** 5557

***Date Received:*** 2/28/2026

***Sender Names:*** 5521: Samuel McCool

***Emails:*** 5521: info@greatbasinwater.org

***Organizations:***

***Subject:*** Samuel McCool Comments on Colorado River

Great Basin Water Network DOI - . There are over 250 ghost towns in the Great Basin, some authorities count more. A good source of documentation, records and photographs are the publications of Nell Murbarger. The geographical history of the area shows that settlements along the Colorado, Muddy, and Virgin Rivers have lasted about 300-400 hundred years. Water, storms, droughts, and other natural disasters brought periods of fertility to a close.We're fortunate to have tools, technologies, and resources unavailable to earlier civilizations in the Southwest. Still, we face downtowns in natural and human resources. Funding lapses and weather changes take their toll. Las Vegas area post annexation has had a thriving period of development and expansion and nears at point where over-development may undermine its sustainability. Imagine the fallout, the economic and human disaster.Let's consider one simple step: Stop development along the Colorado. Halt all projects that require water, excessive water takes that don't recycle especially. Take five, take a breather and study the possibilities of an extended drought. I recommend thinking through a balanced approach to development that reduces dependence on limited and external resources. Urban development in the Southwest, especially around the Great Basin, should set rational goals for regional development based on reasonable expectations. Let's avoid more ghost towns.If you have any additional questions please contact me.Samuel McCool(c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 8803

***Date Received:*** 3/3/2026

***Sender Names:*** 8716: Christal McCrary

***Emails:*** 8716: christalmccrary@gmail.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To Whom It May Concern: I am writing to comment on the Draft Environmental Impact Statement. I have spent the last 15 years living, working, and recreating on the Colorado Plateau. I work in the ski industry, and have seen our winters grow warmer, and thirst for water grow. I would like to see the EIS acknowledge the limitations of Glen Canyon Dam. An analysis of a bypass of Glen Canyon dam at river level seems prudent considering the current climate trends. We need to have options for water to be released as we continue to have less water available in the system. Considerations for the ecosystems and recreation opportunities in Glen Canyon and Grand Canyon should be taken into account. I have kayaked and river guided in Grand Canyon, as well as volunteered for a USGS study. The amount of life-changing trips that happen in Grand Canyon cannot be overstated, with the river as the most viable way to travel through the canyon. I have also spent time in the Glen Canyon Recreation Area, and it is exciting to see many beautiful places emerging as the reservoir drops. The benefits of a healthy flowing river through both Glen Canyon and Grand Canyon should be acknowledged in the Environmental Impact Statement. Thank you for your time. Sincerely, Christal McCrary

***Letter #:*** 6440

***Date Received:*** 3/1/2026

***Sender Names:*** 6413: Holly McDonald

***Emails:*** 6413: Holly.McDonald@messages.fwwatch.org

***Organizations:***

***Subject:*** Save the Colorado River Basin

DOI - . Dear Bureau of Reclamation, I write as an American taxpayer who believes strongly in the necessity of environmental protections throughout all ecosystems. I am deeply concerned about the decimation of the Colorado River. The Colorado River is in crisis, yet discussions of future management alternatives do not account for how the water is used. Without fail in order to save this irreplaceable resource, the Bureau must use its authority to push the Basin states to reach a joint agreement that accepts the need for mandatory conservation measures which limit unconscionable corporate water abuses. Overuse by major agribusiness and tech corporations threatens the basin and water supply for 40 million people. Stop and think about that: for 40 million people! Considering this major threat of collapse, any plan going forward must include an immediate halt to the expansion of alfalfa, mega dairies, and data centers, and a significant rollback of the cultivation of crops that consume large quantities of water and are not suited to growth in highly arid climates. The vast majority of water from the Colorado River is used by big agribusiness, primarily for growing alfalfa, a feedstock for cattle on factory farms. Across all seven Basin states, alfalfa farms consumed an estimated 2.1 trillion gallons of water in 2025, enough to supply the Basin's 40 million people with water for nearly 3 and a half years. Mega dairies, which produce significant pollution and threaten drinking water, consumed 82 billion gallons of water in 2022 across the Basin states (excluding Wyoming, for which no data were available). These agricultural uses are not efficient. Basin states applied 2.6 acre feet of water/acre - 70 percent higher than the U.S. average - for crops ill-suited to arid climates. Finally, big technology companies across the Basin states are deploying water-hungry data centers with little regulation, or regard for impacts on water resources. Such usage is completely unsustainable and unbelievably shortsighted. With the Colorado River significantly overstretched, every environmental analysis and plan for the future must consider how the River's resources are being used. The overuse of the Colorado River by big agribusiness and technology corporations - amid already record-low water levels and drought - has very real, very serious consequences that threaten accessible drinking water for 40 million people right now. I urge the Bureau of Reclamation to prioritize sustainability and the needs of the 40 million people relying on the Colorado River for drinking water over corporate profit. Sincerely, Holly McDonald 1026 Robbinsville Edinburg Rd Robbinsville, NJ

***Letter #:*** 1170

***Date Received:*** 2/18/2026

***Sender Names:*** 1160: Scott McDonald

***Emails:*** 1160: smcd345@yahoo.com

***Organizations:***

***Subject:*** Proposed draconian cuts to CAP water allocation

DOI - . We lived in Tucson for years before moving to south Orange County, CA (San Juan Capistrano) in 2011. Immediately we became extremely bothered and disappointed when we noted moss growing in our street gutter in front of our house due to the extreme over watering and general wasteful use of precious water in California. This was but one example of the difference between water conservation practices in Southern Arizona and the lack of such consideration in Southern California, with the average use per citizen being another obvious distinction.We moved back to Tucson in 2018 and rejoined our water conscious community. We ask the Bureau that before you severely cut CAP water allocations, you first consider the wasteful, inconsiderate use of water by California and determine a more equitable split of such allocations.Thank you for your thoughtful consideration and efforts toward this.Sincerely,William McDonald8061 E Corte de la FamiliaTucson, AZ 85750

***Letter #:*** 3699

***Date Received:*** 2/26/2026

***Sender Names:*** 3662: Paul McElveen

***Emails:*** 3662: babyfawntop@gmail.com

***Organizations:***

***Subject:*** Environmental Protection

DOI - . PROTECT THE COLORADO RIVER RIGHT NOW!!!!! Do NOT lock in More Water Scarcity!

***Letter #:*** 1429

***Date Received:*** 2/25/2026

***Sender Names:*** 1418: Bruce McElya

***Emails:*** 1418: bmcelya@pm.me

***Organizations:***

***Subject:*** Draft EIS Mead & Powell

DOI - . Sir, Ms.,As a river runner of thirty-seven years, I have a few thoughts. The Colorado River flowing through Grand Canyon is not merely a pipeline for the basin states. It is in fact the most visited and important National Park in the Country. Water flowing through the Canyon needs to be more carefully monitored and adjusted in order to better enhance and protect the resource. For instance, the Humpback Chubs need help, the beaches are disappearing, and native flora and fauna are all but gone and have been replaced by invasive species. Future water flows need to be adjusted to enhance the corridor, not diminish it. Let appropriate research lead the way. BOR should make funds available for this research.Commercial river trip bookings are down 40% from twenty years ago. Part of the problem is dam releases. The public is saavy, and doesn't want to run the river in the summer with low water, etc. Personally I'm not concerned. As a solo boatman in a small raft, I have run the river at 5k with no issues. But private trips and commercial trips don't do well at those flows. I recommend you up the flows to 14k minimums in the summer, then drop it down to 12k in the winter and shoulder seasons. Not enough water you say? Drain the lakes above if necessary. Reservoirs are secondary to the health of a National Park.Best personal regards,Bruce McElya

***Letter #:*** 7958

***Date Received:*** 3/2/2026

***Sender Names:*** 7897: Talitha McGuire

***Emails:*** 7897: talithamcguire@gmail.com

***Organizations:***

***Subject:*** Public Comment for Colorado River Draft EIS

DOI - . BOR: I was born and raised in Flagstaff, Arizona and now live in Moab, Utah. I am aware of how critical the Colorado River is to the southwest and remember as a kid boating up into Lake Powell's Dangling Rope Marina. Now, Dangling Rope is permanently closed due to low water levels. We face a uncertain future, a lot of demands on Colorado River, and less stable snowpacks year by year. Many communities rely on the Colorado River. This INCLUDES Tribal Nations. I was deeply disappointed to see that the draft EIS alternatives disproportionately impact Lower Basin tribes and that impacts to Arizona were not fully modeled in the draft EIS. This makes it difficult to clearly assess the full consequences for many Tribal Nations, including those with settled rights and those still awaiting settlement. We have a moral obligation to include tribes as active decision-makers in this process and in water governance--these are the peoples who stewarded this ecosystem long before the BOR even existed. I want to see tribal-soverignty and self-determination in this process, which includes honoring existing settlement agreements, safeguarding water set aside for unresolved claims, and ensuring that Tribal Nations are not disproportionately burdened by shortage mechanisms. In addition, commitments must be upheld; tribes deserve and are owned the right to reach equitable settlements on unresolved claims. What happens to the Colorado River will shape the future of the communities who live here. Involve the original stewards of this river system in management and in the decision process. This isn't just hydrology here--it's literally the future of human life within the southwest. I understand that there is a lot of stress here--there's climate-driven shortages, policy uncertainty, and competing state interests. Yet this can be an opportunity to INVOLVE Tribal Nations rather than push them out to the margins of decisions that shape their futures. Let's build a future humanity can be proud of. Thank you for your time and all of your hard work in processing public comments! Talitha McGuire

***Letter #:*** 5152

***Date Received:*** 2/28/2026

***Sender Names:*** 5117: Kat McKay

***Emails:*** 5117: mckaykat633@everyactioncustom.com

***Organizations:***

***Subject:*** Public Comment on Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead DEIS

DOI - . Dear Carly Jerla Bureau of Reclamation, Thank you for this opportunity to provide input on the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Draft Environmental Impact Statement (Post-2026 Operations). I urge you to take immediate action to protect the future of the Colorado River Basin and to recognize the many recreational opportunities that the river provides. When determining the preferred Alternative for Post-2026 Operations, I request that the Bureau of Reclamation prioritize the below elements and work directly with the seven basin states to ensure that water conservation measures are capable of supporting a living river for generations to come. - Post-2026 Operations must consider how operations will affect daily flows in the Grand Canyon and upstream river segments before a final decision is determined. - Delivery of water between the Upper and Lower Basins must maintain minimum flows at all times in the Grand Canyon to support river recreation opportunities. - Storage in Lake Powell and management of Glen Canyon Dam must also support opportunities for High Flow Experiments in the Grand Canyon for the purposes of sediment and nutrient transport. Infrastructure updates at Glen Canyon Dam must be a short-term priority to ensure that the dam is capable of passing variable flows downstream as reservoir levels become lower. - Operations and agreements must provide for Tribal water rights and respect Tribal sovereignty throughout the Colorado River Basin. A trip through the canyons of the Colorado River was a life-changing experience for me and my family: when I rowed us through the Grand Canyon this past year, my fiance proposed, creating a cherished memory in a setting I want to preserve and revisit from the magical waters of the Colorado. We must work to conserve this precious resource for future generations. Keeping the river flowing and healthy is integral to protecting the safety of river users, as well as the thriving tourism economy of visitors drawn to America's natural wonders. All of the Colorado River's users will feel the impacts of decades of mismanagement, but we cannot sacrifice the Grand Canyon. Sincerely, Ms. Kat McKay 1010 Durkee Rd SE Cleveland, TN 37323-3352 mckaykat633@gmail.com

***Letter #:*** 4052

***Date Received:*** 2/27/2026

***Sender Names:*** 4007: John McKee

***Emails:*** 4007: info@greatbasinwater.org

***Organizations:***

***Subject:*** John McKee Comments on Colorado River

Great Basin Water Network DOI - . Everything I have read
about this project tells me that it has been orchestrated by the wealthy and politically powerful without due consideration to the multitude of unaddressed ramifications. Please spend more time (and money) doing an unbiased complete research of this project!If you have any additional questions please contact me.John McKee(c) Great Basin Water Network. Powered by weForms.

***Letter #:*** 8819

***Date Received:*** 3/3/2026

***Sender Names:*** 8732: hugh mclaughlin

***Emails:*** 8732: iamhubie@yahoo.com

***Organizations:***

***Subject:*** Colorado River management plan

DOI - . To whom it may concern, I live high in the watershed along the yampa river. Here in thr high mountains the only crop that ranchers grow with rover water is alfalfa for cows. I was just talking to a guy I work with who owns a very old ranch with 1800s water rights on the elk river (a major tributary of the yampa) he told me that if he doesn't have water in the river and he makes a call for water that everyone below him on the list but above him on the river has to shut off their water. He said he has 4 cubic feet per second allotted to him. He said that if he makes call that he has to take 4 cubic feet per second whether he needs 4 cubic feet per second or not. Can we not change water laws to where ranchers who need some water are not forced to take water they don't need if they make a call. Then we have "use it or lose it" laws that make ranchers pull water from the rivers and flood irrigate their fields when they don't need any water at all. They do it because they have a water right that they are afraid will before forfeited if they don't continue to use all they are allotted. I've driven by fields that are full of water in November when the last hay has been cut long ago and the fields are brown and nothing will be growing until next year. But some rancher has the pumps running and taking water out of the river and dumping it on dead fields of nothing just because they are afraid they'll lose their water rights. If we can get people growing alfalfa to conserve just a little it would go a long way toward saving a huge amount of water since agriculture is the biggest user and alfalfa is the biggest crop they grow with Colorado River water. All the swimming pools and golf courses and residential lawns are a literal drop in the bucket compared to the amount of water that cattle ranchers waste. Hugh McLaughlin Sent from my iPhone

***Letter #:*** 3481

***Date Received:*** 2/26/2026

***Sender Names:*** 3449: William McMullin

***Emails:*** 3449: mcmullinw@gmail.com

***Organizations:***

***Subject:*** Colorado River

DOI - . To help protect the Colorado River, the Bureau of Reclamation must protect water quality, factor in climate science, prevent ecological collapse in the Colorado River Delta and Basin tributaries, and not allow unsustainable allocations. Make a revised EIS that addresses the major issues with the Colorado River. Thank you. William McMullin 10110 Saratoga St Oak Park, MI 48237

# INTEGRATED SYSTEMS STABILITY FRAMEWORK

Submitted in Support of Public Comment on

## Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

Draft Environmental Impact Statement

## Prepared for Submission to:

Bureau of Reclamation

U.S. Department of the Interior

Comment Deadline: March 2, 2026

## Prepared and Submitted by:

Annette McRae

Resident, Utah Senate District 20

Candidate for Utah State Senate, District 20

Private Citizen

Duchesne | Uintah | Wasatch | Summit | Daggett Counties

## Document Status

This document is interpretive and analytical only. It creates no statutory authority, imposes no mandate, reallocates no water right, alters no interstate compact obligation, directs no agency action, and establishes no regulatory threshold.

# EXECUTIVE SUMMARY

This expanded submission accompanies formal public comment on the Draft EIS for Post-2026 Operational Guidelines for Lake Powell and Lake Mead. Its purpose is to request modeling transparency, compact neutrality, socioeconomic disclosure, distributional clarity, hydrologic sensitivity modeling, and indirect impact evaluation.

Operational guidelines adopted after 2026 will shape planning certainty across Upper Basin communities for decades. Modeling assumptions regarding undeveloped apportionment, demand management permanence, and drought response frameworks directly influence agricultural viability, rural economic stability, recharge landscapes, housing pressure, freight systems, and public safety outcomes.

# FORMAL PUBLIC COMMENT

## I. Statement of Interest

As a resident of Utah Senate District 20, I submit this expanded comment to request analytical transparency within the Draft EIS. The district includes agricultural producers, energy-sector workers, tourism economies, and downstream stakeholders directly influenced by Colorado River system modeling decisions.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## II. Modeling Neutrality Toward Undeveloped Upper Basin Apportionment

The DEIS should clearly disclose whether alternatives assume permanent non-development of currently undeveloped consumptive use. Modeling should not functionally treat undeveloped apportionment as foregone baseline. Hydrology governs physical supply; however, allocation neutrality must be preserved within analytical assumptions.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## III. Demand Management Permanence Distinction

The DEIS should clarify whether conservation measures are voluntary, temporary, incentivized, or structurally assumed permanent. Modeling that embeds temporary conservation into long-term baseline redefinition without explicit legislative authorization risks indirect allocation shifts.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## IV. County-Level Socioeconomic Disclosure

Aggregate basin modeling should not obscure distributional impacts across Duchesne, Uintah, Wasatch, Summit, and Daggett Counties. The Final EIS should evaluate irrigated acreage effects, employment impacts, processing and cold storage infrastructure, land conversion pressure, recharge landscapes, and rural tax base stability.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## V. Agricultural Systems Architecture

Agricultural systems function as economic anchors, recharge interfaces, freight drivers, and food security stabilizers. Reduced irrigated acreage may affect secondary supply chains including farm-to-institution procurement systems.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## VI. Risk Transfer and Indirect Effects

Where rural development pathways are constrained without full disclosure, exposure may transfer to urban corridors. The DEIS should evaluate indirect impacts including congestion stacking, air quality concentration under inversion conditions, housing affordability pressure, and emergency response

reliability.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## VII. Hydrologic Variability and Sensitivity

The DEIS should disclose multi-year drought sensitivity modeling, wet-year recovery sequences, tier oscillation scenarios, and carryover storage assumptions. Scenario transparency strengthens planning certainty.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

## VIII. Compact Neutrality and Institutional Durability

This comment does not seek alteration of interstate compact structure. The Final EIS should affirm that operational modeling does not functionally redefine allocation rights. Institutional clarity preserves durable governance.

### *Expanded Analysis:*

The Final EIS should provide detailed narrative explanation and quantitative disclosure to ensure stakeholders understand long-term structural implications of modeling assumptions. Transparency enhances institutional trust and reduces exposure concentration across geography and time.

# APPENDIX A – INTEGRATED SYSTEMS STABILITY FRAMEWORK

1. Foundational Premise: Water operations are structural infrastructure architecture shaping agricultural viability, workforce mobility, housing distribution, freight systems, recharge continuity, and emergency resilience.

2. Public Safety as System Outcome: Reliability across water systems influences public safety through economic stability, land-use continuity, and emergency response conditions.

3. Sequencing Integrity: Structural decisions should be evaluated prior to irreversible exposure concentration. Drought carryover and recovery modeling must be clearly disclosed.

4. Agricultural Systems Integration: Irrigation stability affects processing, storage, employment, tax base stability, and food distribution networks.

5. Exposure and Risk Transfer: Modeling opacity increases uncertainty. Uncertainty increases exposure. Exposure transfers across systems if not transparently evaluated.

6. Institutional Guardrails: Modeling assumptions must remain consistent with statutory authority and interstate compact structure.

7. Durability Principle: Transparent modeling supports durable planning. Durable planning reduces volatility and litigation risk.

## Final Integrative Statement

Operational guidelines adopted after 2026 will influence Upper Basin planning certainty for decades. Transparent modeling preserves agricultural continuity, rural viability, compact integrity, and long-term institutional stability.

Respectfully submitted,

Annette McRae

Utah Senate District 20

Private Citizen

Date: 2-23-26



***Letter #:*** 7518

***Date Received:*** 3/2/2026

***Sender Names:*** 7470: Dennis McRitchie

***Emails:*** 7470: dmcritchie45@gmail.com

***Organizations:***

***Subject:*** Comments on the draft EIS re post-2026 operational guidelines and strategies for Lake Powell and Lake Mead

DOI - . As a resident of Arizona, I ask the Bureau of Reclamation to consider the following points: The post-2026 agreement should require the Upper Basin states to share in the shortages to some extent. The cuts to the 3 Lower Basin states should be shared proportionately, including those to the CAP. The future agreement should have deliveries to all 7 states be proportional to the actual average flows at Lee's Ferry rather than having deliveries be based on fixed numbers as in the original compact. The upstream reservoirs should be used to keep water levels in Lake Powell above dead pool so that the turbines can continue to generate electricity. Thank you for your consideration. Dennis McRitchie Tucson, AZ

***Letter #:*** 340

***Date Received:*** 2/11/2026

***Sender Names:*** 338: Mike Medici

***Emails:*** 338: mmediciten7@gmail.com

***Organizations:***

***Subject:*** Comments regarding the Draft EIS

DOI - . To: Bureau of ReclamationFrom: Michael Medici Homeowner & Board member for Marina Coves HOA Mohave Valley, AZ 86440The residential lakefront community of Marina Coves was developed in 2001-2002. It was designed to be a master planned gated community consisting of 4 phases and 400 single family homes. We also have a private boat launch to both our lake and to the Colorado River directly across the street. Through a contract with the Fort Mohave Indian Tribe at our inception, the developer built the tribe a million dollar water treatment plant in exchange for them providing reclaimed water to Marina Cove's 26 acre lake for a term of 99 years at no cost to homeowners. Unfortunately, the tribe violated the water contract, kept the treatment plant solely for their crops, and never provided water for our lake. Being a sovereign nation no lawsuit was pursued, and the developer filed bankruptcy. The property was foreclosed on by Levine Investments from Phoenix Arizona. Marina Coves became self-governed by one representative from Levine Investments and myself on behalf of Marina Coves. We were the entire HOA Board. The remaining three phases have never been developed. Our small residential community built 2 wells on the property, and we purchased water from the county. Still to this day we purchase 500 acre feet of water from MVIDD / Mohave Valley Irrigation and Drainage District each year. Our water contract like everyone else's expires on December 26, 2026. Although Marina Coves is in Mohave County, geographically we are outside of the boundary line enabling us to purchase reclaimed water from Bullhead's treatment plant or from Ebcor. I've become well versed about CAP and the Colorado River drought issues for a couple years. Our 26 acre lake is absolutely essential for our community to survive. Each home is built directly on the lake and we have literally thousands of fish and wildlife to protect. We are one of only two lakefront communities in the entire county and the other one is located within the boundary line, so they are currently receiving reclaimed water. Unfortunately our lake community and 2 nearby golf courses are considered, "Amenity users." I meet with MVIDD along with board members from the two golf courses every 3-months to try and find a solution to continue purchasing county water to prevent our lake from drying up, keep the fish from dying, and to prevent the residents of a community who have been here for 25 years from losing their homes. Mohave Valley has a population of approximately 3000 people. It's a farming community and all five board members are farmers. I fear if the cuts to our water allocations are as bad as things appear, and the farmers are the ones who decide who's allocations are cut first, our small community will go unseen and forgotten like very small fish in a large pond so to speak. This Marina Coves community has managed to survive many obstacles for 25 years. I decided to reach out to the Bureau of Reclamation so you actually have an idea of who we are. I couldn't let us go unnoticed just because we are not farmers. We're simply a community of 99 homeowners who have been a part of the Mohave Valley community for well over 2-decades. Thank you for the opportunity to share some concerns as I represent our small community. If you have any suggestions please let me know. Thank you for your time, Sincerely,Mike Medici (951) 205-1337

***Letter #:*** 4343

***Date Received:*** 2/28/2026

***Sender Names:*** 4310: John Mello

***Emails:*** 4310: john.mello@everyactioncustom.com

***Organizations:***

***Subject:*** I speak for the river that only speaks to those who listen

DOI - . Dear Carly Jerla Bureau of Reclamation, Thank you for this opportunity to provide input on the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead - Draft Environmental Impact Statement (Post-2026 Operations). Protecting the Grand Canyon is deeply personal to me. My first trip down the canyon was a private raft trip in 2010 with a group of brothers. It was my first multi-day river journey, and it changed my life. I was awed by the grandeur, the beauty, the adventurous spirit it awakened in me, and the profound sense of wilderness that surrounded us each day. I returned in 2016, and during that trip my wife and I were married in Blacktail Canyon, a side canyon off the main river corridor. We explored countless side hikes and slot canyons--places like Elves Chasm and Chimney Wash--each etched permanently into my memory. In 2021, I came back again for a July trip. My first journey had been in October and November; the second in March. Each season revealed a different expression of the river's character, yet the magic remained constant. I am scheduled to return again on March 3, 2027, with a mix of old and new friends. I look forward to simple moments--drinking coffee at dawn, watching the sunrise ignite those towering cliffs, and feeling the steady current of the Colorado beneath our rafts. The Colorado River is not just a water delivery system. It is a living artery of culture, ecology, recreation, and spiritual renewal. When flows are altered without regard for sediment transport, nutrient cycling, daily variability, and ecosystem integrity, the canyon itself changes. Beaches erode. Habitat diminishes. The character of the river corridor shifts. When determining the preferred Alternative for Post-2026 Operations, I respectfully request that the Bureau of Reclamation prioritize the following elements and work directly with the seven basin states and Tribes to ensure that water conservation measures are effective and capable of supporting a living river for generations to come: Storage in Lake Powell and management and infrastructure of Glen Canyon Dam must support opportunities for High Flow Experiments in the Grand Canyon for the purposes of sediment and nutrient transport. Infrastructure updates at Glen Canyon Dam must be prioritized in the short term to ensure the dam is capable of passing variable flows downstream as reservoir levels become lower and less predictable. Conservation measures and delivery of water between the Upper and Lower Basins must balance maintaining minimum flows at all times in the Grand Canyon with allowing for flow variability across the annual hydrograph to support both the river ecosystem and river recreation opportunities. Water delivery measures that implicate Blue Mesa Reservoir and Flaming Gorge Reservoir must consider immediate and downstream impacts to river ecosystems and recreation opportunities and seek to provide multiple benefits whenever possible. Impacts to river recreation opportunities on the Colorado River and the San Juan River due to changing reservoir levels must be analyzed and mitigated. Post-2026 Operations must analyze and consider how operations will affect daily flows in the Grand Canyon and upstream river segments before a final decision is determined, not after. Operations and agreements must provide for Tribal water rights and respect Tribal sovereignty throughout the Colorado River Basin. A trip through the canyons of the Colorado River leaves a lasting impression on all who make the journey. The river that carved these canyons is the hardest working river in the country. Keeping the river flowing and healthy is integral to protecting the safety, welfare, and spirit of the people who rely on it. We must work with what nature provides--and we must do so together. All Colorado River water users will feel strain in the years ahead, but we cannot sacrifice these extraordinary river canyons and the ecosystem services they provide. The future of the Grand Canyon and the Colorado Ri Sincerely, Mr. John Mello 3345 Crown Crest Rd Lexington, KY 40517-2809 john.mello@gmail.com

***Letter #:*** 3368

***Date Received:*** 2/26/2026

***Sender Names:*** 3337: Maximo Menchaca

***Emails:*** 3337: maximomenchaca@protonmail.com

***Organizations:***

***Subject:*** Colorado River Basin Protections

DOI - . To The Bureau of Reclamation:The Colorado River's future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The Bureau has the opportunity to take meaningful action now to address the full reality of climate-driven water scarcity and the urgent need to protect water quality, ecosystems, and Basin communities.I urge the Bureau of Reclamation to significantly strengthen the Post-2026 Colorado River Basin Draft EIS that proactively addresses the crisis that we face and ensure the public has an opportunity to comment on its revised proposalbefore issuing its final decision.The Colorado River is already overallocated and shrinking. The Bureau must prioritize long-term sustainability, meaningful Tribal consultation, and enforceable reductions in demand, not simply identify new ways to divide a declining supply. The Colorado River can't afford any further delay!!-Dr. Maximo Menchaca

***Letter #:*** 6

***Date Received:*** 1/26/2026

***Sender Names:*** 6: mikedoubleday@earthlink.net

***Emails:*** 6: mikedoubleday@earthlink.net

***Organizations:***

***Subject:*** DRAFT EIS re: January 2026 post operational strategies for Colorado River Management

DOI - . Hello -Could you please e-mail the full Volume 1 of this DEIS? What I see online is a 15 page or so table of contents and perhaps a summary.Thanks.

To: Bureau of Reclamation, Attn: BCOO-1000
Project: Post–2026 Operational Guidelines for Lake Powell & Lake Mead
Date: February 20, 2026

I am submitting this comment during the 45-day public comment period regarding the Bureau of Reclamation's post-2026 Colorado River operations and associated environmental review documents.

I am a Nevada resident and ratepayer with a direct interest in the long-term reliability, equity, and feasibility of Colorado River management decisions. While I recognize the complexity of post-2026 operations, I am concerned that the alternatives under consideration rely too heavily on incremental demand reductions while insufficiently addressing the Basin's documented, long-term (and growing) structural supply deficit. As the United Nations University has stated, "If the Southwest were a business, it would be in Chapter 11."

In a nation defined by abundance and achievement—a nation that built Hoover Dam, spanned a continent by rail, constructed the Interstate Highway System, created the Tennessee Valley Authority, reached the moon, and unlocked the atomic age—it is difficult to accept that in the 21st century our future is framed primarily as permanent restriction: to shrink, limit growth, mine aquifers, strip landscapes, and accept a declining quality of life—not because solutions are impossible, but because we have not yet chosen to implement them. Meanwhile, hundreds of millions of acre-feet of freshwater continue to flow unused to the oceans each year from major river systems such as the Mississippi and Columbia. Despite decades of effort, the seven basin states have largely managed decline—mortgaging our future and kicking the can down the road.

America has never solved its greatest challenges by retreating. We are a world superpower with a history of "can-do." Is this truly the best we can do?

In the twentieth century, economic strength often followed access to oil reserves. In the twenty-first century, resilience and growth are increasingly tied to access to reliable freshwater supplies. Regions with dependable water attract industry, stabilize housing markets, sustain agriculture, and support energy production. Regions without reliability face rising costs and constrained growth. As Eric Kuhn, retired GM of the Colorado River Water Conservation District, stated in the Las Vegas Review-Journal on 2/15/26: "We are in a new era of deficit…where bold action…is required."

My proposed BOLD solution below would, at a minimum:

1. Add $500 billion to $1 trillion in cumulative regional economic growth
2. Create 20,000 direct construction jobs
3. Create tens of thousands of additional direct jobs
4. Create hundreds of thousands of indirect and induced jobs
5. Create a strategic economic asset with annual value exceeding $1.24 trillion through development of millions of new housing units

## The Core Problem Is Structural, Not Behavioral

The Colorado River crisis is not fundamentally a conservation problem. It is a structural supply failure caused by overallocation based on faulty hydrology, long-term climate-driven aridification, rapid population growth, groundwater depletion, and the physical limits of existing infrastructure. The system was designed for a river that no longer exists.

When the Colorado River Compact was signed in 1922, it assumed an average annual flow of approximately 16.4 million acre-feet and treated drought as temporary. Today, long-term flows are closer to 12 million acre-feet, creating a permanent structural mismatch between legal commitments and physical supply—approximately 5.5 million acre-feet per year. For decades, reservoir storage masked this imbalance. Today, those reserves are declining.

Modern pressures have intensified the challenge. The Basin is experiencing aridification rather than cyclical drought: rising temperatures dry soils before runoff reaches rivers, increase evaporation, and reduce effective snowpack. Meanwhile, the population of basin states has grown from approximately 2.8 million in 1922 to more than 60 million today. Demand has increased even as supply has declined.

Infrastructure operates within physical limits. Reservoirs such as Lake Mead and Lake Powell do not decline gradually forever; they approach functional thresholds. If water levels drop too low, hydropower generation becomes unreliable and downstream deliveries are jeopardized. Current forecasts indicate that the system continues trending downward.

Consider the following:

1. In SNWA's 2024–2029 Water Conservation Plan, GM John Entsminger states: "Over the past two decades, evolving hydraulic conditions have led to diminished inflows to the Colorado River system and Lake Mead…Today, crucial storage reserves hover at historically low levels, posing a serious threat to water supply security for much of the West."
2. Bureau of Reclamation modeling suggests Colorado River flows could decline by approximately 5–10% under conservative projections, 15–25% under mid-range scenarios, and 30–45% under higher warming conditions by 2050.
3. Taken together, these forecasts confirm the system's challenges are not episodic but structural—reinforcing the need to evaluate long-term supply strategies alongside demand management measures.
4. According to Reclamation's February 9, 2026 Hydrologic Update, projected inflow for the 2026 water year fell from 72% of normal to 52% of normal.

The likely outcome of continued decline is emergency water management—water trucking at extreme costs, agricultural collapse measured in billions annually, housing value exposure measured in trillions, and rising federal disaster spending that grows faster than infrastructure investment. Planned water is cheaper than emergency water.

## Conservation Alone Cannot Solve This

Conservation, while essential, reduces demand but does not create supply. It cannot refill reservoirs or restore depleted aquifers. Large-scale desalination faces constraints of cost and

scale; even significant investment may struggle to close the system-wide deficit. It has been estimated that resolving the shortfall would require dozens of desalination plants costing many tens of billions—and none have been built at that scale. We cannot conserve our way out of this. Conservation and water cuts decide who must use less water; they do not create new water. Conservation is like a sponge—you can only get so much out of it.

## The Deeper Warning: Groundwater Depletion

The Southwest is increasingly water-depleted, particularly in groundwater reserves. Since 2003, the Colorado River Basin has lost approximately 27.8 million acre-feet of groundwater—roughly comparable to Lake Mead's storage capacity. Groundwater is disappearing much faster than surface water. When groundwater and surface water losses are combined, total depletion across the Basin is estimated at approximately 42.3 million acre-feet. This represents a major reduction in long-term reserves.

NASA's GRACE satellite data indicates the Basin has lost on the order of 52 cubic kilometers of total freshwater storage since the early 2000s—about 42 million acre-feet when converted. Groundwater represents the largest share of this loss. In short, the region has not merely reduced annual river flows—it has drawn down tens of millions of acre-feet from natural storage systems that took thousands of years to accumulate. Many aquifers take centuries to recharge, if recharge occurs at all. Declining groundwater also increases drilling costs and can contribute to land subsidence.

## The System-Wide Scale

All seven basin states—along with Texas and Mexico—have been experiencing water stress for decades. Their deficits can be measured two ways:

1. water lost from long-term storage (aquifers, reservoirs, soil moisture), and
2. cuts from legal allocations to prevent collapse.

To refill the broader water systems of the seven basin states, Texas, and Mexico would require approximately 270 million acre-feet.

The Colorado River system supports roughly 40 million people and irrigates millions of acres of farmland. Without additional supply, risks include infrastructure failure, energy instability, agricultural contraction, municipal restrictions, and increased federal intervention under emergency conditions.

## Freshwater Abundance Exists—But Not the Infrastructure to Move It

**CHINA HAS ALREADY BUILT A MASSIVE WATER PIPELINE.** China's massive South–North Water Transfer Project is the largest water redistribution effort in history, designed to move water from the country's water-rich southern regions to its water-scarce northern areas, including major population and agricultural centers such as Beijing and Tianjin. Because northern China has

roughly 40% of the population but less than 20% of the nation's water, China chose to address the imbalance through infrastructure rather than limiting growth. The project consists of three major routes—eastern, central, and a planned western system—that together are designed to transfer about 45 billion cubic meters of water annually, or roughly **36 million acre-feet per year,** which is about three times the annual flow of the Colorado River. Built over decades at an estimated cost of $80 to $100 billion, the system now supports water supply for more than 300 million people and reflects China's decision to treat water scarcity as a structural challenge requiring large-scale engineered solutions.

The United States does not lack freshwater in absolute terms; it lacks infrastructure to move it where it is needed most.

The Mississippi and Columbia Rivers discharge enormous volumes of freshwater into the Gulf of Mexico and the Pacific Ocean each year—on the order of hundreds of millions of acre-feet. Freshwater is increasingly recognized as "Blue Gold," a strategic economic and security asset. Water has no substitute; cities and economies cannot function without it. In arid regions, reliable water supply directly determines housing growth, agricultural output, industrial investment, and energy stability.

This shift is not theoretical. In 2020, the Chicago Mercantile Exchange introduced a water futures market, reflecting growing recognition that water scarcity carries measurable financial value.

# THE SOLUTION: WATER PIPELINE(S) + BASIN-SCALE GOVERNANCE

Addressing this challenge requires both governance reform and new infrastructure. I propose establishing a Western Water Authority (WWA), modeled on the TVA, to coordinate basin-wide planning and implementation (including Texas and Mexico coordination where relevant). Its mission would include moving water through conveyance systems, stabilizing reservoirs, supporting groundwater recharge, protecting ecosystems, and establishing rational pricing structures.

The United States has built millions of miles of pipelines to move oil, gas, water, wastewater, and other resources, demonstrating national capability to transport critical resources across long distances when priorities demand it. Not building a pipeline is like driving slower to conserve fuel while refusing to build the road that would get you to the gas station.

Potential infrastructure strategies could include pipelines linking surplus river systems (Mississippi and Columbia), expanded reuse, aquifer storage and recovery, and integration with energy systems such as solar generation and small modular reactors. In this model, water would be managed as a grid—stored in wet periods and moved strategically in dry ones. The technology exists.

The WWA could be established by Congress as a federally chartered interstate compact with basin-wide operational authority. Governed by a board representing basin states, federal agencies, Tribal nations, agricultural users, urban utilities, and environmental stakeholders, the

WWA would replace fragmented management with an integrated system capable of planning, financing, building, and operating water infrastructure across the Colorado River Basin.

Its responsibilities would include designing and operating regional conveyance systems (pipelines, recharge canals, storage hubs) capable of moving water from seasonal surpluses, recycled municipal supply, desalination exchange sources, or flood flows into depleted aquifers and declining reservoirs—redistributing water across the region much like electricity is transmitted today.

The WWA would also manage Lakes Mead and Powell as strategic storage assets, maintaining elevations above critical thresholds (power pool and shortage triggers) through coordinated supplemental inflows, forecast-based releases, and system balancing.

A major function of the WWA would be large-scale groundwater recharge systems to transform aquifers from mined resources into managed water banks—through spreading basins, injection wells, and seasonal recharge canals. For example, recharge of 2 million acre-feet annually for 20 years would restore 40 million acre-feet—comparable to the groundwater depletion measured since the early 2000s.

Financially, the WWA could operate on a self-supporting model similar to the TVA, using delivery fees, storage contracts, recharge credits, and infrastructure bonds. For instance, managing 5 million acre-feet annually at an average system fee of $300 per acre-foot would generate approximately $1.5 billion per year in operating revenue.

This project is legally viable because Congress has plenary power over interstate commerce and has repeatedly exercised authority over interstate water and power infrastructure. Courts upheld federal authority in the development of Hoover Dam and the TVA. Treaty authority and binational desalination exchange frameworks with Mexico provide additional precedent.

## Conclusion

The lesson of America's greatest public works is simple: when essential systems fail, ideology must give way to engineering. Water is now one of those systems. The question is not whether federal intervention will occur, but whether it will be deliberate and intelligent—or forced by failure.

Conservation helps manage scarcity but does not resolve structural deficits. Without new sources of water and basin-scale infrastructure, the Southwest faces a future defined by permanent shortfall rather than temporary drought. The longer we wait, the more expensive it becomes.

In closing, further detail on any of the above is available upon request. Thank you for your time.

Edward Mikula

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| Year | Natural | Natural | NV | AZ | CA | Lower Basin | Mexico | Mead Evapo | Hoover | Hv-Mx | Diff 7.5 | Hoover | Diamond | Mead | Powell | Powell Evapo | Glen Canyo | Lees Ferry | Inflow | Inflow Unreg | Upper Basin | CO | UT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1964 | 10.41 | 10.70 | 0.03 | 1.13 | 5.06 | 6.22 | | | | 0.00 | -7.50 | 8.23 | | 11.62 | 4.10 | 0.07 | 2.41 | 2.41 | 6.65 | 7.49 | | | |
| 1965 | 19.42 | 20.84 | 0.02 | 1.01 | 4.90 | 5.93 | 1.50 | | | -1.50 | -9.00 | 7.92 | | 14.71 | 6.26 | 0.17 | 10.82 | 10.82 | 13.70 | 15.05 | | | |
| 1966 | 10.16 | 11.23 | 0.03 | 1.07 | 5.10 | 6.20 | 1.50 | | 7.78 | 6.28 | -1.22 | 7.77 | | 15.00 | 6.22 | 0.22 | 7.85 | 7.85 | 8.55 | 8.69 | | | |
| 1967 | 11.51 | 12.29 | 0.03 | 1.04 | 4.89 | 5.96 | 1.50 | | 7.93 | 6.43 | -1.07 | 7.83 | | 14.38 | 6.16 | 0.19 | 7.80 | 7.80 | 8.25 | 8.98 | | | |
| 1968 | 13.65 | 14.39 | 0.03 | 1.10 | 5.07 | 6.20 | 1.50 | | 7.84 | 6.34 | -1.16 | 7.83 | | 15.02 | 7.27 | 0.21 | 8.33 | 8.33 | 9.93 | 10.32 | | | |
| 1969 | 14.92 | 15.89 | 0.04 | 1.14 | 4.90 | 6.07 | 1.50 | | 7.89 | 6.39 | -1.11 | 7.99 | | 16.13 | 9.39 | 0.27 | 8.82 | 8.82 | 11.51 | 11.52 | | | |
| 1970 | 14.95 | 15.63 | 0.04 | 1.20 | 5.02 | 6.25 | 1.50 | | 8.02 | 6.52 | -0.98 | 7.89 | | 16.77 | 11.65 | 0.32 | 8.67 | 8.67 | 11.76 | 11.99 | | | |
| 1971 | 14.90 | 15.35 | 0.05 | 1.30 | 5.17 | 6.52 | 1.50 | | 8.16 | 6.66 | -0.84 | 8.22 | | 16.89 | 13.17 | 0.38 | 8.59 | 8.59 | 11.04 | 11.80 | 3.66 | 1.85 | 0.77 |
| 1972 | 13.11 | 13.59 | 0.08 | 1.20 | 5.23 | 6.51 | 1.50 | | 8.10 | 6.60 | -0.90 | 8.27 | | 17.45 | 12.09 | 0.39 | 9.31 | 9.31 | 8.80 | 9.33 | 3.74 | 1.91 | 0.79 |
| 1973 | 18.04 | 19.18 | 0.09 | 1.27 | 5.32 | 6.68 | 1.50 | | 8.30 | 6.80 | -0.70 | 7.94 | | 20.18 | 16.74 | 0.42 | 10.11 | 10.11 | 15.40 | 15.97 | 3.64 | 1.66 | 0.77 |
| 1974 | 12.91 | 13.22 | 0.09 | 1.33 | 5.41 | 6.83 | 1.50 | | 8.73 | 7.23 | -0.27 | 8.85 | | 19.36 | 17.44 | 0.52 | 8.27 | 8.27 | 9.99 | 9.97 | 4.06 | 2.00 | 0.81 |
| 1975 | 16.49 | 16.79 | 0.07 | 1.36 | 4.98 | 6.41 | 1.50 | | 8.37 | 6.87 | -0.63 | 8.37 | | 20.15 | 19.58 | 0.54 | 9.26 | 9.26 | 12.37 | 13.10 | 3.89 | 1.93 | 0.67 |
| 1976 | 11.07 | 11.60 | 0.07 | 1.25 | 4.71 | 6.03 | 1.50 | | 7.93 | 6.43 | -1.07 | 8.32 | | 20.06 | 19.03 | 0.56 | 8.48 | 8.48 | 8.71 | 8.43 | 3.75 | 1.79 | 0.66 |
| 1977 | 5.46 | 5.94 | 0.07 | 1.23 | 5.10 | 6.40 | 1.50 | | 7.87 | 6.37 | -1.13 | 7.56 | | 20.20 | 15.62 | 0.51 | 8.26 | 8.26 | 5.48 | 3.53 | 3.12 | 1.67 | 0.41 |
| 1978 | 15.12 | 16.32 | 0.07 | 1.23 | 4.50 | 5.81 | 1.50 | | 7.48 | 5.98 | -1.52 | 7.68 | | 20.87 | 16.03 | 0.47 | 8.35 | 8.35 | 9.45 | 11.06 | 4.00 | 2.04 | 0.70 |
| 1979 | 17.38 | 18.92 | 0.06 | 1.15 | 4.79 | 6.00 | 1.70 | | 7.72 | 6.02 | -1.48 | 7.39 | | 22.24 | 20.99 | 0.54 | 8.30 | 8.30 | 14.20 | 14.19 | 4.07 | 1.87 | 0.75 |
| 1980 | 17.40 | 19.15 | 0.09 | 1.22 | 4.73 | 6.04 | 1.70 | | 11.09 | 9.39 | 1.89 | 9.96 | | 23.64 | 22.42 | 0.63 | 10.91 | 10.91 | 12.85 | 13.68 | 4.10 | 1.85 | 0.71 |
| 1981 | 8.96 | 9.64 | 0.11 | 1.42 | 4.80 | 6.32 | 1.70 | | 8.28 | 6.58 | -0.92 | 9.83 | | 21.87 | 20.12 | 0.61 | 8.30 | 8.30 | 6.41 | 5.64 | 4.12 | 2.12 | 0.65 |
| 1982 | 17.27 | 18.12 | 0.10 | 1.24 | 4.30 | 5.64 | 1.50 | | 7.45 | 5.95 | -1.55 | 7.39 | | 22.77 | 22.34 | 0.60 | 8.30 | 8.30 | 11.31 | 12.77 | 4.16 | 2.06 | 0.62 |
| 1983 | 23.57 | 24.84 | 0.09 | 1.06 | 4.25 | 5.39 | 1.70 | | 19.07 | 17.37 | 9.87 | 14.75 | | 25.66 | 24.14 | 0.67 | 17.49 | 17.49 | 20.11 | 20.37 | 4.09 | 1.92 | 0.59 |
| 1984 | 24.35 | 25.46 | 0.10 | 1.12 | 4.68 | 5.89 | 1.70 | | 21.41 | 19.71 | 12.21 | 22.21 | | 24.41 | 23.67 | 0.66 | 20.50 | 20.50 | 20.65 | 20.85 | 3.99 | 1.87 | 0.63 |
| 1985 | 21.04 | 21.98 | 0.10 | 1.19 | 4.78 | 6.07 | 1.70 | 0.91 | 17.21 | 15.51 | 8.01 | 18.63 | | 24.88 | 22.10 | 0.65 | 19.09 | 19.09 | 18.04 | 17.52 | 4.26 | 2.00 | 0.75 |
| 1986 | 22.98 | 23.36 | 0.11 | 1.36 | 4.80 | 6.27 | 1.70 | 0.88 | 17.55 | 15.85 | 8.35 | 17.21 | | 24.22 | 22.70 | 0.65 | 16.85 | 16.85 | 18.14 | 18.55 | 4.23 | 1.81 | 0.73 |
| 1987 | 15.34 | 16.37 | 0.11 | 1.73 | 4.89 | 6.73 | 1.70 | 0.85 | 11.33 | 9.63 | 2.13 | 13.14 | | 24.36 | 22.44 | 0.65 | 13.43 | 13.43 | 13.80 | 13.38 | 4.29 | 1.89 | 0.77 |
| 1988 | 11.21 | 12.16 | 0.13 | 1.92 | 5.04 | 7.09 | 1.70 | 0.87 | 9.42 | 7.72 | 0.22 | 9.69 | | 22.80 | 22.09 | 0.64 | 8.14 | 8.14 | 8.40 | 7.99 | 4.70 | 2.28 | 0.75 |
| 1989 | 9.51 | 10.20 | 0.16 | 2.23 | 5.14 | 7.53 | 1.50 | 0.85 | 9.23 | 7.73 | 0.23 | 9.03 | | 21.53 | 19.18 | 0.59 | 8.01 | 7.98 | 5.47 | 5.94 | 4.71 | 2.40 | 0.76 |
| 1990 | 9.37 | 9.97 | 0.18 | 2.26 | 5.22 | 7.66 | 1.50 | 0.78 | 9.20 | 7.70 | 0.20 | 9.26 | | 20.14 | 15.72 | 0.51 | 8.14 | 8.14 | 4.91 | 5.31 | 4.41 | 2.10 | 0.80 |
| 1991 | 12.33 | 13.09 | 0.18 | 1.86 | 5.01 | 7.05 | 1.50 | 0.74 | 8.95 | 7.45 | -0.05 | 8.96 | | 19.23 | 14.70 | 0.45 | 8.12 | 8.12 | 7.47 | 8.80 | 4.17 | 1.87 | 0.86 |
| 1992 | 10.96 | 12.23 | 0.18 | 1.91 | 4.55 | 6.63 | 1.50 | 0.69 | 7.83 | 6.33 | -1.17 | 8.01 | | 19.42 | 14.08 | 0.43 | 8.00 | 8.00 | 7.77 | 7.35 | 3.86 | 1.66 | 0.82 |
| 1993 | 18.82 | 21.36 | 0.20 | 2.25 | 4.74 | 7.19 | 1.50 | 0.78 | 7.44 | 5.94 | -1.56 | 7.01 | | 21.38 | 18.82 | 0.49 | 8.10 | 8.10 | 13.71 | 14.44 | 4.12 | 1.79 | 0.86 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994 | 10.62 | 11.06 | 0.23 | 2.15 | 5.17 | 7.55 | 1.50 | 0.79 | 9.35 | 7.85 | 0.35 | 9.41 | | 19.93 | 17.77 | 0.53 | 8.29 | 8.29 | 7.69 | 6.79 | 4.45 | 2.00 | 0.87 |
| 1995 | 19.92 | 21.33 | 0.22 | 2.22 | 4.93 | 7.36 | 1.50 | 0.78 | 8.54 | 7.04 | -0.46 | 8.75 | | 20.71 | 22.31 | 0.57 | 9.22 | 9.22 | 14.70 | 15.91 | 3.96 | 1.65 | 0.84 |
| 1996 | 14.23 | 14.55 | 0.25 | 2.71 | 5.32 | 8.29 | 1.50 | 0.84 | 9.97 | 8.47 | 0.97 | 10.08 | | 21.61 | 21.15 | 0.62 | 11.52 | 11.52 | 10.89 | 10.40 | 4.48 | 1.87 | 0.92 |
| 1997 | 21.66 | 22.04 | 0.24 | 2.85 | 5.25 | 8.35 | 1.70 | 0.87 | 11.67 | 9.97 | 2.47 | 11.16 | | 23.77 | 22.80 | 0.62 | 13.82 | 13.85 | 16.22 | 17.05 | 4.05 | 1.60 | 0.78 |
| 1998 | 16.69 | 17.41 | 0.25 | 2.57 | 5.05 | 7.86 | 1.70 | 0.86 | 12.77 | 11.07 | 3.57 | 11.97 | | 25.13 | 22.40 | 0.64 | 13.51 | 13.42 | 13.72 | 13.52 | 4.21 | 1.77 | 0.82 |
| 1999 | 15.87 | 16.38 | 0.29 | 2.73 | 5.19 | 8.21 | 1.70 | 0.89 | 11.03 | 9.33 | 1.83 | 11.40 | | 24.59 | 23.00 | 0.64 | 11.20 | 11.41 | 12.48 | 12.80 | 4.49 | 1.79 | 0.93 |
| 2000 | 10.55 | 10.81 | 0.32 | 2.80 | 5.16 | 8.29 | 1.70 | 0.88 | 10.69 | 8.99 | 1.49 | 10.98 | | 22.44 | 20.94 | 0.62 | 9.38 | 9.52 | 7.77 | 6.94 | 4.78 | 2.18 | 0.97 |
| 2001 | 10.74 | 11.17 | 0.32 | 2.84 | 5.25 | 8.41 | 1.50 | 0.84 | 10.21 | 8.71 | 1.21 | 10.49 | | 19.87 | 19.13 | 0.57 | 8.24 | 8.34 | 6.86 | 6.99 | 4.94 | 2.21 | 1.04 |
| 2002 | 6.09 | 6.21 | 0.33 | 2.97 | 5.37 | 8.66 | 1.50 | 0.74 | 10.45 | 8.95 | 1.45 | 10.50 | | 17.09 | 14.47 | 0.48 | 8.23 | 8.34 | 3.67 | 2.64 | 3.99 | 1.82 | 0.80 |
| 2003 | 10.63 | 10.90 | 0.30 | 2.83 | 4.41 | 7.54 | 1.50 | 0.68 | 9.38 | 7.88 | 0.38 | 9.45 | | 15.62 | 12.11 | 0.39 | 8.23 | 8.36 | 6.07 | 6.16 | 4.27 | 1.97 | 0.89 |
| 2004 | 10.07 | 10.63 | 0.28 | 2.78 | 4.32 | 7.38 | 1.50 | 0.64 | 9.34 | 7.84 | 0.34 | 9.64 | | 13.94 | 9.17 | 0.32 | 8.23 | 8.34 | 5.38 | 5.91 | 3.94 | 1.81 | 0.85 |
| 2005 | 16.89 | 18.82 | 0.29 | 2.43 | 4.34 | 7.06 | 1.50 | 0.66 | 8.27 | 6.77 | -0.73 | 7.94 | | 15.22 | 11.94 | 0.32 | 8.23 | 8.36 | 11.55 | 12.79 | 4.34 | 1.82 | 1.00 |
| 2006 | 13.50 | 13.72 | 0.29 | 2.78 | 4.34 | 7.41 | 1.50 | 0.64 | 9.26 | 7.76 | 0.26 | 9.39 | | 13.89 | 11.92 | 0.36 | 8.23 | 8.49 | 8.57 | 8.63 | 4.23 | 1.94 | 0.84 |
| 2007 | 11.45 | 11.72 | 0.30 | 2.78 | 4.37 | 7.45 | 1.50 | 0.60 | 9.36 | 7.86 | 0.36 | 9.45 | 9.20 | 12.50 | 11.93 | 0.37 | 8.23 | 8.40 | 8.62 | 8.75 | 4.47 | 2.03 | 0.95 |
| 2008 | 16.00 | 16.51 | 0.27 | 2.75 | 4.50 | 7.52 | 1.50 | 0.58 | 9.55 | 8.05 | 0.55 | 9.53 | 10.06 | 12.01 | 14.51 | 0.40 | 8.98 | 9.16 | 12.16 | 12.09 | 4.49 | 2.09 | 0.85 |
| 2009 | 14.09 | 14.29 | 0.25 | 2.83 | 4.36 | 7.44 | 1.50 | 0.55 | 9.48 | 7.98 | 0.48 | 9.21 | 9.30 | 10.93 | 15.46 | 0.44 | 8.24 | 8.40 | 9.70 | 10.22 | 4.47 | 2.06 | 0.89 |
| 2010 | 12.71 | 13.53 | 0.24 | 2.78 | 4.35 | 7.37 | 1.50 | 0.54 | 9.45 | 7.95 | 0.45 | 9.26 | 9.48 | 10.09 | 15.27 | 0.44 | 8.23 | 8.42 | 8.47 | 8.43 | 4.40 | 1.83 | 0.95 |
| 2011 | 20.26 | 20.85 | 0.22 | 2.78 | 4.31 | 7.32 | 1.45 | 0.58 | 9.21 | 7.76 | 0.26 | 9.80 | 13.47 | 12.98 | 17.59 | 0.47 | 12.52 | 12.73 | 15.50 | 15.97 | 4.44 | 2.03 | 0.85 |
| 2012 | 7.89 | 8.34 | 0.24 | 2.79 | 4.42 | 7.44 | 1.37 | 0.61 | 9.39 | 8.02 | 0.52 | 9.42 | 10.30 | 13.13 | 13.93 | 0.45 | 9.47 | 9.53 | 5.96 | 4.91 | 4.62 | 2.16 | 0.92 |
| 2013 | 9.73 | 10.30 | 0.22 | 2.78 | 4.48 | 7.48 | 1.37 | 0.58 | 9.38 | 8.00 | 0.50 | 9.04 | 9.20 | 12.36 | 10.93 | 0.36 | 8.23 | 8.26 | 5.36 | 5.12 | 3.56 | 1.51 | 0.77 |
| 2014 | 14.25 | 14.56 | 0.22 | 2.77 | 4.65 | 7.65 | 1.44 | 0.53 | 9.61 | 8.17 | 0.67 | 9.76 | 8.37 | 10.12 | 12.29 | 0.35 | 7.48 | 7.57 | 9.29 | 10.38 | 4.01 | 1.74 | 0.87 |
| 2015 | 13.02 | 13.42 | 0.22 | 2.60 | 4.62 | 7.45 | 1.50 | 0.52 | 9.41 | 7.91 | 0.41 | 9.25 | 9.86 | 9.85 | 12.33 | 0.37 | 9.00 | 9.14 | 9.42 | 10.17 | 3.98 | 1.58 | 0.93 |
| 2016 | 13.42 | 13.84 | 0.24 | 2.61 | 4.38 | 7.23 | 1.50 | 0.51 | 9.28 | 7.78 | 0.28 | 9.29 | 9.84 | 9.62 | 12.82 | 0.38 | 9.00 | 9.12 | 9.91 | 9.62 | 4.31 | 1.93 | 0.93 |
| 2017 | 16.30 | 16.77 | 0.24 | 2.51 | 4.03 | 6.78 | 1.50 | 0.52 | 8.73 | 7.23 | -0.27 | 8.62 | 10.04 | 10.18 | 14.66 | 0.41 | 9.00 | 9.15 | 11.40 | 11.90 | 4.71 | 2.04 | 1.01 |
| 2018 | 8.44 | 8.65 | 0.24 | 2.63 | 4.27 | 7.14 | 1.49 | 0.52 | 9.12 | 7.62 | 0.12 | 9.24 | 9.83 | 9.87 | 11.03 | 0.39 | 9.00 | 9.16 | 5.46 | 4.61 | 4.54 | 2.07 | 0.93 |
| 2019 | 17.72 | 18.39 | 0.23 | 2.49 | 3.84 | 6.57 | 1.50 | 0.52 | 8.51 | 7.01 | -0.49 | 8.89 | 10.06 | 10.26 | 13.28 | 0.36 | 9.00 | 9.24 | 11.79 | 12.95 | 4.62 | 2.08 | 0.97 |
| 2020 | 9.56 | 9.69 | 0.26 | 2.47 | 4.06 | 6.79 | 1.43 | 0.53 | 8.78 | 7.35 | -0.15 | 8.26 | 9.10 | 10.28 | 11.37 | 0.37 | 8.23 | 8.42 | 6.54 | 5.85 | 4.85 | 2.16 | 1.12 |
| 2021 | 7.82 | | 0.24 | 2.43 | 4.40 | 7.07 | 1.46 | 0.50 | 9.14 | 7.69 | 0.19 | 9.36 | 8.98 | 9.02 | 7.26 | 0.28 | 8.23 | 8.28 | 4.06 | 3.50 | 3.93 | 1.80 | 0.83 |
| 2022 | 10.11 | | 0.22 | 2.01 | 4.42 | 6.66 | 1.45 | 0.50 | 8.74 | 7.29 | -0.21 | 8.90 | 7.85 | 7.33 | 5.80 | 0.20 | 7.00 | 7.07 | 6.11 | 6.08 | 4.05 | 1.85 | 0.91 |
| 2023 | 17.39 | | 0.19 | 1.89 | 3.70 | 5.78 | 0.00 | 0.48 | 7.44 | 7.44 | -0.06 | 7.63 | 9.58 | 8.87 | 8.79 | 0.23 | 8.58 | 8.73 | 12.04 | 13.42 | 4.71 | 2.30 | 1.05 |
| 2024 | 12.13 | | 0.21 | 1.93 | 3.94 | 6.09 | 1.45 | 0.45 | 7.85 | 6.40 | -1.10 | 7.63 | 8.23 | 8.71 | 9.14 | 0.27 | 7.48 | 7.55 | 8.13 | 7.98 | 4.47 | 1.92 | 1.15 |
| 2025 | | | | | | 0.00 | | 0.43 | | 0.00 | -7.50 | 7.87 | 8.13 | 8.22 | 6.75 | 0.24 | 7.48 | 7.50 | 5.14 | 4.69 | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2026 | | 0.00 | | 0.00 | -7.50 | 1.63 | 2.87 | 8.86 | 5.97 | 0.06 | 2.48 | 2.48 | 1.70 | 1.80 | |

| WY | NM | AZ_ | GC Inflow | Mead Elevation | Powell Elevation | Salton Elevation | Salton Inflow | Alamo River | New River | White water |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1093.49 | 3491.69 | | 1.08 | 0.61 | 0.40 | 0.08 |
| | | | | 1124.79 | 3530.12 | | 0.97 | 0.54 | 0.35 | 0.08 |
| | | | | 1127.59 | 3529.46 | | 1.04 | 0.58 | 0.38 | 0.08 |
| | | | | 1130.20 | 3528.49 | | 1.10 | 0.63 | 0.39 | 0.08 |
| | | | | 1136.44 | 3545.35 | | 1.07 | 0.60 | 0.39 | 0.08 |
| | | | | 1146.86 | 3573.32 | | 1.06 | 0.60 | 0.38 | 0.09 |
| | | | | 1152.58 | 3598.87 | | 1.07 | 0.61 | 0.39 | 0.08 |
| 0.37 | 0.19 | 0.01 | | 1153.61 | 3614.25 | | 1.16 | 0.67 | 0.42 | 0.08 |
| 0.36 | 0.20 | 0.01 | | 1158.49 | 3603.40 | | 1.16 | 0.65 | 0.41 | 0.09 |
| 0.35 | 0.31 | 0.01 | | 1180.26 | 3646.02 | | 1.16 | 0.63 | 0.43 | 0.10 |
| 0.42 | 0.20 | 0.02 | | 1173.99 | 3651.73 | | 1.22 | 0.69 | 0.44 | 0.09 |
| 0.33 | 0.29 | 0.02 | | 1180.10 | 3668.06 | | 1.20 | 0.67 | 0.43 | 0.09 |
| 0.32 | 0.29 | 0.03 | | 1179.40 | 3664.00 | | 1.23 | 0.67 | 0.44 | 0.11 |
| 0.23 | 0.22 | 0.03 | | 1180.48 | 3636.70 | | 1.14 | 0.62 | 0.42 | 0.10 |
| 0.36 | 0.32 | 0.03 | | 1185.43 | 3640.17 | | 1.06 | 0.59 | 0.38 | 0.09 |
| 0.36 | 0.42 | 0.03 | | 1195.30 | 3678.10 | | 1.17 | 0.63 | 0.45 | 0.10 |
| 0.36 | 0.42 | 0.04 | | 1204.92 | 3687.78 | | 1.20 | 0.64 | 0.45 | 0.10 |
| 0.35 | 0.28 | 0.04 | | 1192.67 | 3671.96 | | 1.16 | 0.62 | 0.45 | 0.09 |
| 0.34 | 0.41 | 0.04 | | 1198.96 | 3687.27 | | 1.03 | 0.54 | 0.40 | 0.09 |
| 0.35 | 0.41 | 0.04 | | 1218.21 | 3698.86 | | 1.17 | 0.61 | 0.46 | 0.10 |
| 0.32 | 0.38 | 0.04 | | 1210.06 | 3695.91 | | 1.19 | 0.60 | 0.51 | 0.08 |
| 0.35 | 0.38 | 0.05 | | 1213.14 | 3685.66 | | 1.08 | 0.53 | 0.49 | 0.06 |
| 0.47 | 0.44 | 0.04 | | 1208.83 | 3689.62 | | 1.07 | 0.49 | 0.51 | 0.07 |
| 0.47 | 0.38 | 0.04 | | 1209.79 | 3687.95 | -228.10 | 1.07 | 0.51 | 0.50 | 0.06 |
| 0.56 | 0.35 | 0.04 | | 1199.16 | 3685.61 | -228.60 | 1.15 | 0.57 | 0.51 | 0.07 |
| 0.47 | 0.38 | 0.04 | | 1190.22 | 3665.20 | -228.60 | 1.12 | 0.60 | 0.46 | 0.07 |
| 0.52 | 0.39 | 0.04 | | 1180.02 | 3637.61 | -228.50 | 1.13 | 0.63 | 0.44 | 0.06 |
| 0.55 | 0.33 | 0.03 | | 1173.01 | 3628.62 | -228.50 | 1.10 | 0.62 | 0.42 | 0.06 |
| 0.54 | 0.29 | 0.04 | | 1174.44 | 3623.01 | -227.90 | 1.04 | 0.56 | 0.42 | 0.06 |
| 0.50 | 0.33 | 0.04 | | 1189.15 | 3662.52 | -227.60 | 1.14 | 0.60 | 0.47 | 0.07 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.61 | 0.31 | 0.04 | | 1178.40 | 3654.42 | -227.40 | 1.19 | 0.65 | 0.48 | 0.07 |
| 0.43 | 0.33 | 0.04 | | 1184.28 | 3687.10 | -227.80 | 1.15 | 0.62 | 0.46 | 0.06 |
| 0.65 | 0.31 | 0.03 | | 1190.84 | 3679.29 | -227.90 | 1.12 | 0.61 | 0.45 | 0.06 |
| 0.55 | 0.37 | 0.03 | | 1205.81 | 3690.32 | -227.80 | 1.17 | 0.65 | 0.46 | 0.05 |
| 0.50 | 0.36 | 0.04 | | 1214.78 | 3687.71 | -227.90 | 1.17 | 0.63 | 0.49 | 0.05 |
| 0.65 | 0.36 | 0.04 | | 1211.29 | 3691.59 | -228.20 | 1.15 | 0.61 | 0.49 | 0.05 |
| 0.60 | 0.30 | 0.04 | | 1196.72 | 3677.80 | -228.20 | 1.16 | 0.64 | 0.47 | 0.05 |
| 0.65 | 0.37 | 0.04 | | 1177.96 | 3664.84 | -228.60 | 1.15 | 0.64 | 0.46 | 0.05 |
| 0.52 | 0.28 | 0.04 | | 1155.42 | 3626.53 | -228.70 | 1.14 | 0.65 | 0.44 | 0.05 |
| 0.57 | 0.35 | 0.04 | | 1142.12 | 3603.73 | -229.30 | 1.06 | 0.60 | 0.41 | 0.04 |
| 0.49 | 0.37 | 0.04 | | 1125.86 | 3570.77 | -229.00 | 1.07 | 0.60 | 0.42 | 0.05 |
| 0.61 | 0.44 | 0.04 | | 1138.36 | 3601.97 | -229.50 | 1.10 | 0.60 | 0.46 | 0.05 |
| 0.60 | 0.37 | 0.04 | | 1125.36 | 3601.74 | -229.90 | 1.08 | 0.61 | 0.43 | 0.04 |
| 0.60 | 0.40 | 0.04 | 0.80 | 1111.06 | 3601.87 | -230.40 | 1.10 | 0.63 | 0.43 | 0.04 |
| 0.59 | 0.43 | 0.03 | 0.89 | 1105.76 | 3626.90 | -231.30 | 1.02 | 0.58 | 0.39 | 0.05 |
| 0.53 | 0.42 | 0.04 | 0.90 | 1093.68 | 3635.37 | -231.90 | 0.95 | 0.53 | 0.38 | 0.04 |
| 0.68 | 0.37 | 0.03 | 1.07 | 1083.81 | 3633.66 | -232.00 | 0.99 | 0.57 | 0.40 | 0.03 |
| 0.56 | 0.39 | 0.03 | 0.74 | 1116.04 | 3653.01 | -232.20 | 1.06 | 0.61 | 0.42 | 0.03 |
| 0.61 | 0.39 | 0.03 | 0.77 | 1115.16 | 3621.56 | -232.60 | 1.11 | 0.67 | 0.42 | 0.03 |
| 0.53 | 0.30 | 0.03 | 0.93 | 1106.92 | 3591.25 | -233.80 | 1.00 | 0.58 | 0.39 | 0.03 |
| 0.58 | 0.35 | 0.03 | 0.80 | 1081.33 | 3605.53 | -234.60 | 1.00 | 0.56 | 0.40 | 0.04 |
| 0.63 | 0.34 | 0.03 | 0.73 | 1078.10 | 3606.01 | -235.80 | 0.94 | 0.53 | 0.37 | 0.04 |
| 0.60 | 0.34 | 0.03 | 0.72 | 1075.23 | 3610.93 | -236.30 | 1.04 | 0.56 | 0.43 | 0.05 |
| 0.65 | 0.46 | 0.03 | 0.89 | 1082.05 | 3628.31 | -237.10 | 0.97 | 0.53 | 0.40 | 0.04 |
| 0.71 | 0.35 | 0.03 | 0.67 | 1078.29 | 3592.27 | -237.70 | 0.98 | 0.57 | 0.36 | 0.05 |
| 0.65 | 0.43 | 0.03 | 0.82 | 1083.00 | 3615.36 | -238.40 | 0.94 | 0.56 | 0.32 | 0.05 |
| 0.73 | 0.39 | 0.01 | 0.68 | 1083.21 | 3595.98 | -239.20 | 0.91 | 0.54 | 0.32 | 0.05 |
| 0.59 | 0.35 | 0.01 | 0.70 | 1067.68 | 3545.36 | -239.90 | 0.97 | 0.58 | 0.34 | 0.05 |
| 0.67 | 0.35 | 0.01 | 0.79 | 1045.03 | 3529.33 | -240.80 | 0.95 | 0.57 | 0.34 | 0.05 |
| 0.59 | 0.42 | 0.01 | 0.85 | 1065.82 | 3573.57 | -242.10 | 0.88 | 0.54 | 0.30 | 0.04 |
| 0.69 | 0.35 | 0.01 | 0.68 | 1063.71 | 3578.08 | -243.40 | 0.81 | 0.49 | 0.28 | 0.04 |
| | | | 0.63 | 1057.25 | 3544.69 | -243.13 | 0.80 | 0.49 | 0.27 | 0.04 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.39 | 1066.14 | 3532.18 | | 0.27 | 0.15 | 0.09 | 0.02 |

| Year | iii(c) | = | Natural | - ( | LOWER CU | + | UPPER CU | ) | MX TREA | Hoover |
|---|---|---|---|---|---|---|---|---|---|---|
| 1964 | 4.48 | = | 10.70 | - ( | 6.22 | + | 0.00 | ) | 0.00 | 0.00 |
| 1965 | 14.91 | = | 20.84 | - ( | 5.93 | + | 0.00 | ) | 1.50 | 0.00 |
| 1966 | 5.04 | = | 11.23 | - ( | 6.20 | + | 0.00 | ) | 1.50 | 7.78 |
| 1967 | 6.33 | = | 12.29 | - ( | 5.96 | + | 0.00 | ) | 1.50 | 7.93 |
| 1968 | 8.19 | = | 14.39 | - ( | 6.20 | + | 0.00 | ) | 1.50 | 7.84 |
| 1969 | 9.82 | = | 15.89 | - ( | 6.07 | + | 0.00 | ) | 1.50 | 7.89 |
| 1970 | 9.37 | = | 15.63 | - ( | 6.25 | + | 0.00 | ) | 1.50 | 8.02 |
| 1971 | 5.17 | = | 15.35 | - ( | 6.52 | + | 3.66 | ) | 1.50 | 8.16 |
| 1972 | 3.34 | = | 13.59 | - ( | 6.51 | + | 3.74 | ) | 1.50 | 8.10 |
| 1973 | 8.86 | = | 19.18 | - ( | 6.68 | + | 3.64 | ) | 1.50 | 8.30 |
| 1974 | 2.32 | = | 13.22 | - ( | 6.83 | + | 4.06 | ) | 1.50 | 8.73 |
| 1975 | 6.49 | = | 16.79 | - ( | 6.41 | + | 3.89 | ) | 1.50 | 8.37 |
| 1976 | 1.82 | = | 11.60 | - ( | 6.03 | + | 3.75 | ) | 1.50 | 7.93 |
| 1977 | -3.58 | = | 5.94 | - ( | 6.40 | + | 3.12 | ) | 1.50 | 7.87 |
| 1978 | 6.51 | = | 16.32 | - ( | 5.81 | + | 4.00 | ) | 1.50 | 7.48 |
| 1979 | 8.85 | = | 18.92 | - ( | 6.00 | + | 4.07 | ) | 1.70 | 7.72 |
| 1980 | 9.01 | = | 19.15 | - ( | 6.04 | + | 4.10 | ) | 1.70 | 11.09 |
| 1981 | -.79 | = | 9.64 | - ( | 6.32 | + | 4.12 | ) | 1.70 | 8.28 |
| 1982 | 8.31 | = | 18.12 | - ( | 5.64 | + | 4.16 | ) | 1.50 | 7.45 |
| 1983 | 15.36 | = | 24.84 | - ( | 5.39 | + | 4.09 | ) | 1.70 | 19.07 |
| 1984 | 15.58 | = | 25.46 | - ( | 5.89 | + | 3.99 | ) | 1.70 | 21.41 |
| 1985 | 10.73 | = | 21.98 | - ( | 6.98 | + | 4.26 | ) | 1.70 | 17.21 |
| 1986 | 11.97 | = | 23.36 | - ( | 7.16 | + | 4.23 | ) | 1.70 | 17.55 |
| 1987 | 4.49 | = | 16.37 | - ( | 7.59 | + | 4.29 | ) | 1.70 | 11.33 |
| 1988 | -.49 | = | 12.16 | - ( | 7.96 | + | 4.70 | ) | 1.70 | 9.42 |
| 1989 | -2.89 | = | 10.20 | - ( | 8.38 | + | 4.71 | ) | 1.50 | 9.23 |
| 1990 | -2.87 | = | 9.97 | - ( | 8.43 | + | 4.41 | ) | 1.50 | 9.20 |
| 1991 | 1.13 | = | 13.09 | - ( | 7.79 | + | 4.17 | ) | 1.50 | 8.95 |
| 1992 | 1.04 | = | 12.23 | - ( | 7.32 | + | 3.86 | ) | 1.50 | 7.83 |
| 1993 | 9.26 | = | 21.36 | - ( | 7.98 | + | 4.12 | ) | 1.50 | 7.44 |
| 1994 | -1.73 | = | 11.06 | - ( | 8.34 | + | 4.45 | ) | 1.50 | 9.35 |
| 1995 | 9.22 | = | 21.33 | - ( | 8.15 | + | 3.96 | ) | 1.50 | 8.54 |
| 1996 | .95 | = | 14.55 | - ( | 9.13 | + | 4.48 | ) | 1.50 | 9.97 |
| 1997 | 8.78 | = | 22.04 | - ( | 9.21 | + | 4.05 | ) | 1.70 | 11.67 |
| 1998 | 4.48 | = | 17.41 | - ( | 8.72 | + | 4.21 | ) | 1.70 | 12.77 |
| 1999 | 2.78 | = | 16.38 | - ( | 9.11 | + | 4.49 | ) | 1.70 | 11.03 |
| 2000 | -3.13 | = | 10.81 | - ( | 9.16 | + | 4.78 | ) | 1.70 | 10.69 |
| 2001 | -3.03 | = | 11.17 | - ( | 9.25 | + | 4.94 | ) | 1.50 | 10.21 |
| 2002 | -7.19 | = | 6.21 | - ( | 9.41 | + | 3.99 | ) | 1.50 | 10.45 |
| 2003 | -1.58 | = | 10.90 | - ( | 8.22 | + | 4.27 | ) | 1.50 | 9.38 |
| 2004 | -1.33 | = | 10.63 | - ( | 8.02 | + | 3.94 | ) | 1.50 | 9.34 |
| 2005 | 6.76 | = | 18.82 | - ( | 7.73 | + | 4.34 | ) | 1.50 | 8.27 |
| 2006 | 1.44 | = | 13.72 | - ( | 8.05 | + | 4.23 | ) | 1.50 | 9.26 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | -.80 | = | 11.72 | - ( | 8.05 | + | 4.47 | ) | 1.50 | 9.36 |
| 2008 | 3.92 | = | 16.51 | - ( | 8.10 | + | 4.49 | ) | 1.50 | 9.55 |
| 2009 | 1.83 | = | 14.29 | - ( | 7.99 | + | 4.47 | ) | 1.50 | 9.48 |
| 2010 | 1.22 | = | 13.53 | - ( | 7.90 | + | 4.40 | ) | 1.50 | 9.45 |
| 2011 | 8.51 | = | 20.85 | - ( | 7.89 | + | 4.44 | ) | 1.45 | 9.21 |
| 2012 | -4.34 | = | 8.34 | - ( | 8.05 | + | 4.62 | ) | 1.37 | 9.39 |
| 2013 | -1.32 | = | 10.30 | - ( | 8.06 | + | 3.56 | ) | 1.37 | 9.38 |
| 2014 | 2.37 | = | 14.56 | - ( | 8.18 | + | 4.01 | ) | 1.44 | 9.61 |
| 2015 | 1.48 | = | 13.42 | - ( | 7.96 | + | 3.98 | ) | 1.50 | 9.41 |
| 2016 | 1.79 | = | 13.84 | - ( | 7.74 | + | 4.31 | ) | 1.50 | 9.28 |
| 2017 | 4.76 | = | 16.77 | - ( | 7.30 | + | 4.71 | ) | 1.50 | 8.73 |
| 2018 | -3.55 | = | 8.65 | - ( | 7.66 | + | 4.54 | ) | 1.49 | 9.12 |
| 2019 | 6.67 | = | 18.39 | - ( | 7.09 | + | 4.62 | ) | 1.50 | 8.51 |
| 2020 | -2.48 | = | 9.69 | - ( | 7.32 | + | 4.85 | ) | 1.43 | 8.78 |
| 2021 | -3.68 | = | 7.82 | - ( | 7.57 | + | 3.93 | ) | 1.46 | 9.14 |
| 2022 | -1.10 | = | 10.11 | - ( | 7.16 | + | 4.05 | ) | 1.45 | 8.74 |
| 2023 | 6.43 | = | 17.39 | - ( | 6.25 | + | 4.71 | ) | 0.00 | 7.44 |
| 2024 | 1.12 | = | 12.13 | - ( | 6.54 | + | 4.47 | ) | 1.45 | 7.85 |
| 2025 | -.43 | = | | ( | 0.43 | + | 0.00 | ) | 0.00 | 0.00 |
| 2026 | .00 | = | | ( | 0.00 | + | 0.00 | ) | 0.00 | 0.00 |

# A New Era of Cooperation

# Colorado River Compact EIS Comments

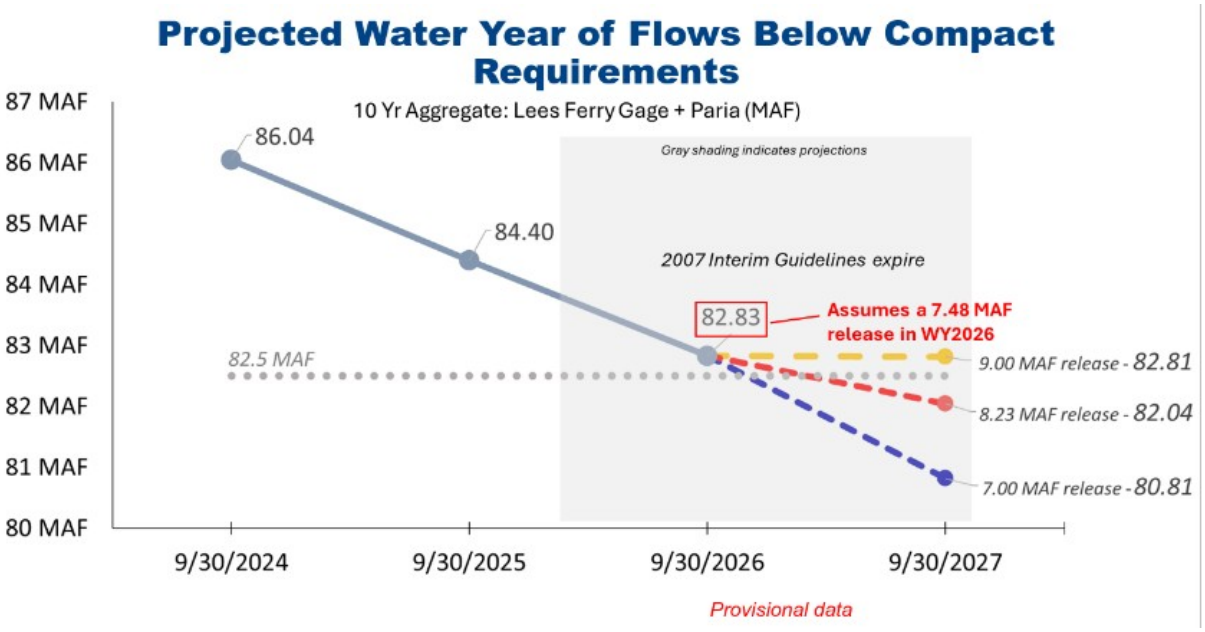
Prepared by: Ed Millard

Water Policy Advisor to Colorado Rep. Larry Don Suckla

Date: Mar 2, 2026

Version 1.3f

Living Document, Work in Progress, Don't Sue Me, Join Me



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## Colorado River Foundational Principles, What do we fight for. V0.5

- **The Colorado River system has to work**. It needs to be in balance and sustainable, **For the river to work the math has to work**. There may be difficult choices ahead to achieve that end.
- **Water is life, so is food. Without agriculture, no cities, no civilization.**
- **Valuable ecosystems are precious.** They must get enough water to thrive. Once they are lost they are hard to recover. Conversely, marginal ecosystems shouldn't use NEPA to drag down the entire system.
- **Cities must have adequate clean water** for health and safety, drinking, cooking, bathing and fire suppression. Cities need green space, parks, swimming pools and even golf courses to be livable. Conversely, finding the balance between enough outdoor water use and too much is the challenge.
- **Rural communities have value too.** Not everyone wants to live in a city. The adverse consequences of fallowing need to be avoided.
- **The United States must retain the ability to feed itself**. In a tumultuous world, if we lose that ability, and the rest of the world chooses not to, we starve.
- **Good farm land is priceless**. The best, most productive farmland, which is at the nexus of an ideal Ag economy is **invaluable**. It must be protected and improved, not fallowed and lost. Once good farm land is lost its hard to recover.
- **Good farmers and ranchers are invaluable, especially young ones.** They must be encouraged, assisted and protected, not driven out of the life they love by an unappreciative world.
- **Water speculation must be discouraged** without compromising free markets.
- **Litigation is the last resort of the desperate.** Article VI, the non litigious, cooperative path must come first. The Upper Basin can no longer succumb to litigation threats. School yard bully rules apply. We may lose but we will fight.
- **The Upper Basin must not be sacrificed** because it can't compete with the ideal conditions in the Lower Basin. The price the Lower Basin paid to get the high dam that creates those ideal conditions was the Colorado River Compact and the obscure wall between the two basins in Article III(a):

    *(a) There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin, respectively, the **exclusive beneficial consumptive use** of 7,500,000 acre-feet of water…*

Before the high dam the Lower Colorado flooded in the spring and went dry in the Winter, the Winter agriculture which now makes the Lower Basin special wasn't there. The high dam provided the power and water that made its cities thrive. To reiterate, "The Wall" in Article iii(a) was the price and it must stand. No inter basin markets.

## Disclaimer

**Disclaimer: I, Ed Millard, am a knowledgeable citizen but I do not speak for Colorado or the UCRC. I do not work for the State of Colorado. I am an informal water policy advisor to Colorado Representative Larry Don Suckla who represents counties in Southwestern Colorado and have been for more than a decade. I am not a lawyer. I an not a Professional Engineer. I am concerned the current doom loop in the Colorado River will not end well for anyone. There are many legal arguments in this paper, they should in no way be treated as actual legal threats or basis for actual litigation even if they sound that way. They are provided purely to spark conversation about and better understanding of these complex issues among people who are not lawyers.**

## Operations, Accounting and NEPA

### Colorado River System Accounting

**For the river to work the math has to work.**

#### Gila River Accounting Transparency

It is imperative USBR establish uniform transparency in water accounting under the Article II definition of the Colorado River System which includes the Gila River and its tributaries:

> *(a) The term "Colorado River System" means that portion of the Colorado River and its tributaries within the United States of America*

With the possibility of future litigation and alteration of how the Compact works this unfortunate black hole in system accounting needs to be remedied. The Gila and its tributaries should have the same consumptive use, loss and natural flow accounting as the rest of the system. This data is essential for litigation and to understand the math.

#### The Math Dataset

Below is Table 1 which is a first attempt to collect all of the essential Colorado River System data, in one place to understand the math, as far back as is available. This a Foundational Principle. The table is not verified, it is a daunting task to verify it, make it easier to understand and finish. Ideally USBR can take over this role so there is a trusted standard dataset where we can all go to get this data in an easily accessible

way without having to write all this code or collect it ourselves.  We all need to understand the math, this is a way to do that.

## Table 1 – The Math

The data below is not validated. Treat it as a straw man for an essential data set we all need to understand the math of this system.  This data comes from multiple disparate sources.  It was very hard to assemble and will be hard to validate.  Do not trust it or use it in anything important, at least yet.

This data is a work in progress.  It is a living document. Always use the latest version of the spreadsheet found here:

https://www.varuna.io/LOTR/Colorado_River_Math.xlsx

Some data, USBR RISE and USGS, are still on Water Year, Oct 1.  Everything has to migrate to Calendar year to match the Compact accounting standard

The Bureau doesn't provide up to date provisional data for Natural Flow at the border which is needed for III(c) calculations below.  This goes only to 2020, we have to use the Lee's Ferry provisional natural flow after that which is inherently low.

| Year | Natural Lees | Natural Border | NV | AZ | CA | Lower Basin | Mexico | Mead Evaporat | Hoover Release | Hv-Mx | Diff 7.5 | Hoover USGS | Diamond Creek | Mead | Powell | Powell Evaporat | Glen Canyon | Lees Ferry | Inflow | Inflow Unregul | Upper Basin | CO | UT | WY | NM | AZ_ | GC Inflow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1964 | 10.41 | 10.70 | 0.03 | 1.13 | 5.06 | 6.22 | | | | 0.00 | -7.50 | 8.23 | | 11.62 | 4.10 | 0.07 | 2.41 | 2.41 | 6.65 | 7.49 | | | | | | | |
| 1965 | 19.42 | 20.84 | 0.02 | 1.01 | 4.90 | 5.93 | 1.50 | | | -1.50 | -9.00 | 7.92 | | 14.71 | 6.26 | 0.17 | 10.82 | 10.82 | 13.70 | 15.05 | | | | | | | |
| 1966 | 10.16 | 11.23 | 0.03 | 1.07 | 5.10 | 6.20 | 1.50 | | 7.78 | 6.28 | -1.22 | 7.77 | | 15.00 | 6.22 | 0.22 | 7.85 | 7.85 | 8.55 | 8.69 | | | | | | | |
| 1967 | 11.51 | 12.29 | 0.03 | 1.04 | 4.89 | 5.96 | 1.50 | | 7.93 | 6.43 | -1.07 | 7.83 | | 14.38 | 6.16 | 0.19 | 7.80 | 7.80 | 8.25 | 8.98 | | | | | | | |
| 1968 | 13.65 | 14.39 | 0.03 | 1.10 | 5.07 | 6.20 | 1.50 | | 7.84 | 6.34 | -1.16 | 7.83 | | 15.02 | 7.27 | 0.21 | 8.33 | 8.33 | 9.93 | 10.32 | | | | | | | |
| 1969 | 14.92 | 15.89 | 0.04 | 1.14 | 4.90 | 6.07 | 1.50 | | 7.89 | 6.39 | -1.11 | 7.99 | | 16.13 | 9.39 | 0.27 | 8.82 | 8.82 | 11.51 | 11.52 | | | | | | | |
| 1970 | 14.95 | 15.63 | 0.04 | 1.20 | 5.02 | 6.25 | 1.50 | | 8.02 | 6.52 | -0.98 | 7.89 | | 16.77 | 11.65 | 0.32 | 8.67 | 8.67 | 11.76 | 11.99 | | | | | | | |
| 1971 | 14.90 | 15.35 | 0.05 | 1.30 | 5.17 | 6.52 | 1.50 | | 8.16 | 6.66 | -0.84 | 8.22 | | 16.89 | 13.17 | 0.38 | 8.59 | 8.59 | 11.04 | 11.80 | 3.66 | 1.85 | 0.77 | 0.37 | 0.19 | 0.01 | |
| 1972 | 13.11 | 13.59 | 0.08 | 1.20 | 5.23 | 6.51 | 1.50 | | 8.10 | 6.60 | -0.90 | 8.27 | | 17.45 | 12.09 | 0.39 | 9.31 | 9.31 | 8.80 | 9.33 | 3.74 | 1.91 | 0.79 | 0.36 | 0.20 | 0.01 | |
| 1973 | 18.04 | 19.18 | 0.09 | 1.27 | 5.32 | 6.68 | 1.50 | | 8.30 | 6.80 | -0.70 | 7.94 | | 20.18 | 16.74 | 0.42 | 10.11 | 10.11 | 15.40 | 15.97 | 3.64 | 1.66 | 0.77 | 0.35 | 0.31 | 0.01 | |
| 1974 | 12.91 | 13.22 | 0.09 | 1.33 | 5.41 | 6.83 | 1.50 | | 8.73 | 7.23 | -0.27 | 8.85 | | 19.36 | 17.44 | 0.52 | 8.27 | 8.27 | 9.99 | 9.97 | 4.06 | 2.00 | 0.81 | 0.42 | 0.20 | 0.02 | |
| 1975 | 16.49 | 16.79 | 0.07 | 1.36 | 4.98 | 6.41 | 1.50 | | 8.37 | 6.87 | -0.63 | 8.37 | | 20.15 | 19.58 | 0.54 | 9.26 | 9.26 | 12.37 | 13.10 | 3.89 | 1.93 | 0.67 | 0.33 | 0.29 | 0.02 | |
| 1976 | 11.07 | 11.60 | 0.07 | 1.25 | 4.71 | 6.03 | 1.50 | | 7.93 | 6.43 | -1.07 | 8.32 | | 20.06 | 19.03 | 0.56 | 8.48 | 8.48 | 8.71 | 8.43 | 3.75 | 1.79 | 0.66 | 0.32 | 0.29 | 0.03 | |
| 1977 | 5.46 | 5.94 | 0.07 | 1.23 | 5.10 | 6.40 | 1.50 | | 7.87 | 6.37 | -1.13 | 7.56 | | 20.20 | 15.62 | 0.51 | 8.26 | 8.26 | 5.48 | 3.53 | 3.12 | 1.67 | 0.41 | 0.23 | 0.22 | 0.03 | |
| 1978 | 15.12 | 16.32 | 0.07 | 1.23 | 4.50 | 5.81 | 1.50 | | 7.48 | 5.98 | -1.52 | 7.68 | | 20.87 | 16.03 | 0.47 | 8.35 | 8.35 | 9.45 | 11.06 | 4.00 | 2.04 | 0.70 | 0.36 | 0.32 | 0.03 | |
| 1979 | 17.38 | 18.92 | 0.06 | 1.15 | 4.79 | 6.00 | 1.70 | | 7.72 | 6.02 | -1.48 | 7.39 | | 22.24 | 20.99 | 0.54 | 8.30 | 8.30 | 14.20 | 14.19 | 4.07 | 1.87 | 0.75 | 0.36 | 0.42 | 0.03 | |
| 1980 | 17.40 | 19.15 | 0.09 | 1.22 | 4.73 | 6.04 | 1.70 | | 11.09 | 9.39 | 1.89 | 9.96 | | 23.64 | 22.42 | 0.63 | 10.91 | 10.91 | 12.85 | 13.68 | 4.10 | 1.85 | 0.71 | 0.36 | 0.42 | 0.04 | |
| 1981 | 8.96 | 9.64 | 0.11 | 1.42 | 4.80 | 6.32 | 1.70 | | 8.28 | 6.58 | -0.92 | 9.83 | | 21.87 | 20.12 | 0.61 | 8.30 | 8.30 | 6.41 | 5.64 | 4.12 | 2.12 | 0.65 | 0.35 | 0.28 | 0.04 | |
| 1982 | 17.27 | 18.12 | 0.10 | 1.24 | 4.30 | 5.64 | 1.50 | | 7.45 | 5.95 | -1.55 | 7.39 | | 22.77 | 22.34 | 0.60 | 8.30 | 8.30 | 11.31 | 12.77 | 4.16 | 2.06 | 0.62 | 0.34 | 0.41 | 0.04 | |
| 1983 | 23.57 | 24.84 | 0.09 | 1.06 | 4.25 | 5.39 | 1.70 | | 19.07 | 17.37 | 9.87 | 14.75 | | 25.66 | 24.14 | 0.67 | 17.49 | 17.49 | 20.11 | 20.37 | 4.09 | 1.92 | 0.59 | 0.35 | 0.41 | 0.04 | |
| 1984 | 24.35 | 25.46 | 0.10 | 1.12 | 4.68 | 5.89 | 1.70 | | 21.41 | 19.71 | 12.21 | 22.21 | | 24.41 | 23.67 | 0.66 | 20.50 | 20.50 | 20.65 | 20.85 | 3.99 | 1.87 | 0.63 | 0.32 | 0.38 | 0.04 | |
| 1985 | 21.04 | 21.98 | 0.10 | 1.19 | 4.78 | 6.07 | 1.70 | 0.91 | 17.21 | 15.51 | 8.01 | 18.63 | | 24.88 | 22.10 | 0.65 | 19.09 | 19.09 | 18.04 | 17.52 | 4.26 | 2.00 | 0.75 | 0.35 | 0.38 | 0.05 | |
| 1986 | 22.98 | 23.36 | 0.11 | 1.36 | 4.80 | 6.27 | 1.70 | 0.88 | 17.55 | 15.85 | 8.35 | 17.21 | | 24.22 | 22.70 | 0.65 | 16.85 | 16.85 | 18.14 | 18.55 | 4.23 | 1.81 | 0.73 | 0.47 | 0.44 | 0.04 | |
| 1987 | 15.34 | 16.37 | 0.11 | 1.73 | 4.89 | 6.73 | 1.70 | 0.85 | 11.33 | 9.63 | 2.13 | 13.14 | | 24.36 | 22.44 | 0.65 | 13.43 | 13.43 | 13.80 | 13.38 | 4.29 | 1.89 | 0.77 | 0.47 | 0.38 | 0.04 | |
| 1988 | 11.21 | 12.16 | 0.13 | 1.92 | 5.04 | 7.09 | 1.70 | 0.87 | 9.42 | 7.72 | 0.22 | 9.69 | | 22.80 | 22.09 | 0.64 | 8.14 | 8.14 | 8.40 | 7.99 | 4.70 | 2.28 | 0.75 | 0.56 | 0.35 | 0.04 | |
| 1989 | 9.51 | 10.20 | 0.16 | 2.23 | 5.14 | 7.53 | 1.50 | 0.85 | 9.23 | 7.73 | 0.23 | 9.03 | | 21.53 | 19.18 | 0.59 | 8.01 | 7.98 | 5.47 | 5.94 | 4.71 | 2.40 | 0.76 | 0.47 | 0.38 | 0.04 | |
| 1990 | 9.37 | 9.97 | 0.18 | 2.26 | 5.22 | 7.66 | 1.50 | 0.78 | 9.20 | 7.70 | 0.20 | 9.26 | | 20.14 | 15.72 | 0.51 | 8.14 | 8.14 | 4.91 | 5.31 | 4.41 | 2.10 | 0.80 | 0.52 | 0.39 | 0.04 | |
| 1991 | 12.33 | 13.09 | 0.18 | 1.86 | 5.01 | 7.05 | 1.50 | 0.74 | 8.95 | 7.45 | -0.05 | 8.96 | | 19.23 | 14.70 | 0.45 | 8.12 | 8.12 | 7.47 | 8.80 | 4.17 | 1.87 | 0.86 | 0.55 | 0.33 | 0.03 | |
| 1992 | 10.96 | 12.23 | 0.18 | 1.91 | 4.55 | 6.63 | 1.50 | 0.69 | 7.83 | 6.33 | -1.17 | 8.01 | | 19.42 | 14.08 | 0.43 | 8.00 | 8.00 | 7.77 | 7.35 | 3.86 | 1.66 | 0.82 | 0.54 | 0.29 | 0.04 | |
| 1993 | 18.82 | 21.36 | 0.20 | 2.25 | 4.74 | 7.19 | 1.50 | 0.78 | 7.44 | 5.94 | -1.56 | 7.01 | | 21.38 | 18.82 | 0.49 | 8.10 | 8.10 | 13.71 | 14.44 | 4.12 | 1.79 | 0.86 | 0.50 | 0.33 | 0.04 | |
| 1994 | 10.62 | 11.06 | 0.23 | 2.15 | 5.17 | 7.55 | 1.50 | 0.79 | 9.35 | 7.85 | 0.35 | 9.41 | | 19.93 | 17.77 | 0.53 | 8.29 | 8.29 | 7.69 | 6.79 | 4.45 | 2.00 | 0.87 | 0.61 | 0.31 | 0.04 | |
| 1995 | 19.92 | 21.33 | 0.22 | 2.22 | 4.93 | 7.36 | 1.50 | 0.78 | 8.54 | 7.04 | -0.46 | 8.75 | | 20.71 | 22.31 | 0.57 | 9.22 | 9.22 | 14.70 | 15.91 | 3.96 | 1.65 | 0.84 | 0.43 | 0.33 | 0.04 | |
| 1996 | 14.23 | 14.55 | 0.25 | 2.71 | 5.32 | 8.29 | 1.50 | 0.84 | 9.97 | 8.47 | 0.97 | 10.08 | | 21.61 | 21.15 | 0.62 | 11.52 | 11.52 | 10.89 | 10.40 | 4.48 | 1.87 | 0.92 | 0.65 | 0.31 | 0.03 | |
| 1997 | 21.66 | 22.04 | 0.24 | 2.85 | 5.25 | 8.35 | 1.70 | 0.87 | 11.67 | 9.97 | 2.47 | 11.16 | | 23.77 | 22.80 | 0.62 | 13.82 | 13.85 | 16.22 | 17.05 | 4.05 | 1.60 | 0.78 | 0.55 | 0.37 | 0.03 | |
| 1998 | 16.69 | 17.41 | 0.25 | 2.57 | 5.05 | 7.86 | 1.70 | 0.86 | 12.77 | 11.07 | 3.57 | 11.97 | | 25.13 | 22.40 | 0.64 | 13.51 | 13.42 | 13.72 | 13.52 | 4.21 | 1.77 | 0.82 | 0.50 | 0.36 | 0.04 | |
| 1999 | 15.87 | 16.38 | 0.29 | 2.73 | 5.19 | 8.21 | 1.70 | 0.89 | 11.03 | 9.33 | 1.83 | 11.40 | | 24.59 | 23.00 | 0.64 | 11.20 | 11.41 | 12.48 | 12.80 | 4.49 | 1.79 | 0.93 | 0.65 | 0.36 | 0.04 | |
| 2000 | 10.55 | 10.81 | 0.32 | 2.80 | 5.16 | 8.29 | 1.70 | 0.88 | 10.69 | 8.99 | 1.49 | 10.98 | | 22.44 | 20.94 | 0.62 | 9.38 | 9.52 | 7.77 | 6.94 | 4.78 | 2.18 | 0.97 | 0.60 | 0.30 | 0.04 | |
| 2001 | 10.74 | 11.17 | 0.32 | 2.84 | 5.25 | 8.41 | 1.50 | 0.84 | 10.21 | 8.71 | 1.21 | 10.49 | | 19.87 | 19.13 | 0.57 | 8.24 | 8.34 | 6.86 | 6.99 | 4.94 | 2.21 | 1.04 | 0.65 | 0.37 | 0.04 | |
| 2002 | 6.09 | 6.21 | 0.33 | 2.97 | 5.37 | 8.66 | 1.50 | 0.74 | 10.45 | 8.95 | 1.45 | 10.50 | | 17.09 | 14.47 | 0.48 | 8.23 | 8.34 | 3.67 | 2.64 | 3.99 | 1.82 | 0.80 | 0.52 | 0.28 | 0.04 | |
| 2003 | 10.63 | 10.90 | 0.30 | 2.83 | 4.41 | 7.54 | 1.50 | 0.68 | 9.38 | 7.88 | 0.38 | 9.45 | | 15.62 | 12.11 | 0.39 | 8.23 | 8.36 | 6.07 | 6.16 | 4.27 | 1.97 | 0.89 | 0.57 | 0.35 | 0.04 | |
| 2004 | 10.07 | 10.63 | 0.28 | 2.78 | 4.32 | 7.38 | 1.50 | 0.64 | 9.34 | 7.84 | 0.34 | 9.64 | | 13.94 | 9.17 | 0.32 | 8.23 | 8.34 | 5.38 | 5.91 | 3.94 | 1.81 | 0.85 | 0.49 | 0.37 | 0.04 | |
| 2005 | 16.89 | 18.82 | 0.29 | 2.43 | 4.34 | 7.06 | 1.50 | 0.66 | 8.27 | 6.77 | -0.73 | 7.94 | | 15.22 | 11.94 | 0.32 | 8.23 | 8.36 | 11.55 | 12.79 | 4.34 | 1.82 | 1.00 | 0.61 | 0.44 | 0.04 | |
| 2006 | 13.50 | 13.72 | 0.29 | 2.78 | 4.34 | 7.41 | 1.50 | 0.64 | 9.26 | 7.76 | 0.26 | 9.39 | | 13.89 | 11.92 | 0.36 | 8.23 | 8.49 | 8.57 | 8.63 | 4.23 | 1.94 | 0.84 | 0.60 | 0.37 | 0.04 | |
| 2007 | 11.45 | 11.72 | 0.30 | 2.78 | 4.37 | 7.45 | 1.50 | 0.60 | 9.36 | 7.86 | 0.36 | 9.45 | 9.20 | 12.50 | 11.93 | 0.37 | 8.23 | 8.40 | 8.62 | 8.75 | 4.47 | 2.03 | 0.95 | 0.60 | 0.40 | 0.04 | 0.80 |
| 2008 | 16.00 | 16.51 | 0.27 | 2.75 | 4.50 | 7.52 | 1.50 | 0.58 | 9.55 | 8.05 | 0.55 | 9.53 | 10.06 | 12.01 | 14.51 | 0.40 | 8.98 | 9.16 | 12.16 | 12.09 | 4.49 | 2.09 | 0.85 | 0.59 | 0.43 | 0.03 | 0.89 |
| 2009 | 14.09 | 14.29 | 0.25 | 2.83 | 4.36 | 7.44 | 1.50 | 0.55 | 9.48 | 7.98 | 0.48 | 9.21 | 9.30 | 10.93 | 15.46 | 0.44 | 8.24 | 8.40 | 9.70 | 10.22 | 4.47 | 2.06 | 0.89 | 0.53 | 0.42 | 0.04 | 0.90 |
| 2010 | 12.71 | 13.53 | 0.24 | 2.78 | 4.35 | 7.37 | 1.50 | 0.54 | 9.45 | 7.95 | 0.45 | 9.26 | 9.48 | 10.09 | 15.27 | 0.44 | 8.23 | 8.42 | 8.47 | 8.43 | 4.40 | 1.83 | 0.95 | 0.68 | 0.37 | 0.03 | 1.07 |
| 2011 | 20.26 | 20.85 | 0.22 | 2.78 | 4.31 | 7.32 | 1.45 | 0.58 | 9.21 | 7.76 | 0.26 | 9.80 | 13.47 | 12.98 | 17.59 | 0.47 | 12.52 | 12.73 | 15.50 | 15.97 | 4.44 | 2.03 | 0.85 | 0.56 | 0.39 | 0.03 | 0.74 |
| 2012 | 7.89 | 8.34 | 0.24 | 2.79 | 4.42 | 7.44 | 1.37 | 0.61 | 9.39 | 8.02 | 0.52 | 9.42 | 10.30 | 13.13 | 13.93 | 0.45 | 9.47 | 9.53 | 5.96 | 4.91 | 4.62 | 2.16 | 0.92 | 0.61 | 0.39 | 0.03 | 0.77 |
| 2013 | 9.73 | 10.30 | 0.22 | 2.78 | 4.48 | 7.48 | 1.37 | 0.58 | 9.38 | 8.00 | 0.50 | 9.04 | 9.20 | 12.36 | 10.93 | 0.36 | 8.23 | 8.26 | 5.36 | 5.12 | 3.56 | 1.51 | 0.77 | 0.53 | 0.30 | 0.03 | 0.93 |
| 2014 | 14.25 | 14.56 | 0.22 | 2.77 | 4.65 | 7.65 | 1.44 | 0.53 | 9.61 | 8.17 | 0.67 | 9.76 | 8.37 | 10.12 | 12.29 | 0.35 | 7.48 | 7.57 | 9.29 | 10.38 | 4.01 | 1.74 | 0.87 | 0.58 | 0.35 | 0.03 | 0.80 |
| 2015 | 13.02 | 13.42 | 0.22 | 2.60 | 4.62 | 7.45 | 1.50 | 0.52 | 9.41 | 7.91 | 0.41 | 9.25 | 9.86 | 9.85 | 12.33 | 0.37 | 9.00 | 9.14 | 9.42 | 10.17 | 3.98 | 1.58 | 0.93 | 0.63 | 0.34 | 0.03 | 0.73 |
| 2016 | 13.42 | 13.84 | 0.24 | 2.61 | 4.38 | 7.23 | 1.50 | 0.51 | 9.28 | 7.78 | 0.28 | 9.29 | 9.84 | 9.62 | 12.82 | 0.38 | 9.00 | 9.12 | 9.91 | 9.62 | 4.31 | 1.93 | 0.93 | 0.60 | 0.34 | 0.03 | 0.72 |
| 2017 | 16.30 | 16.77 | 0.24 | 2.51 | 4.03 | 6.78 | 1.50 | 0.52 | 8.73 | 7.23 | -0.27 | 8.62 | 10.04 | 10.18 | 14.66 | 0.41 | 9.00 | 9.15 | 11.40 | 11.90 | 4.71 | 2.04 | 1.01 | 0.65 | 0.46 | 0.03 | 0.89 |
| 2018 | 8.44 | 8.65 | 0.24 | 2.63 | 4.27 | 7.14 | 1.49 | 0.52 | 9.12 | 7.62 | 0.12 | 9.24 | 9.83 | 9.87 | 11.03 | 0.39 | 9.00 | 9.16 | 5.46 | 4.61 | 4.54 | 2.07 | 0.93 | 0.71 | 0.35 | 0.03 | 0.67 |
| 2019 | 17.72 | 18.39 | 0.23 | 2.49 | 3.84 | 6.57 | 1.50 | 0.52 | 8.51 | 7.01 | -0.49 | 8.89 | 10.06 | 10.26 | 13.28 | 0.36 | 9.00 | 9.24 | 11.79 | 12.95 | 4.62 | 2.08 | 0.97 | 0.65 | 0.43 | 0.03 | 0.82 |
| 2020 | 9.56 | 9.69 | 0.26 | 2.47 | 4.06 | 6.79 | 1.43 | 0.53 | 8.78 | 7.35 | -0.15 | 8.26 | 9.10 | 10.28 | 11.37 | 0.37 | 8.23 | 8.42 | 6.54 | 5.85 | 4.85 | 2.16 | 1.12 | 0.73 | 0.39 | 0.01 | 0.68 |
| 2021 | 7.82 | | 0.24 | 2.43 | 4.40 | 7.07 | 1.46 | 0.50 | 9.14 | 7.69 | 0.19 | 9.36 | 8.98 | 9.02 | 7.26 | 0.28 | 8.23 | 8.28 | 4.06 | 3.50 | 3.93 | 1.80 | 0.83 | 0.59 | 0.35 | 0.01 | 0.70 |
| 2022 | 10.11 | | 0.22 | 2.01 | 4.42 | 6.66 | 1.45 | 0.50 | 8.74 | 7.29 | -0.21 | 8.90 | 7.85 | 7.33 | 5.80 | 0.20 | 7.00 | 7.07 | 6.11 | 6.08 | 4.05 | 1.85 | 0.91 | 0.67 | 0.35 | 0.01 | 0.79 |
| 2023 | 17.39 | | 0.19 | 1.89 | 3.70 | 5.78 | 0.00 | 0.48 | 7.44 | 7.44 | -0.06 | 7.63 | 9.58 | 8.87 | 8.79 | 0.23 | 8.58 | 8.73 | 12.04 | 13.42 | 4.71 | 2.30 | 1.05 | 0.59 | 0.42 | 0.01 | 0.85 |
| 2024 | 12.13 | | 0.21 | 1.93 | 3.94 | 6.09 | 1.45 | 0.45 | 7.85 | 6.40 | -1.10 | 7.63 | 8.23 | 8.71 | 9.14 | 0.27 | 7.48 | 7.55 | 8.13 | 7.98 | 4.47 | 1.92 | 1.15 | 0.69 | 0.35 | 0.01 | 0.68 |
| 2025 | | | | | | 0.00 | | 0.43 | | 0.00 | -7.50 | 7.87 | 8.13 | 8.22 | 6.75 | 0.24 | 7.48 | 7.50 | 5.14 | 4.69 | | | | | | | 0.63 |
| 2026 | | | | | | 0.00 | | | | 0.00 | -7.50 | 1.63 | 2.87 | 8.86 | 5.97 | 0.06 | 2.48 | 2.48 | 1.70 | 1.80 | | | | | | | 0.39 |

## Lower Basin Annual Report Accessibility

Ideally the Bureau should make all of its Lower Basin Annual Report data back to 1964 available in a similar machine accessible way, spreadsheets or CSV files. We've made a first attempt at this. Its pretty good but needs more verification and hasn't been updated since 2022. It would be better if the USBR provide this data as a standard, trusted service, not necessarily in this format, maybe you already have it, couldn't find it. Volunteers are welcome. I've been busy :)

Riverwar Lower Basin Annual Report CSV data

You need a special Python function to read these somewhat non standard CSV files, we need to fix this. The code is on github, it needs a lot of work to be usable by others. A user interface either by web or a cross platform app is needed to visualize and make this data more accessible to non programmers. There is some cross platform desktop code here used on another project.

## CRBFC Lake Powell Inflow Forecasts

With the increasingly dire state of Lake Powell infrastructure described below its imperative that Inflow forecasts be the best they can be. The margins are very thin protecting power head and maintaining Run of the River. Excessively optimistic forecasts could lead to releasing water that would be critical to infrastructure protection.

To this end we ask the Bureau establish a small, independent panel, to evaluate the performance of all relevant models at the end of runoff each year and rate them so we have a guide to which model to trust the most the following year. There may be different models which excel at drought years vs normal years so it may not be simple. Some models may only be available or excel in some sub-basins.

At the recent ASO seminar we were alarmed to hear that CRBFC was abandoning any effort to use ASO snow pack data in their model. We are aware there have been structural problems making this difficult. In basins where this data is available it would seem essential to better informing these critical forecasts.

We ask this panel to determine a way to either successfully integrate this data in the CRBFC model or to integrate ASO WRF-Hydro, or any other successful model, in the Powell inflow forecast. It might worth considering having a defined API under which any very successful model be integrated in this forecast, but this has to be done very carefully to preserves the forecasts integrity and avoid chaos.

The Bureau needs to identify, reward, use and promote models which excel and incentivize everyone to step up their game in these increasingly desperate times. Best

performing models need to be integrated into the critical forecast. Consideration should be given to creating financial incentives for the best Modelers to compete for and win this coveted role.

## Run-of-the-River Operations at Glen Canyon Dam

**Objective 1**: Lake Powell had real value to the Upper Basin in the 80's and 90's when there were surplus inflows stored there. Those days are over. Rather than appreciating and cherishing that precious reserve Arizona took it for granted. They used litigation threats and gaming to abuse it. Since 2007 it's become a liability to the Upper Basin as the Lower Basin drained it to mitigate a problem, the structural deficit, entirely of their making. Since Lake Powell is now being used to squeeze the Upper Basin for water instead of protect us it may be time to let it go.

**Objective 2**: The 2007 Interim Guidelines are "Interim" for a reason. When they were signed the Upper Basin knew they would fail, they wouldn't fix anything. They agreed to them only because threatened litigation was worse. Despite the Bureau's claims to the contrary, and in absence of a seven states compromise, we are relatively certain the only path forward is to revert to the Long Range Operating Criteria backed by Run of the River to protect the power head and turbines in Lake Powell, and this is OK. The Bureau has no authority to impose an arbitrary new alternative on the seven states though they do have the authority to protect their infrastructure and endangered fish.

**Objective 3:** We hope to counter inflammatory rhetoric, terms like "crashed river", "dancing with dead pool" and "turbines will stop turning" being used to pressure and rush stakeholders, like those of us in Colorado, into accepting deep cuts in our Compact water use. With Run of the River the river will instead be OK, not great, risky yes, but OK if managed carefully, very carefully.

As outlined in this 2024 Technical Memo the Bureau can not risk using bypass tubes to operate the Colorado River below Glen Canyon if they lose the power head at 3490'.

> Establishment of Interim Operating Guidance for Glen Canyon Dam
> Richard LaFond
> Date: 2024.03.27
> Director, Technical Service Center

The following page has the essential conclusions.

If water levels in Glen Canyon Dam drop below elevation 3,490 ft, releases can only pass through the river outlet works. Operation of the river outlet works at or below elevation 3,490 ft must consider the following risks and consequences:

- Safe operation of the river outlet works is controlled by submergence and discharge velocity. The original rating curves indicate that this is only possible down to elevation 3,394 ft (20 ft above the river outlet intake centerline elevation).
- If any portion of the river outlet works were to fail, releases would be limited or unavailable through that individual conduit until repairs are complete. Potential points of failure include:
    - Hollow-jet valve failure, which could include the physical valve, or any equipment required for operation of the valves.
    - Ring follower gate failure, which could include the physical gate, or any equipment required for operation of the gates.
    - Lining or conduit damage so severe the structural integrity of the conduit becomes a concern, and it is decided to close the ring follower gate to prevent further damage.
    - Intake trashrack blockage.
- Long term operation of the river outlet works will result in accelerating regular operation and maintenance tasks. This is perhaps accelerated even more so if the interim maximum flows shown in Table 1 are exceeded. These tasks include lining repairs and hollow-jet valve maintenance. During these times, discharge capacity will be reduced to only the available conduits.
- Operation of the river outlet works without powerplant releases will redistribute existing tailrace sediment, gravel and cobbles causing the size of an existing sediment-deposit to grow and potentially impound the powerplant draft tubes.
    - To prevent sediment from entering the draft tubes, bulkheads should be installed prior to releases through only the river outlet works.
    - Sediment that deposits against the draft tube bulkheads will need to be removed prior to lifting the bulkheads back into their storage positions.

In summary, at reservoir levels below the minimum power pool (elevation 3,490 ft), there are concerns with relying on the river outlet works as the sole means of sustained water releases from Glen Canyon Dam. If the situation were to occur, additional operational limits would be determined based on water needs at that time relative to the need to protect the conduits against cavitation damage and minimize stress placed on the hollow jet valves. Given the current uncertainty associated with long-term performance of the river outlet conduits and components, and tailrace scour and sedimentation deposit, it is recommended that Reclamation not rely on the river outlet works as the sole means for releasing water from Glen Canyon Dam as would be required at reservoir levels below the minimum power pool, elevation 3,490 ft.

The Bureau already has authority, in fact an obligation, to protect their infrastructure and endangered fish. Therefor, before Lake Powell loses its power head the Bureau needs to set a power head elevation they are going to defend, possibly 3510', 3500' is risky.

Reservoir coordination with Lake Mead and releases called for in whatever guidelines are in force will end and the Bureau will switch to Run of the River(ROTR), flow matching on an annualized basis:

Outflow = Inflow - Losses

Glen Canyon will be generating power and revenue though output will be limited by the low power head. This is better than the alternative, no power.

Fish have flows so their bellies aren't on the bottom of the river :) Fish experts like Jack Schmidt will need to weigh in on this flow regime. If bypass tubes are used and they fail after loss of power head flows could be lost in the Grand Canyon imperiling endangered fish. This is bad.

In Glen Canyon, at low head, I think one turbine needs 1,600–2,300 cfs (per Reclamation estimates). This equates to roughly 1.2–1.7 MAF. Another common figure used is a conservative 2.3 MAF for one year's operation. As spring runoff winds down the Bureau must insure there will be enough water in the lake to reach the start of the next Spring runoff. The great people at the Bureau can work out these details.

They would hopefully be running 2 or 3 turbines, they can turn a turbine off and on to fine tune the target

The river can run like this indefinitely if Bureau ops people are careful. Hopefully there will be no catastrophic crisis which is key here.

When Powell is in ROTR coordination will be significantly restricted and the two basins will be somewhat decoupled. As long as the Lower Basin can't use Lake Mead elevations to drawn down Lake Powell, there is nothing to draw, what the Bureau and the Lower Basin do regarding shortages and assigned water becomes irrelevant to the Upper Basin.

If snow pack improves you can easily revert to guideline releases. Then the basins would recouple and coordination would matter again.

ROTR is included in one DEIS alternative, Maximum Flexibility submitted by the NGO's. It predictably performs much better protecting critical elevation than the others. In extreme traces like the one we are in this year critical elevation can still be breached if the next year's spring runoff is less than the minimum to operate one turbine.

It is highly desirable that initial units like Flaming Gorge retain as much usable water as possible so that, in event of a catastrophic inflow year like the current one, power head can be maintained in Lake Powell. This can be justified by protection of infrastructure under coordinated operations.

## Powell Infrastructure Protection & Compact Compliance Pool

Three circumstances require establishment of a new pool in Lake Powell immediately, with or without Seven States agreement. This is a kind of gap water:

**Infrastructure Protection and Compact Compliance Pool**

- It is imperative power head be protected at elevation 3510' in light of the LaFond memo above. A pool buffering this elevation is required. A safety margin is needed if extended Run of The River operations are required. USBR should really like this pool right now.
- The Upper Basin has significant established water rights that must be used "exclusively" in the Upper Basin as defined in Article III(a). These include Winters tribal water rights, in particular the two Ute Tribes in Colorado in Animas La Plata totaling about 32,000 AF/year, and water rights for power plants that have been or will be retired. This water is going to the Lower Basin for free which is inappropriate under III(a) for an established Upper Basin water right,
- Its imperative the Upper Basin have more control over the timing of releases of water under established Upper Basin water rights from Lake Powell to better balance infrastructure protection and compact compliance under Article III(d) and the 10 year 7.5 MAF moving average. Examples of problematic Arizona behavior in this area were litigation threats to increase releases from Lake Powell to 9 MAF, and documented manipulation of releases of Lake Powell by the Lower Basin under those terms which are pushing the Upper Basin toward compact noncompliance right now contrary to Section 603 in the 1968 Colorado River Basin Project Act.

A brief summary of this stranded gap water:

32,000 AFY Animas La Plata Settled Tribal Winters water rights
55,000-65,000 AFY Power plants when all are shut (last is 2038)

87,000-97,000 AFY Totaling

It should be made clear we are not proposing to withhold this water from the Lower Basin so it is not an Article III(e) problem. As John Entsminger famously said at CRWUA, "Gravity Works". Once this water is in Lake Powell its going to them, all we are asking is to control when because its an Upper Basin water right and its our prerogative.

Creation of this pool has many perils which must be prevented:

- Under no circumstances can water from this pool be sold to the Lower Basin or to USBR acting in its role as Lower Basin Water Master. This would be an Article III(a) violation and compromise The Wall. The Wall can not be compromised by this pool
- Under no circumstances can this pool support or encourage speculation, its a Foundational Principal.
- Water rights which can participate in this pool must be carefully restricted to Ute ALP water and stranded power plant water for now. It cant become a destination for buy and dried Ag water
- Constraints must be developed on when this water is released from Lake Powell. Presumably it would ONLY be when there is a legally recognized compact compliance call. UCRC would be first entity to proposed this, probably in consultation with the involved state and the water rights holder
- Careful consideration has to be given to how this water right can be monetized by the rights holder. Most probably this would involve sale of the water release to an entity seeking compact compliance protection, like a city with junior water rights… BUT ONLY IN THE UPPER BASIN. The water would be released to offset their curtailment obligation. Again this can not be allowed to be a buy and dry mechanism for Ag so the water rights eligible have to be closely controlled.

## Power Water Stranded and Potentially Stranded

This needs verification before use in decision making:

The cumulative water associated with the shuttered and scheduled-to-shut-down coal-fired power plants in the Upper Colorado River Basin states (Colorado, New Mexico, Utah, and Wyoming) that use Colorado River Basin sources totals approximately 55,000–65,000 acre-feet per year (AF/yr) in consumptive use (primarily evaporative losses for cooling) when all retirements are completed. This estimate aggregates the primary operational water rights or average annual consumptive volumes directly tied to these facilities, based on U.S. Bureau of Reclamation Consumptive Uses and Losses

reports, U.S. Energy Information Administration data, utility filings, and analyses from sources such as the Energy and Policy Institute and Western Resource Advocates (historical averages 1991–2018 place Upper Basin thermal power consumptive use at ~144,000–162,000 AF/yr overall, with coal plants dominating).

These savings represent a potential “water dividend” for the basin upon full retirement, though actual reallocation depends on state water law (prior appropriation), utility retention of rights (e.g., for future uses like hydrogen production or to avoid abandonment), and any transfers, leases, or instream flow protections. Volumes reflect average annual consumptive use or decreed entitlements attributable to plant operations; diversion may be higher with return flows.
Shuttered Plants (Already Ceased Using Water):

- **Nucla Station** (Colorado, San Miguel River tributary): Shuttered 2019; **~4,000–5,000 AF/yr**.
- **San Juan Generating Station** (New Mexico, San Juan River): Fully shuttered 2022; **~8,000 AF/yr** (with portions for associated uses).

Subtotal for shuttered plants: **~12,000–13,000 AF/yr** (already realized savings).

Scheduled Shutdowns (Water Use to Cease Upon Retirement)

- **Craig Generating Station** (Colorado, Yampa River tributary): Units 1 (delayed potentially to post-March 2026), 2 (2028), and 3 (2029); full by late 2028–2029; **~16,000–16,400 AF/yr** (e.g., ~7,394–8,400 AF in recent filings; collective Craig/Hayden rights ~19,000–21,000 AF/yr).
- **Hayden Generating Station** (Colorado, Yampa River tributary): Unit 2 (2027), Unit 1 (2028); **~4,400–5,000 AF/yr**.
- **Four Corners Generating Station** (New Mexico, San Juan River): Full retirement no later than 2038 (potentially extended); **~17,000–24,000 AF/yr** (2020 average ~17,000 AF consumptive; up to ~27,000 AF diversion makeup).
- **Bonanza Power Plant** (Utah, Green River): ~2030; ~6,700–7,600 AF/yr (average ~6,672 AF consumptive; primary right ~7,600 AF/yr).

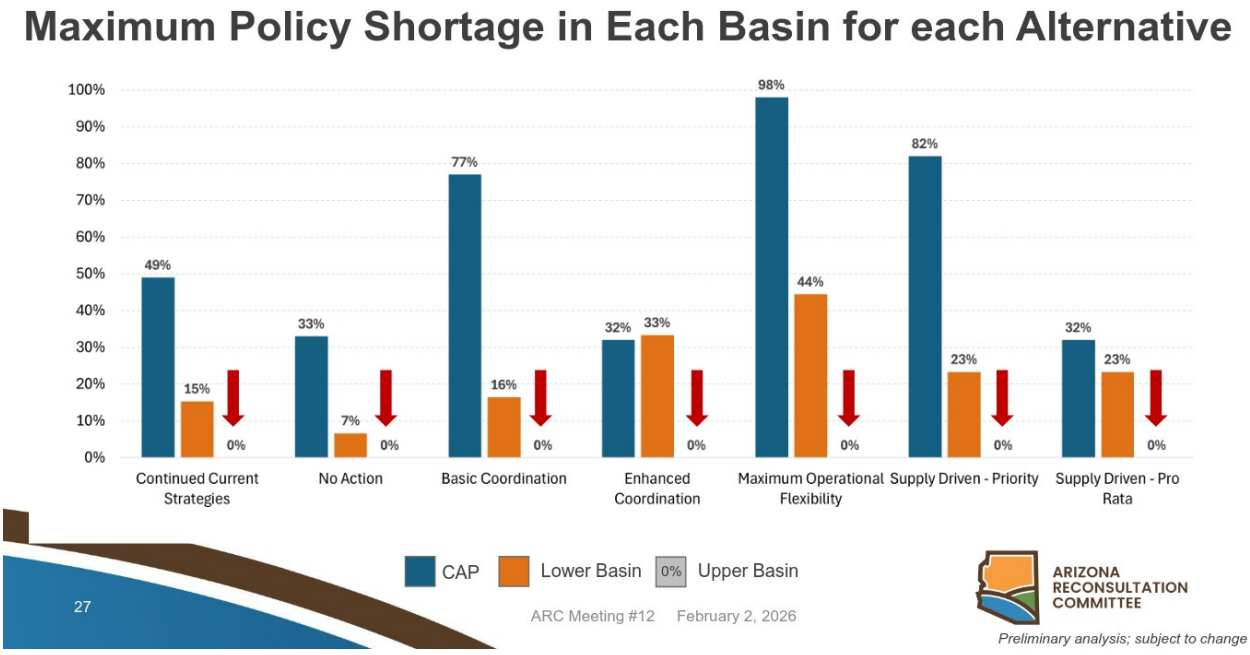
Subtotal for scheduled plants: ~44,000–53,000 AF/yr (phased realization, with most by 2030–2038; subject to delays from reliability needs or federal orders).
Grand Total Upon Full Shutdown of Listed Plants
Approximately **55,000–65,000 AF/yr** in aggregate consumptive use freed up (shuttered + scheduled).

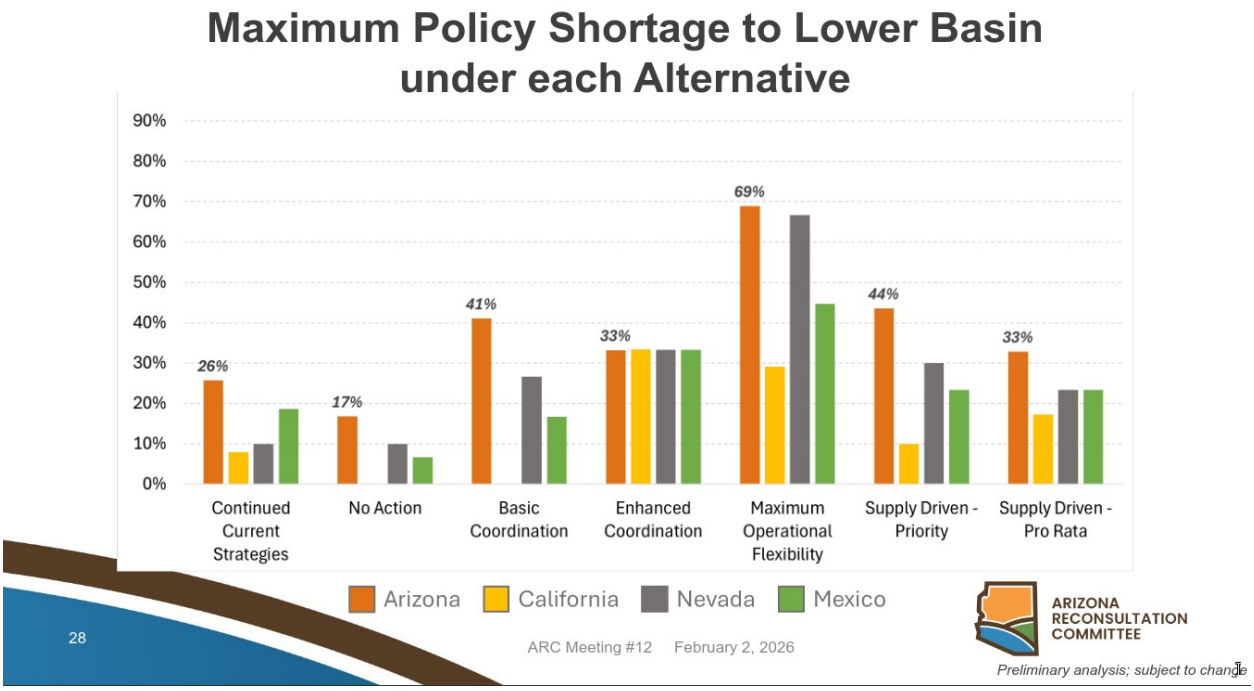
This excludes plants like Jim Bridger (Wyoming, Green River; **~25,000–33,000** AF/yr when coal-active) where coal retirements have been canceled or converted to gas (reducing but not eliminating water needs) and no firm full-shutdown date exists.
Key considerations:

- Historical Upper Basin coal/thermal averages (**~162,000 AF/yr peak**) suggest broader retirements could yield more, but not all plants use Colorado River Basin sources, and some rights may persist.
- Post-closure, water often remains available for reallocation (e.g., discussions for Yampa River instream flows or green hydrogen), but no widespread permanent abandonment has occurred.
- Schedules face uncertainty from demand growth (AI data centers), federal interventions, and economics; volumes are estimates from operational data, not fixed decrees in all cases.

## Our Alternatives

We are concerned USBR might be using this process to make choices illustrated below for the states they shouldn't be making. Please stick to LROC with ROTR and the new Infrastructure Protection Pool. The seven states have to get back to work under Article VI, non litigious cooperation. We ask any operating plan operate only on a year to year basis, until Seven States cooperation is reestablished in a new era.






# A New Era of Cooperation

## The Salton Sea Problem

In 1904 the Salton trough was a dry lake more than 200 ft below sea level. In spring 1905, an engineering mishap led to a major breach of the River's bank that wasn't closed until February 1907. The breach filled the Salton Sea with 15 MAF of water.

The Sea may now be evaporating 1.3 MAF of Colorado River water a year, we are working to find this data. That's as much as Lake Mead and Lake Powell combined, this is not sustainable with today's Colorado River. It's math.

Waste water, mostly from Imperial Irrigation District and Coachella sustained the sea until recently. Its an IV in the arm of a sick patient. The 2018 DCP and Demand Management have broken this equilibrium . Now about 1 MAF of waste water from IID, Coachella and Mexico enter the sea so there is a 300,000 AF deficit every year. It is shrinking and as it shrinks salinity increases.

Irrigation waste water may put 5 unit trains of salt into the sea each week. The sea has no outlet so it will never leave.

We think the Sea is a dead man walking. It will inevitably go hyper saline and die on the current trajectory. Jenny Ross is a top scientist on the Sea. These are her EIS comments in first round. She seems to affirm the Sea is dying and wants to save it, we wish here well.

Bur, we all face a difficult choice that must be made immediately:

- California and the U.S. must embark on a very expensive and extremely difficult project to save the Sea in an artificial way by importing ocean water into the sea, most probably with additional expensive measures to balance salinity. A Sea to Sea pipeline from the Gulf of California is the leading but not only possibility. This must be done quickly and affordably which is a near impossibility with Mexico and California.

- We let the Sea follow its natural cycle and die. The sea needs to return to either a dry lake bed or a much smaller sea where inflows and evaporation are in balance. Salinity would still be a continuing problem in the latter. Dust will be a major problem and must be mitigated. A dry lake bed is natural so it must be possible, but out of scope here. If Jenny and others can design a smaller, sustainable ecosystem, a new Garden of Eden, that would be ideal under Foundational Principles.

It is not our place to influence this choice. But... to bring the River back into balance the math has to work, a Foundational Principal. To make the math work the River can no longer waste water into the Sea. There is an old saying, “You rob banks because that’s where the money is”. In this case we look to Imperial Valley only because that is where the water is. In much of the rest of the basin, not all, return flows return to the River for reuse. In Imperial 1 MAF of return flows are being lost because it is a trans basin diversion.

We do not want to “rob” this bank. Imperial agriculture is a precious national resource. We not only want to preserve it but make it better, its a Foundational Principal.

The objective is to recover this:

- Tail water is water flowing off the surface of the fields, it is nearly the same as Colorado River water
- Tile water is very saline which flows through the soil and comes out underneath

These are some ways to recover this tail water through improved farming practices which have been done in Mexico and Yuma:

- Irrigation tape, which requires money and pressure which can be challenging
- Pressure requires pumps with an extensive electrical system, or piping water if there is sufficient drop. Pumps are a continuing expense, pressurized pCenter ipe are a big up front expense
- Laser leveling of fields requires money and skilled irrigators or someone needs to devise an automated way to time flood irrigation.

I'm told, but have not verified, that efficiency improvements like this are being blocked by NEPA because they would further reduce flows into the Sea accelerating its demise. If so, I'm not sure it is, it is contrary to a Foundational Principal.

A key goal, a Foundational Principle, is to use efficiency improvements to decrease the need to fallow IID, and waste money on this flawed practice. Hopefully these difficult tasks can better equip IID for the new, challenging, shortage dominated world.

Environmentalists will obviously and rightly be devastated be the loss of habitat from letting the Sea die. It is a foundational principal to preserve viable ecosystems but not use NEPA to save marginal or dying ones.

To offset their loss, and align with Foundational Principal, We propose redirecting 100,000 AF or more of the saved tile water to the now dry Colorado River Delta. The Delta c**ould bloom like Cienega is blooming, home for birds and fish**. It is a worthy goal to finally fix the righteous demands for more water from Audubon. **Abandon a doomed ecosystem and save a viable one**.

The Delta has an outlet to dispose of IID's salt which is key here, it is sustainable where the Sea is not.

This would require at least 80 miles of HDPE pipe and a 200' lift of the water so substantial pumps and electricity. Expensive, and not easy but possible. IID generates a lot of power so would be ideal for this. Funding pumping costs is an issue.

## Lower Basin Aquifer Utilization

Lower Basin States have probably put 9 MAF of Colorado River water in underground aquifers for long storage rather than beneficial consumptive use as required by Article iii(e), drawing down reservoirs and pushing us into this crisis. The accounting is so

complex we aren;t sure of the number, but maybe a full year of Lower Basin supply. We request the Lower Basin and USBR immediately develop a plan to rapidly draw down these reserves in the coming year to bridge the system through this crisis. If this water was banked for a rainy day, or a drought, it would seem this would be it. Putting this water back in the system, protecting power head in both Lake Mead and Lake Powell, and waiving compact noncompliance action on the Upper Basin would seem like the only appropriate way to make amends for this dubious practice.

There are legitimate concerns that this hoarding of system water rather than putting it to prompt beneficial use runs counter to Article III(e) and when it pushes the Upper Basin towards compact non compliance, which it has, it may be contrary to Section 603 in the CRBPA.

## Fire Deficit In Our Forests

This is primarily and Upper Basin initiative but funding could come from any where. This proposal is not ready for discussion at this time. It is well known that aggressive historical USFS fire suppression in our forest and reduced forest harvesting have created imbalances in our forests are almost certainly adversely affecting runoff and contributing to this crisis.

## Upper Basin Irrigation Efficiency

This is primarily and Upper Basin initiative but funding could come from any where. This is intended to match Lower Basin initiatives but is much more difficult. This proposal is not ready for discussion at this time

## Desalination

Many have died on this hill but it remains in consideration

## Litigation Issues Which Directly Impact Current Operations

These issues may be a matter of litigation but they in fact have to be resolved to have an even a minimally functional operating plan for this system which complies with the actual terms of the Compact and the 1968 CRBPA, so is relevant to this EIS process.

### Section 603

**Objective**: Based on Arizona's misinterpretation of Article III(c) and the Eric Kuhn et al "Tripwire" paper there is a plausible case for Colorado to invoke Section 603, Federal law in the 1968 CRBPA that authorized CAP

A credible legal argument can be made that this sequence:

- the 2007 Interim Guidelines' treatment of Compact Article III(c)
- CAP's exploitation of the operational "sweet spot,"
- the resulting 9 MAF Powell releases in 2015–2019
- the subsequent drop to ~7.5–8.23 MAF releases today

has prejudiced Upper Basin rights in violation of Section 603(a) of the 1968 Colorado River Basin Project Act (CRBPA), especially if it forces Upper Basin curtailment.

> Section 603(a), CRBPA (Pub. L. 90-537, 82 Stat. 885, 901):
>
> "*Rights of the upper basin to the consumptive use of water available to that basin from the Colorado River system under the Colorado River Compact shall not be reduced or prejudiced by any use of such water in the lower basin*."

This provision was a key Upper Basin protection inserted in 1968 to safeguard against Lower Basin development (especially the then-new CAP) impairing Upper Basin Compact rights.

On the last page of the Tripwire Paper (Eric Kuhn & John Fleck, 2025-ish draft):

> The 1922 Compact is Now the Obvious Elephant in the Negotiating Room

It concludes that the system is on track to breach the "tripwire" (10-year Lee Ferry flow < 82.5 MAF) soon unless unusually wet years occur. High releases (9 MAF 2015–2019)

created a temporary bubble in the moving average, but as those years roll off and are replaced by lower releases (e.g., 8.23 MAF or the current ~7.48 MAF under most-probable scenarios), the 10-year total drops below 82.5 MAF. The paper argues there is "no painless strategy" that protects both Powell (>3,500 ft) and the tripwire; the only real solution is a basin-wide enforceable agreement with Compact claim waivers.

**The "Tripwire" and Article III(c) Connection**
The 82.5 MAF figure is not just Article III(d)'s 75 MAF/10-year non-depletion obligation. It incorporates an interpretation of Article III(c) of the 1922 Compact: if there is no surplus above the 16 MAF apportioned to both basins (7.5 each), the Upper Basin must deliver its half-share of Mexico's 1.5 MAF treaty obligation (0.75 MAF/year = 7.5 MAF/10 years) at Lee Ferry, for a total delivery obligation of 82.5 MAF. • Upper Basin view: III(c) creates an additional delivery requirement once "surplus" is exhausted. • Lower Basin view (historically): Surplus (including Lower Basin overuse above 8.5 MAF) covers Mexico first; Upper's extra obligation is minimal or conditional.

The 2007 Interim Guidelines (Record of Decision) embedded operational assumptions that leaned toward the Lower Basin interpretation by coordinating Powell releases to protect Mead elevations. This produced the 9 MAF releases when Mead was in the ~1,075–1,100 ft range (the "sweet spot" that avoided Lower Basin shortages while triggering higher Powell releases under equalization/balancing rules):

> The Lower Basin Drought Contingency Plan: Development and Delays
> William Tintor
> Water Policy in Arizona and the Semi-arid West – Research Paper

CAP's "Sweet Spot" Strategy In 2017–2018, CAP (and Arizona) openly discussed managing demands to keep Mead in the elevation band that triggered higher Powell releases (~9 MAF) while avoiding formal shortage declarations.

Upper Basin states (via UCRC) accused Arizona/CAP of "gaming" or "manipulating" the guidelines to extract extra water from Powell storage at Upper Basin expense. This was widely reported as a flash point (e.g., Upper Basin representatives called it undermining the purpose of coordinated operations). These high releases temporarily kept the 10-year Lee Ferry average high but depleted Powell storage and inflated the moving average. As those 9 MAF years fall out (starting ~2025–2027) and are replaced by lower releases, the average is projected to cross below 82.5 MAF.

How This Ties to a Section 603 Breach Argument If the 10-year flow drops below 82.5 MAF:

- Lower Basin states could argue a Compact violation (“Compact call”).
- • This would pressure Upper Basin states to curtail uses (post-Compact rights first) to restore deliveries.
- That curtailment would be a direct reduction/prejudice to Upper Basin consumptive uses—precisely what Section 603(a) forbids if caused by Lower Basin uses/operations.

The chain of causation runs through:
1. The 2007 Guidelines’ interpretation/operation of III(c) and coordinated releases.
2. CAP’s demand management to stay in the high-release “sweet spot.”
3. The resulting excessive Powell drawdown.
4. The current low-release regime that exposes the tripwire risk.

Upper Basin interests could argue this was foreseeable, that the guidelines were administered in a way that favored Lower Basin deliveries over Upper Basin storage protection, and that Section 603 (a federal statute) overrides or constrains such prejudice.

**Counterpoints and Realities**

- The guidelines were negotiated with Upper Basin participation (though many Upper Basin voices later felt the “sweet spot” dynamics were not fully anticipated). However Upper Basin negotiators were under duress from litigation threats.
- Reclamation administers the dams under the CRBPA and prior acts; courts give deference to federal operational discretion.
- No court has ever ruled on the exact III(c) delivery obligation or enforced the 82.5 MAF tripwire.
- The Tripwire paper itself essentially concedes that litigation is a dead end (“will not create an additional drop of water”) and that the only viable path is negotiation + waiver of Compact claims.

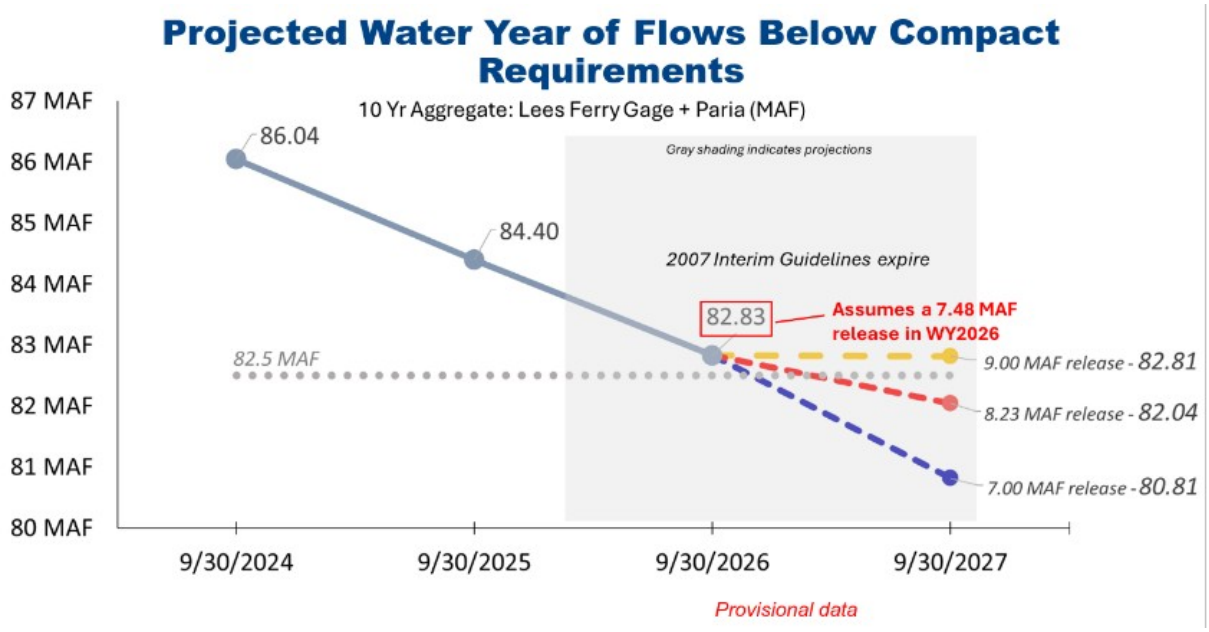
In short: Yes, a strong policy/legal case exists that the described actions have prejudiced Upper Basin rights in violation of Section 603(a)’s plain language, especially if curtailment results. Whether a court would agree is another matter—the politics and federal authority make litigation risky for everyone. The paper’s conclusion is probably right: the only realistic escape is a comprehensive, enforceable basin-wide deal.

## Article III(c) Interpretation

**Objective**: Counter Arizona's expansive interpretation of Article III(c) to restore balance

> "*We may breach the compact in 2026, and almost certainly it will be breached in 2027…sobering news, it's something that hasn't happened before, our Upper Basin neighbors have always met that obligation in the past*"
> Brenda Burman, General Manager, Central Arizona Project

Burman is talking about breaching Arizona's interpretation of the compact which includes half of the Article III(c) Mexico obligation on top of Articles III(d)'s 7.5 MAF so 8.25 MAF over a 10 year moving average. Colorado doesn't recognize this interpretation.




## Background – This is Complicated, Sorry

There is problematic language in the [1922 Colorado River Compact]

> *(c) If, as a matter of international comity, the United States of America shall hereafter recognize in the United States of Mexico any right to the use of any waters of the Colorado River System, such waters shall be supplied first from the waters which are* ***surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b);*** *and if such surplus shall prove insufficient for this purpose, then,* ***the burden of such deficiency shall be equally borne***

***by the Upper Basin and the Lower Basin****, and whenever necessary the* ***States of the Upper Division shall deliver at Lee Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d)****.*

The first problem is how do you determine whether the Colorado is in surplus or deficit.

This is the ridiculously literal interpretation Arizona used in litigation threats 2005-2007:

16 MAF = 7.5 Lower Basin(A) + 1.0 Lower Basin(B) + 7.5 Upper Basin(A)

The obvious flaw in this is the Upper Basin has never used its full entitlement so this interpretation is inevitably 3 MAF high. If this interpretation is correct we are ALWAYS in a deficit because this only works on a fully utilized river much bigger than it actually is. Its a little nuts**.**

The only interpretation that makes any sense is the one the river would've actually used in 1922 to decide this if there had been a Mexico treaty. The river did the math. It was the natural flow of the river minus Upper Basin consumptive use and Lower Basin Consumptive Use which gives you how much water actually crossed the border into Mexico. If it was above 1.5 MAF we were in surplus, if it was below we were in deficit.

Mexico = Natural Flow at Border – (Upper Basin CU + Lower Basin CU)

If Mexico >= 1.5 MAF there is no deficiency or 8.25 mandate

In a recent typical year CU might be:

12 MAF = 7.5 Lower Basin(A) + 4.5 Upper Basin(A)

If the Natural Flow is > 13.5 we are not in a deficit.

Two problems:

- Natural Flow and CU are hard to calculate and lag the calendar year accounting to determine deficiency
- Two reservoirs in the middle really complicates this

Table 2

The following spreadsheet should be treated as a straw man for the calculation we are looking for and are looking to build on to actually correctly compute the iii(c) deficit and obligation,  This is not validated data, much work is needed.

| Year | iii(c) | = | Natural Border | - ( | LOWER CU | + | UPPER CU | ) | MX TREAT | Hoover Release |
|---|---|---|---|---|---|---|---|---|---|---|
| 1964 | 4.48 | = | 10.70 | - ( | 6.22 | + | 0.00 | ) | 0.00 | 0.00 |
| 1965 | 14.91 | = | 20.84 | - ( | 5.93 | + | 0.00 | ) | 1.50 | 0.00 |
| 1966 | 5.04 | = | 11.23 | - ( | 6.20 | + | 0.00 | ) | 1.50 | 7.78 |
| 1967 | 6.33 | = | 12.29 | - ( | 5.96 | + | 0.00 | ) | 1.50 | 7.93 |
| 1968 | 8.19 | = | 14.39 | - ( | 6.20 | + | 0.00 | ) | 1.50 | 7.84 |
| 1969 | 9.82 | = | 15.89 | - ( | 6.07 | + | 0.00 | ) | 1.50 | 7.89 |
| 1970 | 9.37 | = | 15.63 | - ( | 6.25 | + | 0.00 | ) | 1.50 | 8.02 |
| 1971 | 5.17 | = | 15.35 | - ( | 6.52 | + | 3.66 | ) | 1.50 | 8.16 |
| 1972 | 3.34 | = | 13.59 | - ( | 6.51 | + | 3.74 | ) | 1.50 | 8.10 |
| 1973 | 8.86 | = | 19.18 | - ( | 6.68 | + | 3.64 | ) | 1.50 | 8.30 |
| 1974 | 2.32 | = | 13.22 | - ( | 6.83 | + | 4.06 | ) | 1.50 | 8.73 |
| 1975 | 6.49 | = | 16.79 | - ( | 6.41 | + | 3.89 | ) | 1.50 | 8.37 |
| 1976 | 1.82 | = | 11.60 | - ( | 6.03 | + | 3.75 | ) | 1.50 | 7.93 |
| 1977 | -3.58 | = | 5.94 | - ( | 6.40 | + | 3.12 | ) | 1.50 | 7.87 |
| 1978 | 6.51 | = | 16.32 | - ( | 5.81 | + | 4.00 | ) | 1.50 | 7.48 |
| 1979 | 8.85 | = | 18.92 | - ( | 6.00 | + | 4.07 | ) | 1.70 | 7.72 |
| 1980 | 9.01 | = | 19.15 | - ( | 6.04 | + | 4.10 | ) | 1.70 | 11.09 |
| 1981 | -0.79 | = | 9.64 | - ( | 6.32 | + | 4.12 | ) | 1.70 | 8.28 |
| 1982 | 8.31 | = | 18.12 | - ( | 5.64 | + | 4.16 | ) | 1.50 | 7.45 |
| 1983 | 15.36 | = | 24.84 | - ( | 5.39 | + | 4.09 | ) | 1.70 | 19.07 |
| 1984 | 15.58 | = | 25.46 | - ( | 5.89 | + | 3.99 | ) | 1.70 | 21.41 |
| 1985 | 10.73 | = | 21.98 | - ( | 6.98 | + | 4.26 | ) | 1.70 | 17.21 |
| 1986 | 11.97 | = | 23.36 | - ( | 7.16 | + | 4.23 | ) | 1.70 | 17.55 |
| 1987 | 4.49 | = | 16.37 | - ( | 7.59 | + | 4.29 | ) | 1.70 | 11.33 |
| 1988 | -0.49 | = | 12.16 | - ( | 7.96 | + | 4.70 | ) | 1.70 | 9.42 |
| 1989 | -2.89 | = | 10.20 | - ( | 8.38 | + | 4.71 | ) | 1.50 | 9.23 |
| 1990 | -2.87 | = | 9.97 | - ( | 8.43 | + | 4.41 | ) | 1.50 | 9.20 |
| 1991 | 1.13 | = | 13.09 | - ( | 7.79 | + | 4.17 | ) | 1.50 | 8.95 |
| 1992 | 1.04 | = | 12.23 | - ( | 7.32 | + | 3.86 | ) | 1.50 | 7.83 |
| 1993 | 9.26 | = | 21.36 | - ( | 7.98 | + | 4.12 | ) | 1.50 | 7.44 |
| 1994 | -1.73 | = | 11.06 | - ( | 8.34 | + | 4.45 | ) | 1.50 | 9.35 |
| 1995 | 9.22 | = | 21.33 | - ( | 8.15 | + | 3.96 | ) | 1.50 | 8.54 |
| 1996 | 0.95 | = | 14.55 | - ( | 9.13 | + | 4.48 | ) | 1.50 | 9.97 |
| 1997 | 8.78 | = | 22.04 | - ( | 9.21 | + | 4.05 | ) | 1.70 | 11.67 |
| 1998 | 4.48 | = | 17.41 | - ( | 8.72 | + | 4.21 | ) | 1.70 | 12.77 |
| 1999 | 2.78 | = | 16.38 | - ( | 9.11 | + | 4.49 | ) | 1.70 | 11.03 |
| 2000 | -3.13 | = | 10.81 | - ( | 9.16 | + | 4.78 | ) | 1.70 | 10.69 |
| 2001 | -3.03 | = | 11.17 | - ( | 9.25 | + | 4.94 | ) | 1.50 | 10.21 |
| 2002 | -7.19 | = | 6.21 | - ( | 9.41 | + | 3.99 | ) | 1.50 | 10.45 |
| 2003 | -1.58 | = | 10.90 | - ( | 8.22 | + | 4.27 | ) | 1.50 | 9.38 |
| 2004 | -1.33 | = | 10.63 | - ( | 8.02 | + | 3.94 | ) | 1.50 | 9.34 |
| 2005 | 6.76 | = | 18.82 | - ( | 7.73 | + | 4.34 | ) | 1.50 | 8.27 |
| 2006 | 1.44 | = | 13.72 | - ( | 8.05 | + | 4.23 | ) | 1.50 | 9.26 |
| 2007 | -0.80 | = | 11.72 | - ( | 8.05 | + | 4.47 | ) | 1.50 | 9.36 |
| 2008 | 3.92 | = | 16.51 | - ( | 8.10 | + | 4.49 | ) | 1.50 | 9.55 |
| 2009 | 1.83 | = | 14.29 | - ( | 7.99 | + | 4.47 | ) | 1.50 | 9.48 |
| 2010 | 1.22 | = | 13.53 | - ( | 7.90 | + | 4.40 | ) | 1.50 | 9.45 |
| 2011 | 8.51 | = | 20.85 | - ( | 7.89 | + | 4.44 | ) | 1.45 | 9.21 |
| 2012 | -4.34 | = | 8.34 | - ( | 8.05 | + | 4.62 | ) | 1.37 | 9.39 |
| 2013 | -1.32 | = | 10.30 | - ( | 8.06 | + | 3.56 | ) | 1.37 | 9.38 |
| 2014 | 2.37 | = | 14.56 | - ( | 8.18 | + | 4.01 | ) | 1.44 | 9.61 |
| 2015 | 1.48 | = | 13.42 | - ( | 7.96 | + | 3.98 | ) | 1.50 | 9.41 |
| 2016 | 1.79 | = | 13.84 | - ( | 7.74 | + | 4.31 | ) | 1.50 | 9.28 |
| 2017 | 4.76 | = | 16.77 | - ( | 7.30 | + | 4.71 | ) | 1.50 | 8.73 |
| 2018 | -3.55 | = | 8.65 | - ( | 7.66 | + | 4.54 | ) | 1.49 | 9.12 |
| 2019 | 6.67 | = | 18.39 | - ( | 7.09 | + | 4.62 | ) | 1.50 | 8.51 |
| 2020 | -2.48 | = | 9.69 | - ( | 7.32 | + | 4.85 | ) | 1.43 | 8.78 |
| 2021 | -3.68 | = | 7.82 | - ( | 7.57 | + | 3.93 | ) | 1.46 | 9.14 |
| 2022 | -1.10 | = | 10.11 | - ( | 7.16 | + | 4.05 | ) | 1.45 | 8.74 |
| 2023 | 6.43 | = | 17.39 | - ( | 6.25 | + | 4.71 | ) | 0.00 | 7.44 |
| 2024 | 1.12 | = | 12.13 | - ( | 6.54 | + | 4.47 | ) | 1.45 | 7.85 |
| 2025 | -0.43 | = |  | - ( | 0.43 | + | 0.00 | ) | 0.00 | 0.00 |
| 2026 | 0.00 | = |  | - ( | 0.00 | + | 0.00 | ) | 0.00 | 0.00 |

If we are in deficit then:

> ***the burden of such deficiency shall be equally borne by the Upper Basin and the Lower Basin***

*and:*

> ***the Upper Division shall deliver at Lee Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d)****.*

**If the river is in a deficit the next key question is where does the Lower Basin's half of the obligation come from:**

- highly variable Grand Canyon tributaries which offsets Lake Mead evaporation
- stored water in Lake Mead that came from unused 602 releases, equalization or balancing
- conserved water from the Lower Basin's 7.5 MAF entitlement(aka shortages)
- Wellton-Mohawk toxic return flows which would have to be taken from Ciénega de Santa Clara and be desalinated. Audubon and Mexico would oppose this. This water was actually promised by Royce Tipton's 1944 testimony. He said Gila return flows will supply various percentages of the obligation, like half or more. Yuma desalination tried and failed to deliver a little.

Its key that this does not say the Upper Basin must deliver one-half of the deficiency each year, if there is a big equalization or balancing release from Lake Powell then can that water in Lake Mead be used to cover multiple years of the Upper Basin III(c) obligation?

## Scenario 1 - Status Quo, 2007 Interim Guidelines

Arizona documented their position, the basis for litigation threats in 2007 in this paper and kind of what we got in the 2007 guidelines so its the status quo:

> From a Colorado River Compact Challenge to the Next Era of Cooperation Among Seven Basin States
> 49 Ariz. L. Rev. 217 (2007)
> W. Patrick Schiffer, Herbert R. Guenther & Thomas G. Carr

The Schiffer and Guenther paper (co-authored with Carr) argues that Article III(c) of the Colorado River Compact defines "surplus" as annual system-wide supply exceeding the 16 MAF aggregate apportionments in Articles III(a) and (b) (7.5 MAF each to Upper and Lower Basins). Any surplus over 16 MAF must first satisfy the 1.5 MAF Mexican Treaty obligation; if supply is deficient, the Upper and Lower Basins share the burden equally,

with the Upper Basin delivering its half (0.75 MAF) at Lee Ferry plus evaporative/transit losses (totaling ~0.9 MAF Upper share). The authors reject the Upper Division States' view that Lower Basin usage exceeding 8.5 MAF constitutes "surplus" to be applied solely by the Lower Basin to Mexico, insisting instead on system-wide assessment to protect Arizona from undue shortages.

On releases, the paper critiques the 8.23 MAF minimum objective release from Lake Powell as inadequate, excluding full losses and risking Lake Mead depletion that fails to meet ~9 MAF mainstream Lower Division needs (Lower apportionment plus Mexico). It proposes ~8.38 MAF in deficiency years (0.9 MAF Mexican share + 7.48 MAF Article III(d)) and up to 9.28 MAF in surplus years, prioritizing the Upper's Mexican share first under the Basin Project Act and LROC. An interim solution suggests variable 7-9 MAF releases to equalize reservoirs and avert crises, bridging toward long-term augmentation.

## Scenario 2 – Beneficial Consumptive Use Based

Core Upper Basin Argument: **The Compact Apportions Beneficial Consumptive Use, Not Raw Flow — So “Surplus” Is Defined Relative to Actual Apportioned Uses, Not a Hypothetical 16 MAF System Supply Number**

1. The Compact is about beneficial consumptive use, not total virgin flow or system supplyArticle III(a)–(b) apportion “beneficial consumptive use” (the key phrase repeated throughout the Compact). Article III(c) expressly ties the surplus calculation to “the aggregate of the quantities specified in paragraphs (a) and (b)” — i.e., the apportioned beneficial consumptive uses (Upper 7.5 + Lower 8.5 = 16 MAF).If the Lower Basin is already consuming >8.5 MAF (mainstem + tributaries + evaporation/ losses charged to it), then any water it is using beyond its apportionment is, by definition, surplus that Article III(c) says must first go to Mexico. There is no “deficiency” until the Lower Basin has reduced its use to its apportioned 8.5 MAF.→ This directly refutes the paper’s claim that Lower Basin use is “irrelevant.” The Compact itself makes actual use relevant.
2. Lower Basin has been using 10–11+ MAF for decades (including tributaries)In the years the paper was written (and still today), Lower Basin consumptive use (Arizona, California, Nevada mainstem + Gila, Virgin, etc. tributaries + reservoir evaporation charged to Lower) routinely exceeds 10 MAF. That excess (≥1.5 MAF) is precisely the “surplus” III(c) requires to be applied to Mexico first. No deficiency exists; Upper Basin has no III(c) obligation beyond the III(d) non-depletion floor.The paper’s insistence on a pure “system supply >16 MAF” test

would mean the Lower Basin can overuse its apportionment indefinitely while still forcing the Upper Basin to deliver extra water for Mexico — an outcome the Compact negotiators never intended and that would violate the equitable division premise.

3. The extra 1 MAF in III(b) was always understood as coming from surplusArticle III(b) gives the Lower Basin the right to increase its use by 1 MAF "in addition to" the base apportionment. Negotiators (and later Upper Basin witnesses in 1948 Upper Compact hearings and 1960s CAP debates) treated that extra 1 MAF as the Lower Basin's share of expected long-term surplus. If the Lower Basin is already taking that (and more), it cannot simultaneously claim there is no surplus for Mexico.
4. Tributaries and losses reinforce the pointLower Basin tributaries (especially the Gila) are part of the "Colorado River System" (Art. II(a)) and count toward Lower Basin use for purposes of determining surplus/deficiency. Upper Basin deliveries at Lee Ferry do not have to compensate for Lower Basin channel losses/evaporation — those are borne by the Lower Basin from its own apportionment (the Lee Ferry delivery point was chosen for exactly this reason).
5. Historical practice and the 8.23 MAF minimum objective releaseSince the 1970s, Reclamation has operated Glen Canyon Dam to a minimum objective release of ~8.23 MAF (≈7.5 III(d) + a small buffer, but not the full 0.75–0.9 MAF III(c) share the paper demands). Upper Basin states have never accepted the Lower Basin's 8.25 MAF (or higher) figure as legally required under III(c), and they have never been forced to litigate it because their position has effectively prevailed in operations. The paper's interpretation would retroactively declare decades of operations illegal.

In short, the Upper Basin's best refutation is that the Schiffer-Guenther paper reads Article III(c) in isolation and ignores the Compact's overarching framework of beneficial consumptive use apportionments. Once you measure "surplus" against actual basin uses (as the Compact requires), the Lower Basin's longstanding overuse of its own apportionment supplies all the "surplus" needed for Mexico. There is no deficiency, and the Upper Basin has no additional delivery obligation under III(c).

This is why the issue has never been conclusively litigated — both sides have strong textual and historical arguments, but the Upper Basin view protects its ability to develop while holding the Lower Basin accountable for its own overuse. The 2007 Interim Guidelines and subsequent agreements deliberately punted the legal question in favor of operational compromise, but the underlying interpretive disagreement remains exactly as it was in 2004–2007.

## Scenario 3 – Supply Based

Core Upper Basin Argument: **The "surplus" water to satisfy Mexico's allocation under Article III(c) of the 1922 Colorado River Compact does not have to come through Lee's Ferry each and every year. It can (and in practice does) draw from stored surplus in Lake Mead, including water delivered in big-release years like the 2011 equalization. So as long as there is extra water in Mead for III(c) does that mean there is no deficiency? If so 8.25 isn't the basis for a call.**

- The classic compact equation is paragraphs (a) + (b) = 16 MAF of apportioned consumptive use (7.5 MAF Upper + 7.5 MAF Lower + 1 MAF extra to Lower). It makes no sense today, Neither Upper basin use or entitlement are 7.5 MAF, III(b) water does not exist.
- Today's apportioned consumptive use  equation is either this:

  7.5 MAF Lower + 1 MAF extra to Lower = 8.5 MAF
  or
  7.5 MAF Lower

- Mexico's 1.5 MAF (per the 1944 Treaty) comes first from any system-wide surplus above that 7.5 MAF or 8.5 MAF.
- Only if that surplus is insufficient does a "deficiency" arise — and only then does the Compact explicitly require the Upper Division to deliver extra water at Lee's Ferry (half the shortfall, on top of the 75 MAF/10-year minimum in III(d)).
- 1.5 MAF is the default Mexico obligation. It is currently a little lower thanks to shortages Mexico is taking to help the system

The Compact never says the surplus portion itself must pass Lee's Ferry in the same year it is used for Mexico. Surplus is a system-wide concept — water in the Colorado River System not consumed by the apportioned uses in the two basins. Once water reaches the Lower Basin (whether via Lee's Ferry that year, Lower Basin tributaries, or releases from storage), it can be part of the "surplus" pool.

In wet years or equalization operations (like 2011 when the two reservoirs were deliberately rebalanced), extra water is released from Powell → through Lee's Ferry → into Lake Mead. That water becomes stored surplus in Mead.

In a later year, when natural inflows are lower and Lee's Ferry releases are at or near the minimum objective (currently ~8.23 MAF/year under the Long-Range Operating Criteria, which already bakes in 0.75 MAF as the Upper Basin's presumed share of

Mexico), operators can still release water from Mead's storage to meet Mexico's full 1.5 MAF (and Lower Basin demands) without triggering a Compact "deficiency." That stored water originated as surplus and was carried forward.

This is exactly how the system has functioned for decades: reservoirs (Powell + Mead) act as a multi-year buffer. The Compact's surplus/deficiency test is not a strict annual accounting that ignores storage; it's a broader recognition that the river is regulated by large reservoirs. If the basins could only use "this year's" surplus through Lee's Ferry, the entire storage-and-carryover regime that has kept Mexico whole since 1944 would be illegal — which it obviously isn't.

**Bottom line**

- Surplus water for Mexico → can be (and is) supplied from Lake Mead storage that accumulated in big years.
- Deficiency share → triggers Lee's Ferry delivery obligation from the Upper Basin.
- The Compact draws a clear distinction between the two. The surplus clause does not contain a Lee's Ferry requirement; only the deficiency clause does.

So yes — surplus stored in Mead from years like 2011 can satisfy Mexico without creating a deficiency that forces extra Upper Basin deliveries at Lee's Ferry in a subsequent dry year. That's how the "Law of the River" has always worked in practice.

## Article III(e) Interpretation

**Objective**: Counter Arizona's expansive interpretation of Article III(e) to restore balance

> "*The States of the Upper Division shall not withhold water, and the States of the Lower Division shall not require the delivery of water, which cannot reasonably be applied to domestic and agricultural uses*."

This provision is deliberately symmetrical and conditional. The qualifying clause —"which cannot reasonably be applied to domestic and agricultural uses"—applies equally to both prohibitions. It does not create an unqualified duty for the Upper Basin to release water on demand, nor does it grant the Lower Basin an unrestricted right to call for deliveries. Instead, it imposes reciprocal restraints to prevent waste or unreasonable interference during the basins' respective development phases.

During the 1922 negotiations (led by Herbert Hoover as federal representative), Upper Basin delegates (from Colorado, New Mexico, Utah, and Wyoming) expressed significant concern that Lower Basin states—particularly California, with its rapid development and access to storage at Hoover Dam (authorized later)—might use prior appropriation principles or storage infrastructure to make premature "calls" on water before Upper Basin states could fully develop their apportioned uses. The Upper Basin, where most runoff originates but infrastructure lagged, feared that such calls would impair their future consumptive uses.

Article III(e) emerged as a compromise to address this asymmetry:

- It protected the Upper Basin by prohibiting Lower Basin demands for water that the Upper Basin could reasonably apply to its own domestic and agricultural needs (e.g., storing water in future reservoirs like Powell for later use).
- Simultaneously, it restrained the Upper Basin from indefinitely hoarding water that served no beneficial purpose and could be used downstream.
- The clause was not intended as a broad delivery obligation or equity-forcing mechanism but as a pragmatic "safety valve" to promote interstate comity, avoid waste, and facilitate development without one basin unduly hindering the other.

This intent is reflected in the Compact's preamble, which emphasizes equitable division, protection from floods, and expeditious agricultural/industrial development. The provision's narrow focus—limited to "domestic and agricultural uses" (excluding power generation or other purposes)—further underscores its restraint-oriented design rather than an expansive release requirement.

Subsequent legislation and operations reinforce this interpretation:

- The Colorado River Basin Project Act of 1968 (Section 602(a)) explicitly conditions releases from Lake Powell for Lower Basin beneficial use under III(e) on specific criteria, such as Powell storage exceeding Mead storage and no impairment of Upper Basin consumptive uses. This subordinates III(e) to the Compact's core apportionments (III(a), (b), (d)) and protects Upper Basin development.
- Long-Range Operating Criteria and post-2007 guidelines incorporate III(e) in a limited, conditional manner, consistent with its reciprocal nature.
- Upper Basin analyses (e.g., from the Upper Colorado River Commission, experts like Eric Kuhn, and historical reviews) consistently frame III(e) as a safeguard for Upper Basin growth, not a tool to compel releases that could shift disproportionate burdens (e.g, for the Mexican Treaty under III(c)).

In Upper Basin rebuttals, attempts to expand III(e) beyond this narrow, mutual framework—such as using it to mandate releases for Mexican Treaty deficiencies or to prioritize Lower Basin access to stored water—are viewed as contrary to the negotiated balance. The provision was crafted to preserve each basin's exclusive beneficial consumptive use (per III(a)) while preventing abuse, not to override volumetric obligations or create new priorities.

The Schiffer-Guenther paper's emphasis on Upper Basin non-withholding as a broad duty to release usable water is seen as reading the clause one-sidedly, ignoring its symmetry and the Compact's overall grant of "exclusive beneficial consumptive use" to each basin under Article III(a).

The Schiffer paper links III(e) to mandatory Upper Basin releases to meet half the Mexican obligation in deficiency years, arguing that withholding would cause unjustified Lower Basin shortages. Upper Basin rebuttal:

- Article III(c) already contains the precise sharing rule (first from surplus; then equal burden; Upper delivers half-deficiency at Lee Ferry "whenever necessary" in addition to III(d)). III(e) adds no extra obligation.
- Upper Basin's preferred reading of "surplus" in III(c) is basin-specific: if the Lower Basin is already using >8.5 maf (its III(a)+(b) apportionment, including tributaries per Upper Basic view), that excess is the surplus first applied to Mexico, relieving Upper Basin of deficiency sharing.
- Forcing additional releases under III(e) to cover Mexico would impair Upper Basin's own future uses, violating the "without impairment of annual consumptive uses in the upper basin" language in CRBPA §602(a)(3).

This is the exact position the Upper Division Governors' Representatives took in their 2004 letter (the trigger for the Schiffer paper) and that Upper Basin entities have reiterated in post-2007 Guidelines, Drought Contingency Plan, and post-2026 negotiations.

**It is a near certainty that Loer Basin, especially Arizona's, taking delivery of water from reservoirs in the 90's, and probably continuing today, for long term storage in its aquifers and contributing to the current crisis in Lake Powell is a direct and unambiguous violation of Article III(e).**

This data needs verification before use in decision making

The documented transfers of Colorado River water into aquifers by Lower Basin states for long-term storage remain as previously outlined, with the primary mechanisms being

- Arizona's Arizona Water Banking Authority (AWBA) program (intrastate and interstate for Nevada),
- Nevada's local and interstate banking (primarily in Arizona and California aquifers), and
- California's more limited conjunctive use/replenishment (primarily via Coachella Valley Water District [CVWD] and Metropolitan Water District [MWD] interstate for Nevada).

Comprehensive year-by-year volumes of new physical transfers (recharge or in-lieu substitution leading to long-term storage credits [LTSCs] or equivalent) are not uniformly published in a single aggregated table across all programs, as recent years have seen minimal new direct storage due to drought, shortage declarations, and a shift toward purchases of existing credits, Intentionally Created Surplus (ICS) firming, and in-reservoir conservation. Cumulative totals are well-documented through USBR accounting reports and state sources, with interstate banking stable at approximately

- 944,071 AF for Nevada's benefit (613,846 AF in Arizona via AWBA; 330,225 AF in California via MWD) as of the end of calendar years 2023 and 2024 (no net change reported in recent USBR reports due to lack of new storage or recoveries offsetting additions).

Arizona (AWBA LTSCs from Colorado River/CAP Water)
The AWBA is the dominant program for dedicated long-term aquifer storage of Colorado

River water. New accrual has been limited since around 2014–2015 due to reduced excess CAP water availability; recent activity focuses on LTSC purchases or ICS-related firming rather than direct recharge of new volumes.

- Cumulative LTSCs through 2019: Approximately **4.28 million AF** (3.67 million AF intrastate for Arizona; ~614,000 AF interstate for Nevada).
- Cumulative through ~2023: **~4.39 million AF** (intrastate ~3.78 million AF; interstate 613,846 AF).
- Cumulative through 2024: **4.41 million AF** (intrastate ~3.80 million AF; interstate 613,846 AF unchanged).

Annual new accruals (from direct storage) were significant in earlier years (e.g., tens to hundreds of thousands AF in the 2000s–early 2010s) but have been near zero in recent years without purchases. For example:

- 2016: ~65,708 AF delivered for storage (example year with activity).
- Post-2019: Minimal to no new direct recharge reported; reliance on purchases (e.g., 1,327 AF LTSCs purchased in Tucson AMA in 2023). No detailed annual series of new accruals is aggregated publicly beyond cumulatives in AWBA annual reports and USBR Decree Reports.
  Nevada (SNWA Banking)\
- Local Southern Nevada Water Bank (Las Vegas Valley aquifer): Cumulative ~342,000 AF through 2024 (via direct injection or in-lieu; no significant annual breakdown reported recently).
- Interstate (stored in other states' aquifers): Cumulative ~944,071 AF through 2024 (unchanged from prior years; 613,846 AF in Arizona, 330,225 AF in California; no new additions reported in 2023–2024 USBR reports).
  Annual new interstate storage was active in earlier periods (e.g., additions through 2018–2019) but has been negligible recently.
  California
- MWD interstate for SNWA: Cumulative 330,225 AF stored in California aquifers through 2024 (no new storage in recent years; stable balance).
- CVWD conjunctive use/replenishment (Coachella Valley aquifers, including Colorado River sources via CRA exchanges): Cumulative over ~4.37 million AF from 1973–2023 across facilities (mix of SWP and Colorado River; ~4.14 million AF to

Whitewater River facility alone). Recent annual replenishment (including Colorado River portions):

- 2023: ~320,962 AF total artificial replenishment (significant portion Colorado River-related).
- 2023–2024 water year: ~296,726 AF imported/local surface water recharged in Indio Subbasin (with managed recharge reduced in some facilities due to voluntary Colorado River conservation).
- Earlier periods: Over 2 million AF in first 35 years (1973–~2008); ongoing but variable with availability. These are not structured as formal LTSCs but support long-term aquifer storage offsetting pumping.

### Lower Basin Aquifer Storage Summary

- Grand cumulative aquifer storage of Colorado River water (all programs, approximate end-2024): **>9 million AF (AWBA ~4.41 million AF + CVWD >4 million AF + SNWA local ~0.34 million AF** + other minor; with overlaps in interstate credits not double-counted as new transfers).
- Interstate for Nevada benefit (stable benchmark): **944,071 AF.**
- Due to the shift from new physical storage to credit purchases, conservation, and ICS, no comprehensive annual additions table exists for recent years.

## Canonical Legal Arguments Related to Operational Questions

Hopefully you didn't make it this far. We are hoping the Seven States don't either. The following are fairly canonical Upper Basin arguments you may see in event of a Lower Basin Compact Call or litigation. We don't want to go here, but we will if we have to. School yard bully rule applies. In that event we will apply additional resources to develop these and apply some of our unconventional wisdom to strengthen them.

These will obviously have direct impact impact on USBR operation of the system if these events occur so are relevant to the EIS process.

### Article III(d)

The canonical Upper Basin position on the core dispute in the Colorado River Compact of 1922 (particularly Article III(d)) centers on interpreting the Upper Division states' (Colorado, New Mexico, Utah, Wyoming) obligation as a "non-depletion" duty rather than a strict delivery guarantee to the Lower Basin (Arizona, California, Nevada).Article III(d) states: the Upper Division states "will not cause the flow of the river at Lee Ferry to

be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years." The Upper Basin interprets this literally as a prohibition on their own actions causing depletion—meaning they must not consume (deplete) more than their share in a way that drops the 10-year rolling flow at Lee Ferry (just below Glen Canyon Dam) below 75 million acre-feet (MAF), averaging 7.5 MAF/year.Key elements of the Upper Basin view:

- No absolute delivery obligation — They are not required to guarantee or "deliver" 7.5 MAF annually (or 75 MAF/10 years) to the Lower Basin regardless of natural conditions. If low runoff from climate change, drought, or aridity reduces natural flows, the Upper Basin is not at fault and should not face forced cuts solely to meet a fixed delivery target.

- Consumptive use cap — Their primary limit is their own beneficial consumptive use (up to 7.5 MAF/year basin-wide under Article III(a)), plus their share of U.S. treaty water to Mexico if no surplus exists (Article III(c)). They argue they have never fully used their 7.5 MAF allocation (often ~4–5 MAF in recent decades), so any shortfall at Lee Ferry stems from reduced supply, not overuse.

- Climate change as force majeure — Depletion caused by natural variability or long-term aridification (not human depletions in the Upper Basin) does not trigger a Compact violation or "call" requiring Upper Basin curtailments. This protects upstream development rights, as the Compact was designed to allow Upper Basin growth without being penalized by prior Lower Basin claims.

- Contrast with Lower Basin view — Lower Basin states read III(d) as imposing a firm delivery requirement (strict liability for 75 MAF/10 years at Lee Ferry, potentially including half of Mexico's share under operating criteria), enforceable via litigation if flows fall short.

This interpretation aligns with the Compact's 1922 context: Upper Basin delegates feared Lower Basin storage projects (like Hoover Dam) could establish prior rights before upstream states developed, so they insisted on "non-depletion" language to safeguard future use. The Upper Basin Compact (1948) reinforces this by allocating percentages of available water after meeting Compact obligations, without mandating fixed deliveries. In modern negotiations (post-2026 guidelines), this stance emphasizes shared basin-wide responsibility for shortages driven by climate, not unilateral Upper Basin cuts, while rejecting litigation threats of a "Compact call."

## Article III(b)

In 1922, Arizona's compact commissioner W.S. Norviel asked that 1 MAF be set aside in Article III(b) to cover the natural flow of the Gila River at the confluence with the Colorado. The Gila is a wasting river so that is inherently much less than their actual Consumptive Use, they've used it to extinction since the 1870's. His rationale was even if Arizona wasn't use the Gila's water only 1 MAF would reach the confluence. The rest would disappear into aquifers and evaporation.

After his ask the minutes stop and don't cover what did happen, it wasn't Norviel's ask. It ended up being just an additional 1 MAF split between Arizona and California when there was surplus water. California took it all before CAP came on line, exceeding their 4.4 MAF limitation and diverting 5 to 5.5 MAF.

Eric Kuhn's assertion is that in 1922 everyone knew the Upper Basin wouldn't be able to develop more than 6.1-6.5MAF so they had a bubble in their entitlement at 7.5 MAF that was of concern to the Lower Basin. The solution was to give the Lower Basin an extra 1 MAF to offset it, which is how III(b) worked until the 2003 QSA when their was no more surplus and California was forced back under their 4.4 limitation,.

With 20/20 hindsight it would've been better to cut the Upper Basin entitlement to 6.5 MAF but they thought they had a big river then. If the Compact is reopened for amendments in the coming tumult, amendment is a hard process, consideration should be given to removing III(b) and cutting the Upper Basin entitlement to 6.5 MAF. It removes any chance of future Lower Basin use of the surplus water and doesn't really matter to the Upper Basin. They will never develop 7.5 MAF. It would eliminate a constant source of confusion and friction. The compact would be simpler.

Another possible amendment is to do Norviel's ask and use III(b) to cover the Gila natural flow at the confluence. The Gila is a problem. Article III(d)

The canonical Upper Basin position on the core dispute in the Colorado River Compact of 1922 (particularly Article III(d)) centers on interpreting the Upper Division states' (Colorado, New Mexico, Utah, Wyoming) obligation as a "non-depletion" duty rather than a strict delivery guarantee to the Lower Basin (Arizona, California, Nevada).Article III(d) states: the Upper Division states "will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years." The Upper Basin interprets this literally as a prohibition on their own actions causing depletion—meaning they must not consume (deplete) more than their share in a way that drops the 10-year rolling flow at Lee Ferry (just below Glen Canyon

Dam) below 75 million acre-feet (MAF), averaging 7.5 MAF/year.Key elements of the Upper Basin view:

- No absolute delivery obligation — They are not required to guarantee or "deliver" 7.5 MAF annually (or 75 MAF/10 years) to the Lower Basin regardless of natural conditions. If low runoff from climate change, drought, or aridity reduces natural flows, the Upper Basin is not at fault and should not face forced cuts solely to meet a fixed delivery target.
- Consumptive use cap — Their primary limit is their own beneficial consumptive use (up to 7.5 MAF/year basin-wide under Article III(a)), plus their share of U.S. treaty water to Mexico if no surplus exists (Article III(c)). They argue they have never fully used their 7.5 MAF allocation (often ~4–5 MAF in recent decades), so any shortfall at Lee Ferry stems from reduced supply, not overuse.
- Climate change as force majeure — Depletion caused by natural variability or long-term aridification (not human depletions in the Upper Basin) does not trigger a Compact violation or "call" requiring Upper Basin curtailments. This protects upstream development rights, as the Compact was designed to allow Upper Basin growth without being penalized by prior Lower Basin claims.
- Contrast with Lower Basin view — Lower Basin states read III(d) as imposing a firm delivery requirement (strict liability for 75 MAF/10 years at Lee Ferry, potentially including half of Mexico's share under operating criteria), enforceable via litigation if flows fall short.

This interpretation aligns with the Compact's 1922 context: Upper Basin delegates feared Lower Basin storage projects (like Hoover Dam) could establish prior rights before upstream states developed, so they insisted on "non-depletion" language to safeguard future use. The Upper Basin Compact (1948) reinforces this by allocating percentages of available water after meeting Compact obligations, without mandating fixed deliveries. In modern negotiations (post-2026 guidelines), this stance emphasizes shared basin-wide responsibility for shortages driven by climate, not unilateral Upper Basin cuts, while rejecting litigation threats of a "Compact call."

### Gila River

The canonical Upper Basin position on the exclusion ("removal") of the Gila River from Colorado River Compact accounting, as affirmed in the 1963 Arizona v. California Supreme Court decision, is that the ruling's scope is limited to interpreting the Boulder Canyon Project Act (BCPA) and mainstream apportionments among Lower Basin states (Arizona: 2.8 MAF, California: 4.4 MAF, Nevada: 0.3 MAF from the 7.5 MAF

mainstream allocation). This is the Statutory construction case Mark Wilmer used to win Arizona v California. Colorado and Wyoming were not party to this case, they refused California to join. It was a Lower Basin case so it is doubtful it applies to them.

It does not alter the Compact's broader inclusion of all Lower Basin tributaries—like the Gila—in the definition of the "Colorado River System" (Article II(a)), which encompasses the river and its tributaries within the U.S. for basin-wide apportionment purposes. Upper Basin states argue that the Compact's text (e.g., Articles III(a)–(c)) apportions 7.5 MAF + 1 MAF to the Lower Basin from the entire system, including tributaries, to determine total available water, surpluses, and shared obligations such as deliveries to Mexico under Article III(c).

Excluding the Gila allows Arizona unrestricted use (estimated 1–3.5 MAF annually, depending on hydrology) beyond its mainstream share, effectively enabling the Lower Basin to exceed its 8.5 MAF system-wide entitlement. This, they contend, imbalances the basin, increases pressure on Upper Basin deliveries at Lee Ferry (to meet the non-depletion obligation of 75 MAF over 10 years under Article III(d)), and shifts a disproportionate burden for shortages or Mexico deliveries onto the Upper Basin amid climate-driven reductions in natural flows.

Historically, during Arizona v. California litigation, Upper Basin intervenors supported tributary exclusion from BCPA mainstream accounting to protect against precedents that might encroach on Upper tributaries or allow California to claim more mainstream water, potentially affecting inter-basin equity.

However, in modern interpretations (e.g., post-2000 negotiations and analyses like the Upper Colorado River Commission's stances), the position has solidified around Compact inclusion for system accounting, rejecting the Arizona v. California exclusion as inapplicable to Compact obligations and emphasizing shared basin-wide responsibility without unilateral Upper cuts. This view is substantiated by Compact negotiation records (e.g., 1922 minutes showing intent for inclusive apportionment) and critiques that the extra 1 MAF in Article III(b) was meant to accommodate Gila uses within—not beyond—the Lower Basin's total share.

There are stronger, more persuasive arguments in the canonical Upper Basin position on the Gila River's exclusion from Colorado River Compact accounting (as established by Arizona v. California in 1963). The initial textual argument—that the Compact's definition of the "Colorado River System" in Article II(a) explicitly includes all tributaries—is solid but often seen as somewhat literalist and countered by the Supreme Court's narrow reading of the Boulder Canyon Project Act (BCPA). Better arguments focus on equity, intent, basin-wide balance, and practical consequences amid declining flows.

**Upper Basin Arguments**

1. The Extra 1 MAF in Article III(b) Was Intended as Compensation for Gila Inclusion
   During 1922 negotiations, Arizona strongly opposed including the Gila (its dominant tributary) because its waters enter far downstream and cannot be reused in the U.S. after mixing with the mainstream. Upper Basin delegates agreed to the additional 1 MAF allocation to the Lower Basin (beyond the base 7.5 MAF in III(a)) specifically to offset Arizona's Gila uses—meaning the Gila was factored into the overall Lower Basin entitlement. Excluding it now lets Arizona enjoy unrestricted Gila consumption (often 2–3+ MAF in wet years) plus its full 2.8 MAF mainstream share, effectively giving the Lower Basin more than its intended 8.5 MAF system total. This violates the Compact's equitable intent and forces the Upper Basin to subsidize Lower Basin "over-allocation" through higher Lee Ferry releases.
2. Basin-Wide Equity and Shared Burden for Shortages/Mexico Obligations
   The Compact apportions the entire system (mainstream + tributaries) to ensure balanced development. By excluding the Gila (24% of the basin's drainage area), Arizona's effective Lower Basin consumptive use often exceeds the 7.5 MAF mainstream + 1 MAF extra, increasing pressure on Upper Basin flows to meet Article III(c) Mexico treaty obligations (shared equally unless surplus exists). Upper Basin states argue this creates asymmetry: they face climate-driven shortages without "credit" for their own undeveloped allocations, while Arizona benefits from tributary exclusion without bearing proportional responsibility. This undermines the Compact's goal of preventing one basin from disproportionately burdening the other.
3. Historical Negotiation Context and Arizona's Own Position
   Arizona refused to ratify the Compact for decades partly because it feared Gila inclusion without safeguards—yet Arizona v. California gave Arizona the exclusion it wanted for mainstream accounting while ignoring Compact-wide implications. Upper Basin views this as selective application: the decision resolved Lower Basin internal disputes under the BCPA but did not rewrite the 1922 Compact's inclusive system definition. Negotiation records (e.g., 1922 minutes) show delegates understood tributaries would count toward basin totals to avoid upstream development being penalized by downstream claims.
4. Modern Practical and Hydrologic Reality
   With climate change reducing natural flows, excluding major tributaries like the Gila artificially inflates perceived Lower Basin "compliance" while the Upper Basin (which generates most runoff) absorbs disproportionate risk. Upper Basin

advocates (e.g., via Upper Colorado River Commission analyses) emphasize that formal water budgets and accounting should reflect actual system contributions for fair post-2026 operations—excluding the Gila distorts this and incentivizes inefficient Lower Basin use.

These arguments are more compelling because they shift from pure textualism to equitable apportionment principles (embedded in Compact negotiations), original intent, and current hydrologic equity—key in ongoing post-2026 negotiations where Upper Basin states resist mandatory cuts without basin-wide accounting reforms. The position avoids over-relying on the Supreme Court's BCPA specific ruling, instead framing exclusion as an unintended loophole that imbalances the 1922 framework.

Western Resource Advocates

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March 2, 2026

Scott Cameron
Acting Commissioner
U.S. Bureau of Reclamation
Attn: BCOO-1000
P.O. Box 61470
Boulder City, NV 89006

RE Post 2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead – Draft Environmental Impact Statement

Acting Commissioner Cameron:

Attached is a list of 1,632 individuals who added their name in support of new management guidelines for the Colorado River that:

- Include flexible water conservation pools to help the Colorado River Basin increase its water security
- Protect river health
- Take a proactive approach to water management
- Honor Tribal sovereignty and fulfill the federal government's legal obligations to Tribal Nations

Each of these signatures is being provided from the individual supporter, and not on behalf of Western Resource Advocates.

Thank you,

Bart Miller
Healthy Rivers Director

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275 Hill Street
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307 West 200 South
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Dear Acting Commissioner Cameron,

I support new management guidelines for the Colorado River that:

- **Include flexible water conservation pools to help the Basin increase its water security.** Current water conservation programs are insufficient to address the West's water challenges. The new guidelines must include expanded water conservation pools and allow water to be saved and moved between Lake Powell and Lake Mead as needed to protect river health, stabilize the system, and support our communities in dry years.
- **Protect river health.** The Colorado River is a dynamic, living system that is under increasing stress as the Basin gets hotter and drier. The new guidelines must be adaptable, consider ecosystem impacts in reservoir operating plans, incorporate mitigation plans to help the river and our communities get through dry years, and support agreements for Colorado River Delta restoration.
- **Take a proactive approach to water management.** Management strategies with a high likelihood of deadpool shortages or loss of hydropower are not sustainable. Our communities cannot plan ahead when the river is always on the brink of a crisis and facing unplanned emergency actions. The new guidelines must promote water conservation across the Basin, and management decisions need to consider how much water is actually flowing in the river and stored across its major reservoirs. This will help provide certainty to our communities and avoid crisis management.
- **Honor Tribal sovereignty and fulfill the federal government's legal obligations to Tribal Nations.** The 30 federally recognized Tribes in the Colorado River Basin have historically been excluded from decision making and key programs on the Colorado River. Greater transparency, inclusion, and collaboration are urgently needed. Tribes hold rights to the river's water, and the federal government has a responsibility to uphold those rights and provide pathways for Tribal collaboration. Tribes must be able to engage in conservation pools and other programs, and the new guidelines must include Tribal voices and fulfill federal trust responsibility.

Thank you,

[Signatures Attached]

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| Michael | Daus | NM | 87124 |
| Zana | Davey-Greaves | CO | 80521 |
| David | David | FL | 34205 |
| Linda | David | VA | 22901 |
| Linda | David | VA | 22901-3765 |
| Rebecca | Davidson | CA | 90808 |
| Lisa | Davis | NV | 89103 |
| Timothy | Davis | IL | 61201-7705 |
| Phallon | Davis | CA | 95401 |
| William | Davis | AZ | 85749 |
| Elizabeth | Davis | OH | 44028 |
| Angela | Davis | IL | 60636 |
| Geraldine | Dawicke | OH | 45344 |
| Jose | De Arteaga | DC | 20020-3314 |
| Percy | Deal | AZ | 86039 |
| Monica | Dechering | OH | 45248 |
| Robyn | DeCiccio | RI | 2889 |
| Karen | Deckel | MA | 2532 |
| Christie | Decker | CA | 94109 |
| Jeff | Deischer | CO | 80011 |
| Deborah | Delaney | MI | 48429 |
| Patricia | DeLuca | FL | 34275 |
| Aimee | Denault | AZ | 85306 |
| Karine | Denicola | CA | 90630 |
| Bruce And Carol | DENNING | CO | 80905 |
| Wesley | Derr | MD | 21236 |
| ray | Derrickson | NC | 27604 |
| Jim | Derzon | NY | 12983 |
| Denice | DeSoto | CO | 80403 |
| Jesse | DeSoto | CO | 80465 |
| Carole | Deuser | TX | 78738 |
| Madelaine | DeVan | CO | 80033 |
| Lobsang | Dhondup | MN | 55113 |
| Robyn | Dibble | NH | 3077 |
| Mary | Dickson | NV | 89403 |
| Tim | Diemer | IN | 46514 |
| B. Thomas | Diener | NM | 87112-5742 |
| Tanya | Dillinger | MT | 59072 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Lynn | Dimmick | CO | 80026 |
| Jan | Dittrich | AZ | 85710 |
| Ludmila | DmitrievOdier | NE | 68124 |
| Susan | Dobbelaere | KS | 66223-7968 |
| Patricia | Dobson | CO | 80863-8715 |
| Jane | Doe | AZ | 85225 |
| Carla | Donelson | CO | 80120 |
| Susanne | Donoghue | WI | 53024 |
| Diana | Donovan | FL | 34235 |
| Elaine | Dorado | CA | 90242 |
| Arlinda | Dorsett | HI | 96826 |
| Ann | Dorsey | CA | 91325-3844 |
| Timothy | Dow | MA | 1464 |
| Ralph | Dowden | NM | 88101 |
| Paul | Downey | MO | 63110 |
| Peter | Downing | CO | 80209 |
| Christine | Doyle | NC | 28403-5221 |
| Kathleen | Doyle | CO | 80403 |
| KELLY | DOYLE | CA | 94965 |
| Tracy | Drake | IL | 60614-2017 |
| Debi | Drewes | CO | 80219 |
| Yoka | Drion | CA | 95128-4948 |
| Brian | Driscoll | NH | 3801 |
| Jim | Drobny | MI | 49855 |
| Geoff | Drumm | AZ | 86323 |
| Margo | Drummond | CO | 80211 |
| Pauline | Duchesneau | ME | 4474 |
| Pat | Duffus | CO | 80216 |
| Thomas | Dugger | CA | 91208-1626 |
| Barbara | Duin | CO | 81147 |
| Robin | Dumler | MD | 21811 |
| David | Dunham | AZ | 85268 |
| Dennis | Dunn | MO | 65802 |
| Mary | Durdall | MN | 55113 |
| Maureen | Duthie | GA | 30067 |
| Ruth | DuValle | TX | 78233 |
| Eva | Dyan | CA | 90036 |
| Cornelia | E Davis | TX | 78045-6420 |
| Lynn | E Luther | CA | 95407 |
| Louise | E Reardon | PA | 17602 |
| John | Eakins | CO | 81505 |
| Cheryl | Eames | AZ | 85373 |
| Cat | Eberhart | WA | 98382 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Monique | Edwards | AZ | 85716 |
| Donna | Edwards | NJ | 7063 |
| Rosemary | Egan Olcott | NJ | 8840 |
| Laura | Ehrenkranz | CT | 6825 |
| Karolyn | Ehrenpreis | CA | 92241 |
| Julietta | Eisenberg | NY | 10025 |
| Diane | Eisenhower | FL | 32967 |
| Annette | Elder | NV | 89134 |
| Chantal | Eldridge | TX | 78739 |
| Jacqueline | Eliopoulos | CO | 80304 |
| Sandra | Elliott | OR | 97225 |
| Maureen | Ellis | IL | 60613 |
| R. | Ellis | IL | 60014 |
| Sidney | Ellison | CO | 80927 |
| Rachel | Elmore | AL | 35748 |
| Steve | Empey | CO | 80919 |
| Bart | Endicott | AZ | 85641 |
| Carolyn | Engel | CO | 80123 |
| I. | Engle | NM | 88352 |
| Denie | English | NM | 87015 |
| Antonino | Erba | IA | 52001 |
| John | Erickson | AZ | 85044 |
| Charles | Erminger | TX | 77345 |
| Ozlem | Erol | AZ | 85743-6801 |
| Elizabeth | Erpelding-Garratt | FL | 32086 |
| Daniel | Erwin | IN | 46011 |
| Louis A. | Esposito | NY | 11209 |
| nick | evans | AZ | 85143 |
| Bruce | Everett | IL | 61611 |
| JOYCE | EVERS | NY | 13605 |
| Penelope | Ewanic | IL | 60517 |
| Amber | Exum | CO | 80220 |
| Julia | Faber | CO | 80210 |
| Jim | Fahey | MN | 56073 |
| Ron | Faich | NM | 87112 |
| Giovannina | Fazio | CA | 94061 |
| James | Feit | WA | 98368 |
| Ramon | Felix | CA | 93309 |
| J | Feller | WA | 98502 |
| April | Fennell | AZ | 85250 |
| Nancy | Ferguson | NC | 27517 |
| Marge | Ferrance | NJ | 8830 |
| John | Ferrante | CA | 94520-5506 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Jessie | Ferri | FL | 33596 |
| Sam | Feuerborn | CO | 81601 |
| Carolyn | Feury | VT | 5773 |
| Carrie | Fieger | CO | 80129 |
| Phyllis | Fields | PA | 19026 |
| Barbara | Finley-Shea | MN | 55912 |
| Lynne | Firestone | IL | 60203 |
| Richard | Fish | MN | 55417 |
| Tracey | Flanagan | NC | 28906 |
| Marshall | Flanigan | FL | 33912 |
| Douglas | Flint | CO | 80113 |
| Elisabeth | Fluellen | VA | 23502 |
| Linda | Flynn | MT | 59754 |
| Pamela | Foley Simmons | OH | 44123 |
| Gretel | Follingstad | NM | 87505 |
| Gloria | Fooks | MO | 63077 |
| Richard | Force | MI | 49015 |
| Debbie King | Ford | CO | 81657 |
| janet | forman | NY | 10011 |
| Cindy | Fornstrom | CO | 80113-2805 |
| Richard | FORTUNATI | FL | 32506 |
| MaryAnna | Foskett | MA | 02476-8005 |
| Lisa | Foster | MO | 63084 |
| lorraine | foster | OR | 97202 |
| Eric | Fox | AL | 35173 |
| Jesse | Fox | CO | 80005 |
| Andrew | Foy | CO | 80220 |
| Deborah | Frame | CA | 95570 |
| Marta | Francis | IN | 46614 |
| Matthew | Franken | CO | 80138 |
| Courtney | Franklin | KS | 67219-1222 |
| Judy | Frederick | IL | 60026 |
| Gregory | Freeman | AZ | 85625 |
| Briah | Freeman | CO | 80538 |
| Beth Jane | Freeman | NY | 11793 |
| Edwina | Frei | MA | 2642 |
| Jeffrey | Freilich | NY | 11357 |
| marilyn | freiwald | NJ | 7834 |
| Wayne | Frey | OR | 97303 |
| Joyce | Frohn | WI | 54901 |
| Michael | Frost | CA | 94070 |
| ronald | fuchs | SD | 57301 |
| Keira | Fullbright | SC | 29627 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Jonathan | Futch | NM | 87574 |
| vinodkumar | gadley | NV | 89108 |
| Anthony | Gahr | CA | 94553 |
| Joni | Gail | SC | 29588 |
| Barbara | Gaines | GA | 30087 |
| Jenna | Galli | MT | 59047 |
| Grace | Galway | IL | 60540 |
| Nancy | Gangi | CA | 92026 |
| Autumn | Garcia | AZ | 86303 |
| Elaine | Garcia | NJ | 8330 |
| Raymond | Garcia | CA | 92058 |
| Daniela | Garcia Moreno | CO | 80218 |
| Rosemarie | Garczynski | WI | 53916 |
| Margaret | Garr | UT | 84332 |
| Presley | Garrett | NV | 89144 |
| Ron | Garst | OR | 97381 |
| Lydia | Garvey | OK | 73601 |
| Elizabeth | Gass | NJ | 7753 |
| Liz | Gato | FL | 32908 |
| Thomas | Geilfuss | WI | 53217 |
| tracey allyson | geisler | CA | 94102 |
| Mike | Gellerman | MN | 55126 |
| Derek | Gendvil | NV | 89117 |
| Laura | Genovese | NM | 87528 |
| PATRICIA | GEORGE | AZ | 86322 |
| Jim | Gergat | PA | 19464-1878 |
| Astrid | Gerjets | GA | 31319 |
| Susan | Gerstner | WI | 53549-1227 |
| Sylvan | Giacchino | AZ | 86001 |
| Sharon | Gilbert | AZ | 85387 |
| Michael | Gilbert | TX | 78248 |
| Alan | Gill | NV | 89134 |
| Patricia | Gilliland | NM | 87124 |
| Ruby | Gilpin | AL | 36530 |
| Gina | Gilson | NV | 89502 |
| Janet | Ginepro | MI | 48162 |
| Linda | Giudice | VT | 5672 |
| Ros | Gladman | AK | 7254 |
| Ros | Gladman | AK | 7254 |
| Lynne | Glaeske | CO | 80237-1503 |
| Carol | Glansberg | NY | 12020 |
| Nancy | Glaser | CA | 94065 |
| Neil | Glaser | CO | 81621 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Rita | Glasscock | NM | 87507 |
| Stephanie | Glatt | CA | 93427-6821 |
| Lynn | Gleason | NY | 12170 |
| Michalle | Gleason | OR | 97233 |
| Cristy | Godwin | CO | 80209 |
| terrence | goebel | OR | 97267 |
| Noliwe | Gofhamodimo | DC | 20008 |
| Cody | Goin | MO | 65622-6202 |
| Ina | Goldberg | IL | 60660 |
| Denise | Goldin-Dubois | CO | 80212 |
| Mary | Goldstein | AZ | 85743 |
| Omar | Gomez | CO | 80260 |
| Maria | Gomez Murphy | AZ | 85648 |
| Christine | Gonos-Boyd | PA | 16506 |
| Kristin | Gonzalez | FL | 33165 |
| Joseph | Gonzalez | AZ | 85203-8117 |
| Dale | Goodin | CO | 80227 |
| Judith | Goral | OH | 44114 |
| Kellie | Gorman | CO | 80526 |
| Gene | Gossett | OR | 97220 |
| Deidre | Gotjen | AZ | 85022 |
| Sarah | Graf | CO | 81650 |
| Nikki | Graham | FL | 34275-1459 |
| E S | Graham | IL | 60133 |
| Rosemary | Graham-Gardner | CA | 90266 |
| General | Grant | WA | 99403 |
| Gia | Granucci | CA | 95448 |
| Gary | Graper | WI | 53711 |
| JACKIE | Gray | NC | 27510 |
| Richard J | Gray | CO | 81401 |
| Tarley | Green | AZ | 85027 |
| Chloe | Greene | WA | 98383 |
| Katey | Greene | CO | 80487 |
| Judy | Greenfield | CO | 80237 |
| Sarah | Greenholz | CO | 81623 |
| Linda | Gregory | AZ | 85622 |
| Arline | Grehan | NJ | 08022-1107 |
| Angie | Gridley | CO | 81007 |
| Kathy | Grieves | AZ | 85383 |
| Lynne | Griffin | CO | 80017-4513 |
| Kenneth | Griffith | PA | 17921 |
| Glenda | Griffith | CA | 93428 |
| kevin | grimes | NY | 11596 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Diana | Grob | OR | 97030 |
| Susanne | Groenendaal | PA | 16801 |
| Ostara | Groeschel | WI | 53562-3183 |
| Sister Julie | Grote | OH | 44883 |
| B | Gruenberg | CO | 81611 |
| d | Gryk | CT | 6042 |
| Storme | Guaraldi | NH | 3858 |
| Gabriele | Guenther-Segundo | CA | 92677 |
| Barb | Guilliams | SC | 29577 |
| Judee | Guilmette | NM | 87108 |
| L Penny | Guinther | OR | 97367-1356 |
| Joseph | Gulas | CT | 6418 |
| Lauren | Gunacan | CO | 80015 |
| Lisa | Gutheil | NY | 12018 |
| Amanda | H | PA | 18951 |
| mary | h tindukasiri | CA | 92683-1715 |
| Ariel | Hacker | CO | 80919 |
| Elsa | Hafez | TX | 78201 |
| M | Hagen | MN | 55408 |
| Katie | Haldeman | OR | 97701 |
| Holly | Hall | CA | 92592-6484 |
| Tom | Hall | CA | 94588 |
| Derinda | Hall | NY | 13502 |
| Gerald | Hallead | MI | 49684 |
| Philip | Halliwell | CO | 81601 |
| Bill N | Hals | GA | 30360 |
| Susan | Halversen | AZ | 85718 |
| Frederick | Hamilton | CA | 91739-1925 |
| Richard | Han | MI | 48105 |
| Julie | Hancock | UT | 84779 |
| Alexandra | Hänisch | AA | 73447 |
| Susan | Hanlon | NJ | 8759 |
| Roger | Hannah | IL | 60073 |
| warwick | hansell | UT | 84121 |
| Craig | Hansell | UT | 84121 |
| Julie | Hansen | SD | 57029 |
| Marsha | Hansen | OR | 97224 |
| Sharon | HANSFORD | CA | 93449 |
| Art | Hanson | MI | 48823 |
| Doug | Harder | IL | 60137 |
| Sandra | Hareld | NM | 87114 |
| Abigail | Harkey | CO | 80215 |
| EmmaDee | Harlan | TN | 37130 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Nancy | Harlander | CA | 94510 |
| Patricia | Harlow | PA | 19462 |
| Deborah | Harmon | AZ | 85373 |
| Keri | Harneck | IL | 60432 |
| David | Harpenau | IN | 47203 |
| David Brian | Harrington | CA | 94109 |
| John | Harris | CA | 94565 |
| Donna | Harrison | CO | 80121 |
| John | Harrison | FL | 34744-3964 |
| Lucy | Hart | CA | 91316 |
| Paula | Hartgraves | AZ | 85750-2925 |
| John | Hartley | MO | 65053 |
| Penny | Hartman | CA | 95476 |
| Chris | Hassig | CO | 81623 |
| Ysa | Hasty | MN | 55420 |
| Sheila | Hatch | NM | 88001 |
| Sydney | Hauser | FL | 33713 |
| Jay | Hawkshead | NJ | 7656 |
| Jeanne | Hayes | UT | 84106 |
| Pamela | Hayes | CO | 80538 |
| Mary | Hayes | NY | 14891 |
| Frank | Haymond | NV | 89108 |
| Judith | Hazelton | VT | 5201 |
| Mary | Headley | CO | 80501 |
| Mary Louise | Hegarty | CA | 94901 |
| eli | hegeman | MA | 1503 |
| Barbara | Heil | PA | 18055 |
| janet | Heinle | CA | 90403 |
| Sue | Hekman | CA | 91910 |
| Kendra | Held | CO | 81435 |
| Doug | Helliesen | FL | 33040 |
| Victoria | Hellmer | CO | 80212 |
| Leah | Helmer | NY | 11763 |
| Tyler | Henderson | CO | 80033 |
| Diana | Henderson | CA | 92110 |
| Kajsa | Hendrickson | UT | 84081-8549 |
| Dawn | Hendry | CO | 80127 |
| Renata | Hennell | CA | 95946 |
| Louise | Hepp | WI | 53095 |
| Sharon | Herber | OR | 97213 |
| BIRGIT | HERMANN | CA | 94117 |
| Ms. Maria Celia | Hernandez | MA | 2128 |
| Melinda | Hernandez | NY | 10001 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Terence | Hero | OH | 43302 |
| James | Herther | MN | 55117-3586 |
| Malin | Hessedahl | KS | 66830 |
| Heather | Hettick | OH | 44217 |
| James | Hickey | TX | 76082 |
| Elizabeth | Hickman | WA | 98092 |
| Lindi | Higgins | MA | 2631 |
| Madeline | Hill | IL | 60016 |
| Mindy | Hill | CO | 80521 |
| David | Hill | CO | 80521 |
| Katherine | Hinson | AZ | 85295 |
| Robert | Hirasuna | NM | 87506 |
| Mark | Hirschman | PA | 17543 |
| Josh | Hmielowski | CO | 81623 |
| Barbara | Hoch | MA | 2026 |
| Paula | Hodges | ID | 83815 |
| William | Hoffer | WA | 98672 |
| rachel | hoffman | PA | 19075 |
| John | Hoholik | CO | 80206 |
| Emily | Holcomb | NM | 87111 |
| Julie | Holguin | CA | 90027 |
| Kate | Holland | CO | 80247 |
| gabriele | holland | NH | 3884 |
| Andy | Holloway | NY | 11207 |
| Holli | Holmes | KY | 40205-3231 |
| Peggy | Holmes | CA | 94564 |
| David | Holzman | MA | 2421 |
| Ellen | Homsey | DE | 19707 |
| Lea | Hoogervorst | AZ | 85033 |
| Coleen | Hoover | IN | 46556 |
| Ethan | Hoover | CO | 80212 |
| Margaret | Hope | CO | 80538-2089 |
| Robin | Hordon | WA | 98346 |
| Michael | Horner | MI | 48076 |
| Jean | Horseherder | NM | 87124 |
| deanna | horton | AZ | 85750 |
| Dan | Horton | AZ | 85750 |
| Jennifer | Horton | CO | 80026 |
| Thomas | Hostomsky | MA | 2043 |
| Dennis | Hough | NY | 13205 |
| Kim | House | WI | 54235-8377 |
| Crystal | Howell | UT | 84104 |
| Sue | Howell | CA | 95437 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Cathy | Hower | CO | 81301 |
| Connie | Howes | CO | 80027 |
| David | Hoyler | NH | 3861 |
| Kelsi | Hubbard | IN | 46989 |
| Joseph | Hueg | CA | 95018 |
| vicki | hughes | CA | 92648 |
| Ken | Hughes | NM | 88507 |
| Cynthia | Hull | NM | 87301 |
| Rhonda | Hunt | MS | 39466 |
| Janet | Hurt | WA | 98178 |
| Tori | Hutchens | CO | 80222 |
| Andrew | Hutchinson | CO | 81323 |
| Deborah | Iannizzotto | CA | 92027 |
| Keith | Igoe | CO | 80211 |
| Amanda | Ingalls | RI | 2859 |
| Wilma | Ingram | OR | 97146 |
| Aurora | Insurriaga | CO | 80016 |
| Gwen | Irish | MA | 1701 |
| Andrew | Isoda | HI | 96761 |
| Julio | Iturreria | CO | 80120 |
| Ronald | Ives | CT | 6249 |
| Shirley | J | PA | 19067 |
| Rick | Jackson | CA | 92104 |
| Teryl | Jackson | CA | 95203 |
| Kathy | Jackson | NM | 87507 |
| Andrew | Jacobs | NY | 10801 |
| Brad | Jacobsen | CO | 80516 |
| Gordon | James | CO | 80222 |
| Monica | Jamison | IA | 52320 |
| Thomas B | Janter | GA | 30338 |
| Johnine | Jarvis | AZ | 86314 |
| Michael | Jayjock | PA | 19047 |
| wendy | jayko | CO | 80134 |
| Zack | Jeffreys | CO | 80004 |
| Nick | Jenkins | NH | 3222 |
| Debbie | Jenkins | OR | 97506 |
| Amada | Jenkins | AZ | 85009 |
| Mason | Jenks | OH | 44236 |
| Ken | Jenrow | MI | 48858 |
| Kyle | Jessup | CO | 81620 |
| Taryn | Joel | WA | 98106 |
| Mark | Johns | NE | 68138 |
| Walker | Johnsen | CA | 95628 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Karen | Johnson | VA | 22947 |
| Ernest | Johnson | PA | 19131 |
| Ann | Johnson | CO | 81623 |
| Allison | Johnson | IA | 50263 |
| Tara | Johnson | TX | 77573 |
| Roy | Johnson | FL | 32935 |
| Sarah | Johnson | CO | 81621 |
| Annie | Johnson | AZ | 85747 |
| Beth | Johnson | CO | 81623 |
| Elizabeth | Johnson-Quayle | MI | 48192 |
| Marilyn | Jones | CO | 80127 |
| Elsa | Jones | IL | 60181 |
| rebeccah | jones | FL | 33647 |
| Zareth | Jones | GA | 31406 |
| Pat | Jones | NM | 88030 |
| Lindsay | Jones | CO | 81623 |
| Deb | Josiger-Holzem | WI | 54956 |
| Elenara | Joubert | VT | 5602 |
| Mary | Julienne | CA | 92646 |
| Linda | Julson | AZ | 85383 |
| Lena | Jurgens | WA | 98802 |
| Ron | Kaminski | MT | 59105 |
| Tracy | Kanno | RI | 2910 |
| Sharon | Kansas | NM | 87532 |
| Angela | Kantola | CO | 80127 |
| Julie | Kaplan | CA | 90291 |
| Sharon | Karpinski | NM | 87107 |
| Dimitri | Katsaros | CA | 95129 |
| Tracey | Katsouros | MD | 20601 |
| Jeffrey | Kaufman | WA | 98604-9657 |
| Ryan | Keane | MA | 1752 |
| Eunice | Keeping | TX | 77406 |
| Christopher | Keleher | CO | 81612 |
| Brian | Keleher | CO | 81623 |
| Shelly | Keller | CA | 95818 |
| Kathleen | Kelley | FL | 34601 |
| Sister Mary Louise | Kelly | NY | 11570 |
| Emily | KenCairn | CO | 80303 |
| Perry | Kendall | PA | 19038-7924 |
| Joe | Kennedy | NM | 88061 |
| Erin | Kennedy | NH | 3847 |
| Catherine | Kenny | MA | 1930 |
| Debra | Kern | IL | 60013 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Tony | Kerr | KS | 66013-9418 |
| dorothy | kethler | NM | 87557 |
| Elizabeth | Ketz-Robinson | VA | 22308 |
| Siri Kar Kaur | Khalsa | NM | 87567 |
| Pat | Kiernan | CO | 81654 |
| Thor | Kieser | CO | 80403 |
| Laura | Kiholm | AZ | 85207 |
| Cynthia | Kilbrith | NY | 11755 |
| Susan | Kilgore | NY | 13820 |
| Roger | Kinney | CA | 95423 |
| JAMES | KIPPLE | TX | 78750 |
| Kelsey | Kirkwood | CO | 81201 |
| James | Kirschvink | CO | 81623 |
| Andrea | Kitson | NM | 87144 |
| Cynthia | Klatte | AZ | 85710 |
| Karen | Klauseger | IL | 60439 |
| Laurie | Kleen | MO | 63111-2808 |
| Randal | Klefbeck | WA | 98837-3281 |
| Sari Michelle | Klein-Hass | CA | 91402 |
| Linda | Klenotic | PA | 16105 |
| Lisa | Klepek | IL | 60137 |
| George F. | Klipfel II | CA | 92234-8405 |
| Dennis | Knaack | NY | 10457 |
| Donna | Kneeland | MN | 55309 |
| Susan | Knieriemen | FL | 34491 |
| Kristan | Knierim | UT | 84501 |
| Tara | Knopp | KY | 40216 |
| Maggie | Knudsen | CO | 80439 |
| Tricia | Kob | CO | 80526 |
| Renae | Kofford | CO | 80304 |
| Eric | Kohler | CA | 94117 |
| Laura | Kohlhaas | CO | 80503 |
| Bill | Kohlmeyer | WA | 98198 |
| Niki | Kolaitis | VA | 22201 |
| Sonja | Koontz | NV | 89029 |
| Scott | Korman | NY | 11005 |
| sandy | koshari | CA | 95409 |
| Tina | Krauz | MN | 55802 |
| Karen | Kravcov Malcolm | AZ | 85262 |
| Janet | Kregelstein | UT | 84010 |
| Judith | Krehbiel | KS | 67114 |
| Dennis | Kreiner | IL | 60110 |
| Ross | Kribbs | CO | 81623 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| yolanda | krisch | MD | 21093 |
| Michael | Kunsman | CO | 80122 |
| Suzanne | kunstman | CA | 94571 |
| Daniel | Kuperus | OR | 97215 |
| Jean | Kurniawan | FL | 33907 |
| Susan | Kutz | NM | 88012 |
| minda | l | MD | 21208 |
| E | L | CO | 81211 |
| Mercedes | Lackey | OK | 74017-4445 |
| Helena | Lafferty | IL | 62563-9556 |
| Paris | LaLonde | MI | 48306 |
| John | Lamb | CA | 91016 |
| Robin | Lane | PA | 15642 |
| Kellie | Langden | CO | 80126 |
| Antonia | Langowski | AZ | 53555 |
| Mike | Larkin | PA | 18078 |
| Rick | Larsen | CA | 95062 |
| Daniel | Larsen | TX | 77979 |
| Doran | Larson | NY | 13323 |
| Erik | LaRue | WA | 98233 |
| Dona | LaSchiava | AZ | 85614 |
| Juan Carlos. | Latorre. | WV | 26003 |
| Walker | Laughlin | NM | 87031 |
| Kathleen | Lautaret | CO | 81212 |
| Christopher | Lawell | WI | 53140 |
| Chris | Lawenstein | IL | 60634 |
| Melissa | Lawrence | IL | 60406 |
| Jamie | Lawson | AR | 72450 |
| Cornelia | Layton | CO | 80031 |
| Charlotte | Leas | CO | 80108 |
| Carter | Lebe | CO | 80537 |
| Michele | Ledesky | NY | 11783-3239 |
| Patricia | Ledford | NJ | 7444 |
| Kris | Ledford | NC | 27278 |
| Michael | Lee | CO | 80465 |
| Audra | Lee | CO | 80011 |
| Dorothea | Leicher | PA | 16914 |
| Tracy | Leigh | CO | 80478 |
| JENNIFER | LEIGH | WI | 53213 |
| Emily | Leight | OH | 44135 |
| Marc | LeMaire | WI | 54665 |
| Jeanie | Lemens | OR | 97801 |
| Kandy | LeMoine | NM | 87401 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Bobbi | Lempert | NC | 28714 |
| Torey | Lenoch | CO | 81211 |
| BLAKE | LENOIR | IL | 60617 |
| Frey | Lester | KY | 40503 |
| Helen | Leuthner | NY | 11755 |
| Barbara | Levenstien | NV | 89107 |
| Barbara | Levenstien | NV | 89104 |
| Deborah | Levin | PA | 19095 |
| Mary | Lewallen | MI | 49452-8147 |
| David | Lewis | CO | 81623 |
| Nora | Lewis | CA | 93444 |
| Zeta | Lezon | CA | 95821 |
| Francelia | Lieurance | CO | 81201 |
| Janet | Lincoln | NM | 87505 |
| Kristy | Lindberg | IL | 62025 |
| Susan | Lindbloom | CO | 81623 |
| Alan | Linn | NC | 28602 |
| Cynthia | Liss | NY | 11228 |
| SHERWIN | LITTLE | OH | 45241 |
| Randal | Little | CO | 80229 |
| Kevin | Lockhart | UT | 84032 |
| Emilie | Lofgren | AZ | 85118 |
| Jess | Lofland | UT | 84116 |
| Debra | Lofquist | CO | 80130 |
| Marilyn | Logan | NC | 28731 |
| Charlene | Lojewski | NY | 13413-1215 |
| Ann | Looby | CA | 95949 |
| Peter | Looram | CO | 81611 |
| Edward | Loosli | WA | 98612 |
| David | Lopez | NM | 87104-2658 |
| Ryan | Lopez | FL | 34711 |
| Edward | Lopez jr | CA | 92345 |
| joel | lorimer | NM | 87108 |
| Adam | Love | CO | 80121 |
| Anissa | Love | UT | 84120 |
| Jim | Loveland | FL | 33714-1970 |
| Belinda | Lovins | CO | 80233 |
| Anne | Lowe | MA | 1930 |
| Virginia | Lowery | LA | 70119 |
| Alannah | Lowman | MI | 48328 |
| David | Lucas | WA | 98026-3641 |
| Jim | Luebke | WI | 54935 |
| John | Luepke | AZ | 85643 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Judy | Lujan | UT | 84116 |
| Lexy | Luna | CO | 80918 |
| Sandra | Lunsford | AZ | 85254-3610 |
| Sue Ellen | Lupien | AR | 72113 |
| Debra | Luther | CO | 80498 |
| Denise | Lytle | NJ | 7095 |
| Gail | M Breen | NJ | 7026 |
| Patricia | M Williams | DE | 19958 |
| d'Anne | MacNeil | AZ | 85202 |
| Jill | Madsen | CO | 80918 |
| Lorrence | Mahaffy | CO | 80241 |
| Nancy | Mahoney | NY | 12481 |
| Rita | Mahoney | KS | 66046-2732 |
| Roger | Mairlot | NJ | 7901 |
| pete | mandeville | WA | 99208 |
| Jolyn | Mangiameli | NE | 68104 |
| Raymond | Manis | TN | 37062 |
| Bonnie | Manjarrez | TN | 37055 |
| Rita | Manna | CO | 80501 |
| Michael | Manning | NV | 89103 |
| Joan | Maples | VA | 23112 |
| George | Marano | NJ | 7110 |
| David | Margolis | IL | 60089 |
| Elise | Margulis | NJ | 7039 |
| Paul | Markillie | MI | 48439 |
| Gabrielle | Marks | NY | 10016 |
| Helen | Marks | OH | 44122-8600 |
| Carolyn | Markson | WI | 53029 |
| sallie | martin | CA | 94605 |
| Mary | Martin | IL | 61115 |
| Julie | Martin | WI | 54837 |
| Wendy | Martin | WV | 26250 |
| Walter | Martindale | VA | 22306 |
| Priscilla | Martinez | NM | 87120 |
| Kit | Mason | MD | 20902 |
| Kathy | Mason | MI | 48759 |
| Jeffery and Pamela | Mastin | NC | 28618 |
| Barbara | Mathes | AZ | 85648 |
| Geronimo | Mato | NM | 87501 |
| Irene | Mauer | KS | 66608 |
| Tatiana | Maxwell | WA | 98856 |
| Malinda | Mayer | RI | 2904 |
| Christopher | Mayfield | AZ | 85012 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Lisa | Mayr Boynton | MD | 21403 |
| Ozala | Mazar | GA | 30576 |
| JILL | MC ANALLY | WA | 98368 |
| Catherine | Mc Arthur | WI | 53213 |
| Kathleen J. | McBeth | WA | 98008 |
| Peter | McBride | CO | 81621 |
| Shaeril | McBrown | NY | 10469-5229 |
| Janis | Mccallum | WI | 53562 |
| Kerry | McCarthy | CA | 95926 |
| Mary | McCauley | NM | 87558 |
| Eden | McClellan | CO | 81623 |
| Danielle | McCormick | MA | 1022 |
| Danielle | McCormick | MA | 1022 |
| Elise | McCoubrie | MO | 63376 |
| Julie | Mcdermott | IA | 50265 |
| Linda | McDevitt | MT | 59901 |
| Nancy | McDonald | MI | 49839-0221 |
| Matthew | McDonald | WA | 98125 |
| Richard | McDonald | CO | 80303 |
| Carol | McDonald | NM | 87517 |
| Donna | MCDonald | AZ | 85706-1837 |
| David | McElrath | KY | 40601 |
| Deborah | McGinley | NY | 11210 |
| David | McGlocklin | CA | 95616 |
| Sean | McKelvie | UT | 84124 |
| rachelle | Mckenzie | ME | 4042 |
| Amy | McKeon | CO | 80011-7088 |
| Gayle | McKinley | WA | 98665 |
| NANCY | MCLAUGHLIN | FL | 34116 |
| Robert | McLaury | SC | 29803-2241 |
| Audrey | McLean | NJ | 7044 |
| Elizabeth | McMichael | CO | 81623 |
| Braden | McNeil | NV | 89117 |
| Joann | McNeilly | FL | 33810 |
| Jeremy | Meade | NM | 88001-5266 |
| Micah | Medina | AZ | 86406 |
| Mark | Meeks | CO | 80421 |
| Kate | Megowan | OR | 97756 |
| Alison | Mehlhorn | WI | 53051 |
| Nancy | Meister | AZ | 85364 |
| shelly | Mendoza | WA | 98632-1973 |
| William | Menke | WI | 53533-8916 |
| Diana | Menshouse | WV | 25705 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Patricia | Mensing | PA | 19073 |
| Ethan | Merritt | CO | 81601 |
| Ralph | Merry | OK | 74066 |
| Rene | Merwin | NC | 27707 |
| John | Messer | MI | 49716-9762 |
| Barbara | Methvin | OR | 97225-1855 |
| Wayne | Meulendyk | MI | 49546 |
| Derek | Meyer | VA | 22305 |
| Andrew | Michaelson | ME | 4103 |
| Richard | Middleton | UT | 84103 |
| Laura | Mihalakeas | TX | 76548 |
| Rob | Milburn | IL | 60625-3004 |
| Jeanne | Miller | NM | 88001 |
| Wister | Miller | CO | 80525 |
| Kim | Miller | CO | 80304 |
| Matthew | Miller | NY | 11706-7732 |
| DEBBIE | MILLS | IL | 62269 |
| Donald | Milotte | MA | 1950 |
| Constance | Minerovic | OH | 44067 |
| Shanese | Mitchell | GA | 31088 |
| Kim | Mitchell | AZ | 85254-1672 |
| Kristy | Mitchell | TX | 76802 |
| Kristina | Mitschke | AZ | 85658 |
| Kristina | Mitschke | AZ | 85658 |
| Andrew | Mizsak | OH | 44146 |
| Emily | Moddelmog | AZ | 85648 |
| Kathleen | Mohning | TN | 37209 |
| Jay | Mohr | WA | 98102 |
| Leila | Mohseni | CO | 80302 |
| cheryl | money | IN | 47150 |
| Peter | Monie | TX | 78232 |
| EJ | Monroe | NJ | 8010 |
| Judith | Montross | FL | 32708-2126 |
| Morgan | Moore | TX | 78758 |
| David | Moore | CA | 90065-3533 |
| Roberta | Moore | CO | 80120 |
| Robert | Moore | NC | 27587 |
| Catherine | Moore | AZ | 85023 |
| Christopher W. | Moore | CO | 80302 |
| Linda | Morgan | CA | 95630 |
| ruth | Morison | GA | 30541 |
| Susan | Morris | MA | 01262-1684 |
| Susan J | Morris | NM | 87326 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Kevin | Morrow | CO | 80904 |
| John | Morse | ID | 83843 |
| Bernette | Mosley-Dozier | CT | 6067 |
| susan | moulton | ME | 4074 |
| Cindy | Mouse | PA | 17202 |
| Johanna | Movassat | CA | 92672 |
| Stephen | Moyer | PA | 17901 |
| Bob | Moyer | PA | 18964 |
| Sharon | Muench | CO | 80016 |
| James | Mulcare | WA | 99403 |
| Amanda | Muller | CO | 80220 |
| Linna | Muller-Wille | VT | 5036 |
| Robert | Murdock | WA | 98506 |
| Joyce | Murphy | CA | 92117 |
| A | Murphy | CO | 81623 |
| Lynn | Murray | CA | 95630 |
| Amy | Muscarello | AZ | 85202 |
| Rebecca | Myers | CO | 80227 |
| Marilyn | Mythen | MA | 2302 |
| Joseph | Naidnur | IL | 61615 |
| Karen | Naiman | CO | 80247 |
| Irene | Nance | NM | 87901 |
| Nancy | Nance | NC | 28212-2816 |
| Sharon | Nash | MI | 49010 |
| David | Nash | WI | 53190 |
| Adrienne | Naumann | IL | 60076 |
| Rick | Naumoff | WY | 83127 |
| Diego | Navarro Garibay | OR | 97301 |
| Kim | Nelson | CO | 80524 |
| Richard C | Nelson | PA | 19382-3605 |
| David | Nelson | AZ | 85715-5016 |
| Kat | Nelson | NM | 88312 |
| Jonah | Nelson | UT | 84118 |
| John | Nettleton | OR | 97202 |
| Ken | Neubecker | CO | 81601 |
| Beverly | Newman | TN | 37312 |
| Mona | Newton | CO | 81623 |
| Leslie | Nicholas | KS | 67114 |
| Cherry | Nichols | IN | 46140 |
| Phyllis | Nichols | NY | 11209 |
| Barbara | Nicolson | CO | 80104-5281 |
| Thomas | Nieland | TX | 78516 |
| Susan | Nierenberg | NJ | 07666-3024 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Maryann | Nilsen | CO | 80231 |
| Maryann | Nilsen | CO | 80016 |
| Jacob | Nolan | AZ | 85643 |
| Mary | Noll | NY | 10562-6005 |
| Kristin | Noonan | NY | 12020 |
| Kathy | Nordlund | WV | 25813 |
| Susan | Norman | CA | 96150 |
| James | Norris | MO | 63111-2441 |
| jules | norris | AZ | 85741 |
| Andrew | Nowik | FL | 32164 |
| P | Nun | FL | 34491 |
| Katie | Nunnally | KS | 66216 |
| Kathleen | Nuss | AZ | 85119-7813 |
| Martin | Oakes | NY | 13027 |
| Siobhan | OConnell | NJ | 8742 |
| Margaret | O'Connell | NY | 11375-3043 |
| Maura | O'Connor | DE | 19810 |
| Marilyn | Odin | CA | 92563 |
| Linda | Oeth | CA | 92625 |
| Shannon | OKeefe | NM | 87107 |
| Suzanne | O'Keefe | WA | 98665 |
| Lauren | O'Keefe | CA | 95691 |
| Kim | Oki | WA | 98168 |
| Monika | Okula | CO | 81601 |
| Shaina | Oliver | CO | 80207 |
| Donna | Oliver | PA | 19333 |
| Patricia | Oliver | CO | 80033 |
| Elliana | Ondersma | MI | 49345 |
| John and Dorothy | O'Neal | AZ | 85202 |
| Lenora | ONeill | WA | 98591 |
| Joan | Oosterwyk | WI | 53527 |
| Kevin | O'Rourke | NY | 13316 |
| Nancy | Orr | UT | 84532 |
| Jerrold | Osborn | NM | 87107 |
| Rhea | Osland | IA | 50141 |
| Susan | Ostlie | NM | 87112-2505 |
| Lillian Vail | Owens | AR | 71653 |
| Dogan | ozkan | AK | 99701 |
| Cindy | P. | SC | 29681 |
| Kelly | Padgett | AL | 36618 |
| Pr.Cristoforo | Padula | MD | 21740 |
| Hugo | Paez | AZ | 85020 |
| Czora | Pagsolingan | OR | 97080 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Paul | Pallardy | CA | 95116-2704 |
| Natalya | Panteleyeva | CO | 80112 |
| Marija | Papineau | CO | 80122 |
| Hannah | Paradise-Sandoval | CO | 80221 |
| Ibraham | Paris | NV | 89135 |
| Brenda | Parker | AZ | 85224 |
| Silvina | Parkin | ID | 83825 |
| George | Parrish | NM | 87002-7538 |
| Terry | Partipilo | OR | 97301 |
| Joan | Paskewitz | CO | 80504 |
| Jude | Pasqualini | NC | 28715 |
| Megan | Passmore | CO | 81623 |
| Joseph | Pasternack | MI | 49091 |
| DHAVAL | PATEL | LA | 70094 |
| Debbie | Patsel | NJ | 7460 |
| Toni | Patterson | MT | 59840 |
| Neal | Paul | AZ | 85258 |
| Nora | Paul | IL | 60645 |
| kristin | paulson | CO | 80015 |
| Virginia | Paulson | IA | 52245 |
| Annie | Pausback | CO | 81615 |
| Joe | Pausback | CO | 80120 |
| Marti | Pausback | AK | 99516 |
| Mike | Peale | PA | 19014-1545 |
| Nan | Peck | CO | 80421 |
| Thomas | Peel | MN | 55421 |
| Janice | Peischl | PA | 15101 |
| susan | pelican | CA | 95695-9315 |
| Kathleen | Pelley | CA | 95501-2747 |
| Dominic | Percopo | CT | 06516-1063 |
| Palmira | PEREA HAY | NM | 87120 |
| elodia | perez | IN | 46526 |
| Sandra | Perkins | WA | 98125 |
| George | Perla | GA | 30306 |
| Kathleen | Perna | OH | 44320 |
| Anthony | Perry | CA | 95776 |
| Tracey | Peterson | AZ | 85032 |
| Eldon | Peterson | WA | 98241 |
| Ronald | Peterson | MD | 20910 |
| DAVID | PETERSON | CA | 95112 |
| Dawn | Peterson | CA | 95476 |
| Gary | Peterson | CO | 80203-3695 |
| Carrington | Petras | VA | 24401 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| kimberly | pettit | UT | 84532 |
| Kevin | Petty | AZ | 85282 |
| Shannon | Petty | SC | 29582 |
| Olivia | Pevec | CO | 81623 |
| susan | pfaff | VT | 05341-0070 |
| Keith | Phelps | IN | 46220 |
| Pamela | Philbrick | MA | 2169 |
| Justin | Philipps | OH | 43055 |
| Ari | Philipson | CO | 81650 |
| Claire | Phillips | CO | 80540 |
| Maryann | Piccione | CT | 6473 |
| Jennifer | Piche | CO | 80015 |
| Pamala | Pickard | UT | 84331-8903 |
| Monica | Pierce | GA | 30080 |
| Diane | Pierce | IA | 50014-9405 |
| Kyle | Pieti | CO | 81623 |
| Linda | Pippitt | OR | 97477 |
| Pat | Pire | WI | 53226 |
| Lisa | Pisano | NY | 11214 |
| Dolly | Pizzimenti | NH | 3055 |
| Tracy | Platero | NY | 10520 |
| George | Plummer | PA | 19335-6009 |
| Mary Beth | Podpeskar | OH | 44138 |
| Joanna | Podraskie | SC | 29322 |
| Carolyn | Polak | OH | 44134-2210 |
| Daniel | polley | IL | 60660 |
| Patricia | Pomeroy | OR | 97844 |
| Jayla | Poppleton | CO | 80487 |
| Marlene | Porcell | NV | 89139 |
| Janeene | Porcher | CO | 80401 |
| Charlie | Post | CO | 81507 |
| Michael | PotvinFrost | NM | 88310 |
| Julia | Powers | PA | 17602 |
| Linda | Powers | OH | 45036 |
| Scott | Pratt | NV | 89115 |
| Debbi | Pratt | WA | 98199 |
| Hans Joachim | Preiss | CO | 80305 |
| Karen | Procter | AK | 99517 |
| William | Prokop | NY | 14052 |
| Nancy | Prowell | NY | 14471 |
| Maresa | Pryor-Luzier | NM | 87821 |
| Swoj | Puttemans | OK | 73007 |
| Britton | Pyland | CA | 94705 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| shaye | pyper | UT | 84070-3560 |
| Susan | Querze | MA | 1843 |
| Diane | Quinlivan | CO | 80229 |
| Michael | Quinn | AZ | 85051 |
| James | Quirk | CO | 80501 |
| Elizabeth | Radcliffe | NM | 87104-3099 |
| Sally | Radford | WA | 98409 |
| Tanya | Radford | NY | 12533 |
| Jenni | Rafferty | MI | 48185 |
| Rachel | Rakaczky | NV | 89431 |
| Pavani | Ramnarayan | CA | 92128 |
| Patrick | Ramsey | NM | 87114 |
| Patrick | Ramsey | NM | 87114 |
| Elizabeth | Ramsey | CA | 95616 |
| Radine | Ramsey | NM | 87114-2001 |
| Dee | Randall | AZ | 85044 |
| Barbara | Ranous | AZ | 85345 |
| Maureen | Rautenberg | MA | 2169 |
| Ronald | Ray | AZ | 85342 |
| anne | rebello | ME | 3907 |
| Kate | Redford | CO | 80110 |
| Lynn | Redmon | FL | 33617 |
| Betsy | Reed | OR | 97266 |
| Bob | Reese | OH | 43935 |
| Gene | Reetz | CO | 80206 |
| Sally | Regan | CO | 81647 |
| Alyssa | Reindel | CO | 81623-9250 |
| Charles | Reindl | LA | 70005 |
| Salome | Reis | NC | 28905 |
| Jan | Renee | OR | 97206 |
| Allison | Rensch | CA | 90210 |
| Olivia | Reynolds | NV | 89523 |
| marc | Reynolds | NV | 89406 |
| Tammy | Riddle | CO | 80123 |
| Philip | Ritter | AZ | 85388 |
| Mary | Rittgers | IA | 50324 |
| Carol | Rivera | WI | 54313 |
| Jenny | Roberson | ID | 83686 |
| Zoe | Roberts | CO | 80524 |
| Joseph | Robustelli | CO | 80019 |
| Kathleen | Roche | OR | 97701-8232 |
| Lillian NINA | RODRIGUEZ | TX | 78861 |
| Starrlet | Rogers | CO | 80031-2324 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Lilith | Rogers | CA | 95473 |
| Erik | Rogers | NV | 89120 |
| Larry | Rolfe | MI | 48890 |
| Tom | Rolofson | CO | 80906 |
| Nicole | Rom | CO | 81623 |
| Teryn | Romaine | GA | 30512 |
| Timothy | Romano | CO | 80304 |
| Karen | Rome | SC | 29369 |
| RoseMaria | Root | PA | 17350 |
| FLORA | ROSAS | CA | 90038 |
| Kathryn | Rose | CO | 80205 |
| Cynthia | rose | SC | 29526 |
| Ken | Rosen | CA | 90212 |
| Stephen | Rosenblum | CA | 94301-3939 |
| Pam | Rosendal | CO | 80123 |
| Steve | Rosin | CA | 91106 |
| Russel | Ross | IL | 62441 |
| Melinda | Ross | IN | 47403 |
| Laura | Ross | MN | 55110 |
| Ronald | Roth | PA | 18088 |
| Janet | Rountree | VA | 23434 |
| David | Roupp | CO | 81615 |
| Frances A | Rove | KS | 66206 |
| Suzanne | Row | WI | 53092 |
| Haley | Rowan | CO | 80033-5131 |
| Maria | Rowe | CA | 93428 |
| Patricia | Rowell | VA | 22308 |
| Ashley | Rowley | CO | 81504 |
| JoEllen | Rudolph | MI | 49770 |
| michele | rule | NH | 3303 |
| W | Runyon | OR | 97055 |
| Paul | Russell | IN | 13385 |
| Emmet | Ryan | NY | 11001-3053 |
| An | Ryan | CO | 81521 |
| Lynette | Rynders | CO | 80136 |
| J | S | NV | 89533 |
| joy | s | CA | 94978 |
| Francis | S. | IL | 60515 |
| Kulu | Sadira | IA | 52556 |
| Jane | Salgado | NY | 11426 |
| Daniel | Salmen | PA | 15205 |
| Karinmaria | Salzman | NJ | 7480 |
| William | Sampson | AZ | 86315 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Sylvia | Sanchez | CA | 92354 |
| Rebecca | Sanchez | NV | 89138 |
| Patricia | Sanin | WA | 98004 |
| Jan | Sarvis | CA | 94930 |
| Sally | Sato | WY | 82009 |
| Rodney | Sato | CO | 80921 |
| Patty | Sauer | VA | 20148 |
| Pamela | Saulter | CA | 92571 |
| Randy | Savicky | FL | 33472 |
| Dorothy C | Sawyer | OH | 44112 |
| Susan | Sawyer | CA | 95824 |
| Emma | Schaefer | CO | 80503 |
| Stacie | Schaefer | CO | 80503 |
| Myra | Schegloff | CA | 90405 |
| Mary | Schell | PA | 16059 |
| Paula | Scherschel | IN | 46168 |
| Jennifer | Schertz | TX | 77494 |
| Cheryl | Scheurer | CA | 94941 |
| Robert | Schildgen | CA | 95412-9746 |
| Kenneth | Schilling | MI | 49512 |
| Tim | Schirber | CO | 80022 |
| Kimberly | Schlaepfer | CO | 81620 |
| Mary | Schmidt | TX | 78016 |
| Linda | Schmidt | NM | 87104 |
| Betsy | Schmidt | MA | 2635 |
| L. L. | Schneider | MN | 55427 |
| Carol | Schoen | FL | 32578 |
| Marie | Schoepke | VA | 24101 |
| Richard | Schoonover | WA | 98499 |
| Mark | Schrier | NC | 27587-6670 |
| Elisabeth | Schröder | CA | 35037 |
| Margaret | Schulenberg | TX | 78664 |
| Rhiannon | Schurig | AZ | 85338 |
| Thomas | Schwarting | NY | 12769 |
| Rhonda | Schwartz | CA | 92020 |
| Robert | Schwartz | CO | 80904 |
| christina | scott | NY | 14305 |
| Susan | Scott | CO | 80911 |
| Cindy | Scott-Petroski | MI | 49935-1005 |
| Penny | Scribner | NM | 88005 |
| Jackie | Sculco | CO | 81621 |
| Jennifer | Scull | OH | 44024 |
| TONI | SEGER | ME | 4051 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Kanwaldeep | Sekhon | NY | 11004-1517 |
| Claudette | Selph | NM | 87144 |
| John | Semivan | NY | 10009 |
| James | Senger | CO | 81122 |
| Evangelina | Serrano | NM | 87111 |
| Lorraine | Sevilla | AZ | 85029 |
| JOE | SEVILLA | CA | 93013 |
| Michelle | Sewald | CO | 80202 |
| Kathleen | Sewright | FL | 32708 |
| Michael | Sexton | FL | 34607 |
| Phoenix | Shadow Of Moon | IN | 46218 |
| Shaina | Shay | AZ | 85745 |
| Steve | Sheehy | OR | 97603 |
| Patricia | Sheffield | TX | 78418 |
| Marilyn | Shepherd | CA | 95570 |
| Sally | Sherbina | AZ | 85614 |
| Nicholas | Sherman | VT | 5482 |
| Kayan | Sherrer | CO | 80620 |
| Rebecca | Shiell | FL | 32080 |
| Matt | Shmigelsky | CO | 81623 |
| David | Shokenu | WA | 98409 |
| George | Shrewsbury | WA | 98244 |
| Jeff | shultz | CO | 80120 |
| Linda | Sie | CO | 80906 |
| Marcia | Silverstein | CO | 82524 |
| Christie | Silverstein | AZ | 85308 |
| Peter | Simons | CO | 80206 |
| Malcolm | Simpson | NV | 89104 |
| Dharma | Singh | WI | 53590 |
| William | Sinkler | PA | 18966 |
| Katrin | Sippel | NY | 10023 |
| James B | Sitrick Jr | ME | 4348 |
| Dianne | Slater | FL | 32137-9722 |
| Elizabeth | Slikas | AZ | 85201 |
| Elaine | Sloan | NY | 10022 |
| Tamara | Smejkal | AZ | 85635 |
| Joy | Smiley | NY | 11756 |
| Oliver | Smith | CO | 80540 |
| Veda | Smith | FL | 32955 |
| Alex | Smith | MD | 21045 |
| Freida Bell | Smith | IL | 62881 |
| Joe | Smith | PA | 19446 |
| Laurel | Smith | CO | 80549 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Lisa | Smith | IL | 61032 |
| J.T. | Smith | PA | 18960 |
| Mary Ann | Smith | NY | 10545 |
| Katherine | Smith | MO | 63139 |
| Steven | Smits | CO | 81631 |
| Art | Smoker | IN | 46526 |
| Scott | Snyder | AZ | 85029 |
| Elizabeth | Snyder | MI | 48009 |
| Ashley | Snyder | MO | 65203 |
| REBECCA | Snyder | MD | 21755-7906 |
| Sandra | Sobanski | NY | 11218 |
| Sandra | Sobanski | NY | 11218 |
| Michael | Solis | TX | 77573 |
| Steven | Sondheim | IL | 60657-4753 |
| Doris | Soraci | NY | 12563 |
| Mary | Southard | IL | 60526 |
| Roger | Southward | NM | 87043 |
| Cheryl | Spector | CO | 80204 |
| Charlie | Speno | CO | 81301-4344 |
| Zoe | Spiropoulou | NY | 12436 |
| Kerry | Spitzer | CO | 80306 |
| Tod Alan | Spoerl | WI | 53036 |
| Richard | Spotts | UT | 84790 |
| Pattie | Squiqui | AZ | 85373 |
| Gabriel | Stanley | IL | 60471 |
| Jack | Stansfield | WA | 98292 |
| Lee | Stark | CO | 80017 |
| Rodney | Stark | PA | 18347 |
| Alice | Stehle | PA | 16001 |
| Amy | Steinberg | NJ | 7470 |
| Audrey | Steiner | TX | 78723 |
| James | Steinert | WI | 53074 |
| Oktober | Stephens | CO | 81301 |
| Jean | Stephenson | UT | 84111 |
| Roberta | Stern | CA | 94618 |
| Craig | Stevens | NJ | 8628 |
| Sarah | Stewart | MA | 2472 |
| Jovana | Stewart | AZ | 85259 |
| Christopher | Stimson | OH | 44313 |
| Kelly | Stinnett | MD | 21163 |
| Reagan | Stinson | TX | 76182 |
| John | Stofko | PA | 18102-5512 |
| Janet | Stoker | NM | 87501 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Diana | Stokes | CA | 95677 |
| Jackie | Stolfi | NY | 11762 |
| Brandon | Stoll | CO | 80016 |
| Lauren | Stone | MA | 2558 |
| Darby | Stone | AL | 35749 |
| ILYA | STOROZHINSKIY | CO | 80230 |
| Abigail | Stough | AZ | 85085 |
| Madalynn | Stratton | WY | 82001 |
| Wayne | Stroessner | WI | 53075-1608 |
| susan | strong | AZ | 85206 |
| Grace | Strong | MI | 49938 |
| Signe | Stuart | NM | 87508 |
| MARY | SULLIVAN | PA | 17844 |
| Ann | Sutherin | OH | 43235 |
| Carrie | Swank | PA | 19608 |
| Betsy | Swanson | CT | 6018 |
| W | Swartz | AZ | 85745 |
| Tracy | Swope | FL | 33157-5924 |
| Barbara | Swyden | NM | 87124 |
| Mary Ellen | Sychtyz | PA | 18706 |
| Evelyn | Symonds | ID | 83651 |
| Russell | Symonds | CA | 92627 |
| Jillene | Syphus | UT | 84532 |
| Janelle | Syverson | CO | 80021 |
| K | T | IL | 60102 |
| Kirk | Tanaka | HI | 96788 |
| Anna | Tangi | PA | 19148 |
| Alina | Taniuchi | CO | 81639 |
| Dennis | Tapley | NM | 88011 |
| Matthew | Tarpley | GA | 30014 |
| Elizabeth | Tart | CO | 80238 |
| Mara | Tasker | CO | 80503 |
| Susan | Tatro | CA | 95503 |
| Terry | Taucer-Samson | CO | 6100 |
| Dennis J | Tavares | CO | 80113 |
| Brigitte | Tawa | CO | 80303 |
| laura | taylor | NM | 87565-9001 |
| Maria | Taylor | IA | 52806 |
| Janine | Taylor | CA | 90710 |
| Dorothy | Tharsing | OR | 97411 |
| Jim | Thiele | AK | 99507 |
| Pilar | Thomas | AZ | 85746 |
| Jean | Thornsbury | WA | 98047 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Thor | Thorsen | UT | 84032 |
| Kenneth | Thrash | AL | 36092 |
| Doris Marie | Thrasher | WI | 53212 |
| Donnae | Tidwell | UT | 84111 |
| Kathleen | Tihanich | NJ | 8831 |
| Tina | Tine | TN | 37203 |
| Priscilla | Tine | TN | 37203 |
| Jim | Titus | IA | 51104 |
| Catherine | Tokarchuck | IN | 46368 |
| Anais | Tomezsko | CO | 81623 |
| Luis | Torres | CA | 92262 |
| Mary Lynn | Toth | PA | 15943 |
| Kay | Toth | TX | 76877 |
| Emily | Towell | CO | 80232 |
| Teri | Tracy | CO | 80512 |
| Nancy Carol | Traeger | WI | 53222 |
| Dana | Trick | CA | 93021 |
| Richard | Trilsch | CO | 80301 |
| Tia | TRIPLETT | CA | 90016 |
| john milu | truesdale | NM | 87108 |
| Jude | Tubbs | CO | 80228 |
| Susan | Tucker | PA | 16365 |
| Ed | Turley | NC | 28711 |
| Patricia | Turner | ID | 83713 |
| Brady | Turner | CO | 81147 |
| Carolyn | Turner | GA | 30084 |
| Margaret Guilfoy | Tyler | MO | 63122 |
| Nathan | Tyson | GA | 31015 |
| Dana | Udall | CO | 80304 |
| Andrew | Ulloa | CO | 80461 |
| Carol | Underhill | MO | 63088 |
| Amy | Uptegraft | CA | 94062 |
| Marina | Urquhart | CO | 80206 |
| Michael | Utley | CO | 81321 |
| Martin | Valens | NY | 10516 |
| JACQUELINE | VALLE | KY | 40356-9337 |
| Bente | van Alphen | CO | 80220 |
| Kathy | Van Dame | UT | 84121 |
| Harley | Van De Wege | CO | 80227 |
| cheryl | vana | AZ | 85194 |
| Dyan | Vandino | NY | 11385 |
| Wiliam | VanDriessche | FL | 33917 |
| Michael | Varichak | CO | 80231 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Heather | Vasquez | CO | 80238 |
| Patricia | Vasta | MI | 48162 |
| Liz | V-C | NY | 11901 |
| Nadia | Vega | FL | 32714 |
| Ricky | Vestal | CO | 80919 |
| Felipe | Vieyra | CO | 80010 |
| Gayle | Vistine | MO | 63146 |
| Eric | Voise | AZ | 85044 |
| Phil | von Hake | CO | 80465 |
| Tracy | Vonder Haar | IL | 60640 |
| Linda | Vopicka | FL | 33606 |
| Sherry | Vosburgh | NY | 10017 |
| Linda | Vretos | VA | 22039 |
| Kristin | Vyhnal | NM | 87122 |
| Ann | W | IL | 60630 |
| p | w | MS | 39110 |
| Carolyn | Wacaser | CO | 80227-4887 |
| Valerie | Waddell | AZ | 85212 |
| Dawn | Wait | WI | 53058 |
| Ann | Wakefield | MD | 20910 |
| Bob | Walker | CO | 80209 |
| Patrice | Wallace | CA | 95060 |
| Erlynn | Wallace | OH | 43123 |
| Mary | Walls | NM | 88030 |
| David | Walsh | CA | 55104 |
| Robert | Walsh | PA | 19403 |
| Barbara | Walt | AZ | 85303 |
| Angela | Walter Schemahorn | IN | 46737 |
| Ernest | Walters | CA | 94587 |
| Ernie | Walters | CA | 94587 |
| Gabriele | Wampfler | CA | 94062 |
| Aurelie | Ward | NC | 28677 |
| Diana | Ward | FL | 33713 |
| Robert | Ward | CO | 81623 |
| Susan | Ward | MI | 48917 |
| Rita | Warde | NJ | 7847 |
| Rita | Warde | NJ | 7847 |
| Lynn | Warren | CO | 80204 |
| Barbara | Wasserman | CA | 91311 |
| Ray | Waters | FL | 32211 |
| Laura | Waterworth | CO | 80013 |
| Henry | Watkins | MA | 1778 |
| Natasha | Watson | AZ | 85630 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Nancy | Wavra | WA | 98649 |
| virginia | weaver | FL | 32955 |
| Holly | Weaver | VA | 22408-0298 |
| Laurie | Webber | OR | 97213 |
| Mary | Weber | NY | 14546 |
| William | Webster | UT | 84094 |
| Victor | Webster | NM | 87540 |
| MarySue | Wedl | WI | 53551 |
| Jennifer | Weiche | CO | 80120 |
| Roxanne | Weidman | WA | 98604 |
| Susan | Weiss | MD | 20852 |
| Nancy | Welch | AZ | 85283 |
| Therese | Weldon | VA | 23113 |
| Michele | Wells | MI | 48075-4214 |
| Jack | west | FL | 34759 |
| Dennis | West | OR | 97498-0846 |
| Sandra | Weston | ID | 83221-2045 |
| Rosemary | Wetherold | TX | 78759 |
| Michael | Whalen | WI | 53129-1040 |
| Sherri | Whalen | CO | 80477 |
| MAUREEN | WHEELER | MD | 20901-1725 |
| David | White | ME | 4609 |
| Viola | White | NM | 87520 |
| Jason | White | CO | 81623-1812 |
| Emily | White | CO | 81623 |
| Patricia | Whitlock | NV | 89108 |
| Fanny | Whitman | MA | 2791 |
| Claudia | Whitman | CO | 81328 |
| Susie | Whittinghill | MT | 59715 |
| Charles | Wieland | CA | 94583 |
| Jamie | Wienk | CO | 81301 |
| Pamm G | Wiggin | MD | 21212 |
| Sandy | Wight | UT | 84604 |
| Melissa | Wilander | PA | 18330 |
| Leslie | Wilbur | NM | 88005 |
| Jane | Wiley | FL | 33624 |
| John | Wiley | MO | 64068 |
| Elizabeth | Wilkening | AZ | 85742 |
| Mariela | Wilkes | OR | 97362 |
| L.L. | Wilkinson | NM | 87571-6436 |
| Dorothy | Wilkinson | CA | 90027 |
| Catherine | Williams | AZ | 85719 |
| Dot | Williams | CO | 80908 |

| First Name | Last Name | State | Zip/Postal |
|---|---|---|---|
| Donna Marie | Williams | NV | 89701 |
| freddie | williams | MA | 1504 |
| Carole | Williams | WV | 26505-3065 |
| Kathryn | Williams | FL | 33913 |
| Emily | Williams | CO | 81623 |
| Twila Dawn | Willis | TX | 78745 |
| Graham | Wilson | CA | 95062-5229 |
| tina | wilson | NV | 89048 |
| Sherita | Wilson | NY | 14228 |
| sherry | wilson | AZ | 85013 |
| Sarah | Wilson | MT | 59106 |
| Sarah | Wilson | CO | 80461 |
| Linda | Winchester | PA | 19401 |
| Ken | Windrum | CA | 91406 |
| Amber | Wingerson | NC | 28144 |
| Erica | Winstead | IN | 46236 |
| Joseph | Wisboro | MA | 1606 |
| Michael | Witter | HI | 96332 |
| Martin | Wolchansky | MN | 55391 |
| Tobias | Wolff | CA | 94305 |
| Carol | Wong | CA | 90045 |
| Peter | Wood | NY | 10022-6436 |
| Dale | Wood | AL | 36532 |
| Karen | Wood | CA | 92314 |
| Karen | Wood | OH | 43402 |
| gerrit | woudstra | CA | 91126 |
| Cathy | Wray | VA | 23451 |
| Barbara Jo | Wuest | MD | 21206 |
| Janet | Wyatt | CO | 81507 |
| margo | wyse | NM | 88049 |
| Pam | Y | CO | 81328 |
| Helen | Yeomans | KS | 66212 |
| Barbara | Youngquist | IL | 60053 |
| Nancy | Yuen | NM | 87122 |
| Daniel | Zamecnik | UT | 84321 |
| Daniel | Zanchi | CA | 92270 |
| Robert | Zeller | NY | 10029 |
| Cynthia | Ziegler | CO | 81428 |
| Gary | Zimmermann | AZ | 85208 |
| Barry | Zuckerman | NY | 10940 |
| Stacey | Zuckerman | IA | 51109 |

***Letter #:*** 3363

***Date Received:*** 2/27/2026

***Sender Names:*** 3332: Kay Miller

***Emails:*** 3332: miller5494@sbcglobal.net

***Organizations:***

***Subject:*** Protect the Colorado Rier!!!!

DOI - .

***Letter #:*** 26

***Date Received:*** 1/10/2026

***Sender Names:*** 24: Sandra & Steve Miller

***Emails:*** 24: smillersc5@aol.com

***Organizations:***

***Subject:*** Colorado River basin study

DOI - . Many years ago, I submitted a prop thru my congress rep Hurt, on this problem. The Corps came back with another agency, perhaps yours, with "we cant do that". The country has done nothing, and the problem has worsened. I wrote a fairly lengthy prop on means to collect flood water from the Ms, Oh and Mo rivers. Collection would be based on techniques developed by the James River company, with the help of surveyors like G Washington....who were constructing a major shipping canal system, that was successful for some time, prior to railroads. This prop included the construction of short term storage basins along the rivers, followed by pump stations and large piping that would ship water to the upper Colorado. There is no wonder that this country is in the state it is, as I have observed many similar projects that have already taken place in China. But, we just sit on our hands. I would also note that if something like this were enacted, it would help to mitigate flood damage on the rivers. It could also complement contrived programs to store water underground, one discussed several years back. None of this is difficult, and has all been done before, parts here, parts elsewhere. However, we have lost our way, and now want to study, provide grants, have meetings, and then have politicians discuss on TV. And, nothing happens. Good thing is that I am old enough not to have to see the result of the failed state. I will continue to watch the fun, with several States arguing over who gets wet, and how much it will cost. I have also sent this type of message over many years to the water boards, some to direct addressees, in some of the States affected.....with the same result....nada.sPS as I sit in my recliner, retired, I also came up with a simple scheme to add between a locomotive and the cars, to perhaps reduce, again the word is mitigate, the derailing of the rail cars, in some types of accidents. As an engineer, I think it would have some inertial merit. When sent to several govt agencies, one actually responded, telling me that only the loco mfr could institute such a safety mod. I then tried two of these mfrs, with once again, you got it, nada. And yes, after over 30 yrs of work for our govt, at an engr pay rate significantly less than the civilian market, I did get a huge pay raise later as contractor, with great actual benefits. So then, I spent 8 years constructing a patent relating to the IED threat. Imagine my surprise, when the army comes in early and applies a secrecy order to it. And, to my later surprise, the USPTO did not tell me early on, that there is a US code requiring such applications to not be issued a patent, due to secrecy. I did ask the USPTO why they had not had the simple courtesy to tell me this when I began the process in 2015. The response would not surprise.

***Letter #:*** 589

***Date Received:*** 2/25/2026

***Sender Names:*** 579: Jean Miyake

***Emails:*** 579: jean.miyake@yahoo.com

***Organizations:***

***Subject:*** Post-2026 Draft EIS Public Comment

DOI - . To whom it may concern, I'm writing to comment on the Draft Environmental Impact Statement (EIS) for Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead. This Draft fails to meet its stated purpose and need, as it ignores options that would provide operational flexibility and environmental benefits. Specifically, the new Colorado River guidelines must: - Analyze river-level bypass of Glen Canyon Dam to ensure naturalized flows through the Grand Canyon, continue Glen Canyon's ecological restoration, and provide maximum operational flexibility in the system. The dam has become a liability preventing water from flowing downstream. Failing to study river-level bypass needlessly limits options for the river, its users, and its ecosystems. - Study a "Fill Mead First" option, prioritizing water storage in Lake Mead before Powell. Today's hydrology does not support filling both Lake Mead and Lake Powell. Given this reality, it doesn't make sense to continue needlessly drowning the national park-caliber canyons in Glen. Analyzing different variations of a one-reservoir option would benefit the ecosystems and management of the entire Basin. - Acknowledge the extensive emerging resources in Glen Canyon. In the years since Lake Powell reservoir has declined, there has been an amazing reemergence of wonders like Cathedral in the Desert and Gregory Natural Bridge, as well as vital riparian ecosystems, cultural sites, and new recreation opportunities. These resources must be given equal value to other resources across the Basin. - Require curtailment plans from each state, and prohibit new non-Tribal diversions. Federal agencies must take the supply and demand crisis seriously, imploring each state to produce plans to reduce demand. These agencies should also put a moratorium on new water diversions, with the exception of Tribes with senior water rights. Thank you for your consideration.

***Letter #:*** 2622

***Date Received:*** 2/24/2026

***Sender Names:*** 2600: Mary D. Moderacki

***Emails:*** 2600: dmoderacki17@gmail.com

***Organizations:***

***Subject:*** The Colorado River

DOI - . Dear Bureau of Land Mangement Will fighting over water bring it back? Of course not. We are all in this together. Stop trying to cheat your neighbors. Face the facts. Everyone needs water but that can only happen if it is sustainable. Show me how you will help save the Colorado River. Sincerely, Mary D Moderacki 626 E 14th St New York, NY 100093312 dmoderacki17@gmail.com

***Letter #:*** 19

***Date Received:*** 1/18/2026

***Sender Names:*** 18: Guillermo Mojarro

***Emails:*** 18: foochiememo@aol.com

***Organizations:***

***Subject:*** Water shortage

DOI - . At all cost... build the system that we need.Get the water from Canada, make a deal through the great lakes to provide the water that we need....all the way from the Arctic, to the Colorado River system, if we have to go so far. Save everything and everyone, get the water.Pay the bill because there is no other way to insure that we can have all the water that we need in the future.RespectfullyMr Guillermo Mojarro Corpus Christi's Texas Sent from AOL on Android

***Letter #:*** 3954

***Date Received:*** 2/26/2026

***Sender Names:*** 3911: Ji Montgomery

***Emails:*** 3911: jiprk99@gmail.com

***Organizations:***

***Subject:*** Re:Save the rivers in Colorado!

DOI - . Dear whom to concern,Tell the Trump Administration's Brueau of Reclamation: The Colorado River future depends on bold action, not incremental adjustments.We need a management framework that protects clean water, communities, and ecosystems for generations to come. The bureau has the opportunity to take meaningful action now to address the full reality of climate driven water scarcity and the urgent need to protect water quality, ecosystems, and basin communities.I urge the Brueau of Reclamation to significantly strengthen the post 2026 Colorado River Basin Draft EIF that proactively addresses the crisis that we face and ensure the public has opportunity to comment on this revised proposal before issuing it final decision.The Colorado River already overallocated and shrinking. The Brueau must prioritize long term sustainability, meaningful tribal consultation, and enforceable reduction in demand, not simply identify new ways to divide a declining supply.The Colorado River cannot afford delay. Sincerely, Ji Montgomery

***Letter #:*** 3144

***Date Received:*** 2/26/2026

***Sender Names:*** 3115: moondrop

***Emails:*** 3115: moondrop7@gmail.com

***Organizations:***

***Subject:*** PLEASE Protect the Colorado River

DOI - .

***Letter #:*** 1564

***Date Received:*** 2/24/2026

***Sender Names:*** 1553: Jennifer Moore

***Emails:*** 1553: windwalkerarts7@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement HIS IS A MORAL ISSUE! We CANNOT allow trump and his "team of thrives" to destroy the future of 1/3 this country by deliberately allowing the Cokirado River to be divided up and destroy the livelihoods of every person and all of our agriculture in the SW region of the USA to be placed in danger just because "he" doesn't believe in the global environmental crisis! I am NOT going to let him do this to our country!!! NO, NO, NO! STOP HIM NOW! I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Sincerely, Jennifer Moore PO Box 2653 Glenwood Spgs, CO 81602-2653 windwalkerarts7@gmail.com

***Letter #:*** 3746

***Date Received:*** 2/26/2026

***Sender Names:*** 3709: Annajean Morales

***Emails:*** 3709: annajeangrace@yahoo.com

***Organizations:***

***Subject:***

DOI - . Sent from Yahoo Mail for iPhone

***Letter #:*** 2686

***Date Received:*** 2/22/2026

***Sender Names:*** 2663: Mary Moran

***Emails:*** 2663: Mary.Moran.1115118288@forgrassroots.com

***Organizations:***

***Subject:*** Comments on the Post-2026 Colorado River Guidelines

DOI - . Dear U.S. Bureau of Reclamation,Please, it's time for extreme actions, now, to address the extreme drops of the Colorado River and Lake Powell.The current rules and dam design obviously don't work anymore. Lake Powell elevations are predicted to reach minimum power pool elevation as early as mid-July this year! This would gravely endanger power production, but also, crucially, the flows and ecology of the Grand Canyon downstream.I feel this danger personally, having spent time along the river in Grand Canyon. I was working on a vegetation monitoring project there back in 1992. A coworker hiked in to join our trip and told us that the Grand Canyon Protection Act had passed. We had a memorable celebration down on a Colorado River beach that evening. We were so happy that there was now a mandate that Glen Canyon Dam was required to have releases to benefit the Canyon - its native fish, beaches, and overall ecology as well as cultural resources.They Grand Canyon Protection Act still stands. The dam itself, and its management, need reworking. A comprehensivenn plan must be created, with input from engineers, experts in the Canyon's ecology, and the tribes. The Grand Canyon Protection Act mandate must be followed.Thanks for still allowing me to comment.Sincerely,Mary Moran

VIA EMAIL
crbpost2026@usbr.gov

March 2, 2026

Bureau of Reclamation
Attn: BCOO-1000
P.O. Box 61470
Boulder City, NV 89006

**Re: Comments on Draft Environmental Impact Statement Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead**

I submit the following comments on the Draft Environmental Impact Statement (DEIS) prepared by the Bureau of Reclamation (Bureau) addressing post-2026 Colorado River operations.

I appreciate the agency's efforts to evaluate multiple operational pathways to guide Colorado River water deliveries, including the No Action Alternative, Basic Coordination Alternative (Federal Authorities Alternative), Enhanced Coordination Alternative (Federal Authorities Hybrid Alternative), Maximum Operational Flexibility Alternative, and the Supply Driven Alternative. Given the physical and legal complexities of the river system, it is indeed a formidable undertaking, and the document provides much useful information. However, the DEIS fails to satisfy the requirements under the National Environmental Policy Act (NEPA) in that it fails to explore and objectively evaluate all reasonable alternatives.

Under NEPA, the alternatives analysis is the heart of the EIS. A document must rigorously explore and objectively evaluate a reasonable range of alternatives that accomplish the project's purpose and need. While the DEIS presents certain operational options, it does not consider infrastructure modification options at Glen Canyon Dam that could ensure reliable releases independent of presumed reservoir elevation constraints. By focusing predominantly on release reductions and coordination frameworks given existing infrastructure, the DEIS omits serious consideration of structural adaptations that may be necessary to ensure compliance with the Colorado River Compact and downstream priorities. The document also lacks actions that can be taken upstream in the Upper Basin to address the purpose and need for the federal action.[1]

**Glen Canyon Dam Retrofit**

Any long-term operating plan for Glen Canyon Dam must prioritize the ability to pass water in compliance with the Colorado River Compact over preserving a minimum reservoir elevation of 3,490 feet (minimum power pool). The Compact imposes a non-depletion obligation at Lee Ferry—75 million acre-feet over any consecutive ten-year period. That legal requirement is not contingent on hydropower economics or structural preferences; it is a binding interstate commitment. An operating plan that subordinates Compact compliance to infrastructure protection risks legal conflic among basin states and potential Supreme Court intervention.

[1] One of the project's needs as define in the DEIS is to provide "Colorado River water users, including Basin Tribes, expanded opportunities to conserve, store, and take subsequent delivery of water in and from Lake Mead and/or Lake Powell. The guidelines should also support and integrate future efficiency improvements and opportunities for augmentation." Yet the document focuses solely on actions in the Lower Basin as though the Bureau has no authority in the Upper Basin.

Lake Powell was constructed to help ensure Upper Basin compliance with Compact obligations, not to become a structural constraint that impairs them. If reservoir levels approach elevations that threaten power generation or expose spillway vulnerabilities, the appropriate response is to retrofi or modify outlet works to ensure reliable low-level releases—not to artificiall restrict downstream flows. Engineering constraints cannot override interstate law. The dam's design should adapt to hydrologic reality and legal mandates, not the reverse. Power production is subservient to agricultural and domestic water uses.[2]

Moreover, conditioning releases on maintaining 3,490 feet effectivel shifts hydrologic risk downstream, concentrating shortages in the Lower Basin while preserving storage upstream. That undermines basin wide equity considerations and erodes confidenc in cooperative management. Retrofitting—whether through bypass construction or modified intake/outlet works—would protect dam safety while preserving operational flexibility. It would also safeguard hydropower revenues by reducing the likelihood of emergency drawdowns driven by legal noncompliance.

Climate variability and declining inflows make structural adaptability essential. The Bureau of Reclamation has both the technical capacity and statutory responsibility to operate federal facilities consistent with the Law of the River. Incorporating dam modification into the operating plan ensures that Compact compliance remains paramount, infrastructure risks are responsibly addressed, and interstate stability is preserved over the long term.

As stated in the Lower Basin States' February 13, 2025, letter to Secretary of the Interior Doug Burgum, submitted prior to publication of the Draft Environmental Impact Statement (DEIS), "the … approach to protecting the Lake Powell outlet works by reducing releases from Lake Powell—rather than making infrastructure repairs and improvements—is shortsighted and harms the Lower Basin States by slashing the water available to our farmers, communities, and economies." Despite this observation and other similar comments submitted to the Bureau of Reclamation prior to the preparation of the DEIS, the document fails to meaningfully address that concern in its formulation of alternatives, instead omitting infrastructure modification from serious consideration. By excluding infrastructure retrofi options and focusing narrowly on operational reductions, the DEIS fails to evaluate a full spectrum of reasonable alternatives. This omission undermines informed decision-making and deprives the public of meaningful participation in evaluating viable solutions.

**Upper Basin Curtailment and Enforcement to meet Compact Flows**

Any federal operating plan designed to regulate flow in the Colorado River must incorporate curtailments of post-1922 water use at Upper Basin federal projects because the Bureau of Reclamation possesses both contractual leverage and operational authority over these facilities. Absent inclusion of project-based reductions, a federal plan risks placing the entire burden of Compact compliance on reservoir storage alone—an increasingly untenable strategy under declining hydrology.

The Colorado-Big Thompson Project (CBT) alone diverts roughly 220,000–250,000 acre-feet annually, with a long-term average near 230,000 AFY, under an authorized ceiling of about 310,000 AFY. Approximately 50% of this supply supports municipal and industrial uses along Colorado's Front Range, and about 50% serves agriculture. Because CBT water is highly reliable and supported by carryover

[2] Colorado River Compact, Article IV(b) "water of the Colorado River System may be impounded and used for the generation of electrical power, but such impounding and use shall be subservient to the use and consumption of such water for agricultural and domestic purposes and shall not interfere with or prevent use for such dominant purposes."

storage, it represents a discrete, measurable block of consumptive use that could be proportionally reduced during shortage operations without dismantling state priority systems.

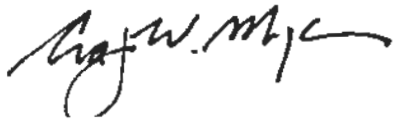
Similarly, while Flaming Gorge Dam does not itself consume water, total depletions in the Green River Basin—Colorado, Wyoming, and Utah—range from approximately 1.1 to 1.2 million AFY upstream of Lee Ferry. A coordinated federal plan that conditions project releases and associated contracts could influenc a meaningful portion of this consumptive use, particularly where federal facilities regulate supply timing and storage.

The Navajo Dam and the Navajo Unit add another 40,000 to 70,000 AFY of non-tribal consumptive use. Because these uses depend on federally constructed and operated infrastructure, Reclamation retains a legitimate role in shaping shortage response through contract administration and reservoir operations.

Collectively, these federally linked uses approach 1.5 million acre-feet annually. Incorporating curtailments into a federal operating plan would allow for the satisfaction of priority water rights, distribute risk more equitably across the river system, reinforce Compact compliance, and motivate Upper Basin water users to institute meaningful water conservation programs like Lower Basin water users have.

I respectfully request that the Final EIS expand the alternatives analysis to include infrastructure modificatio options at Glen Canyon Dam and the consideration of implementing operational constraints in the Upper Basin. Only through a comprehensive evaluation can Reclamation ensure durable, lawful, and equitable river management.

Thank you for the opportunity to comment.



Craig William Morgan, PE, MBA
President
Avalex Inc.

***Letter #:*** 909

***Date Received:*** 2/24/2026

***Sender Names:*** 899: Paula Morgan

***Emails:*** 899: paulaymorgan@gmail.com

***Organizations:***

***Subject:*** Please support a smarter future for the Colorado River, and all who depend on it!

DOI - . Dear Bureau of Land Mangement I am writing to encourage the Bureau of Reclamation to combine elements from the proposed alternatives in the draft Environmental Impact Statement (DEIS) to ensure a sustainable future for the Colorado River with new, long-term guidelines that: - Provide clarity and predictability: continued crisis management puts everything and everyone in the basin at risk. New guidelines must promote conservation and respond to conditions on the ground - Incorporate flexible, adaptive tools for conserving, storing, and managing water: new guidelines must allow for more flexibility in how water is stored and moved to protect and stabilize the system - Embed environmental stewardship: the Colorado River is more than a plumbing system. New guidelines must account for the river itself and the bounty of life it sustains. - Provides for meaningful and voluntary Tribal participation grounded in sovereignty and self-determination: the 30 federally recognized Tribes in the Basin must be included in decision-making. - And preserve pathways for advancing in-basin mitigation and continued binational cooperation with Mexico Anything less will be the death of the Colorado River Basin. Use intelligence and forethought along with science to plan for the revival of the Great Colorado River! Our lives depend on it! Think twice and act once but don't forget to think! Sincerely, Paula Morgan 1595 Eagle Wind Ter Winter Spgs, FL 327080013 paulaymorgan@gmail.com

***Letter #:*** 412

***Date Received:*** 2/18/2026

***Sender Names:*** 407: Victor Moss

***Emails:*** 407: vjmoss@earthlink.net

***Organizations:***

***Subject:*** Colorado River Allocation

DOI - . It's really an easy fix. Since each state agreed to a certain percent of the water, take the past 20-year average flow of the river, subtract 10% and divide the rest by the percentage that each state has already agreed to. The 10% reduction would take into account evaporation and allow the remainder to slowly refilling Lakes Powell and Mead. Then tell each state to figure out on their own how to deal with their own reduction. But since there are bureaucrats and politicians involved, they make it difficult.Victor Moss4008 W. Bonanza Rd.Las Vegas, NV 89107Ph. 702-493-3028 American Legion Paradise Post 149: https://www.post149.org/International Brotherhood of Motorcycle Campers: https://www.ibmc.org/----------"Only a biker understands why a dog sticks its head out the window of a moving car."

***Letter #:*** 8841

***Date Received:*** 3/3/2026

***Sender Names:*** 422: Steve Munsell

***Emails:*** 422: smunsell@prescott.edu

***Organizations:***

***Subject:*** Public comment on Post 2026 Powell Mead EIS

DOI - . Thanks for all your hard work to prepare the draft EIS. Sadly- the physical reality of the river may eclipse your detailed efforts. I think a 'run of the river' alternative would be a good starting point for the operation of Powell reservoir. You all know how vulnerable the dam infrastructure is and how close to triggers we are with the Hydropower elevation. Maintaining the hydropower head may be optimistic but it's important because it's the only viable release method. How will the ROW system work in the long haul? Is that an operating 'experiment' we want to risk? Not ideally. Longer term it's time to figure out how to get all of that water out of the lower reaches of the reservoir as it's a lot of water to lose in the system if the dam can't release it and it sits there. Evaporating. Steady 8000cfs is a good alternative also so you can study other options and wait for the states and the Fed to figure out how to respect the rivers limits and reduce the volume of water commitments across the board. 8000 is really a good bottom end flow for rafting in Grand Canyon to remain realistic commercially and recreationally. Yes- One reservoir is really the limit in the new climate regime and it should be the older, nobler brother- Lake Mead. It's just a matter of time and having the system collapse is not a way to build trust in the public eye. Best of luck with your studies and work.... Steven Munsell Faculty Emeritus, Adventure Education w. www.prescott.edu e. smunsell@prescott.edu t. 928 848 0369c Join us on social media! #igotoprescottcollege Facebook | Instagram | YouTube | Snapchat | Twitter Take Our Virtual Tour

***Letter #:*** 9054

***Date Received:*** 12/4/2024

***Sender Names:*** 8992: Ryley Murphy

***Emails:*** 8992: ace378murphy@gmail.com

***Organizations:***

***Subject:*** Page 0142

I Support Recreation on the Colorado River Basin I am writing as a supporter and user of Lake Powell, Lake Mead and water in the west. I am a concerned citizen and supporter of responsible water and energy infrastructure management. I am writing regarding the proposed alternatives for the Post-2026 Colorado River Operation Guidelines. It is important to recognize the role that the dams within the Colorado River Basin play in ensuring energy reliability, irrigation, water storage, navigation, and regional economic stability. I appreciate the Bureau of Reclamation recognizing BlueRibbon Coalition's Path to 3588' Plan as an alternative considered and recreation as a whole in alternatives analyzed. Glen Canyon and Hoover Dam and the Colorado River Basin, face growing pressure from radical environmental activists and anti-dam interests who seek its decommissioning. These calls threaten the dam's essential functions on the Colorado River system, therefore we appreciate BOR recognizing that moving to a one dam system would not yield a resilient system and would be bad for the environment and the economy. As a recreation user, I support any alternative that recognizes and supports recreational opportunities within the Colorado River Basin. The Supply-Driven, Max Operational Flexibility and Enhanced Coordination Alternatives all identify release levels based off of low water levels, shortages or low inflows which will better protect the dams critical infrastructure. I support any alternative or blend of alternatives in which releases are based off of real water inflows and not maximum deliveries that could hurt the water storage system and ultimately recreation. I support keeping the most water in the reservoirs for recreation as possible. The nation cannot afford to treat these critical infrastructure assets as bargaining chips in speculative environmental campaigns. Lake Powell and Lake Mead are too important to lose, and its operation must be protected. Lake Powell, national recreation park should not only be saved but should be national parks main focus to restore to the fullest safest capacity. The revenue lost would not only hurt the local communities but it would trickle to neighboring states. As we all don't want new data centers anywhere they can fit, it is inevitable that they will be. As long as everyone has a smart phone they will build data centers. I believe everyone would agree that something needs to be done about water usage and production. As we never know when we will be in a drought. but I believe lake Post-2026 Colorado River 142 of 5176 Powell does not need to be sacrificed to make changes happen. Please save my family and many others favorite place on earth. LAKE POWELL Post-2026 Colorado River

**U.S. Bureau of Reclamation**
Attn: BCOO-1000
P.O. Box 61470
Boulder City, NV 89006
VIA: Email: crbpost2026@usbr.gov

Re: Public Comment on the Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead – Draft Environmental Impact Statement (January 2026), hereinafter Draft EIS.

Submitted by: John D. Musick, Jr.

Date: February 20, 2026

Dear U.S. Bureau of Reclamation (Attn: BCOO-1000):

I respectfully submit the following comments on the Draft EIS *Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead – Draft Environmental Impact Statement (January 2026)* during the public comment period ending March 2, 2026. https://www.usbr.gov/ColoradoRiverBasin/post2026/draft-eis/

I respectfully request that the Bureau of Reclamation (Reclamation) consider the following summary comments on the Draft EIS number 1st – 10th and also then consider the detailed comments that follow which provide an explanation in greater detail of my summary comments on the Draft EIS.

**Summary Comments:**

Reclamation is hereby requested to reject Draft EIS five proposed alternatives and act proactively according to the following facts as I see them.

1st: The Colorado River Basin is not an isolated basin.

The Colorado River Basin is a basin that is interconnected, interdependent, and interrelated with the Upper and Lower Basin of the Colorado River, and numerous adjacent river basins in many states.

What happens in any part of the Colorado River basin directly and indirectly impacts other parts of these Upper and Lower Basin states, and river basins in other states.

The Lower Basin states of California, Nevada and Arizona have significant adjacent river basins.

The Colorado River basin and its adjacent river basins are more than just a water supply basin, they are also a related energy supply river basin, coupled with all things that the water and energy provide.

This interconnection of everything, everywhere can be expressed as the Colorado River Basin "Water-Energy-Food-Society-Climate-Environment-Financing NEXUS" (NEXUS).

The Colorado River Basin NEXUS is critical for many millions of existing residents, millions of acres of agriculture, millions of businesses, countless massive military-industrial-hi tech industry, national defense and emerging uses for data centers, AI Era facilities for the AI Value Chain Capital Stack such as advanced materials manufacturing, critical minerals etc.

The Colorado River Basin NEXUS is so interconnected that adjusting one NEXUS element in one river basin impacts all NEXUS elements in many river basins.

The Colorado River Basin NEXUS must not be touched or reduced or altered in any adverse way by "allocating shortages" of water supply through conservation or other water "supply management" tools.

The Colorado River Basin NEXUS also must not be touched or reduced or altered in any adverse way as to adversely impact energy supplies by "allocating shortages" of water supply through conservation or other "supply management" tools that would also directly and indirectly adversely impact energy supplies.

The Colorado River Basin NEXUS must instead be facilitated by "aggregating surplus" of water supply, energy supply and the supply of all other NEXUS elements.

Reclamation must accomplish this "aggregating of surplus" for the Colorado River Basin NEXUS elements by an immediate new multi-trillion dollar "Manhattan Project" style emergency action.

The Colorado River Basin "Manhattan Project" style action for preserving the entire NEXUS is critically necessary to meet the urgent needs of the global competition and national defense for AI, data centers, defense industry, military, humanity and related facilities.

The Colorado River Basin "Manhattan Project" style action for preserving the NEXUS must be broken down into the Lower Colorado River Basin NEXUS demands.

The Lower Colorado River Basin NEXUS demands must be further broken down into data centers demands and related AI Era demands for water and energy, and then also broken down into the military-industrial complex NEXUS demands for water and energy, and then further broken down into the ancillary NEXUS demands for water and energy people, plants and equipment (PPE) supporting those data centers, AI Era and military service's needs.

Data Centers: The Lower Colorado River Basin NEXUS is meeting the estimated current demands for just the ~541+ existing data centers in California, Nevada and Arizona which is ~9.7 GW of energy and ~434,000 AFY of water.

The Lower Colorado River Basin NEXUS data center demands are estimated to grow by ~950% to ~5,680 data centers and to ~102 GW of energy and ~4.5 MAFY of water.

Ancillary data center demands: The Lower Colorado River Basin NEXUS estimated LifeCycle Assessment (LCA), Lifecycle Costing (LCC) and Lifecycle Sustainability/Social Assessment (LCSA/S-LCA) pursuant to ISO 14040:2026 et. seq., with no system boundary, from the beginning of facilities life to end of life input and out-put for all data centers, AI Era supporting facilities estimated to grow in just the next decade to from current ~14.5 GW of energy to ~154 GW of energy, and from current ~613,000 AFY to future ~6.4 MAFY of water.

Military and national defense: The Lower Colorado River Basin NEXUS water supply, energy supply and related facilities and infrastructure demand of the NEXUS elements must never be adversely impacted in any way to jeopardize the mission of the numerous national defense military facilities, identified and the other unidentified security enhanced nameless national defense contractors.

These numerous national defense users of water, energy and related NEXUS elements are for equipment, training, technological innovation, housing, and private defense training in the California-Nevada National Defense Military Corridor with unmatched proximity to the nation's premier military Multi-Domain Training & Testing Infrastructure.

These numerous national defense users of water, energy and related NEXUS elements require an unlimited abundant water supply (and energy) and related NEXUS elements is always available from the Lower Colorado River Basin coverage area comprising ~440,000 square miles containing ~38 major military installations, ~150+ contractors, millions of people within a ~350 Mile Radius, and which future demands are for an incalculable amount of water and energy and NEXUS elements due to national defense security information limits under Department of defense (DoD) Cloud Impact Levels 4 through 6 (IL4-IL6) etc.

Suffice it to say, the future military-industrial complex primary and ancillary demands for water and energy, and ancillary NEXUS services is an order of magnitude increase on just data centers and their ancillary demands listed above.

Into this matrix of demands, Reclamation proposes in the Draft EIS an impossible to comprehend or justify "management philosophy" of "allocating shortages" when what is needed immediately is a national defense based aggressive "aggregation of surplus" of water and energy, not to mention all of the other elements of the NEXUS related to military readiness and critical mission execution.

2nd: This Colorado River Basin, and especially the Lower Colorado River Basin, "Manhattan Project" style immediate action plan prevents the United States of America (U.S.A.) from losing the global dominance and superiority technological lead over global adversaries.

This goal of U.S.A. global dominance and superiority is dictated by the successful "Launching the Genesis Mission" required by President Donald J. Trump in Executive Order 14363 on November 24, 2025, https://www.whitehouse.gov/presidential-actions/2025/11/launching-the-genesis-mission/ .

This “Genesis Mission” goal of U.S.A. global dominance and superiority has been further required and enforced by EO 14318 (Accelerating Federal Permitting), EO 14365 (National AI Policy), EO 14156 (Energy & Mineral Security), EO 14181 (Emergency Measures To Provide Water Resources to California), Executive Orders on energy, AI, permitting (America’s AI Action Plan, Unleashing American Energy, Accelerating Federal Permitting of Data Center Infrastructure, Removing Barriers to American Leadership in AI) of January 20, 23, July 23, 2025 and “One Big Beautiful Bill Act” (OBBBA), which was signed into law on July 4, 2025 for accelerated depreciation MACRS and Section 179 et. seq. which provides enhancements to shortening investment recovery, and the goal of U.S.A. global dominance and superiority built upon prior laws, prior legislation like Inflation Reduction Act, CHIPS Act etc.

Thus, Reclamation must reclassify data center, AI and semiconductor and related NEXUS facilities of water/energy significant increased needs under Section 4007 of the WIIN Act (which allows for federal support of expanded water storage) as a "National Priority" rather than a local request.

Reclamation must create Federal NEXUS Energy-Water Corridors.

These Federal NEXUS Energy-Water Corridors would be pre-permitted "Super-Zones" where Reclamation provides guaranteed water and energy to the military-industrial complex, data centers, AI facilities, semiconductor fabs, critical mineral producers and advanced materials manufacturers, and all ancillary supporting facilities and infrastructure, bypassing the traditional multi-year red tape.

Reclamation must Declare a National Emergency, which suggests to the President to utilize the Defense Production Act (DPA) to compel Reclamation to prioritize the construction of reservoirs and hydroelectric retrofits, and all other NEXUS facilities necessary to meet the moment of the new “Manhattan Project” by “aggregation of surplus” and not allocation of shortages”, lest the U.S.A. loses the global race for superiority.

All of these forgoing actions must be taken separately or in totality to require Reclamation and all Federal agencies to “aggregate surplus” of water supply, energy and all related NEXUS demands, for the Lower Basin States of the Colorado River to meet national defense, data center and AI Era demands and not “allocate shortages” which are, thus, contrary to the Executive Orders, laws, rules, regulations and court decisions.

3rd: Collectively, the Draft EIS alternatives are not grounded in existing statutory authority, enforceable compact obligations, sound hydrologic science, or economically viable implementation mechanisms.

Further, the Draft EIS ignores Executive Orders, and ignores the critically vital Lower Basin states of California, Arizona and Nevada defense industry and defense readiness posture, and the crucial role that data centers, AI and other NEXUS related technological improvement provide.

The Draft EIS “allocation of shortages” instead of “aggregating surplus” is and will cause irreparable damage to military-industrial complex facilities and other NEXUS related facilities.

These facilities are such as: Edwards AFB remote detachment facility at Homey Airport a/k/a Groom Lake a/k/a Area 51, Nellis AFB, Creech AFB, Nevada National Security Site (NNSS), Naval Station Fallon (a/k/a "Tallon"), Nevada Test and Training Range (NTTR), Tonopah Test Range, Nevada Army National Guard, Nevada Air National Guard, U.S. Army Reserve Centers, USARD, 6th Medical Recruiting Battalion, Joint Force Headquarters, 152nd Airlift Wing (Reno), Floyd Edsall Training Center, Elko County Training Center, and related military operation bases relying upon California and Nevada and which are co-located in California, Nevada and etc.

These include numerous identified and security enhanced nameless national defense contractors for equipment, training, technological innovation, housing, and private defense training in the California-Nevada National Defense Military Corridor Unmatched Proximity to Nation's Premier Multi-Domain Training & Testing Infrastructure.

The lengthy list is as follows:

For the AIR DOMAIN (~15 installations) Edwards AFB (flight testing, X-planes), Nellis AFB (Red Flag, Weapons School, 414th Combat Training Squadron), Creech AFB (MQ-9 Reaper global operations center), Beale AFB (U-2, RQ-4 Global Hawk), Travis AFB (Air Mobility Command), Los Angeles SFB (Space Systems Command HQ), Vandenberg SFB (space launch, missile defense testing), March ARB, Channel Islands ANGB, Fresno ANGB, others.

For the MARITIME DOMAIN (~8 installations), Naval Base San Diego (Pacific Fleet HQ, ~50+ ships), NAS North Island (carrier aviation), NAS Lemoore (largest F/A-18E/F base), China Lake NAWS (weapons testing, ~1.1M acres), Point Mugu NAWS (sea range, missile testing), NAS Fallon ("TOPGUN", Strike Warfare Center, a/k/a "Tallon"), Naval Postgraduate School (Monterey), USCG bases (San Diego, Alameda, Sacramento).

For the GROUND DOMAIN (~6 installations), Fort Irwin NTC (instrumented combat training, ~1,000 sq mi), Twentynine Palms MCAGCC (Marine combined arms, ~932 sq mi), Camp Pendleton (~125,000 acres, I MEF), MCAS Miramar (F-35B, 3rd MAW), Hawthorne Army Depot (ammunition storage), Sierra Army Depot.

For the TRAINING RANGES (~9 ranges), Nevada Test & Training Range (~2.9M acres — largest in CONUS), Chocolate Mountain Aerial Gunnery Range, San Clemente Island (Navy SEAL training), Multiple restricted airspace zones (R-2508, R-2524, etc.).

For the Defense Contractor Ecosystem (~100+ Facilities) Major Primes, Lockheed Martin (Palmdale - F-35, F-22 production; Sunnyvale - space systems), Northrop Grumman (Palmdale - B-21, RQ-4; Redondo Beach - space, missiles), Boeing (Long Beach, Seal Beach - satellite systems, missile defense), General Atomics (San Diego - MQ-9, railgun, fusion research), SpaceX (Hawthorne - Falcon/Starship; Vandenberg - launch ops), Raytheon (El Segundo - missiles, space systems), Specialized: Kratos (San Diego - autonomous systems, XQ-58 Valkyrie), Anduril (Costa Mesa - AI/ML defense systems), Shield AI (San Diego - autonomous aircraft AI), 200+ SMEs in aerospace, electronics, advanced materials manufacturing.

4th: Reclamation must reject any form of “allocation of shortages” instead of “aggregation of surplus” impacting water, energy, any element of the NEXUS for critical facilities in The Lower Basin in any of the five proposed alternatives as currently structured.

5th: Reclamation must revise the Draft EIS to ensure full consistency with Executive Order 14363 (Genesis Mission) and all other Executive Orders and laws referenced herein.

6th: Reclamation must ground all alternatives explicitly in existing statutory and compact law.

7th: Reclamation must enforce Upper Basin delivery obligations as a non-negotiable operational baseline.

8th: Reclamation must exclude conservation-based shortage allocation schemes all of which lack legal, factual, or scientific justification.

This exclusion of conservation-based shortage allocation schemes must be permanent so that there will never be a direct or in-direct adverse impact on the very Lower Basin regional public, businesses, AI Era facilities for the AI Value Chain Capital Stack, advanced materials manufacturing companies, and national defense that are reliant upon Reclamation and U.S.A. federal government.

Reclamation must at all times keep its statutory, legal and enforceable promises of “aggregating surplus” pursuant to Reclamation “Duty to Perform” the "Permanent Service” Mandate “Promise of Continuity”, and as required to be defended and protected and supplied with water and energy by the Executive Orders, laws, rules, regulations and court decisions listed herein below.

9th: Reclamation must develop alternatives centered on future forward innovation, infrastructure, lawful enforcement, and “aggregation of surplus” rather than behavioral modification “allocation of shortages” based upon hypothetical and indefensible weather and climate projections, Global Warming, Climate Change or other discredited, unfounded and now federal government rejected theories.

10th: Reclamation must reject any and all alternatives that by Reclamation “management philosophy” allow Reclamation to merely be a “neutral arbiter” of scarcity by reducing one drop of Colorado River water or one watt of energy because each drop or watt within the Colorado River Basin reduced by conservation adversely impacts many drops and watts outside of the basin in the NEXUS interconnected universe of water and energy supplies.

**Detailed Analysis:**

1. “Duty to Perform”

Reclamation has a legally declared, compulsory, non-delegable, non-arbitrable, non-amendable, non-negotiable Colorado River basin-wide “Duty to Perform”.

The “Duty to Perform” requires Reclamation to continue to exercise the full “Promethean” spirit of the organic law establishing the Bureau in 1902.

This organic law created the “Duty to Perform” a Colorado River basin-wide storage network exceeding ~ 60 MAF and massive amounts of energy capable of eliminating drought and energy risk.

The “Duty to Perform” compelled Reclamation to do this through reservoir carryover storage by the unsurpassed feats of system-scale engineering by a fully integrated river-management designed water-supply and energy-supply system.

The “Duty to Perform” compelled Reclamation to do this at a scale, speed, and permanence of interstate allocation, continental-scale storage, irrigation, municipal supply, and international treaty obligations that should, did and can continue to overcome scarcity in the desert to create, enlarge and protect the investments of the citizenry by “aggregating surplus” and not “allocating shortages “of water, energy and the other NEXUS elements.

The “Duty to Perform” laid upon Reclamation as a federal “contractor” a duty since the start of Reclamation projects from 1902 to the last one completed in 1993.

Reclamation has repeatedly failed to deliver upon the century-old legally enforceable “Duty to Perform” promise of regional water and energy security by “aggregating surplus” estimated by original Reclamation planning to be an another ~ 20 MAF, and by modern technology easily could double the ~80 MAF of combined existing and older planned projects.

The “Duty to Perform” is not just a “management philosophy” allowing Reclamation to merely be a “neutral arbiter” of scarcity.

This “Duty to Perform” failure of “aggregating surplus” and instead “allocating shortages” has violated the provisions of the 5$^{th}$ Amendment to the U.S.A. Constitution.

This “Duty to Perform” failure of “aggregating surplus” and instead “allocating shortages” is also in violation of the Reclamation “Blue Book” budget allocations when Reclamation expends money allocated for water supply “aggregation of surplus” and augmentation by the “aggregating surplus” and instead is improperly diverting money to “allocating shortages” type conservation-only programs.

This “Duty to Perform” failure is especially egregious when using the misguided, weak, improper, un-authorized “Feasibility Defense” for not “aggregating surpluses” in favor of “allocating shortages”.

2. "Permanent Service” Mandate

The "Permanent Service” Mandate Statutory Authority: Boulder Canyon Project Act of 1928 (43 U.S.C. § 617d)

The "Permanent Service" Mandate Statutory Language of the Boulder Canyon Project Act of 1928 (BCPA) provides the Secretary of the Interior with the authority to contract for the storage and delivery of water.

It states, in pertinent part: "The Secretary of the Interior is hereby authorized... to contract for the storage of water in said reservoir and for the delivery thereof... for assets and permanent service and shall maintain and operate said works at all times as a project authorized by this Act**."**

3. The "Permanent Service" Mandate is an enforceable "Promise of Continuity".

In the context of Western Water Law, "The Laws of the River" and the Reclamation "Heroic Engineering Era," the term "Permanent Service" is a "Duty to Perform" enforceable "Promise of Continuity" and was utilized by Congress to provide the certainty necessary for the massive capital investment required to build the cities and agricultural districts of the desert in the Lower Basin.

By definition, "Permanent" denotes a service that is intended to continue indefinitely by the "Duty to Perform" the "Promise of Continuity" without fundamental reduction in its character or reliability.

4. "Contractual Vested Rights".

Under the BCPA, the "Permanent Service" contracts (such as those held by the State of Nevada, Imperial Irrigation District, Metropolitan Water District, and the State of Arizona, and its individual citizens and businesses as "Beneficial Users" of the water) are not mere "discretionary permits."

They are fully vested legal rights to the "Duty to Perform" the "Permanent Service" and "Promise of Continuity" for the delivery of the stored water and energy.

Any effort at enforcing or allowing "managed shortage" by conservation or otherwise effectively attempts to re-classify "Permanent Service" as "Conditional Service," and, thus, violates the "Promise of Continuity" by a breach of the "Duty to Perform" which is an unauthorized shift in Reclamation functions that lacks any specific Congressional authorization.

5. "The Duty to Augment".

If the physical supply of the Colorado River is insufficient to fulfill the "Duty to Perform" the "Permanent Service" and "Promise of Continuity" obligations, Reclamation has a legally enforceable "Duty to Perform" coupled with "The Duty to Augment" as the statutory duty of Reclamation—as a "Construction Agency" under the 1902 and 1928 Acts—to "aggregate surplus" from other sources (augmentation) to meet its contractual and statutory delivery mandates.

Managing a "structural deficit" by rationing is a failure to maintain the "Works" for the purpose

of the “Duty to Perform” the "Permanent Service" and “Promise of Continuity” obligations promised by the 1902 Act and 1928 Act and subsequent acts.

6. None of the Reclamation five proposed operational alternatives Draft EIS provide the following statutory requirements:

The Reclamation five proposed operational alternatives Draft EIS do not provide for reliable, affordable, safe, secure, defensible, time-delay sensitive, implementable, environmental, water supply (or energy supply) which will not “strand” the massive trillions in capital expended by and for the immediately required national defense industry, AI Era, AI Value Chain Capital Stack, advanced materials manufacturing and all other supply chain in-put and out-put NEXUS industrial facilities that are required for American global superiority, national defense and futuristic innovative solutions required by Executive Orders, laws, rules, regulations and court decisions.

The Reclamation five proposed operational alternatives Draft EIS do not provide for services that are fundamentally necessary for providing to the “Direct Side” NEXUS uses such as AI Era facilities etc. the critical “Enabling Side” infrastructure for water supply, wastewater management, energy generation and distribution, total recoverable waste by-products recycling and commercialization, critical materials mining, and production.

The Reclamation five proposed operational alternatives Draft EIS do not provide for the essential immediate implementation of the “Direct Side” demands of the AI Era facilities AI Value Chain Capital Stack including data centers, AI and related NEXUS facilities.

The Reclamation five proposed operational alternatives Draft EIS do not comply with the “Law of the River” summarized as the 1922 Colorado River Compact, 1928 Boulder Canyon Project Act, 1944 U.S.-Mexico Treaty, 1948 Upper Colorado River Compact, Arizona vs. California , 373 U.S.546 (1963) etc.

The Reclamation five proposed operational alternatives Draft EIS do not comply with the Executive Orders, laws, rules, regulations and court decisions including the Reclamation Act of 1902 as subsequently implemented to include the reclamation of the arid lands of the west as the core aim and later broadened to include multi-purpose water development—adding flood control, navigation, hydroelectric power, and municipal and industrial water supply, and importantly national defense industry development.

7. It also bears expanding and repeating that in addition to the fact that none of the Reclamation five proposed alternatives Draft EIS comply with the Executive Orders, laws, rules, regulations and court decisions, Reclamation five proposed alternatives Draft EIS also conflict with the spirit and letter of the earlier laws on the U.S.A. which include all water supply, wastewater management, energy generation and distribution, critical and all other mineral development laws starting with the Mining Laws of 1866 and 1872 and et. seq., and further broadened to include national defense and the defense industry and its critical inputs and out-puts, in a lawful, enforceable, reliable, or sustainable framework for long-term Colorado River management.

It is especially critical for the crucial and vital States of Nevada, California, and Arizona as a foundational base of successful development of the Genesis Mission and implementation of the Reclamation management of the Colorado River for protecting the NEXUS elements related to the local residents and businesses which make up and support the crucially vital defense industry and data centers, AI Value Chain Capital Stack industries, advanced materials manufacturing, critical minerals production for Genesis Mission and national defense.

As presented, the Reclamation five proposed alternatives Draft EIS rely primarily on illegal unauthorized attempts at behavioral modification assumptions to cause "allocation of shortages" rather than legally defensible operational controls and innovative future forward infrastructure-based solutions resulting in aggressive "aggregation of surplus" in vast surpluses of water supply, successful wastewater management, energy generation and distribution, waste repurposing for commercial uses, advanced materials manufacturing and critical minerals mining and production.

All of these NEXUS elements are critically vital for Genesis Mission success, and the existing residents and business that foundationally support and whose lives and livelihoods are essential for all national defense and AI Value Chain Capital Stack industries in California, Nevada, Arizona and all surrounding states in "Direct Side" facilities requiring "Enabling Side" infrastructure such as water supply, wastewater management, energy generation and distribution, total recoverable water by-products recycling and commercialization, advanced materials manufacturing critical materials mining, and production.

8. Failure to Ground Alternatives in Existing Law

Reclamation five proposed alternatives in the Draft EIS does not adequately evaluate or enforce the controlling legal framework governing the Colorado River, including the Law of the River's explicit delivery obligations.

Reclamation seems to ignore the compelling "Duty to Perform" existing law that compels the Upper Basin States to deliver 75.0 million acre-feet over any ten-year period at Lees Ferry.

None of the Reclamation five proposed alternatives prioritize enforcement of this over-arching requirement as the foundational operating condition.

Absent enforcement of existing laws, the Reclamation five proposed alternatives function as discretionary policy experiments which are not authorized rather than lawful operational strategies.

This makes the Reclamation five proposed alternatives legally vulnerable, operationally unreliable, and practically unenforceable.

9. Conflict with Executive Order 14363 (Genesis Mission).

Executive Order 14363 (Genesis Mission) issued November 24, 2026, (and supported by all other Executive Orders and laws listed herein) directs federal agencies to base policy and

regulatory actions on demonstrable facts, lawful authority, and durable national infrastructure rather than coercive behavioral controls or speculative social policy frameworks.

The Executive Orders and laws emphasize “aggregation of surpluses”, innovation, system reliability, economic stability, and adherence to existing law as core federal responsibilities.

The Reclamation five proposed alternatives Draft EIS are inconsistent with these directives.

Rather than advancing “aggregation of surpluses”, innovation, infrastructure, or enforceable operational controls, the proposed alternatives rely primarily on demand “allocation of shortages” as a tool of suppression, conservation mandates, and assumed behavioral compliance.

These approaches do not constitute durable infrastructure solutions, do not aggregate new or surplus water supplies, and do not rest on enforceable legal mechanisms.

10. Improper Reliance on Conservation-Based “Allocation of Shortages”.

The Reclamation five proposed alternatives Draft EIS relies heavily on conservation-based “allocation of shortage” mechanisms that lack factual, legal, and scientific justification.

Programs framed as “conservation” are repeatedly used as de facto reallocation tools without demonstrating that such measures are sustainable, equitable, or required under governing law.

“Allocation of shortage” strategies based on speculative conservation assumptions—rather than enforceable supply augmentation or “aggregation of surplus”—introduce unacceptable reliability risks.

Policies that rely on economically punitive or coercive conservation measures are inconsistent with both the Law of the River and the policy direction articulated in Executive Order 14363, and others referenced herein.

11. California, Nevada, and Arizona Legal and Physical Position.

The Reclamation five proposed alternatives Draft EIS does not adequately acknowledge the California, Nevada and Arizona legally and physically protected position within the Colorado River system.

For but one example, Nevada’s geographic location, priority structure, Lake Mead “Dead Pool” supply dominance and infrastructure provide long-term supply reliability independent of hydrologic variability.

Any basin-wide strategy that implicitly reallocates risk to Nevada by any form of coercion or “allocation of shortages” without explicit legal authority conflicts with existing law and should be rejected.

12. Genesis Mission Framework: “Direct Side” and “Enabling Side” Infrastructure Requirements.

Executive Order 14363 (Genesis Mission) establishes the Genesis Mission AI Value Chain Capital Stack as the national strategic end product (the “Direct Side”).

The Direct Side is wholly dependent upon the immediate availability of foundational infrastructure (the “Enabling Side”).

This “Enabling Side” infrastructure of water supply, wastewater management and energy generation and distribution must occur without stranding trillions of dollars of capital invested in AI Era facilities AI Value Chain Capital Stack, data centers, advanced materials manufacturing companies, critical minerals development and etc.

Any such destruction of capital must be absolutely prevented by Reclamation so that operational, scalable, and resilient facilities are immediately built, rather than delayed by legacy, time-intensive, or risk-averse investment models.

The “Enabling Side” consists of integrated water supply, wastewater management, energy generation and distribution, critical minerals mining and processing, and defense industry requirements, and all other NEXUS elements.

These systems must be planned, permitted, and implemented in a coordinated manner to support the Genesis Mission’s “Direct Side” objectives.

The Reclamation five proposed alternatives Draft EIS fails to evaluate the Colorado River system as part of this broader “Enabling Side” infrastructure.

Instead, the Reclamation five proposed alternatives apply a narrow, conservation-focused framework that does not address immediate infrastructure readiness, supply “aggregation of surplus”, or innovation-driven expansion required under Executive Order 14363, and others referenced herein.

Thus, the Reclamation five proposed alternatives are fatally flawed and unenforceable.

13. Reclamation five proposed alternatives Draft EIS have contributed to the ill-advised and damaging failure to seriously reflect upon the severity of the “Enabling Side” infrastructure problem as exemplified by the new Microsoft Fair Share plan designed to pay less and get more: **https://blogs.microsoft.com/on-the-issues/2026/01/13/community-first-ai-infrastructure/** .

Allowing or encouraging private industries to self-supply critical “Enabling Side” infrastructure for their “Direct Side” demands is the epitome of the worse instincts of the free enterprise capital system.

This is because the “law of unintended consequences” puts all of the burden of past and future

infrastructure on their customers and causes an execution of their customers by burdening them with utility rates that are becoming second mortgages on their life and property.

**In conclusion**:

California, Nevada and Arizona are uniquely positioned as the NEXUS element's foundational location for the Genesis Mission "Direct Side" and "Enabling Side".

California, Nevada and Arizona possess the necessary geographic, legal, infrastructural, industrial, and defense-related assets already in operation to support the Genesis Mission "Direct Side" AI Value Chain Capital Stack, data centers, advanced materials manufacturing, and "Enabling Side" water supply, wastewater management, energy generation and distribution infrastructure, and all other NEXUS elements.

No other state or groups of states offers the same combination of protected water rights, operational infrastructure, energy resources, critical minerals capacity, and defense industry presence with the history of excellence and people ready to execute on the mission of U.S.A. global dominance for the future.

Accordingly, Reclamation should use the Colorado River EIS process as the base platform for the "Manhattan Project" style expanded innovation through a California, Nevada, Arizona-based and staffed public–private–NGO-Defense Industry, AI Value Chain Capital Stack, NEXUS elements partnership structured as a public–private–government partnership (PPGP).

Such an approach would align Reclamation's actions with Executive Order 14363, and others referenced herein, by enabling immediate planning, design, and implementation of the "Enabling Side" infrastructure necessary to support the "Direct Side" end product.

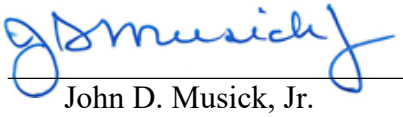
Continuing the current narrow Reclamation five proposed alternatives Draft EIS approach represents a misallocation of time, money, and public resources and does little to enable immediate Genesis Mission implementation.

The Reclamation five proposed alternatives Draft EIS must be revised to support coordinated, cooperative, and accelerated infrastructure NEXUS development consistent with Executive Order 14363, and others referenced herein.

I request that these comments be fully addressed in the Reclamation Final Environmental Impact Statement.

Thank you for the opportunity to submit these comments.

Sincerely,



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**ATTN: BCOO-1000 VIA: Email: crbpost2026@usbr.gov**

**PROVIDE A COPY PLEASE TO**:

Donald J. Trump
The President of the United States

Douglas James Burgum
The Honorable Secretary of the Department of Interior (DOI)

Scott Cameron
Acting Commissioner
Bureau of Reclamation

Genvieve Johnson
Acting Regional Director
Lower Colorado River Regional Office
Bureau of Reclamation

Chris Wright
The Honorable Secretary of the Department of Energy (DOE)

Michael Kratsios
The Assistant to the President for Science and Technology (APST)

Arati Prabhakar
Director of the White House Office of Science and Technology Policy (OSTP)
National Science and Technology Council (NSTC)

Kirsten Dalboe
Chief Data Officer for the Federal Energy Regulatory Commission (FERC)
Federal Chief Data Officer Council

David Sacks
Special Advisor for AI and Crypto

Russell Vought
Director of the Office of Management and Budget (OMB)

***Letter #:*** 6146

***Date Received:*** 3/1/2026

***Sender Names:*** 6119: Dirk Muyskens

***Emails:*** 6119: dirkmuyskens67@gmail.com

***Organizations:***

***Subject:*** Colorado River water rights

DOI - . My name is Dirk Muyskens and I moved to Glendle, AZ from Seattle, WA some years ago to retire. By ceeding more water rights away from Arizona you are damaging my future and financial stability. I will be organizing as many as my fellow neighbors as I can to file litigation against the Federal government, the State of Utah and the State of Colorado. There is precedent that the upper basin states must cede to avoid financial disaster for the residence of Arizona.Dirk MuyskensGlendale, AZ